



Guide Ball Bushing/Linear Bushing

THK General Catalog

Guide Ball Bushing/Linear Bushing

THK General Catalog

A Product Descriptions

| | | | |
|--|-------|--|--------|
| Features and Types | A4-4 | Model LME | A4-48 |
| Features of the Guide Ball Bushing | A4-4 | Model LM-L | A4-50 |
| • Structure and Features | A4-4 | Model LMF | A4-52 |
| • Examples of Changing the Linear Bushing to the Guide Ball Bushing .. | A4-6 | Model LMF-M (Stainless Steel Type) | A4-54 |
| Types of the Guide Ball Bushing | A4-7 | Model LMF-L | A4-56 |
| • Types and Features | A4-7 | Model LMF-ML (Stainless Steel Type) .. | A4-58 |
| Point of Selection | A4-8 | Model LMK | A4-60 |
| Flowchart for Selecting a Guide Ball Bushing .. | A4-8 | Model LMK-M (Stainless Steel Type) | A4-62 |
| • Steps for Selecting a Guide Ball Bushing .. | A4-8 | Model LMK-L | A4-64 |
| Rated Load and Nominal Life | A4-9 | Model LMK-ML (Stainless Steel Type) .. | A4-66 |
| Table of Equivalent Factors | A4-13 | Model LMJK | A4-68 |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | A4-13 | Model LMJK-L | A4-70 |
| Accuracy Standards | A4-13 | Model LMH | A4-72 |
| Dimensional Drawing, Dimensional Table | | Model LMH-M (Stainless Steel Type) | A4-74 |
| Model LG | A4-14 | Model LMH-L | A4-76 |
| Point of Design | A4-16 | Model LMH-ML (Stainless Steel Type) .. | A4-78 |
| Assembling the Guide Ball Bushing | A4-16 | Model LMIF | A4-80 |
| Options | A4-19 | Model LMIF-L | A4-82 |
| Lubrication | A4-19 | Model LMCF-L | A4-84 |
| Dust prevention | A4-19 | Model LMIK | A4-86 |
| Model No. | A4-20 | Model LMIK-L | A4-88 |
| • Model Number Coding | A4-20 | Model LMCK-L | A4-90 |
| Precautions on Use | A4-21 | Model LMIH | A4-92 |
| Features and Types | A4-23 | Model LMIH-L | A4-94 |
| Features of the Linear Bushing | A4-23 | Model LMCH-L | A4-96 |
| • Structure and Features | A4-23 | Models SC6 to 30 | A4-98 |
| Types of the Linear Ball Bushing | A4-24 | Models SC35 to 50 | A4-100 |
| • Types and Features | A4-24 | Model SL | A4-102 |
| Classification Table | A4-34 | Model SH | A4-104 |
| Point of Selection | A4-36 | Model SH-L | A4-106 |
| Flowchart for Selecting a Linear Bushing .. | A4-36 | Model SK | A4-108 |
| • Steps for Selecting a Linear Bushing | A4-36 | • Standard LM Shafts | A4-109 |
| Rated Load and Nominal Life | A4-37 | • Specially Machined Types | A4-110 |
| Table of Equivalent Factors | A4-41 | • Dedicated Shafts | A4-111 |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | A4-41 | • Table of Rows of Balls and Masses for Clearance-adjustable Types and Open Types of the Linear Bushing | A4-111 |
| Accuracy Standards | A4-41 | Point of Design | A4-112 |
| Dimensional Drawing, Dimensional Table | | Assembling the Linear Bushing | A4-112 |
| Model LM | A4-42 | Options | A4-119 |
| Model LM-GA (Metal Retainer Type) | A4-44 | Lubrication | A4-119 |
| Model LM-MG (Stainless Steel Type) | A4-46 | Material and Surface Treatment | A4-119 |
| | | Dust prevention | A4-120 |
| | | Felt Seal Model FLM | A4-120 |
| | | Model No. | A4-121 |
| | | • Model Number Coding | A4-121 |
| | | Precautions on Use | A4-123 |

B Support Book (Separate)

| | |
|--|-------|
| Features and Types | B4-4 |
| Features of the Guide Ball Bushing | B4-4 |
| • Structure and Features | B4-4 |
| • Examples of Changing the Linear Bushing to the Guide Ball Bushing .. | B4-6 |
| Types of the Guide Ball Bushing | B4-7 |
| • Types and Features | B4-7 |
| Point of Selection | B4-8 |
| Flowchart for Selecting a Guide Ball Bushing .. | B4-8 |
| • Steps for Selecting a Guide Ball Bushing .. | B4-8 |
| Rated Load and Nominal Life | B4-9 |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | B4-12 |
| Mounting Procedure and Maintenance .. | B4-13 |
| Assembling the Guide Ball Bushing | B4-13 |
| Options | B4-16 |
| Lubrication | B4-16 |
| Dust prevention | B4-16 |
| Model No. | B4-17 |
| • Model Number Coding | B4-17 |
| Precautions on Use | B4-18 |
| Features and Types | B4-20 |
| Features of the Linear Bushing | B4-20 |
| • Structure and Features | B4-20 |
| Types of the Linear Ball Bushing | B4-22 |
| • Types and Features | B4-22 |
| Classification Table | B4-32 |
| Point of Selection | B4-34 |
| Flowchart for Selecting a Linear Bushing .. | B4-34 |
| • Steps for Selecting a Linear Bushing | B4-34 |
| Rated Load and Nominal Life | B4-35 |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | B4-38 |
| Mounting Procedure and Maintenance .. | B4-39 |
| Assembling the Linear Bushing | B4-39 |
| Options | B4-46 |
| Lubrication | B4-46 |
| Material and Surface Treatment | B4-46 |
| Dust prevention | B4-47 |
| Felt Seal Model FLM | B4-47 |
| Model No. | B4-48 |
| • Model Number Coding | B4-48 |

| | |
|---------------------------------|-------|
| Precautions on Use | B4-50 |
|---------------------------------|-------|

Features of the Guide Ball Bushing

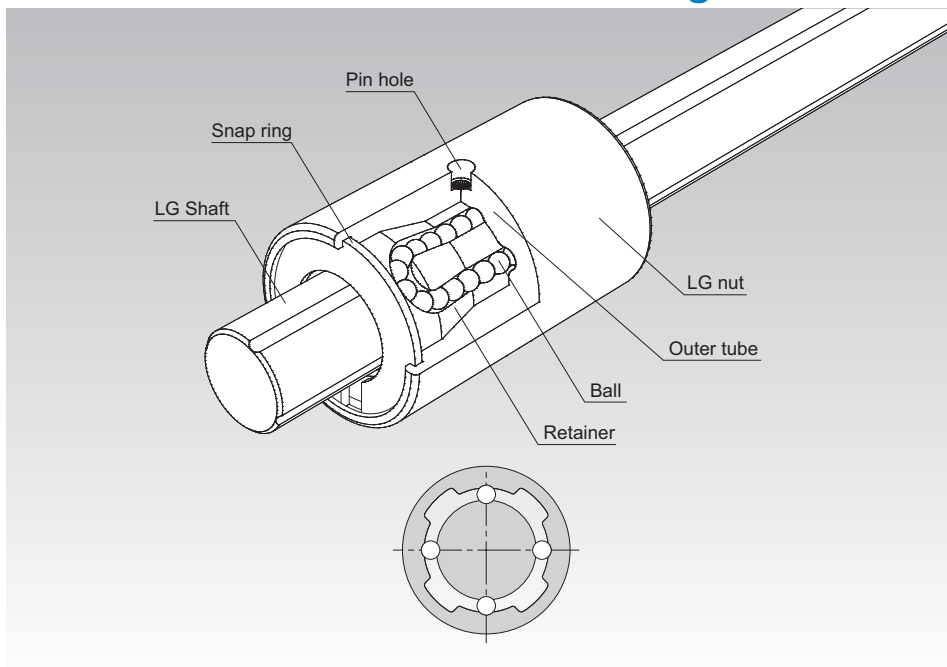


Fig.1 Structure of the Guide Ball Bushing model LG

Structure and Features

Since model LG has 4 rows of circular arc grooves (raceways), it does not need a mechanism to prevent the outer tube from rotating. In addition, its load rating is much larger than Linear Bushing model LM with the same dimensions. Therefore, replacing the Linear Bushing with the Guide Ball Bushing will reduce the size and cost of the guide unit and extend the service life.

Features and Types

Features of the Guide Ball Bushing

[Higher Load Rating than the Linear Bushing]

Since model LG ensures an R contact through the use of circular arc grooves for ball contact, it achieves a load rating more than twice that of point-contact Linear Bushing model LM with the same size.

[A Rotation Stopper is Unnecessary Because of Raceways]

Since model LG has circular arc grooves, it does not need a rotation stopper required for Linear Bushing model LM, and allows the machine design to be compact.

[Interchangeable in Dimensions with Linear Bushing Model LM]

Since the outer tube of model LG has the same outer diameter and length as that of Linear Bushing model, LM, it is possible to replace Linear Bushing model LM with Guide Ball Bushing model LG as assemblies.

[Various Combinations of Nut and Shaft are Available (Any Combination is Allowed)]

As with the Linear Bushing, any combination of the LG nut and the LG shaft of model LG is allowed.

Examples of Changing the Linear Bushing to the Guide Ball Bushing

[Advantage of using the Guide Ball Bushing 1: Longer service life]

Since model LG has a rated load more than 2.4 times the Linear Bushing with the same dimensions, replacing the Linear Bushing with model LG will increase the service life by more than 13.8 times.

Table1 Comparison of the service life between Guide Ball Bushing mode LG and Linear Bushing model LM

| Model No. | Basic dynamic load rating: C [N] | Load rating ratio | Service life ratio |
|-----------|-------------------------------------|-------------------|--------------------|
| LG4S | 335 | 3.8 times | 54.8 times |
| LM4 | 88.2 | | |
| LG6S | 494 | 2.4 times | 13.8 times |
| LM6 | 206 | | |
| LG8S | 796 | 3.0 times | 27.0 times |
| LM8 | 265 | | |

[Advantage of using the Guide Ball Bushing 2: Smaller machine size]

Since the Linear Bushing is not suitable for applications where a load in the rotational direction is applied, it is necessary to use two or more Linear Bushing units in parallel or have a rotation stopper mechanism even under conditions where a torque is not applied. In contrast, the Guide Ball Bushing, which has a structure containing four rows of circular arc grooves, is operable with a single shaft and therefore contributes to downsizing the machine, unless an excessive load is applied.

Achieves a load carrying capacity approximately three times the Linear Bushing in a half space

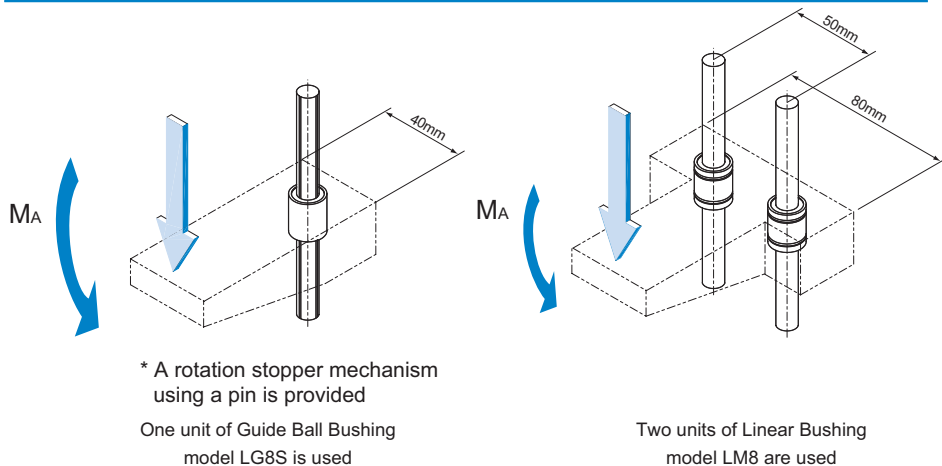


Table2 Comparison of the permissible moment between Guide Ball Bushing mode LG and Linear Bushing model LM

| Model No. | Permissible moment: M_A [N·m] |
|---------------------------|---------------------------------|
| One unit of LG8S is used | 1.46 |
| Two units of LM8 are used | 0.45 |

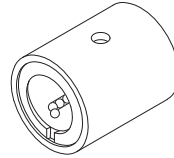
Types of the Guide Ball Bushing

Types and Features

Model LG-S

Specification Table⇒ **A4-14**

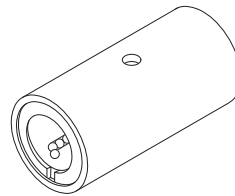
In this type, the diameter and the length of the LG nut are the same as that of Linear Bushing model LM. This type is dimensionally interchangeable with model LM.



Model LG-L

Specification Table⇒ **A4-14**

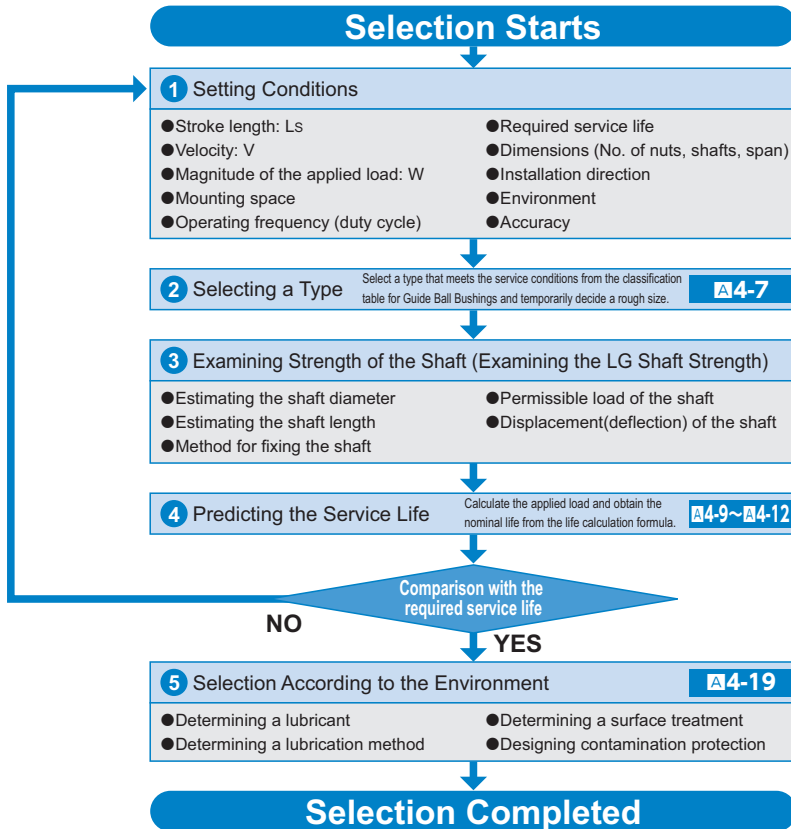
Model LG-L is a long type in which the overall length of the LG nut is longer than that of model LG-S to increase the load carrying capacity.



Flowchart for Selecting a Guide Ball Bushing

Steps for Selecting a Guide Ball Bushing

The following flowchart should be used as a guide for selecting a Guide Ball Bushing.



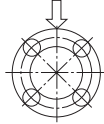
Rated Load and Nominal Life

[Load Rating]

The rated load of the Guide Ball 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 Guide Ball Bushing is mounted so that two rows of balls evenly receive the load in the load direction, the rated load changes as shown in Table1.

Table1 Rated load of the Guide Ball Bushing

| Rows of balls | Ball position | Load Rating |
|---------------|---|-----------------|
| 4 rows |  | $1.41 \times C$ |

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

[Calculating the Nominal Life]

The nominal life of the THK guide ball bushing is defined as 50 km. The nominal life (L_{10}) is calculated from the basic dynamic load rating (C) and the load acting on the guide ball bushing (P_c) using the following formula.

$$L_{10} = \left(\frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots(1)$$

| | | |
|----------|-----------------------------|------|
| L_{10} | : Nominal life | (km) |
| C | : Basic dynamic load rating | (N) |
| P_c | : Calculated load | (N) |

*This nominal life formula may not apply if the length of the stroke is less than or equal to twice the length of the nut.

When comparing the nominal life (L_{10}), you must take into account whether the basic dynamic load rating was defined based on 50 km or 100 km. Convert the basic dynamic load rating based on ISO 14728-1 as necessary.

ISO-regulated basic dynamic load rating conversion formula:

$$C_{100} = \frac{C_{50}}{1.26}$$

| | |
|-----------|---|
| C_{50} | : Basic dynamic load rating based on a nominal life of 50 km |
| C_{100} | : Basic dynamic load rating based on a nominal life of 100 km |

[Calculating the Modified Nominal Life]

During use, a guide ball bushing may be subjected to vibrations and shocks as well as fluctuating loads, which are difficult to detect. In addition, the surface hardness of the raceways, the operating temperature, and having blocks arranged directly behind one another will have a decisive impact on the service life. Taking these factors into account, the modified nominal life (L_{10m}) can be calculated according to the following formula (2).

•Modified factor α

$$\alpha = \frac{f_H \cdot f_T \cdot f_c}{f_w}$$

| | | |
|----------|----------------------|--------------------------------|
| α | : Modified factor | |
| f_H | : Hardness factor | (see Fig.1 on A4-11) |
| f_T | : Temperature factor | |
| f_c | : Contact factor | (see Table2 on A4-12) |
| f_w | : Load factor | (see Table 3 on A4-12) |

•Modified nominal life L_{10m}

$$L_{10m} = \left(\alpha \times \frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots(2)$$

| | | |
|-----------|-----------------------------|------|
| L_{10m} | : Modified nominal life | (km) |
| C | : Basic dynamic load rating | (N) |
| P_c | : Calculated load | (N) |

● **When a Moment Load is Applied to a Single Nut or Two Nuts in Close Contact with Each Other**

When a moment load is applied to a single nut or two nuts in close contact with each other, calculate the equivalent radial load at the time the moment is applied.

$$P_v = K \cdot M$$

P_v : Equivalent radial load (N)
(with a moment applied)

K : Equivalent factors
(see Table4 to Table5 on **A4-13**)

M : Applied moment (N·mm)

However, " P_v " is assumed to be within the basic static load rating (C_0).

● **When a Moment Load and a Radial Load are Simultaneously Applied**

When a moment and a radial load are applied simultaneously, calculate the service life based on the sum of the radial load and the equivalent radial load.

■ **f_H : Hardness Factor**

To maximize the load capacity of the Guide Ball Bushing, the hardness of the raceways needs to be between 58 to 64 HRC.

If the hardness is lower than this range, the basic dynamic load rating and the basic static load rating decrease. Therefore, it is necessary to multiply each rating by the respective hardness factor (f_H).

Normally, $f_H = 1.0$ since the Guide Ball Bushing has sufficient hardness.

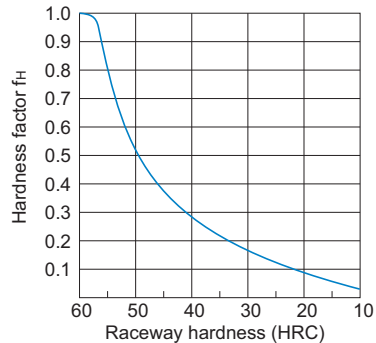


Fig.1 Hardness Factor (f_H)

■ **f_T : Temperature Factor**

The temperature of the environment where the Guide Ball Bushing is used must be 80°C or below. Therefore, adopt a temperature factor $f_T = 1.0$.

The Guide Ball Bushing does not support high temperature. Therefore, if the environment temperature exceeds 80°C, it is necessary to use another product.

■ f_c : Contact Factor

When multiple nuts are used in close contact with each other, their linear motion is affected by moments and mounting accuracy, making it difficult to achieve uniform load distribution. In such applications, multiply the basic load rating (C) and (C₀) by the corresponding contact factor in Table2.

Note) If uneven load distribution is expected in a large machine, take into account the respective contact factor indicated in Table2.

Table2 Contact Factor (f_c)

| Number of nuts in close contact with each other | Contact factor f_c |
|---|----------------------|
| 2 | 0.81 |
| 3 | 0.72 |
| 4 | 0.66 |
| 5 | 0.61 |
| Normal use | 1 |

■ f_w : Load Factor

In general, reciprocating machines tend to experience vibrations or impacts during operation, and it is extremely difficult to accurately determine the vibrations generated during high-speed operation and impacts during frequent starts and stops. Therefore, when the actual load applied to a guide ball bushing cannot be obtained, or when speed and vibrations have a significant influence, divide the basic dynamic load rating (C) by the corresponding load factor in Table 3, which has been empirically obtained.

Table 3 Load Factor (f_w)

| Vibrations/ impact | Speed(V) | f_w |
|--------------------|-------------------------------------|------------|
| Faint | Very low $V \leq 0.25\text{m/s}$ | 1 to 1.2 |
| Weak | Slow $0.25 < V \leq 1\text{m/s}$ | 1.2 to 1.5 |
| Medium | Medium $1 < V \leq 2\text{m/s}$ | 1.5 to 2 |
| Strong | High $V > 2\text{m/s}$ | 2 to 3.5 |

[Calculating the Service Life Time]

When the nominal life (L_{10}) has been obtained, if the stroke length and the number of reciprocations per minute are constant, the service life time is obtained using the following equation.

$$L_h = \frac{L_{10} \times 10^3}{2 \times \ell_s \times n_1 \times 60}$$

L_h : Service life time (h)

ℓ_s : Stroke length (m)

n_1 : Number of reciprocations per minute (min^{-1})

Table of Equivalent Factors

Table4 Equivalent Factors of Model LG-S

| Model No. | Equivalent factor: K | |
|-----------|----------------------|---------------|
| | Single nut | Double blocks |
| LG 4S | 1.062 | 0.193 |
| LG 6S | 0.885 | 0.121 |
| LG 8S | 0.708 | 0.096 |

Table5 Equivalent Factors of Model LG-L

| Model No. | Equivalent factor: K |
|-----------|----------------------|
| | Single nut |
| LG 4L | 0.733 |
| LG 6L | 0.465 |
| LG 8L | 0.442 |

Precautions To Be Taken if an Eccentric Load Is Applied

Model LG achieves a much higher load-carrying capacity in receiving the eccentric load (moment and torque) than Linear Bushing model LM because of 4 rows of raceways. However, under conditions where the eccentric load is larger, the product may result in poor operation or early failure. In such cases, we recommend using Ball Spline model LBS or LT, both of which have larger load-carrying capacities (see **A3-52** onward for model LBS, or **A3-76** onward for model LT).

Accuracy Standards

[Guide Ball Bushing]

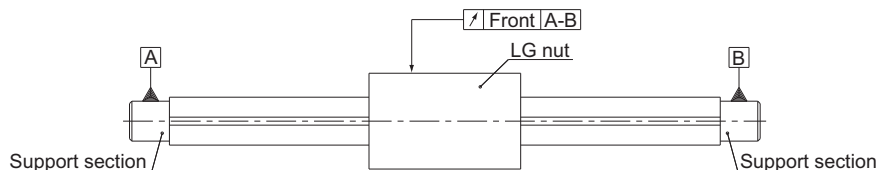


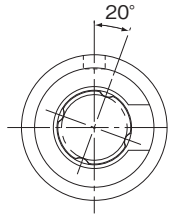
Table6 Run-out of the outer diameter of the nut relative to the support section of the shaft

Unit: μm

| Overall shaft length (mm) | | Run-out(max)* |
|---------------------------|-------------|---------------|
| - | 200 or less | 72 |
| Above 200 | 250 or less | 133 |

*: The value if the radial clearance is zero

Model LG

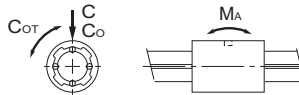


| Model No. | Shaft Diameter D _o h7 | Nut dimensions | | | | | |
|-----------|-------------------------------------|----------------|-----------|--------|-----------|-----------------|---------------------|
| | | Outer diameter | | Length | | Pin hole | |
| | | D | Tolerance | L | Tolerance | b +0.05 0 | t +0.08 -0.02 |
| LG4S | 4 | 8 | 0 | 12 | 0 | 1.2 | 0.8 |
| LG4L | | 8 | -0.009 | 19 | -0.12 | 1.2 | 0.8 |
| LG6S | 6 | 12 | 0 | 19 | 0 | 1.5 | 1.2 |
| LG6L | | 12 | | 27 | | 1.5 | 1.2 |
| LG8S | 8 | 15 | -0.011 | 24 | -0.2 | 2 | 1.5 |
| LG8L | | 15 | | 30 | | 2 | 1.5 |

Note) The basic load ratings each indicate the value when one row of balls receiving a load are directly under the load.

The permissible torques each represent a reference value when the radial clearance is maximum (+10 μ m).

The permissible moments each indicate a reference value when the radial clearance is the maximum (+10 μ m) with one row of balls receiving a load being directly under the load.



Model number coding

① LG shaft only

LG4 -100L

Model No.

Overall LG shaft length

② LG nut only

LG4S

Model No.

③ A set product consisting of an LG shaft and an LG nut

2 LG4S +100L

Model No.

Overall LG shaft length

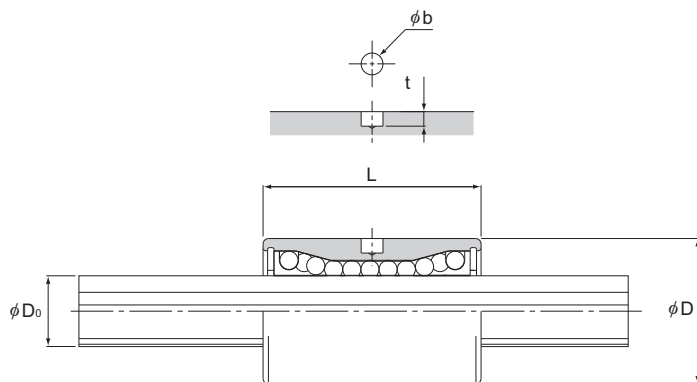
Number of LG nuts on one shaft
(no symbol for one nut)

Note) Model LG guide ball bushing available as LG shaft ①, or the LG nut ② separate.

A set consisting of an ③ LG shaft + an LG nut is also available if so desired.

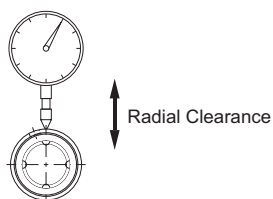
A special radial clearance, designated grease application (standard type is applied only with antirust oil) and surface treatment (THK AP-C treatment, THK AP-CF treatment, THK AP-HC treatment) are also available.

Contact THK for details.



Unit: mm

| | Basic load rating (radial) | | Permissible torque C_{0T} N·m | Permissible moment M_A N·m | Mass g |
|--|----------------------------|------------|---------------------------------------|------------------------------------|-----------|
| | C N | C_0 N | | | |
| | 335 | 473 | 0.066 | 0.33 | 2.5 |
| | 466 | 757 | 0.105 | 0.71 | 4.0 |
| | 494 | 681 | 0.241 | 0.74 | 10.5 |
| | 860 | 1499 | 0.530 | 1.71 | 14.0 |
| | 796 | 1065 | 0.838 | 1.46 | 16.5 |
| | 1203 | 1916 | 1.509 | 2.66 | 22.0 |

[Radial Clearance]

Measurement of a radial clearance

Radial Clearance Unit: μm

| Normal clearance |
|------------------|
| 0 to +10 |

[LG Shaft]

Material: SUJ2

Hardness: 56 to 64 HRC



LG shaft dimensions Unit: mm

| Model No. | Shaft diameter D_0 h7 | Standard length L | | | | Maximum manufacturing length | Mass (g/m) |
|-----------|----------------------------|----------------------|-----|-----|-----|------------------------------|---------------|
| | | 100 | 150 | 200 | 250 | | |
| LG4 | 4 | 100 | 150 | — | — | 150 | 95 |
| LG6 | 6 | 100 | 150 | 200 | — | 200 | 220 |
| LG8 | 8 | 100 | 150 | 200 | 250 | 250 | 390 |

Assembling the Guide Ball Bushing

[Inner Diameter of the Housing]

Table1 shows recommended housing inner-diameter tolerance for the Guide Ball Bushing. When fitting the Guide Ball Bushing with the housing, loose fit is normally recommended. If the clearance needs to be smaller, provide transition fit.

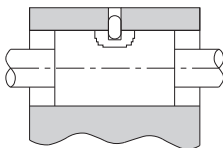
Table1 Housing Inner-diameter Tolerance

| | |
|---|----|
| General conditions | H6 |
| If the accuracy does not need to be very high | H7 |

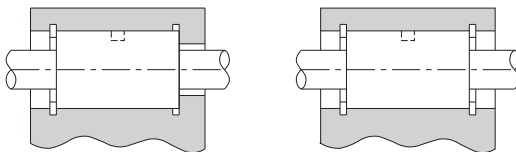
[Mounting the Nut]

Although the Guide Ball Bushing does not require a large amount of strength for securing it in the LG shaft direction, do not support the nut only with driving fitting. For the housing inner-diameter tolerance, see Table1.

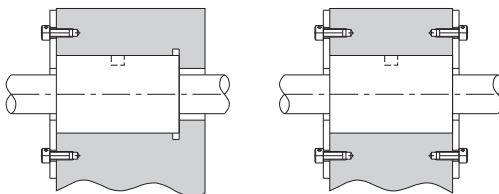
- Mounting model LG using a pin



- Mounting model LG as with the conventional Linear Bushing



Snap Ring



Stopper Plate

Point of Design

Assembling the Guide Ball Bushing

■Snap Ring for Installation

To secure the Guide Ball Bushing model LG, snap rings indicated in Table2 are available.

Table2 Types of Snap Rings

| Model No. | Snap ring | |
|-----------|-------------------|-------------------|
| | For inner surface | |
| | Needle snap ring | C-shape snap ring |
| LG 4 | 8 | — |
| LG 6 | 12 | 12 |
| LG 8 | 15 | 15 |

■Set Screws Not Allowed

Securing the nut by pressing the outer surface with one set screw as shown in Fig.1 will cause the nut to be deformed.

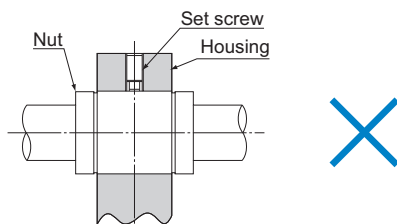


Fig.1

[Incorporating the Nut]

When incorporating the Guide Ball Bushing into a housing, use a jig and drive in the nut, or use a flatter plate and gently hit the nut, instead of directly hitting the side plate or the seal. (see Fig.2).

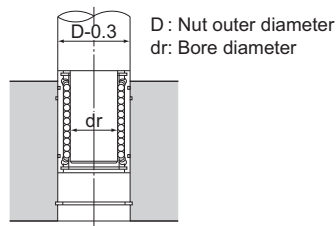


Fig.2

Unit: mm

| Model No. | dr | Tolerance |
|-------------|-----|--------------|
| LG 4S/LG 4L | 3.6 | -0.1 -0.3 |
| LG 6S/LG 6L | 5.6 | |
| LG 8S/LG 8L | 7.5 | |

[Inserting the LG Shaft]

When inserting the LG shaft into the Guide Ball 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 (see Fig.3).

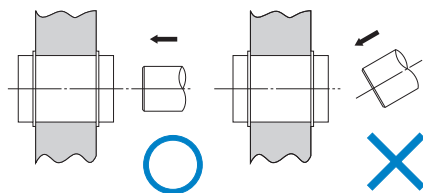


Fig.3

[When Under a Moment Load]

When using the Guide Ball Bushing, make sure that the load is evenly distributed on the whole ball raceway. In particular, if a moment load is applied, use two or more Guide Ball Bushing units on the same LG shaft and secure an adequately large distance between the units.

If using the Guide Ball Bushing under a moment load, also calculate the equivalent radial load and identify the correct model number. (See **A4-11**.)

Lubrication

The Guide Ball Bushing requires grease or oil as a lubricant for its operation.

[Grease Lubrication]

Before mounting the product onto the LG shaft, apply grease to each row of balls inside the Guide Ball Bushing.

Thereafter apply grease as necessary, in accordance with usage and other conditions noted above, or attach housing as shown in Fig.1, or apply grease directly to the LG shaft.

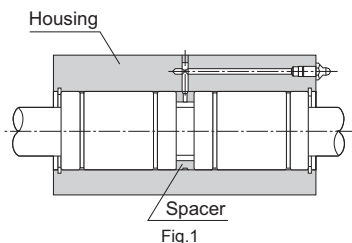
We recommend using lithium soap-based grease No. 2.

[Oil Lubrication]

To lubricate, apply lubricant to the LG shaft one drop at a time, as needed, or attach housing as shown in Fig.1, in the same manner as when lubricating with grease.

Commonly used lubricants include turbine oil, machine oil, and spindle oil.

In addition to the procedures described the above, an oil hole or grease nipple can also be used for lubrication. For further information, contact THK.



Dust prevention

Entrance of dust or other foreign material into the Guide Ball Bushing will cause abnormal wear or shorten the service life. When entrance of dust or other foreign material is a possibility, it is important to select effective seals and/or dust-control device that meets the service environment conditions. In addition, THK produces round bellows. Contact us for details.

Model Number Coding

Model number configurations differ depending on the model features. Refer to the corresponding sample model number configuration.

[Guide Ball Bushing]

Estimates and orders should be made for LG shafts alone or LG nuts alone in principle.

A set consisting of an LG shaft and an LH nut is also available if desired by the customer. Contact THK for details.

● Models LG-S and LG-L

- LG shaft only

LG4 -100L

Model No.
of LG shaft

Overall LG shaft length (in mm)

- LG nut only

LG4S

Model No. of LG nut

- Combination of
LG shaft and LG nut

2 LG4S +100L

Model No.
of LG nut

Overall LG shaft length (in mm)

Number of LG nuts on one shaft
(no symbol for one nut)

A special radial clearance, designated grease application (standard product is applied with antirust oil only), and surface treatment (THK AP-C treatment, THK AP-CF treatment, THK AP-HC treatment) are also available. Contact THK for details.

[Handling]

- (1) Disassembling each part may cause dust to enter the system or degrade mounting accuracy of parts. Do not disassemble the product.
- (2) Take care not to drop or strike the Guide Ball Bushing. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
- (3) When handling the product, wear protective gloves, safety shoes, etc., as necessary to ensure safety.

[Precautions on Use]

- (1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
- (2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
- (3) Do not use the product at temperature of 80°C or higher. Exposure to higher temperatures may cause the resin/rubber parts to deform/be damaged.
- (4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
- (5) Micro-strokes tend to obstruct oil film to form on the raceway in contact with the rolling element, and may lead to fretting corrosion. Take consideration using grease offering excellent fretting prevention. It is also recommended that a stroke movement corresponding to the length of the outer cylinder be made on a regular basis to make sure oil film is formed between the raceway and rolling element.
- (6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate permanent deformation on the raceway, leading to loss of functionality.
- (7) Insert the shaft straight through the opening. Inserting the shaft at an angle can introduce foreign matter, damage internal components, or cause balls to fall out.
- (8) Using this product with any balls removed may result in premature damage.
- (9) Please contact THK if any balls fall out; do not use the product if any balls are missing.
- (10) If an attached component is insufficiently rigid or mounted incorrectly, the bearing load will be concentrated at one location and performance will decline significantly. Make sure the housing and base are sufficiently rigid, the anchoring bolts are strong enough, and the component is mounted correctly.

[Lubrication]

- (1) Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
- (2) Do not mix different lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
- (3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
- (4) To lubricate the product, apply lubricant directly to the raceway surface and execute a few preliminary strokes to ensure that the interior is fully lubricated.
- (5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the Guide Ball Bushing also changes as the consistency of grease changes.

- (6) After lubrication, the slide resistance of the Guide Ball Bushing may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
- (7) Excess grease may scatter immediately after lubrication, so wipe off scattered grease as necessary.
- (8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
- (9) The greasing interval varies depending on the use condition and service environment. Set the final lubrication interval/amount based on the actual machine.

[Assembling the LG Nut with the LG Shaft of the Guide Ball Bushing]

- (1) When assembling the LG nut with the LG shaft, align the position of the balls inside the LG nut with the position of the groove of the LG shaft, then insert the LG shaft into the LG nut straightforward and gradually. If the LG shaft is tilted when it is inserted, balls may bounce out or damage the circulating part.
- (2) If the LG shaft is stuck in the middle of insertion, do not force it into the nut. Instead, but pull it out first, re-check the ball position and the LG shaft groove position, and then insert it straightforward and gradually.
- (3) After assembling the LG nut with the LG shaft, check that the LG nut or the LG shaft smoothly moves. If the shaft was forced into the nut, function could be lost even if the product looks intact.

[Storage]

When storing the Guide Ball Bushing, enclose it in a package designated by THK and store it in a room while avoiding high temperature, low temperature and high humidity.

[Disposal]

Dispose of the product properly as industrial waste.

Features of the Linear Bushing

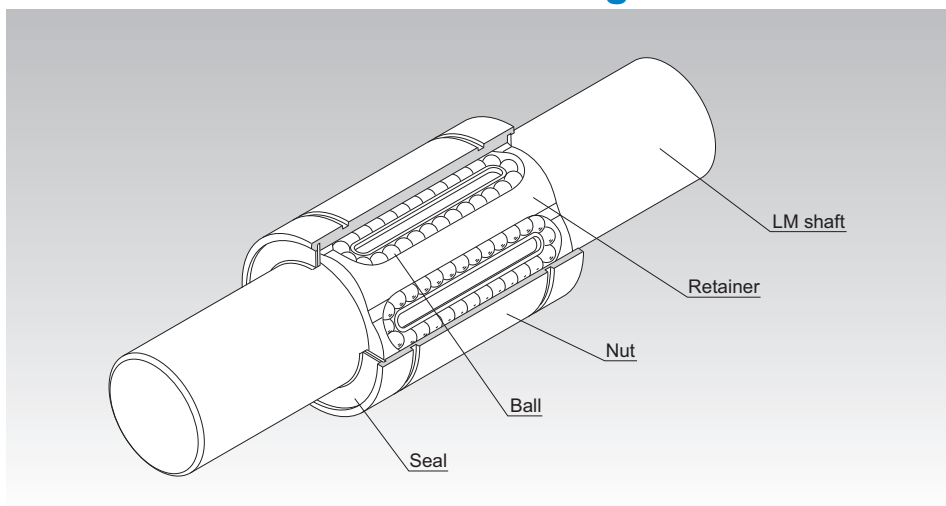


Fig.1 Structure of Linear Bushing Model LM···UU

Structure and Features

The linear bushing is a linear motion product that is used in combination with a cylindrical LM shaft. The ball bearings in the load area offer point contact with the LM shaft. This allows straight motion with minimal friction resistance and therefore smooth motion.

High-carbon chromium bearing steel is used for the nut, and the outer and inner surfaces are ground and heat-treated.

Linear bushings are used for medical equipment, packing equipment, and lightweight OA equipment that is not subject to vibration, shock, etc.

However, they cannot be used for applications in which loads are applied in a rotational direction.

[Interchangeability]

The linear bushing and LM shaft are interchangeable, allowing for use in any combination.

[Low Noise]

A molded resin retainer is incorporated into the standard type in order to prevent the balls from falling out. This also provides silent and smooth operation.

[Wide Array of Types]

A wide array of types are available, such as the Standard Type, Clearance-adjustable Type, Open Type, Long Type, Fitted Flange Type, and Flanged Linear Bushing, allowing the user to select a type that suits the intended application.

Types of the Linear Ball Bushing

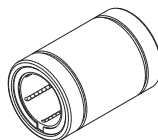
Types and Features

Standard Type

Specification Table⇒ [A4-42](#)/[A4-44](#)/[A4-46](#)/[A4-48](#)

The most standard type with a wide range of applications.

- Model LM SUJ2 Type
This product series has commonly used dimensions
- Model LM-GA SUJ2 Type
Features the Model LM-GA metal retainer
- Model LM-MG SUS Type
- Model LME SUJ2 Type
This product series has dimensions commonly used in Europe



Standard Type

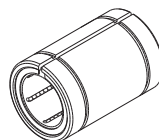
Clearance-adjustable Type

Specification Table⇒ [A4-42](#)/[A4-44](#)/[A4-46](#)/[A4-48](#)

A standard nut with a slit in the direction of the LM shaft.

The clearance between the LM shaft and housing can be adjusted by installing the shaft to a housing with an adjustable inner diameter.

- Models LM-AJ/LM-GA-AJ/LME-AJ... Made of SUJ2
- Model LM-MG-AJ SUS Type



Clearance-adjustable Type

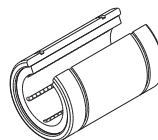
Open Type

Specification Table⇒ [A4-42](#)/[A4-44](#)/[A4-46](#)/[A4-48](#)

The nut features a cut equal to the width of one row of ball bearings (50° to 80°).

This enables it to be used even in locations where the LM shaft is supported by a column or fulcrum. In addition, the clearance can be adjusted.

- Models LM-OP/LM-GA-OP/LME-OP... Made of SUJ2
- Model LM-MGA-OP SUS Type



Open Type

Features and Types

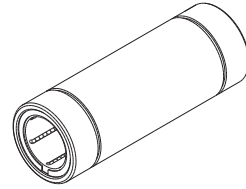
Types of the Linear Ball Bushing

Long Type

Incorporates two standard type retainers, giving it a large net rated load.

Model LM-L SUJ2 Type

Specification Table⇒ **A**4-50



Long Type

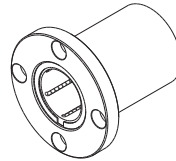
Flanged Type (Round)

Easy to mount because the spline nut can be directly attached to the housing.

Model LMF SUJ2 Type

Model LMF-M SUS Type

Specification Table⇒ **A**4-52/**A**4-54



Flanged Type (Round)

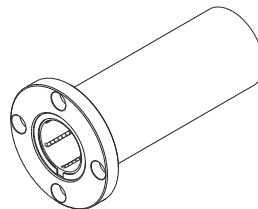
Flanged Type (Round) - Long

Incorporates two standard type retainers, giving it a large net rated load.

Model LMF-L SUJ2 Type

Model LMF-ML SUS Type

Specification Table⇒ **A**4-56/**A**4-58



Flanged Type (Round) - Long

Flanged Type (Square)

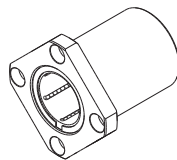
Features a Model LMF flange that has been flattened on four sides.

The lower core height compared to circular flanges allows for more compact designs.

Model LMK SUJ2 Type

Model LMK-M SUS Type

Specification Table⇒ [A4-60/A4-62](#)



Flanged Type (Square)

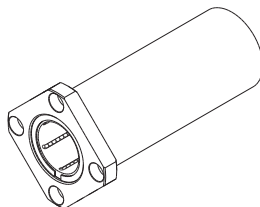
Flanged Type (Square) - Long

Incorporates two standard type retainers, giving it a large net rated load.

Model LMK-L SUJ2 Type

Model LMK-ML SUS Type

Specification Table⇒ [A4-64/A4-66](#)



Flanged Type (Square) - Long

Lightweight Flanged Type (Square) NEW

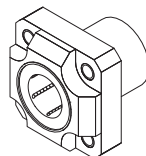
Features a flange made using high strength plastic.

Weighs less than metal flanges.

Mounting this type to moving parts reduces the overall weight.

Model LMJK SUJ2 Type

Specification Table⇒ [A4-68](#)

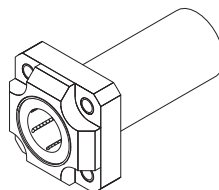


Lightweight Flanged Type (Square)

Lightweight Flanged Type (Square) - Long NEW Specification Table⇒ [A4-70](#)

Incorporates two standard type retainers, giving it a large net rated load.

Model LMJK-L SUJ2 Type



Lightweight Flanged Type (Square) - Long

Features and Types

Types of the Linear Ball Bushing

Flanged Type (Cut Flange)

Features a Model LMF flange that has been flattened on two sides.

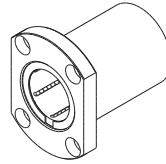
The lower core height compared to square flanges allows for more compact designs.

The rows of bearings are aligned so that a load from one of the flattened sides will be supported by two rows of bearings.

Model LMH SUJ2 Type

Model LMH-M SUS Type

Specification Table⇒ [A4-72/A4-74](#)



Flanged Type (Cut Flange)

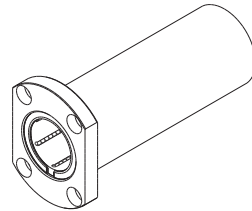
Flanged Type (Cut Flange) - Long

Incorporates two standard type retainers, giving it a large net rated load.

Model LMH-L SUJ2 Type

Model LMH-ML SUS Type

Specification Table⇒ [A4-76/A4-78](#)



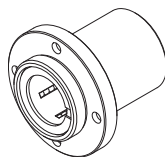
Flanged Type (Cut Flange) - Long

Fitted Flanged Type (Round)

Specification Table⇒ **A4-80**

Since the fitted part is short, the linear bushing tends not to protrude into the other side, so space is saved on the side opposite the mounting.

Model LMIF SUJ2 Type



Fitted Flanged Type (Round)

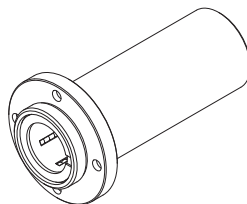
Fitted Flanged Type (Round) - Long

Specification Table⇒ **A4-82**

Model LMIF - Long.

Incorporates two standard type retainers, giving it a large net rated load.

Model LMIF-L SUJ2 Type



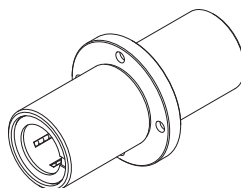
Fitted Flanged Type (Round) - Long

Center Flanged Type (Round) - Long

Specification Table⇒ **A4-84**

As work pieces can be mounted around the center of the nut, the load can be distributed and spaced evenly on either side of the flange. Ideal for making the stroke even in both directions.

Model LMCF-L SUJ2 Type



Center Flanged Type (Round) - Long

Features and Types

Types of the Linear Ball Bushing

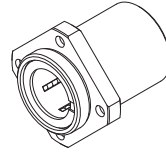
Fitted Flanged Type (Square)

Specification Table⇒ [A-4-86](#)

The flange is similar to the Model LMIF, but flattened in four places.

The lower core height compared to circular flanges allows for more compact designs.

Model LMIK SUJ2 Type



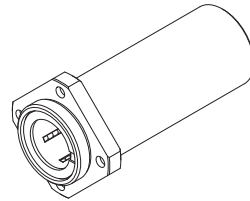
Fitted Flanged Type (Square)

Fitted Flanged Type (Square) - Long

Specification Table⇒ [A-4-88](#)

Incorporates two standard type retainers, giving it a large net rated load.

Model LMIK-L SUJ2 Type



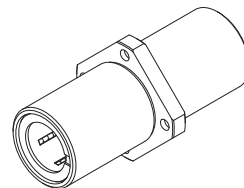
Fitted Flanged Type (Square) - Long

Center Flanged Type (Square) - Long

Specification Table⇒ [A-4-90](#)

As work pieces can be mounted around the center of the nut, the load can be distributed and spaced evenly on either side of the flange. Ideal for making the stroke even in both directions.

Model LMCK-L SUJ2 Type



Center Flanged Type (Square) - Long

Fitted Flanged Type (Ovular)

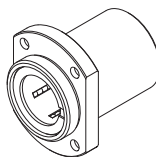
Specification Table⇒ **A4-92**

Features a Model LMIF flange that has been flattened on two sides.

The lower core height compared to square flanges allows for more compact designs.

The rows of bearings are aligned so that a load from one of the flattened sides will be supported by two rows of bearings.

Model LMIH SUJ2 Type



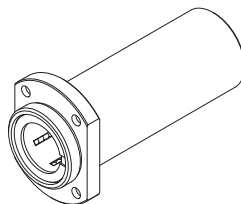
Fitted Flanged Type (Ovular)

Fitted Flanged Type (Ovular) - Long

Specification Table⇒ **A4-94**

Incorporates two standard type retainers, giving it a large net rated load.

Model LMIH-L SUJ2 Type



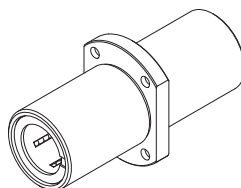
Fitted Flanged Type (Ovular) - Long

Center Flanged Type (Ovular) - Long

Specification Table⇒ **A4-96**

As work pieces can be mounted around the center of the nut, the load can be distributed and spaced evenly on either side of the flange. Ideal for making the stroke even in both directions.

Model LMCH-L SUJ2 Type



Center Flanged Type (Ovular) - Long

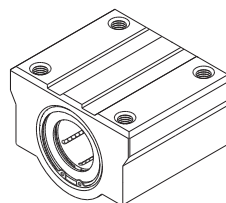
Features and Types

Types of the Linear Ball Bushing

Linear Bushing Model SC

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

Specification Table⇒ **A**4-98

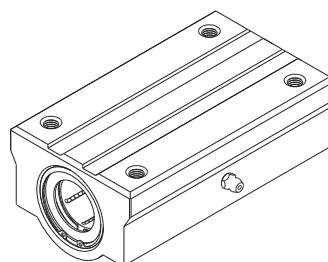


Linear Bushing Model SC

Linear Bushing (Long) Model SL

A case unit that features two standard linear bushings embedded within an aluminum casing.

Specification Table⇒ **A**4-102

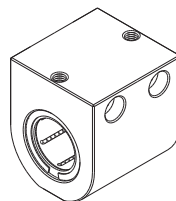


Linear Bushing (Long) Model SL

Linear Bushing Model SH

It is a case unit where the standard type of Linear Bushing is incorporated into a smaller and lighter aluminum casing than model SC. This model allows even more compact design than model SC. It also has flexibility in mounting orientation. Additionally, it is structured so that two rows of balls receive the load from the top of the casing, allowing a long service life to be achieved.

Specification Table⇒ [A4-104](#)

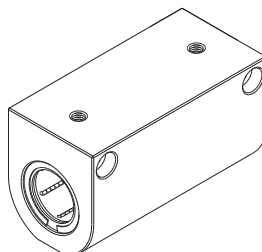


Linear Bushing Model SH

Linear Bushing (Long) Model SH-L

A long version of model SH, this model is a case unit that contains two units of the standard type Linear Bushing in an aluminum casing.

Specification Table⇒ [A4-106](#)



Linear Bushing (Long) Model SH-L

Features and Types

Types of the Linear Ball Bushing

Standard LM Shafts

LM shafts for use with the high quality linear bushing model LM series.

Specification Table⇒ **A4-109**



Standard LM Shafts

Build-to-order LM Shafts

Machined shaft ends available upon request.

Specification Table⇒ **A4-111**



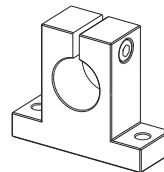
Build-to-order LM Shafts

LM Shaft End Support Model SK

A lightweight aluminum fulcrum for securing an LM shaft.

Allows the LM shaft to be secured without having to machine the LM shaft ends.

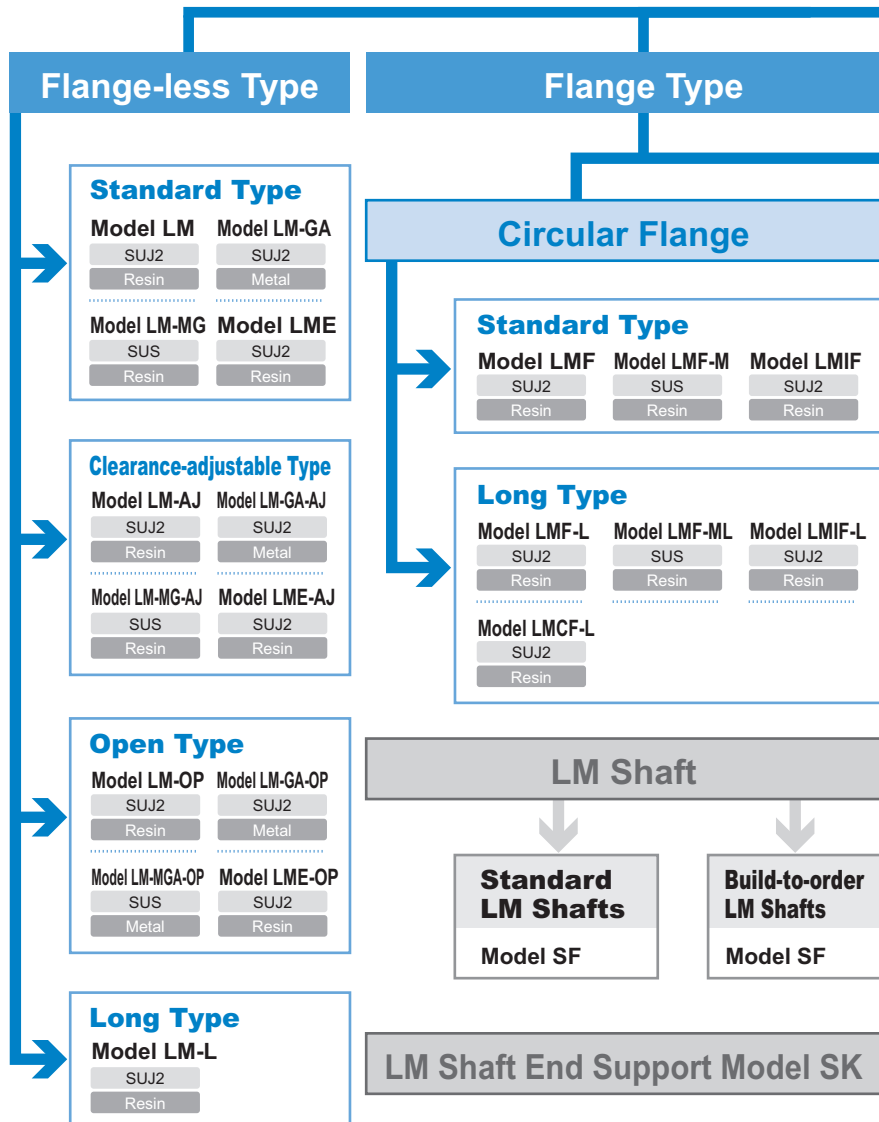
Specification Table⇒ **A4-108**



LM Shaft End Support Model SK

Classification Table

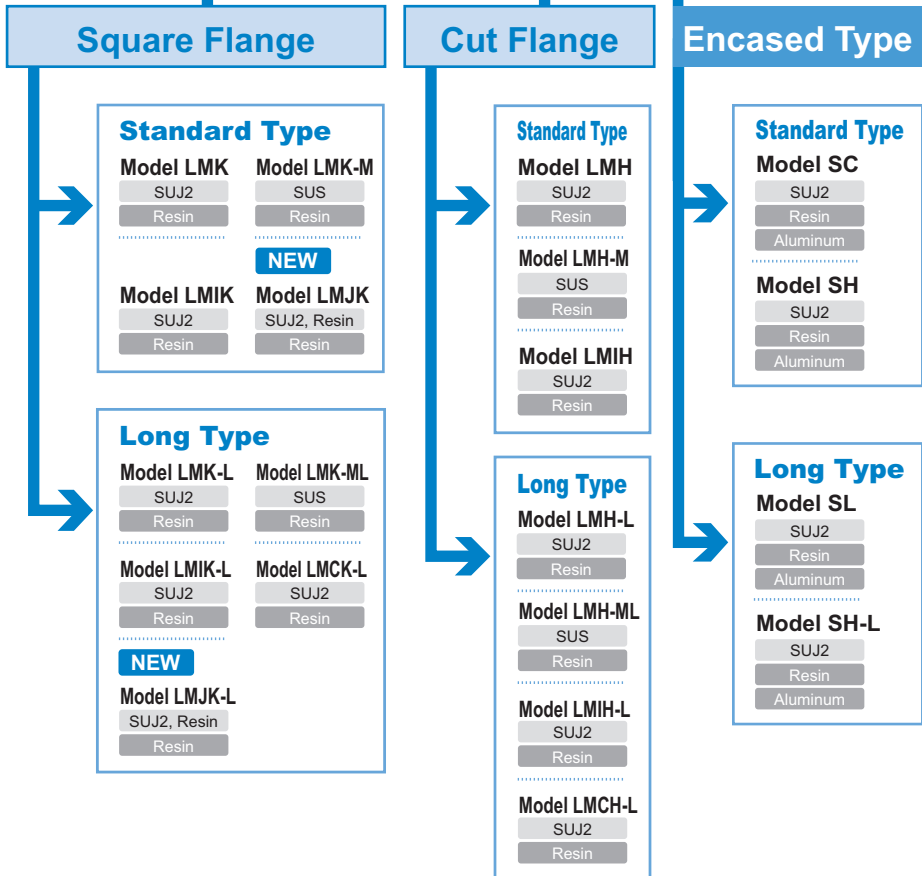
Linear Bushing



Features and Types

Classification Table

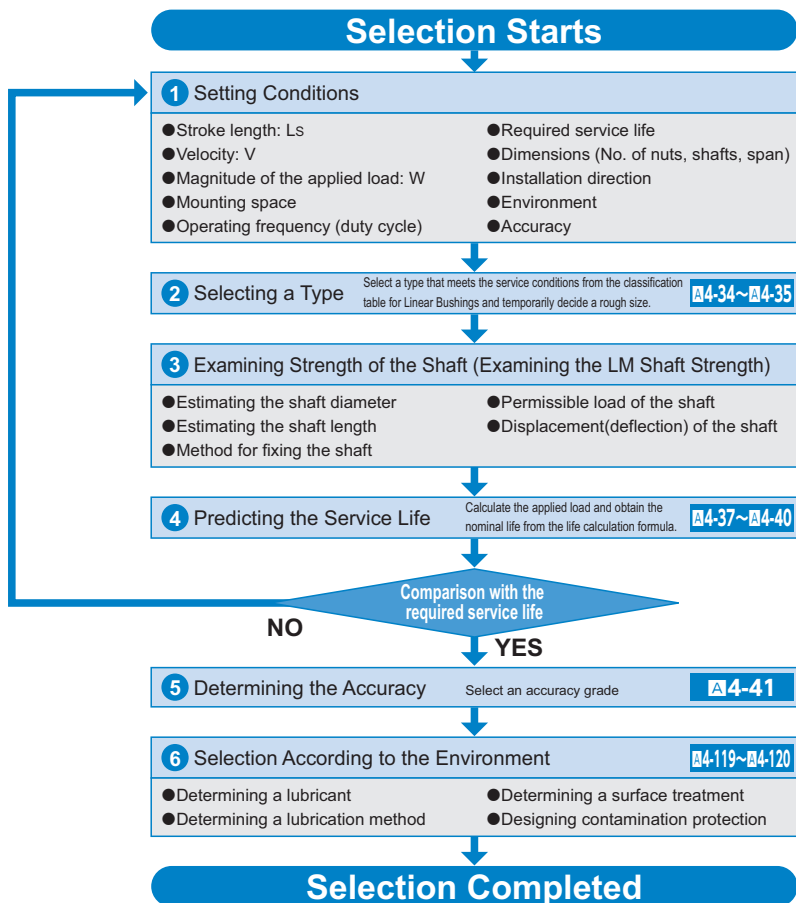
| Type of Material | |
|---|--|
| Model No. | |
| Nut Material | |
| - SUJ2 (High-carbon Chromium Bearing Steel) | |
| - SUS (Martensite Stainless Steel) | |
| Retainer Material | |
| Case Material | |



Flowchart for Selecting a Linear Bushing

Steps for Selecting a Linear Bushing

The following flowchart should be used as a guide for selecting a Linear Bushing.



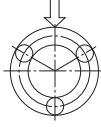
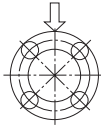
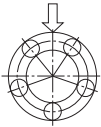
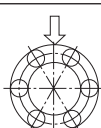
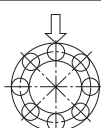
Rated Load and Nominal Life

[Load Rating]

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 in Table1.

Table1 Rated load of the Linear Bushing

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

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

[Calculating the Nominal Life]

The nominal life of the THK linear bushing is defined as 50 km. The nominal life (L_{10}) is calculated from the basic dynamic load rating (C) and the load acting on the linear bushing (P_c) using the following formula.

$$L_{10} = \left(\frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots\dots(1)$$

| | | |
|----------|-----------------------------|------|
| L_{10} | : Nominal life | (km) |
| C | : Basic dynamic load rating | (N) |
| P_c | : Calculated load | (N) |

*This nominal life formula may not apply if the length of the stroke is less than or equal to twice the length of the nut.

When comparing the nominal life (L_{10}), you must take into account whether the basic dynamic load rating was defined based on 50 km or 100 km. Convert the basic dynamic load rating based on ISO 14728-1 as necessary.

ISO-regulated basic dynamic load rating conversion formula:

$$C_{100} = \frac{C_{50}}{1.26}$$

| | |
|-----------|---|
| C_{50} | : Basic dynamic load rating based on a nominal life of 50 km |
| C_{100} | : Basic dynamic load rating based on a nominal life of 100 km |

[Calculating the Modified Nominal Life]

During use, a linear bushing may be subjected to vibrations and shocks as well as fluctuating loads, which are difficult to detect. In addition, the surface hardness of the raceways, the operating temperature, and having blocks arranged directly behind one another will have a decisive impact on the service life. Taking these factors into account, the modified nominal life (L_{10m}) can be calculated according to the following formula (2).

•Modified factor α

$$\alpha = \frac{f_H \cdot f_T \cdot f_C}{f_W}$$

| | | |
|----------|----------------------|--------------------------------|
| α | : Modified factor | |
| f_H | : Hardness factor | (see Fig.1 on A4-39) |
| f_T | : Temperature factor | (see Fig.2 on A4-39) |
| f_C | : Contact factor | (see Table2 on A4-40) |
| f_W | : Load factor | (see Table 3 on A4-40) |

•Modified nominal life L_{10m}

$$L_{10m} = \left(\alpha \times \frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots\dots(2)$$

| | | |
|-----------|-----------------------------|------|
| L_{10m} | : Modified nominal life | (km) |
| C | : Basic dynamic load rating | (N) |
| P_c | : Calculated load | (N) |

● **When a Moment Load is Applied to a Single Nut or Two Nuts in Close Contact with Each Other**

When a moment load is applied to a single nut or two nuts in close contact with each other, calculate the equivalent radial load at the time the moment is applied.

$$P_v = K \cdot M$$

P_v : Equivalent radial load (N)
(with a moment applied)

K : Equivalent factors
(see Table4 to Table6 on **A4-41**)

M : Applied moment (N·mm)

However, " P_v " is assumed to be within the basic static load rating (C_0).

● **When a Moment Load and a Radial Load are Simultaneously Applied**

When a moment and a radial load are applied simultaneously, calculate the service life based on the sum of the radial load and the equivalent radial load.

■ **f_H : Hardness Factor**

To maximize the load capacity of the Linear Bushing, the hardness of the raceways needs to be between 58 to 64 HRC.

If the hardness is lower than this range, the basic dynamic load rating and the basic static load rating decrease. Therefore, it is necessary to multiply each rating by the respective hardness factor (f_H).

Normally, $f_H = 1.0$ since the Linear Bushing has sufficient hardness.

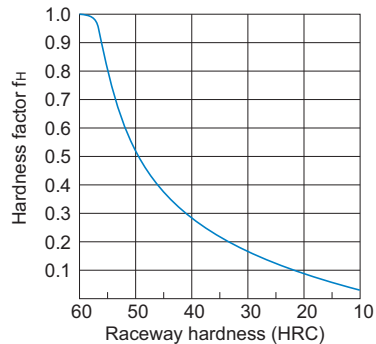


Fig.1 Hardness Factor (f_H)

■ **f_T : Temperature Factor**

If the temperature of the environment surrounding the operating Linear Bushing exceeds 100°C, take into account the adverse effect of the high temperature and multiply the basic load ratings by the temperature factor indicated in Fig.2.

Also note that the Linear Bushing itself must be of high temperature type.

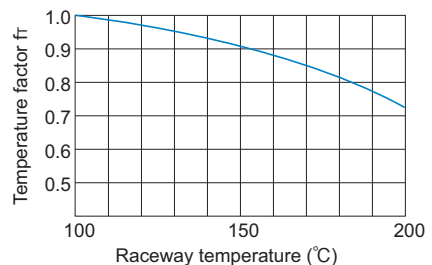


Fig.2 Temperature Factor (f_T)

Note) If the environment temperature exceeds 80°C, use a Linear Bushing type equipped with metal retainer plates.

■ f_c : Contact Factor

When multiple nuts are used in close contact with each other, their linear motion is affected by moments and mounting accuracy, making it difficult to achieve uniform load distribution. In such applications, multiply the basic load rating (C) and (C₀) by the corresponding contact factor in Table2.

Note) If uneven load distribution is expected in a large machine, take into account the respective contact factor indicated in Table2.

Table2 Contact Factor (f_c)

| Number of nuts in close contact with each other | Contact factor f_c |
|---|----------------------|
| 2 | 0.81 |
| 3 | 0.72 |
| 4 | 0.66 |
| 5 | 0.61 |
| Normal use | 1 |

■ f_w : Load Factor

In general, reciprocating machines tend to experience vibrations or impacts during operation, and it is extremely difficult to accurately determine the vibrations generated during high-speed operation and impacts during frequent starts and stops. Therefore, when the actual load applied to a linear bushing cannot be obtained, or when speed and impacts have a significant influence, divide the basic dynamic load rating (C) by the corresponding load factor in Table 3, which has been empirically obtained.

Table 3 Load Factor (f_w)

| Vibrations/impact | Speed(V) | f_w |
|-------------------|-------------------------------------|------------|
| Faint | Very low $V \leq 0.25\text{m/s}$ | 1 to 1.2 |
| Weak | Slow $0.25 < V \leq 1\text{m/s}$ | 1.2 to 1.5 |
| Medium | Medium $1 < V \leq 2\text{m/s}$ | 1.5 to 2 |
| Strong | High $V > 2\text{m/s}$ | 2 to 3.5 |

[Calculating the Service Life Time]

When the nominal life (L_{10}) has been obtained, if the stroke length and the number of reciprocations per minute are constant, the service life time is obtained using the following equation.

$$L_h = \frac{L_{10} \times 10^3}{2 \times \ell_s \times n_1 \times 60}$$

L_h : Service life time (h)

ℓ_s : Stroke length (m)

n_1 : Number of reciprocations per minute (min^{-1})

Table of Equivalent Factors

Table4 Equivalent Factors of Model LM

| Model No. | Equivalent factor: K | |
|-----------|----------------------|---------------|
| | Single nut | Double blocks |
| LM 3 | 1.566 | 0.26 |
| LM 4 | 1.566 | 0.21 |
| LM 5 | 1.253 | 0.178 |
| LM 6 | 0.553 | 0.162 |
| LM 8S | 0.708 | 0.166 |
| LM 8 | 0.442 | 0.128 |
| LM 10 | 0.389 | 0.101 |
| LM 12 | 0.389 | 0.097 |
| LM 13 | 0.343 | 0.093 |
| LM 16 | 0.279 | 0.084 |
| LM 20 | 0.257 | 0.071 |
| LM 25 | 0.163 | 0.054 |
| LM 30 | 0.153 | 0.049 |
| LM 35 | 0.143 | 0.045 |
| LM 38 | 0.127 | 0.042 |
| LM 40 | 0.117 | 0.04 |
| LM 50 | 0.096 | 0.032 |
| LM 60 | 0.093 | 0.028 |
| LM 80 | 0.077 | 0.022 |
| LM 100 | 0.065 | 0.017 |
| LM 120 | 0.051 | 0.015 |

Note) Equivalent factors for the following models are the same as for model LM: Models LMF, LMK, LMIF, LMIK, LMIH, LMH, and SC.

Table5 Equivalent Factors of Model LM-L

| Model No. | Equivalent factor: K | |
|-----------|----------------------|--|
| | Single nut | |
| LM 3L | 0.654 | |
| LM 4L | 0.578 | |
| LM 5L | 0.446 | |
| LM 6L | 0.402 | |
| LM 8L | 0.302 | |
| LM 10L | 0.236 | |
| LM 12L | 0.226 | |
| LM 13L | 0.214 | |
| LM 16L | 0.192 | |
| LM 20L | 0.164 | |
| LM 25L | 0.12 | |
| LM 30L | 0.106 | |
| LM 35L | 0.1 | |
| LM 40L | 0.086 | |
| LM 50L | 0.068 | |
| LM 60L | 0.062 | |

Note) Equivalent factors for the following models are the same as for model LM-L: Models LMF-L, LMK-L, LMH-L, LMIF-L, LMIK-L, LMIH-L, LMCF-L, LMCK-L, and LMCH-L.

Table6 Equivalent Factors of Model LME

| Model No. | Equivalent factor: K | |
|-----------|----------------------|---------------|
| | Single nut | Double blocks |
| LME 5 | 0.669 | 0.123 |
| LME 8 | 0.514 | 0.116 |
| LME 12 | 0.389 | 0.09 |
| LME 16 | 0.343 | 0.081 |
| LME 20 | 0.291 | 0.063 |
| LME 25 | 0.209 | 0.052 |
| LME 30 | 0.167 | 0.045 |
| LME 40 | 0.127 | 0.039 |
| LME 50 | 0.105 | 0.031 |
| LME 60 | 0.093 | 0.024 |
| LME 80 | 0.077 | 0.018 |

Precautions To Be Taken if an Eccentric Load Is Applied

Since Linear Bushing is not suitable for application of an eccentric load, we recommend using Guide Ball Bushing or Ball Spline.

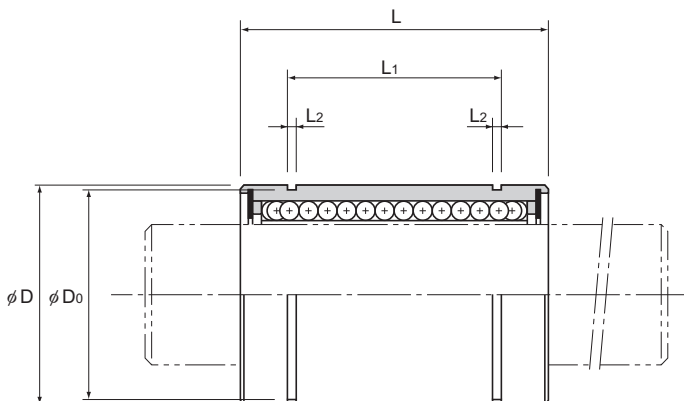
Accuracy Standards

[Linear Bushing]

The accuracy of the Linear Bushing in inscribed bore diameter, outer diameter, width and eccentricity is described in the corresponding specification table. The accuracy of mode LM in inscribed bore diameter and eccentricity is classified into high accuracy grade (no symbol) and precision grade (P). (Accuracy symbol is expressed at the end of the model number.)

For the clearance-adjustable type (-AJ) and open type (-OP), the inscribed bore diameter tolerance, the outer diameter tolerance, and the eccentricity indicate the values before the division of the nut.

Model LM



| Model No. | | | Ball rows | Main | | | | | | | | | |
|---------------|---------------------------|-----------|-----------|-------------------------|-----------|----------------|--------|--------------------------|--------|-----------|----|--------|----|
| Standard type | Clearance-adjustable type | Open type | | Inscribed bore diameter | | Outer diameter | | Length | | | | | |
| | | | | dr | Tolerance | | D | Tolerance High/Precision | L | Tolerance | | | |
| LM 3 | — | — | 4 | 3 | 0 | 0 | 7 | 0 | 10 | 0 | | | |
| LM 4 | — | — | 4 | 4 | | | -0.008 | | -0.005 | | 8 | 12 | |
| LM 5 | — | — | 4 | 5 | | | | | | | 10 | 15 | |
| LM 6 | LM 6-AJ | — | 4 | 6 | 0 | 0 | 12 | 0 | 19 | 0 | | | |
| LM 8S | LM 8S-AJ | — | 4 | 8 | | | 15 | | -0.011 | | 17 | | |
| LM 8 | LM 8-AJ | — | 4 | 8 | | | 15 | | | | 24 | | |
| LM 10 | LM 10-AJ | — | 4 | 10 | | | 19 | | | | 29 | | |
| LM 12 | LM 12-AJ | — | 4 | 12 | | | -0.009 | | -0.006 | | 21 | 0 | 30 |
| LM 13 | LM 13-AJ | LM 13-OP | 4 | 13 | 0 | 0 | 23 | -0.013 | 32 | 0 | | | |
| LM 16 | LM 16-AJ | LM 16-OP | 5 | 16 | | | 28 | | 37 | | | | |
| LM 20 | LM 20-AJ | LM 20-OP | 5 | 20 | | | 32 | | 42 | | | | |
| LM 25 | LM 25-AJ | LM 25-OP | 6 | 25 | | | 40 | | 0 | | 59 | | |
| LM 30 | LM 30-AJ | LM 30-OP | 6 | 30 | | | -0.010 | | -0.007 | | 45 | -0.016 | 64 |
| LM 35 | LM 35-AJ | LM 35-OP | 6 | 35 | 0 | 0 | 52 | 0 | 70 | 0 | | | |
| LM 40 | LM 40-AJ | LM 40-OP | 6 | 40 | | | -0.012 | | -0.008 | | 60 | -0.019 | 80 |
| LM 50 | LM 50-AJ | LM 50-OP | 6 | 50 | | | 80 | | 100 | | | | |
| LM 60 | LM 60-AJ | LM 60-OP | 6 | 60 | 0 | 0 | 90 | 0 | 110 | -0.3 | | | |
| | | | | | -0.015 | -0.009 | | -0.022 | | | | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

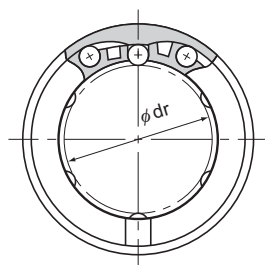
If the ambient temperature exceeds 80°C, use the type equipped with a metal retainer (model LM-GA).

If requiring a type equipped with a seal, indicate it when placing an order.

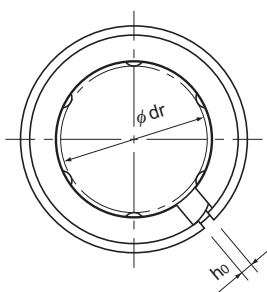
(Example) LM13 UU

————— Seal attached on both ends of the nut

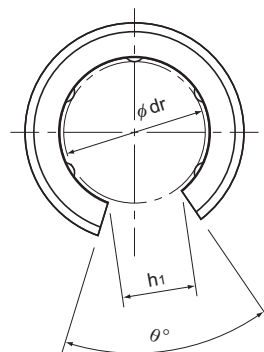
For the clearance-adjustable type (-AJ) and open type (-OP), the inscribed bore diameter tolerance, the outer diameter tolerance, and the eccentricity indicate the values before the division of the nut.



Model LM



Model LM-AJ



Model LM-OP

Unit: mm

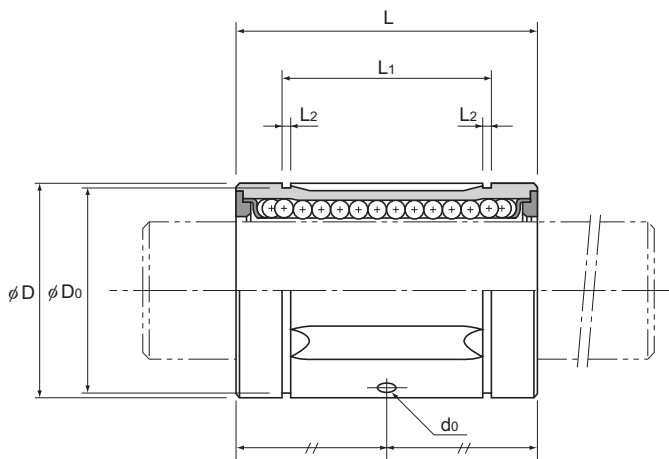
| dimensions | | | | | | | | Eccentricity (max) μm | | Radial clearance tolerance μm | Basic load rating | | Mass g |
|----------------|-----------|----------------|----------------|----------------|----------------|----|------|--------------------------|--------|--|---------------------|------|-----------|
| L ₁ | Tolerance | L ₂ | D ₀ | h ₀ | h ₁ | θ° | High | Precision | C N | | C ₀ N | | |
| — | — | — | — | — | — | — | 8 | 4 | -2 | 88.2 | 108 | 1.6 | |
| — | — | — | — | — | — | — | 8 | 4 | -3 | 88.2 | 127 | 2.2 | |
| 10.2 | 0 -0.2 | 1.1 | 9.6 | — | — | — | 8 | 4 | -3 | 167 | 206 | 4 | |
| 13.5 | | 1.1 | 11.5 | 1 | — | — | 12 | 8 | -5 | 206 | 265 | 8 | |
| 11.5 | | 1.1 | 14.3 | 1 | — | — | 12 | 8 | -5 | 176 | 225 | 9.3 | |
| 17.5 | | 1.1 | 14.3 | 1 | — | — | 12 | 8 | -5 | 265 | 402 | 13.5 | |
| 22 | | 1.3 | 18 | 1 | — | — | 12 | 8 | -5 | 373 | 549 | 25 | |
| 23 | | 1.3 | 20 | 1.5 | — | — | 12 | 8 | -5 | 412 | 598 | 28 | |
| 23 | | 1.3 | 22 | 1.5 | 9 | 80 | 12 | 8 | -7 | 510 | 775 | 38 | |
| 26.5 | | 1.6 | 27 | 1.5 | 11 | 60 | 12 | 8 | -7 | 775 | 1180 | 78 | |
| 30.5 | | 1.6 | 30.5 | 1.5 | 11 | 60 | 15 | 10 | -9 | 863 | 1370 | 86 | |
| 41 | | 0 -0.3 | 1.85 | 38 | 2 | 12 | 50 | 15 | 10 | -9 | 980 | 1570 | 210 |
| 44.5 | 1.85 | | 43 | 2.5 | 15 | 50 | 15 | 10 | -9 | 1570 | 2750 | 221 | |
| 49.5 | 2.1 | | 49 | 2.5 | 17 | 50 | 20 | 12 | -13 | 1670 | 3140 | 358 | |
| 60.5 | 2.1 | | 57 | 3 | 20 | 50 | 20 | 12 | -13 | 2160 | 4020 | 557 | |
| 74 | 2.6 | | 76.5 | 3 | 25 | 50 | 20 | 12 | -13 | 3820 | 7940 | 1418 | |
| 85 | 3.15 | | 86.5 | 3 | 30 | 50 | 25 | 17 | -16 | 4710 | 10000 | 1733 | |

Note) When using the Linear Bushing on a single shaft, use two or more units (instead of one unit) on the same shaft to avoid a moment load, and secure a large distance between the units.

If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.

For further information, contact THK.

Model LM-GA (Metal Retainer Type)



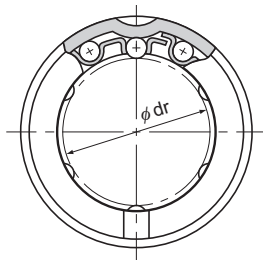
| Model No. | | | Ball rows | Main | | | | | | | |
|---------------|---------------------------|-------------|-----------|-------------------------|-----------|----------------|-----|--------------------------|--------|-----------|----|
| Standard type | Clearance-adjustable type | Open type | | Inscribed bore diameter | | Outer diameter | | Length | | | |
| | | | | dr | Tolerance | | D | Tolerance High/Precision | L | Tolerance | |
| LM 6GA | — | — | 3 | 6 | 0 | 0 | 12 | 0 | 19 | -0.2 | |
| LM 8SGA | — | — | 3 | 8 | | | 15 | | -0.011 | | 17 |
| LM 8GA | — | — | 3 | 8 | | | 15 | | | | 24 |
| LM 10GA | — | — | 4 | 10 | | | 19 | -0.013 | 29 | | |
| LM 12GA | LM 12GA-AJ | LM 12GA-OP | 4 | 12 | | | 21 | | 30 | | |
| LM 13GA | LM 13GA-AJ | LM 13GA-OP | 4 | 13 | | | 23 | | 32 | | |
| LM 16GA | LM 16GA-AJ | LM 16GA-OP | 4 | 16 | 28 | 37 | | | | | |
| LM 20GA | LM 20GA-AJ | LM 20GA-OP | 5 | 20 | 32 | 0 | 42 | | | | |
| LM 25GA | LM 25GA-AJ | LM 25GA-OP | 5 | 25 | 40 | -0.016 | 59 | -0.3 | | | |
| LM 30GA | LM 30GA-AJ | LM 30GA-OP | 6 | 30 | 45 | 0 | 64 | | | | |
| LM 35GA | LM 35GA-AJ | LM 35GA-OP | 6 | 35 | 52 | 0 | 70 | | | | |
| LM 38GA | LM 38GA-AJ | LM 38GA-OP | 6 | 38 | 57 | | 76 | | | | |
| LM 40GA | LM 40GA-AJ | LM 40GA-OP | 6 | 40 | 60 | | 80 | | | | |
| LM 50GA | LM 50GA-AJ | LM 50GA-OP | 6 | 50 | 80 | 0 | 100 | | | | |
| LM 60GA | LM 60GA-AJ | LM 60GA-OP | 6 | 60 | 90 | -0.022 | 110 | | | | |
| LM 80GA | LM 80GA-AJ | LM 80GA-OP | 6 | 80 | 120 | 0 | 140 | | | | |
| LM 100GA | LM 100GA-AJ | LM 100GA-OP | 6 | 100 | 150 | | 175 | | | | |
| LM 120A | LM 120A-AJ | LM 120A-OP | 8 | 120 | 180 | | 200 | | | | |

Note) If requiring a type equipped with a seal, indicate it when placing an order. (seal heat resistance: 80°C.)

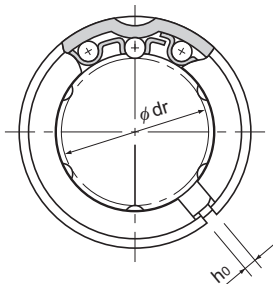
(Example) LM50GA UU

Seal attached on both ends of the nut

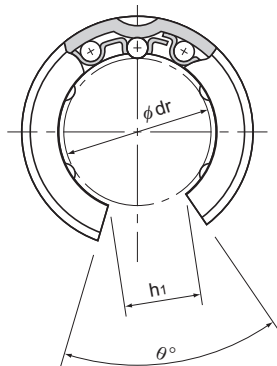
For the clearance-adjustable type (-AJ) and open type (-OP), the inscribed bore diameter tolerance, the outer diameter tolerance, and the eccentricity indicate the values before the division of the nut.



Model LM-GA



Model LM-GA-AJ



Model LM-GA-OP

Unit: mm

| dimensions | | | | | | | | Greasing hole d _o | Eccentricity (max) μm | | Radial clearance tolerance μm | Basic load rating | | Mass g |
|----------------|-----------|----------------|----------------|----------------|----------------|----|------|---------------------------------|--------------------------|--------|----------------------------------|---------------------|-------|-----------|
| L ₁ | Tolerance | L ₂ | D ₀ | h ₀ | h ₁ | θ° | High | | Precision | C N | | C ₀ N | | |
| 13.5 | 0 -0.2 | 1.1 | 11.5 | — | — | — | — | 12 | 8 | -5 | 206 | 265 | 7 | |
| 11.5 | | 1.1 | 14.3 | — | — | — | — | 12 | 8 | -5 | 176 | 225 | 10 | |
| 17.5 | | 1.1 | 14.3 | — | — | — | — | 12 | 8 | -5 | 265 | 402 | 14 | |
| 22 | | 1.3 | 18 | — | — | — | — | 2 | 12 | 8 | -5 | 373 | 549 | 27 |
| 23 | | 1.3 | 20 | 1.5 | 7.5 | 80 | 2 | 12 | 8 | -5 | 412 | 598 | 31 | |
| 23 | | 1.3 | 22 | 1.5 | 9 | 80 | 2 | 12 | 8 | -7 | 510 | 775 | 41 | |
| 26.5 | | 1.6 | 27 | 1.5 | 11 | 60 | 2.3 | 12 | 8 | -7 | 775 | 1180 | 69 | |
| 30.5 | | 1.6 | 30.5 | 2 | 11 | 60 | 2.3 | 15 | 10 | -9 | 863 | 1370 | 92 | |
| 41 | 0 -0.3 | 1.85 | 38 | 2 | 13 | 60 | 3 | 15 | 10 | -9 | 980 | 1570 | 200 | |
| 44.5 | | 1.85 | 43 | 2.5 | 15 | 50 | 3 | 15 | 10 | -9 | 1570 | 2750 | 250 | |
| 49.5 | | 2.1 | 49 | 2.5 | 17 | 50 | 3 | 20 | 12 | -13 | 1670 | 3140 | 370 | |
| 58.5 | | 2.1 | 54.5 | 3 | 18 | 50 | 3 | 20 | 12 | -13 | 2160 | 4020 | 490 | |
| 60.5 | | 2.1 | 57 | 3 | 20 | 50 | 3 | 20 | 12 | -13 | 2160 | 4020 | 590 | |
| 74 | | 2.6 | 76.5 | 3 | 25 | 50 | 4 | 20 | 12 | -13 | 3820 | 7940 | 1500 | |
| 85 | | 3.15 | 86.5 | 3 | 30 | 50 | 4 | 25 | 17 | -16 | 4710 | 10000 | 1850 | |
| 105.5 | | 0 -0.4 | 4.15 | 116 | 3 | 40 | 50 | 4 | 25 | 17 | -16 | 7350 | 16000 | 4200 |
| 125.5 | 4.15 | | 145 | 3 | 50 | 50 | 4 | 30 | 20 | -20 | 14100 | 34800 | 8200 | |
| 158.6 | 4.15 | | 175 | 4 | 85 | 80 | 5 | 30 | 20 | -25 | 16400 | 40000 | 15500 | |

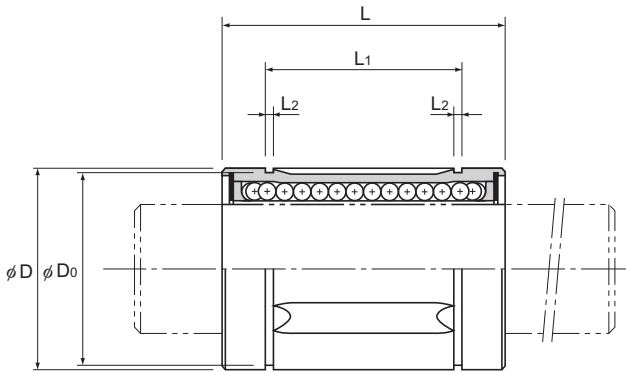
Note) When using the Linear Bushing on a single shaft, use two or more bushings on the same shaft to minimize a moment load, and secure a large distance between the units.

Model LM-GA has oil holes as a standard feature.

If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.

For further information, contact THK.

Model LM-MG (Stainless Steel Type)



| Model No. | | | Ball rows | Main | | | | | | | | | |
|---------------|---------------------------|--------------|-----------|-------------------------|-----------|----------------|--------|-----------|--------|-----------|--------|------|-------|
| Standard type | Clearance-adjustable type | Open type | | Inscribed bore diameter | | Outer diameter | | Length | | | | | |
| | | | | dr | Tolerance | | D | Tolerance | L | Tolerance | | | |
| LM 3M | — | — | 4 | 3 | 0 | 0 | 7 | 0 | 10 | 0 | | | |
| LM 4M | — | — | 4 | 4 | | | 8 | | 12 | | -0.009 | 15 | -0.12 |
| LM 5M | — | — | 4 | 5 | | | 10 | | 15 | | | | |
| * LM 6MG | LM 6MG-AJ | — | 4 | 6 | 0 | 0 | 12 | 0 | 19 | 0 | | | |
| * LM 8SMG | LM 8SMG-AJ | — | 4 | 8 | | | 15 | | 17 | | -0.011 | 24 | -0.2 |
| * LM 8MG | * LM 8MG-AJ | — | 4 | 8 | | | 15 | | 24 | | | | |
| * LM 10MG | * LM 10MG-AJ | — | 4 | 10 | | | 19 | 29 | 0 | | 30 | 0 | |
| * LM 12MG | * LM 12MG-AJ | — | 4 | 12 | | | 21 | 30 | | | | | |
| * LM 13MG | * LM 13MG-AJ | * LM13MGA-OP | 4 | 13 | | | 23 | 32 | -0.013 | | 37 | -0.3 | |
| * LM 16MG | * LM 16MG-AJ | * LM16MGA-OP | 4 | 16 | 28 | 37 | | | | | | | |
| * LM 20MG | * LM 20MG-AJ | * LM20MGA-OP | 5 | 20 | 32 | 42 | 0 | 59 | 0 | | | | |
| * LM 25MG | * LM 25MG-AJ | * LM25MGA-OP | 5 | 25 | 40 | 59 | | | | | | | |
| * LM 30MG | * LM 30MG-AJ | * LM30MGA-OP | 6 | 30 | 45 | 64 | -0.016 | 70 | 0 | | | | |
| * LM 35MG | * LM 35MG-AJ | * LM35MGA-OP | 6 | 35 | 52 | 70 | | | | | | | |
| * LM 40MG | * LM 40MG-AJ | * LM40MGA-OP | 6 | 40 | 60 | 80 | -0.019 | 80 | -0.3 | | | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

If the ambient temperature exceeds 80°C, use the type equipped with a metal retainer and indicate "A" at the end of the model number.

(For those marked with * in the table, metal retainers are available. Only metal retainer is available for open type.)

(Metal retainer types of models LM6MG, 8SMG and 8MG each have 3 rows of balls.)

(Example) LM30MG A

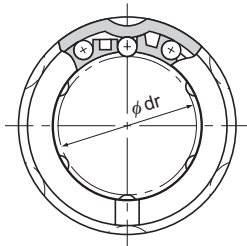
High temperature symbol

If requiring a type equipped with a seal, indicate it when placing an order. (seal heat resistance: 80°C.)

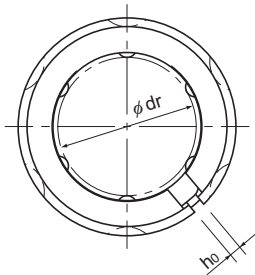
(Example) LM30MG UU

Seal attached on both ends of the nut

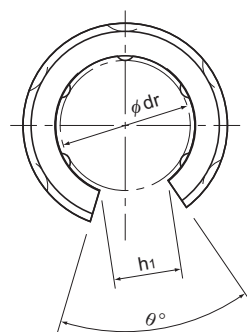
For the clearance-adjustable type (-AJ) and open type (-OP), the inscribed bore diameter tolerance, the outer diameter tolerance, and the eccentricity indicate the values before the division of the nut.



Model LM-MG



Model LM-MG-AJ



Model LM-MG-OP

Unit: mm

| dimensions | | | | | | | | Eccentricity (max) μm | | Radial clearance tolerance μm | Basic load rating | | |
|----------------|-----------|----------------|----------------|----------------|----------------|----------------|------|-------------------------------------|--------|---|---------------------|-----------|-----|
| L ₁ | Tolerance | L ₂ | D ₀ | h ₀ | h ₁ | θ° | High | Precision | C N | | C ₀ N | Mass g | |
| — | — | — | — | — | — | — | 8 | 4 | -2 | 88.2 | 108 | 1.6 | |
| — | — | — | — | — | — | — | 8 | 4 | -3 | 88.2 | 127 | 2.2 | |
| 10.2 | -0.2 | 1.1 | 9.6 | — | — | — | 8 | 4 | -3 | 167 | 206 | 4 | |
| 13.5 | | 1.1 | 11.5 | 1 | — | — | 12 | 8 | -5 | 206 | 265 | 6 | |
| 11.5 | | 1.1 | 14.3 | 1 | — | — | 12 | 8 | -5 | 176 | 225 | 9 | |
| 17.5 | | 1.1 | 14.3 | 1 | — | — | 12 | 8 | -5 | 265 | 402 | 13 | |
| 22 | | 1.3 | 18 | 1 | — | — | 12 | 8 | -5 | 373 | 549 | 23 | |
| 23 | | 1.3 | 20 | 1.5 | — | — | 12 | 8 | -5 | 412 | 598 | 27 | |
| 23 | | 1.3 | 22 | 1.5 | 9 | 80 | 12 | 8 | -7 | 510 | 775 | 35 | |
| 26.5 | | 1.6 | 27 | 1.5 | 11 | 80 | 12 | 8 | -7 | 775 | 1180 | 59 | |
| 30.5 | | 1.6 | 30.5 | 1.5 | 11 | 60 | 15 | 10 | -9 | 863 | 1370 | 79 | |
| 41 | | -0.3 | 1.85 | 38 | 2 | 12 | 50 | 15 | 10 | -9 | 980 | 1570 | 170 |
| 44.5 | 1.85 | | 43 | 2.5 | 15 | 50 | 15 | 10 | -9 | 1570 | 2750 | 220 | |
| 49.5 | 2.1 | | 49 | 2.5 | 17 | 50 | 20 | 12 | -13 | 1670 | 3140 | 330 | |
| 60.5 | 2.1 | | 57 | 3 | 20 | 50 | 20 | 12 | -13 | 2160 | 4020 | 530 | |

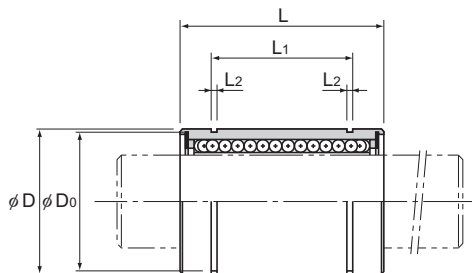
Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.

If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.

For further information, contact THK.

When using the Linear Bushing on a single shaft, use two or more bushings on the same shaft to minimize a moment load, and secure a large distance between the units.

Model LME



| Model No. | | | Ball rows | Main | | | | | |
|---------------|---------------------------|-------------|-----------|-------------------------|------------------|----------------|-----------|--------|-----------|
| Standard type | Clearance-adjustable type | Open type | | Inscribed bore diameter | | Outer diameter | | Length | |
| | | | | dr | Tolerance | D | Tolerance | L | Tolerance |
| LME 5 | LME 5-AJ | — | 4 | 5 | +0.008 0 | 12 | 0 | 22 | 0 -0.2 |
| LME 8 | LME 8-AJ | — | 4 | 8 | | 16 | -0.008 | 25 | |
| LME 12 | LME 12-AJ | — | 4 | 12 | | 22 | 0 | 32 | |
| LME 16 | LME 16-AJ | LME 16-OP | 5 | 16 | +0.009 | 26 | -0.009 | 36 | 0 -0.3 |
| LME 20 | LME 20-AJ | LME 20-OP | 5 | 20 | -0.001 | 32 | 0 | 45 | |
| LME 25 | LME 25-AJ | LME 25-OP | 6 | 25 | +0.011 | 40 | -0.011 | 58 | |
| LME 30 | LME 30-AJ | LME 30-OP | 6 | 30 | -0.001 | 47 | 0 | 68 | 0 -0.3 |
| LME 40 | LME 40-AJ | LME 40-OP | 6 | 40 | +0.013 -0.002 | 62 | 0 | 80 | |
| LME 50 | LME 50-AJ | LME 50-OP | 6 | 50 | | 75 | -0.013 | 100 | |
| LME 60 | LME 60-AJ | LME 60-OP | 6 | 60 | | 90 | 0 | 125 | |
| LME 80GA | LME 80GA-AJ | LME 80GA-OP | 6 | 80 | +0.016 -0.004 | 120 | -0.015 | 165 | 0 -0.4 |

Note) Since Linear Bushing models LME60 or smaller models are incorporated with a synthetic resin retainer, do not use them at temperature exceeding 80°C.

If the ambient temperature exceeds 80°C, use the type equipped with a metal retainer and indicate "A" at the end of the model number.

(Example) LME20G A

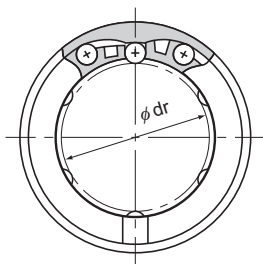
High temperature symbol

If requiring a type equipped with a seal, indicate it when placing an order. (seal heat resistance: 80°C.)

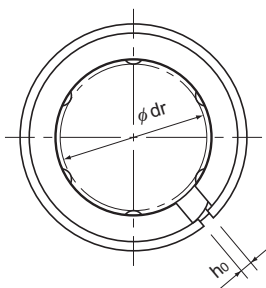
(Example) LME16 UU

Seal attached on both ends of the nut

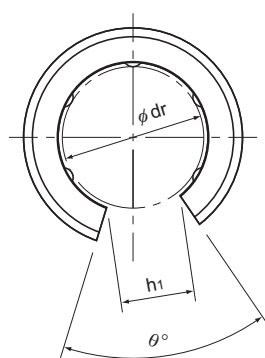
For the clearance-adjustable type (-AJ) and open type (-OP), the inscribed bore diameter tolerance, the outer diameter tolerance, and the eccentricity indicate the values before the division of the nut.



Model LME



Model LME-AJ



Model LME-OP

Unit: mm

| dimensions | | | | | | | | Eccentricity (max) μm | Radial clearance tolerance μm | Basic load rating | | Mass g |
|------------|-----------|-------|-------|-------|-------|----------------|--------|--|---|-------------------|------|-----------|
| L_1 | Tolerance | L_2 | D_0 | h_0 | h_1 | θ° | C N | | | C_0 N | | |
| 14.5 | 0 -0.2 | 1.1 | 11.5 | 1 | — | — | 12 | -5 | 206 | 265 | 11.4 | |
| 16.5 | | 1.1 | 15.2 | 1 | — | — | 12 | -5 | 265 | 402 | 18.5 | |
| 22.9 | | 1.3 | 21 | 1.5 | 7.5 | 78 | 12 | -7 | 510 | 775 | 37 | |
| 24.9 | | 1.3 | 24.9 | 1.5 | 10 | 78 | 12 | -7 | 775 | 1180 | 52 | |
| 31.5 | | 1.6 | 30.3 | 2 | 10 | 60 | 15 | -9 | 863 | 1370 | 89 | |
| 44.1 | 0 -0.3 | 1.85 | 37.5 | 2 | 12.5 | 60 | 15 | -9 | 980 | 1570 | 203 | |
| 52.1 | | 1.85 | 44.5 | 2 | 12.5 | 50 | 15 | -9 | 1570 | 2750 | 306 | |
| 60.6 | | 2.15 | 59 | 3 | 16.8 | 50 | 17 | -13 | 2160 | 4020 | 673 | |
| 77.6 | | 2.65 | 72 | 3 | 21 | 50 | 17 | -13 | 3820 | 7940 | 1025 | |
| 101.7 | 0 -0.4 | 3.15 | 86.5 | 3 | 27.2 | 54 | 20 | -16 | 4710 | 10000 | 1914 | |
| 133.7 | | 4.15 | 116 | 3 | 36.3 | 54 | 20 | -16 | 7350 | 16000 | 4800 | |

Note) If a metal retainer is used, the Linear Bushing has the shape as shown below.

When using the Linear Bushing on a single shaft, use two or more units (instead of one unit) on the same shaft to avoid a moment load, and secure a large distance between the units.

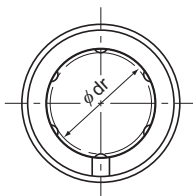
If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.

For further information, contact THK.



Model LME-GA

Model LM-L



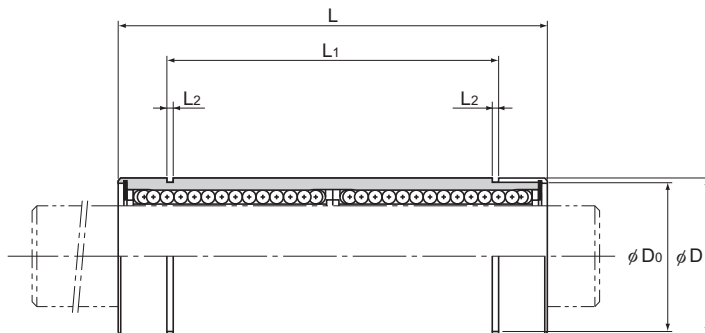
Model LM-L

| Model No. | Ball rows | Main | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance |
| LM 3L | 4 | 3 | 0 -0.010 | 7 | 0 -0.013 | 19 | 0 -0.3 |
| LM 4L | 4 | 4 | | 8 | | 23 | |
| LM 5L | 4 | 5 | | 10 | | 29 | |
| LM 6L | 4 | 6 | | 12 | | 35 | |
| LM 8L | 4 | 8 | | 15 | | 45 | |
| LM 10L | 4 | 10 | | 19 | 55 | | |
| LM 12L | 4 | 12 | | 21 | 0 -0.016 | 57 | |
| LM 13L | 4 | 13 | | 23 | 61 | | |
| LM 16L | 5 | 16 | | 28 | 70 | | |
| LM 20L | 5 | 20 | | 32 | 80 | | |
| LM 25L | 6 | 25 | 0 -0.012 | 40 | 0 -0.019 | 112 | 0 -0.4 |
| LM 30L | 6 | 30 | 45 | 123 | | | |
| LM 35L | 6 | 35 | 52 | 135 | | | |
| LM 40L | 6 | 40 | 0 -0.015 | 60 | 0 -0.022 | 154 | |
| LM 50L | 6 | 50 | 80 | 192 | | | |
| LM 60L | 6 | 60 | 0 -0.020 | 90 | 0 -0.025 | 211 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LM13L UU

└── Seal attached on both ends of the nut



Unit: mm

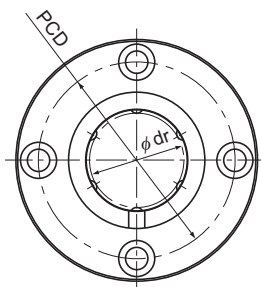
| dimensions | | | | | Eccentricity (max) μm | Radial clearance tolerance μm | Basic load rating | | Mass g |
|----------------|-----------|----------------|----------------|--------|-----------------------------|--|---------------------|------|-----------|
| L ₁ | Tolerance | L ₂ | D ₀ | C N | | | C ₀ N | | |
| — | — | — | — | 10 | -2 | 139 | 216 | 3 | |
| — | | — | — | 10 | -3 | 139 | 254 | 4 | |
| 20 | 0 -0.3 | 1.1 | 9.6 | 10 | -3 | 263 | 412 | 10 | |
| 27 | | 1.1 | 11.5 | 15 | -5 | 324 | 529 | 15 | |
| 35 | | 1.1 | 14.3 | 15 | -5 | 431 | 784 | 26 | |
| 44 | | 1.3 | 18 | 15 | -5 | 588 | 1100 | 48 | |
| 46 | | 1.3 | 20 | 15 | -5 | 657 | 1200 | 56 | |
| 46 | | 1.3 | 22 | 15 | -7 | 814 | 1570 | 75 | |
| 53 | | 1.6 | 27 | 15 | -7 | 1230 | 2350 | 147 | |
| 61 | | 1.6 | 30.5 | 20 | -9 | 1400 | 2750 | 163 | |
| 82 | | 0 -0.4 | 1.85 | 38 | 20 | -9 | 1560 | 3140 | 397 |
| 89 | | | 1.85 | 43 | 20 | -9 | 2490 | 5490 | 434 |
| 99 | 2.1 | | 49 | 25 | -13 | 2650 | 6270 | 696 | |
| 121 | 2.1 | | 57 | 25 | -13 | 3430 | 8040 | 1087 | |
| 148 | 2.6 | | 76.5 | 25 | -13 | 6080 | 15900 | 2770 | |
| 170 | 3.15 | | 86.5 | 25 | -16 | 7650 | 20000 | 3340 | |

Note) A stainless steel type (LM3ML to 30ML) is also available. Contact THK for details.

If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.

For further information, contact THK.

Model LMF



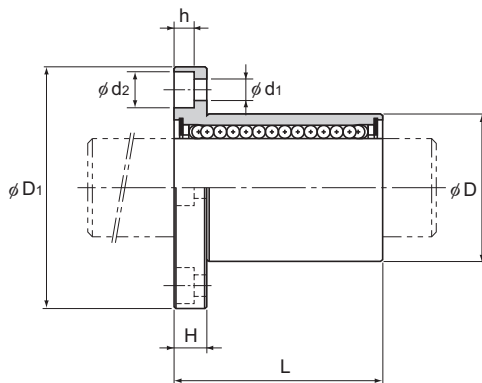
Model LMF

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D _f | Tolerance |
| LMF 6 | 4 | 6 | 0 -0.009 | 12 | 0 -0.011 | 19 | 0 -0.2 | 28 | 0 -0.2 |
| LMF 8S | 4 | 8 | | 15 | | 17 | | 32 | |
| LMF 8 | 4 | 8 | | 15 | 24 | 32 | | | |
| LMF 10 | 4 | 10 | | 19 | 29 | 39 | | | |
| LMF 12 | 4 | 12 | 21 | 0 -0.013 | 30 | 42 | 0 -0.2 | | |
| LMF 13 | 4 | 13 | 23 | 32 | 43 | | | | |
| LMF 16 | 5 | 16 | 28 | 37 | 48 | 0 -0.10 | 54 | | |
| LMF 20 | 5 | 20 | 32 | 42 | 54 | | | | |
| LMF 25 | 6 | 25 | 40 | 0 -0.016 | 59 | 62 | 0 -0.3 | | |
| LMF 30 | 6 | 30 | 45 | 64 | 74 | | | | |
| LMF 35 | 6 | 35 | 52 | 0 -0.019 | 70 | 82 | | | |
| LMF 40 | 6 | 40 | 60 | 80 | 96 | 0 -0.3 | | | |
| LMF 50 | 6 | 50 | 80 | 100 | 116 | | | | |
| LMF 60 | 6 | 60 | 90 | 0 -0.022 | 110 | | 134 | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMF25 UU

└── Seal attached on both ends of the nut

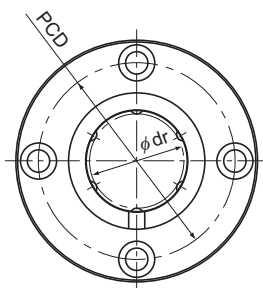


Unit: mm

| | H | PCD | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|-----|--|----------------------------|-----------------------|----------------------------------|-------------------|---------------------|-----------|
| | | | | μm | μm | μm | C N | C ₀ N | |
| | 5 | 20 | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 206 | 265 | 23 |
| | 5 | 24 | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 176 | 225 | 29 |
| | 5 | 24 | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 265 | 402 | 33 |
| | 6 | 29 | 4.5 × 8 × 4.4 | 12 | 12 | -5 | 373 | 549 | 59 |
| | 6 | 32 | 4.5 × 8 × 4.4 | 12 | 12 | -5 | 412 | 598 | 68 |
| | 6 | 33 | 4.5 × 8 × 4.4 | 12 | 12 | -7 | 510 | 775 | 80 |
| | 6 | 38 | 4.5 × 8 × 4.4 | 12 | 12 | -7 | 775 | 1180 | 126 |
| | 8 | 43 | 5.5 × 9.2 × 5.4 | 15 | 15 | -9 | 863 | 1370 | 160 |
| | 8 | 51 | 5.5 × 9.2 × 5.4 | 15 | 15 | -9 | 980 | 1570 | 305 |
| | 10 | 60 | 6.6 × 11 × 6.5 | 15 | 15 | -9 | 1570 | 2750 | 422 |
| | 10 | 67 | 6.6 × 11 × 6.5 | 20 | 20 | -13 | 1670 | 3140 | 583 |
| | 13 | 78 | 9 × 14 × 8.6 | 20 | 20 | -13 | 2160 | 4020 | 960 |
| | 13 | 98 | 9 × 14 × 8.6 | 20 | 20 | -13 | 3820 | 7940 | 1920 |
| | 18 | 112 | 11 × 17.5 × 10.8 | 25 | 25 | -13 | 4710 | 10000 | 2720 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMF-M (Stainless Steel Type)



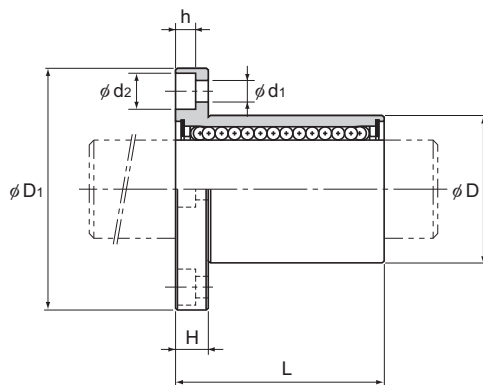
Model LMF-M

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D _i | Tolerance |
| LMF 6M | 4 | 6 | 0 -0.009 | 12 | 0 -0.011 | 19 | 0 -0.2 | 28 | 0 -0.2 |
| LMF 8SM | 4 | 8 | | 15 | | 17 | | 32 | |
| LMF 8M | 4 | 8 | | 15 | 24 | 32 | | | |
| LMF 10M | 4 | 10 | | 19 | 29 | 39 | | | |
| LMF 12M | 4 | 12 | 21 | 0 -0.013 | 30 | 42 | | | |
| LMF 13M | 4 | 13 | 23 | 32 | 43 | | | | |
| LMF 16M | 5 | 16 | 28 | 37 | 48 | | | | |
| LMF 20M | 5 | 20 | 32 | 0 -0.016 | 42 | 54 | | | |
| LMF 25M | 6 | 25 | 40 | 59 | 0 -0.3 | 62 | | | |
| LMF 30M | 6 | 30 | 45 | 64 | 74 | | | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMF20M UU

└── Seal attached on both ends of the nut

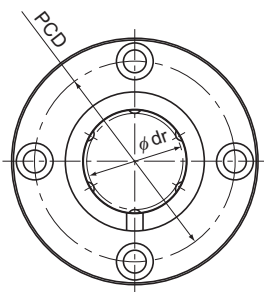


Unit: mm

| | H | PCD | Mounting hole $d_1 \times d_2 \times h$ | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|-----|--|-------------------------|--------------------|----------------------------|-------------------|---------|--------|
| | | | | μm | μm | μm | C N | C_0 N | |
| | 5 | 20 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 206 | 265 | 23 |
| | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 176 | 225 | 29 |
| | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 265 | 402 | 33 |
| | 6 | 29 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -5 | 373 | 549 | 59 |
| | 6 | 32 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -5 | 412 | 598 | 68 |
| | 6 | 33 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -7 | 510 | 775 | 80 |
| | 6 | 38 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -7 | 775 | 1180 | 126 |
| | 8 | 43 | $5.5 \times 9.2 \times 5.4$ | 15 | 15 | -9 | 863 | 1370 | 160 |
| | 8 | 51 | $5.5 \times 9.2 \times 5.4$ | 15 | 15 | -9 | 980 | 1570 | 305 |
| | 10 | 60 | $6.6 \times 11 \times 6.5$ | 15 | 15 | -9 | 1570 | 2750 | 422 |

Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.
If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMF-L



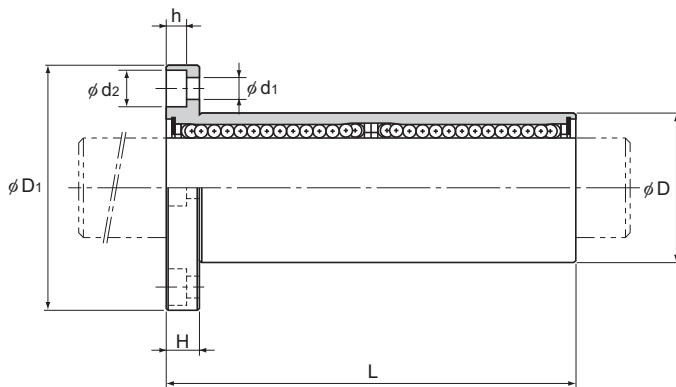
Model LMF-L

| Model No. Standard type | Ball rows | Main dimensions | | | | | | | | | | |
|----------------------------|-----------|-------------------------|-------------|----------------|-------------|-------------|-----------|-----------------|-----------|-----------|-----------|----|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | | | | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance | | | |
| LMF 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | 0 -0.3 | 28 | 0 -0.2 | | | |
| LMF 8L | 4 | 8 | | 15 | -0.013 | 45 | | 32 | | | | |
| LMF 10L | 4 | 10 | | 19 | 0 -0.016 | 55 | | 39 | | | | |
| LMF 12L | 4 | 12 | | 21 | | 57 | | 42 | | | | |
| LMF 13L | 4 | 13 | | 23 | | 61 | | 43 | | | | |
| LMF 16L | 5 | 16 | | 28 | 0 -0.012 | 70 | | 0 -0.4 | | 48 | 0 -0.3 | |
| LMF 20L | 5 | 20 | | 32 | | 80 | | | | 54 | | |
| LMF 25L | 6 | 25 | | 40 | | 0 -0.019 | | | | 112 | | 62 |
| LMF 30L | 6 | 30 | | 45 | | 123 | | | | 74 | | |
| LMF 35L | 6 | 35 | | 52 | | 0 -0.022 | | | | 135 | | 82 |
| LMF 40L | 6 | 40 | 60 | 154 | | | 96 | | | | | |
| LMF 50L | 6 | 50 | 80 | 192 | | | 116 | | | | | |
| LMF 60L | 6 | 60 | 0 -0.020 | 90 | | 0 -0.025 | 211 | | 134 | 0 -0.3 | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMF35L UU

└─── Seal attached on both ends of the nut

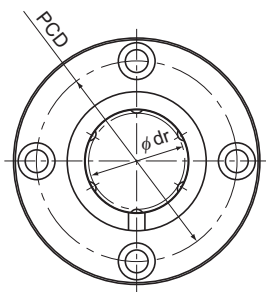


Unit: mm

| | H | PCD | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|-----|--|----------------------------|-----------------------|----------------------------------|-------------------|---------------------|-----------|
| | | | | μm | μm | μm | C N | C ₀ N | |
| | 5 | 20 | 3.4 × 6.5 × 3.3 | 15 | 15 | -5 | 324 | 529 | 29 |
| | 5 | 24 | 3.4 × 6.5 × 3.3 | 15 | 15 | -5 | 431 | 784 | 45 |
| | 6 | 29 | 4.5 × 8 × 4.4 | 15 | 15 | -5 | 588 | 1100 | 81 |
| | 6 | 32 | 4.5 × 8 × 4.4 | 15 | 15 | -5 | 657 | 1200 | 93 |
| | 6 | 33 | 4.5 × 8 × 4.4 | 15 | 15 | -7 | 814 | 1570 | 115 |
| | 6 | 38 | 4.5 × 8 × 4.4 | 15 | 15 | -7 | 1230 | 2350 | 194 |
| | 8 | 43 | 5.5 × 9.2 × 5.4 | 20 | 20 | -9 | 1400 | 2750 | 250 |
| | 8 | 51 | 5.5 × 9.2 × 5.4 | 20 | 20 | -9 | 1560 | 3140 | 500 |
| | 10 | 60 | 6.6 × 11 × 6.5 | 20 | 20 | -9 | 2490 | 5490 | 646 |
| | 10 | 67 | 6.6 × 11 × 6.5 | 25 | 25 | -13 | 2650 | 6270 | 930 |
| | 13 | 78 | 9 × 14 × 8.6 | 25 | 25 | -13 | 3430 | 8040 | 1488 |
| | 13 | 98 | 9 × 14 × 8.6 | 25 | 25 | -13 | 6080 | 15900 | 3268 |
| | 18 | 112 | 11 × 17.5 × 10.8 | 25 | 25 | -13 | 7650 | 20000 | 4342 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMF-ML (Stainless Steel Type)



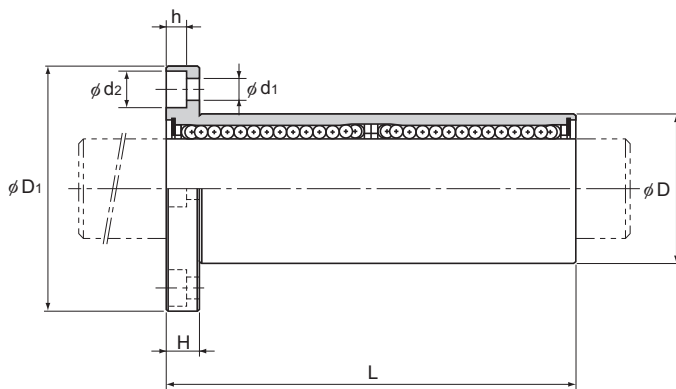
Model LMF-ML

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMF 6ML | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | 0 -0.3 | 28 | 0 -0.2 |
| LMF 8ML | 4 | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMF 10ML | 4 | 10 | | 19 | 0 -0.016 | 55 | | 39 | |
| LMF 12ML | 4 | 12 | | 21 | | 57 | | 42 | |
| LMF 13ML | 4 | 13 | 23 | 0 -0.019 | 61 | 43 | | | |
| LMF 16ML | 5 | 16 | 28 | | 70 | 48 | | | |
| LMF 20ML | 5 | 20 | 32 | 0 -0.012 | 80 | 54 | | | |
| LMF 25ML | 6 | 25 | 40 | | 112 | 0 | 62 | | |
| LMF 30ML | 6 | 30 | 45 | | 123 | -0.4 | 74 | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMF13ML UU

└── Seal attached on both ends of the nut

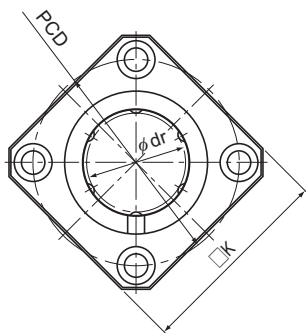


Unit: mm

| | H | PCD | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|-----|--|----------------------------|-----------------------|----------------------------------|-------------------|---------------------|-----------|
| | | | | μm | μm | μm | C N | C ₀ N | |
| | 5 | 20 | 3.4 × 6.5 × 3.3 | 15 | 15 | -5 | 324 | 529 | 29 |
| | 5 | 24 | 3.4 × 6.5 × 3.3 | 15 | 15 | -5 | 431 | 784 | 45 |
| | 6 | 29 | 4.5 × 8 × 4.4 | 15 | 15 | -5 | 588 | 1100 | 81 |
| | 6 | 32 | 4.5 × 8 × 4.4 | 15 | 15 | -5 | 657 | 1200 | 93 |
| | 6 | 33 | 4.5 × 8 × 4.4 | 15 | 15 | -7 | 814 | 1570 | 115 |
| | 6 | 38 | 4.5 × 8 × 4.4 | 15 | 15 | -7 | 1230 | 2350 | 194 |
| | 8 | 43 | 5.5 × 9.2 × 5.4 | 20 | 20 | -9 | 1400 | 2750 | 250 |
| | 8 | 51 | 5.5 × 9.2 × 5.4 | 20 | 20 | -9 | 1560 | 3140 | 500 |
| | 10 | 60 | 6.6 × 11 × 6.5 | 20 | 20 | -9 | 2490 | 5490 | 646 |

Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.
If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMK



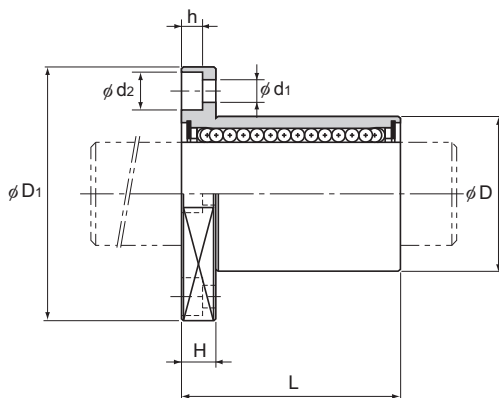
Model LMK

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D _i | Tolerance |
| LMK 6 | 4 | 6 | 0 -0.009 | 12 | 0 -0.011 | 19 | 0 -0.2 | 28 | 0 -0.2 |
| LMK 8S | 4 | 8 | | 15 | | 17 | | 32 | |
| LMK 8 | 4 | 8 | | 15 | 24 | 32 | | | |
| LMK 10 | 4 | 10 | | 19 | 29 | 39 | | | |
| LMK 12 | 4 | 12 | 21 | 0 -0.013 | 30 | 42 | | | |
| LMK 13 | 4 | 13 | 23 | 32 | 43 | | | | |
| LMK 16 | 5 | 16 | 28 | 37 | 48 | | | | |
| LMK 20 | 5 | 20 | 32 | 42 | 54 | | | | |
| LMK 25 | 6 | 25 | 0 -0.010 | 40 | 0 -0.016 | 59 | 62 | | |
| LMK 30 | 6 | 30 | 45 | 64 | 74 | | | | |
| LMK 35 | 6 | 35 | 0 -0.012 | 52 | 0 -0.019 | 70 | 82 | | |
| LMK 40 | 6 | 40 | 60 | 80 | 96 | | | | |
| LMK 50 | 6 | 50 | 80 | 100 | 116 | | | | |
| LMK 60 | 6 | 60 | 0 -0.015 | 90 | 0 -0.022 | 110 | 134 | 0 -0.3 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMK13 UU

└── Seal attached on both ends of the nut

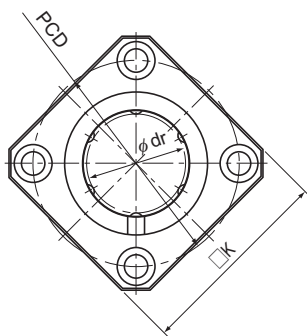


Unit: mm

| | K | H | PCD | Mounting hole $d_1 \times d_2 \times h$ | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|-----|----|-----|--|-------------------------|--------------------|----------------------------|-------------------|------------|-----------|
| | | | | | μm | μm | μm | C N | C_0 N | |
| | 22 | 5 | 20 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 206 | 265 | 17 |
| | 25 | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 176 | 225 | 25 |
| | 25 | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 265 | 402 | 26 |
| | 30 | 6 | 29 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -5 | 373 | 549 | 45 |
| | 32 | 6 | 32 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -5 | 412 | 598 | 50 |
| | 34 | 6 | 33 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -7 | 510 | 775 | 67 |
| | 37 | 6 | 38 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -7 | 775 | 1180 | 105 |
| | 42 | 8 | 43 | $5.5 \times 9.2 \times 5.4$ | 15 | 15 | -9 | 863 | 1370 | 130 |
| | 50 | 8 | 51 | $5.5 \times 9.2 \times 5.4$ | 15 | 15 | -9 | 980 | 1570 | 270 |
| | 58 | 10 | 60 | $6.6 \times 11 \times 6.5$ | 15 | 15 | -9 | 1570 | 2750 | 344 |
| | 64 | 10 | 67 | $6.6 \times 11 \times 6.5$ | 20 | 20 | -13 | 1670 | 3140 | 487 |
| | 75 | 13 | 78 | $9 \times 14 \times 8.6$ | 20 | 20 | -13 | 2160 | 4020 | 790 |
| | 92 | 13 | 98 | $9 \times 14 \times 8.6$ | 20 | 20 | -13 | 3820 | 7940 | 1705 |
| | 106 | 18 | 112 | $11 \times 17.5 \times 10.8$ | 25 | 25 | -13 | 4710 | 10000 | 2278 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMK-M (Stainless Steel Type)



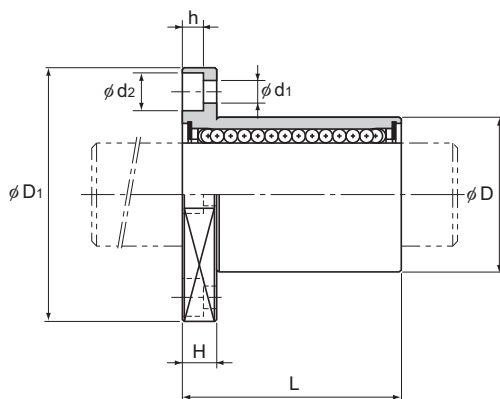
Model LMK-M

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D_f | Tolerance |
| LMK 6M | 4 | 6 | 0 -0.009 | 12 | 0 -0.011 | 19 | 0 -0.2 | 28 | 0 -0.2 |
| LMK 8SM | 4 | 8 | | 15 | | 17 | | 32 | |
| LMK 8M | 4 | 8 | | 15 | 24 | 32 | | | |
| LMK 10M | 4 | 10 | | 19 | 29 | 39 | | | |
| LMK 12M | 4 | 12 | 21 | 0 -0.013 | 30 | 42 | | | |
| LMK 13M | 4 | 13 | 23 | 32 | 43 | | | | |
| LMK 16M | 5 | 16 | 28 | 37 | 48 | | | | |
| LMK 20M | 5 | 20 | 32 | 0 -0.016 | 42 | 54 | | | |
| LMK 25M | 6 | 25 | 40 | 59 | 0 -0.3 | 62 | | | |
| LMK 30M | 6 | 30 | 45 | 64 | 74 | | | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMK25M UU

└── Seal attached on both ends of the nut

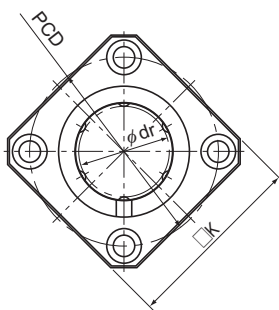


Unit: mm

| | K | H | PCD | Mounting hole $d_1 \times d_2 \times h$ | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|----|-----|--|-------------------------|--------------------|----------------------------|-------------------|---------|--------|
| | | | | | μm | μm | μm | C N | C_0 N | |
| | 22 | 5 | 20 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 206 | 265 | 17 |
| | 25 | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 176 | 225 | 25 |
| | 25 | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 12 | 12 | -5 | 265 | 402 | 26 |
| | 30 | 6 | 29 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -5 | 373 | 549 | 45 |
| | 32 | 6 | 32 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -5 | 412 | 598 | 50 |
| | 34 | 6 | 33 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -7 | 510 | 775 | 67 |
| | 37 | 6 | 38 | $4.5 \times 8 \times 4.4$ | 12 | 12 | -7 | 775 | 1180 | 105 |
| | 42 | 8 | 43 | $5.5 \times 9.2 \times 5.4$ | 15 | 15 | -9 | 863 | 1370 | 130 |
| | 50 | 8 | 51 | $5.5 \times 9.2 \times 5.4$ | 15 | 15 | -9 | 980 | 1570 | 270 |
| | 58 | 10 | 60 | $6.6 \times 11 \times 6.5$ | 15 | 15 | -9 | 1570 | 2750 | 344 |

Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.
If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMK-L



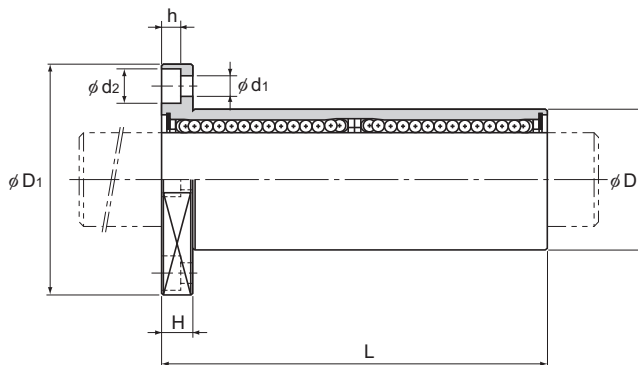
Model LMK-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|-------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMK 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | 0 -0.3 | 28 | 0 -0.2 |
| LMK 8L | 4 | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMK 10L | 4 | 10 | | 19 | 0 -0.016 | 55 | | 39 | |
| LMK 12L | 4 | 12 | | 21 | | 57 | | 42 | |
| LMK 13L | 4 | 13 | 23 | 0 -0.012 | 61 | 0 -0.4 | 43 | 0 -0.2 | |
| LMK 16L | 5 | 16 | 28 | | 70 | | 48 | | |
| LMK 20L | 5 | 20 | 32 | 0 | 80 | 0 -0.019 | 54 | 0 -0.2 | |
| LMK 25L | 6 | 25 | 40 | 112 | 62 | | | | |
| LMK 30L | 6 | 30 | 45 | 0 -0.022 | 123 | 0 -0.4 | 74 | 0 -0.3 | |
| LMK 35L | 6 | 35 | 52 | | 135 | | 82 | | |
| LMK 40L | 6 | 40 | 60 | 0 -0.025 | 154 | 0 -0.4 | 96 | 0 -0.3 | |
| LMK 50L | 6 | 50 | 80 | | 192 | | 116 | | |
| LMK 60L | 6 | 60 | 90 | 0 | 211 | 0 | 134 | 0 -0.3 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMK50L UU

└─── Seal attached on both ends of the nut

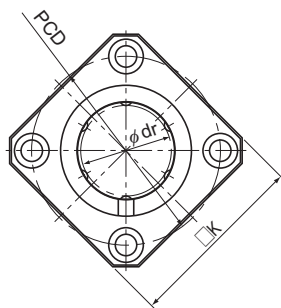


Unit: mm

| | K | H | PCD | Mounting hole $d_1 \times d_2 \times h$ | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|-----|----|-----|--|-------------------------|--------------------|----------------------------|-------------------|------------|-----------|
| | | | | | μm | μm | μm | C N | C_0 N | |
| | 22 | 5 | 20 | $3.4 \times 6.5 \times 3.3$ | 15 | 15 | -5 | 324 | 529 | 24 |
| | 25 | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 15 | 15 | -5 | 431 | 784 | 39 |
| | 30 | 6 | 29 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -5 | 588 | 1100 | 68 |
| | 32 | 6 | 32 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -5 | 657 | 1200 | 76 |
| | 34 | 6 | 33 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -7 | 814 | 1570 | 100 |
| | 37 | 6 | 38 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -7 | 1230 | 2350 | 176 |
| | 42 | 8 | 43 | $5.5 \times 9.2 \times 5.4$ | 20 | 20 | -9 | 1400 | 2750 | 210 |
| | 50 | 8 | 51 | $5.5 \times 9.2 \times 5.4$ | 20 | 20 | -9 | 1560 | 3140 | 466 |
| | 58 | 10 | 60 | $6.6 \times 11 \times 6.5$ | 20 | 20 | -9 | 2490 | 5490 | 569 |
| | 64 | 10 | 67 | $6.6 \times 11 \times 6.5$ | 25 | 25 | -13 | 2650 | 6270 | 825 |
| | 75 | 13 | 78 | $9 \times 14 \times 8.6$ | 25 | 25 | -13 | 3430 | 8040 | 1321 |
| | 92 | 13 | 98 | $9 \times 14 \times 8.6$ | 25 | 25 | -13 | 6080 | 15900 | 2952 |
| | 106 | 18 | 112 | $11 \times 17.5 \times 10.8$ | 25 | 25 | -13 | 7650 | 20000 | 3883 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMK-ML (Stainless Steel Type)



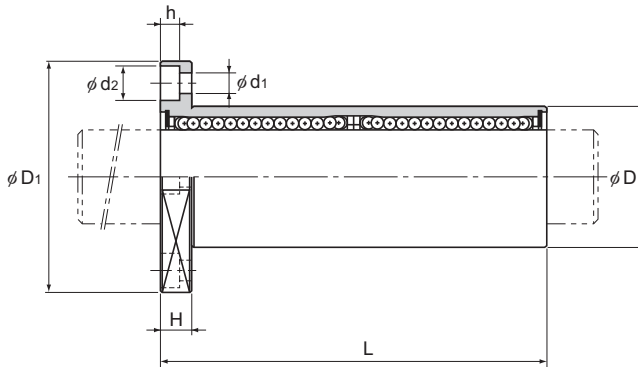
Model LMK-ML

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-----------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMK 6ML | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | 0 -0.3 | 28 | 0 -0.2 |
| LMK 8ML | 4 | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMK 10ML | 4 | 10 | | 19 | 0 | 55 | | 39 | |
| LMK 12ML | 4 | 12 | | 21 | -0.016 | 57 | | 42 | |
| LMK 13ML | 4 | 13 | | 23 | 0 | 61 | | 43 | |
| LMK 16ML | 5 | 16 | 28 | 0 | 70 | 48 | | | |
| LMK 20ML | 5 | 20 | 32 | 0 | 80 | 54 | | | |
| LMK 25ML | 6 | 25 | 40 | -0.019 | 112 | 0 | 62 | | |
| LMK 30ML | 6 | 30 | 45 | 0 | 123 | -0.4 | 74 | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMK8ML UU

└── Seal attached on both ends of the nut

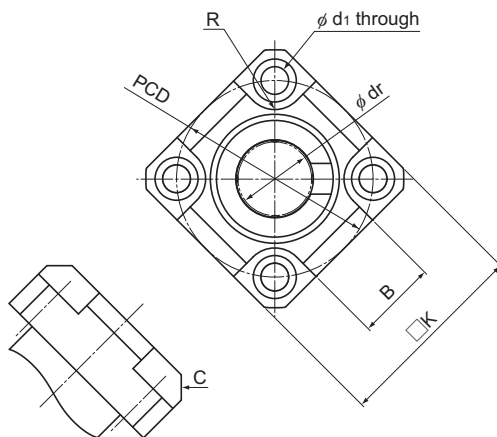


Unit: mm

| | K | H | PCD | Mounting hole $d_1 \times d_2 \times h$ | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|----|-----|--|-------------------------|--------------------|----------------------------|-------------------|------------|-----------|
| | | | | | μm | μm | μm | C N | C_0 N | |
| | 22 | 5 | 20 | $3.4 \times 6.5 \times 3.3$ | 15 | 15 | -5 | 324 | 529 | 24 |
| | 25 | 5 | 24 | $3.4 \times 6.5 \times 3.3$ | 15 | 15 | -5 | 431 | 784 | 39 |
| | 30 | 6 | 29 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -5 | 588 | 1100 | 68 |
| | 32 | 6 | 32 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -5 | 657 | 1200 | 76 |
| | 34 | 6 | 33 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -7 | 814 | 1570 | 100 |
| | 37 | 6 | 38 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -7 | 1230 | 2350 | 176 |
| | 42 | 8 | 43 | $5.5 \times 9.2 \times 5.4$ | 20 | 20 | -9 | 1400 | 2750 | 210 |
| | 50 | 8 | 51 | $5.5 \times 9.2 \times 5.4$ | 20 | 20 | -9 | 1560 | 3140 | 466 |
| | 58 | 10 | 60 | $6.6 \times 11 \times 6.5$ | 20 | 20 | -9 | 2490 | 5490 | 569 |

Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.
If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMJK



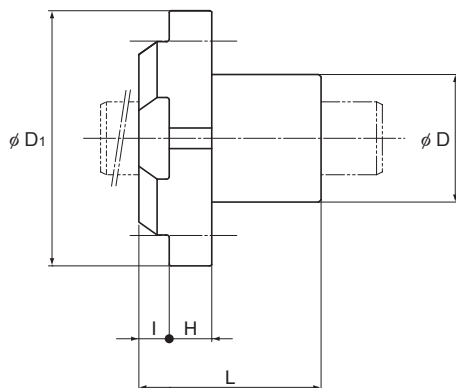
Model LMJK

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|-----------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMJK 8 | 4 | 8 | 0 -0.009 | 15 | 0 -0.011 | 24 | 0 -0.2 | 32 | 0 -0.2 |
| LMJK 10 | 4 | 10 | | 19 | 0 | 29 | | 39 | |
| LMJK 12 | 4 | 12 | | 21 | 0 -0.013 | 30 | | 42 | |
| LMJK 16 | 5 | 16 | | 28 | 0 | 37 | | 48 | |
| LMJK 20 | 5 | 20 | 32 | 0 | 42 | 54 | | | |
| LMJK 25 | 6 | 25 | 40 | 0 -0.016 | 59 | 0 -0.3 | 62 | | |

Note) Includes synthetic resin; do not use in temperatures exceeding 80°C.
If seals must be attached, please specify when placing an order.

(Example) LMJK8 UU

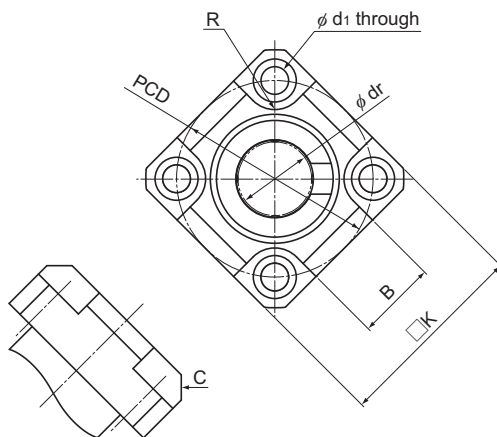
└── Seal attached on both ends of the nut



Unit: mm

| | K | B | R | H | I | C | PCD | Mounting hole d_i | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|----|----|----|---|----|-----|------------------------|-------------------------|--------------------|----------------------------|-------------------|------------|-----------|
| | | | | | | | | | μm | μm | μm | C N | C_0 N | |
| | 25 | 10 | R4 | 6 | 4 | C3 | 24 | 3.4 | 12 | 12 | -5 | 265 | 402 | 20 |
| | 30 | 12 | R5 | 7 | 5 | | 29 | 4.5 | | | | 373 | 549 | 35 |
| | 32 | 13 | | | | | 412 | | | | | 598 | 38 | |
| | 37 | 18 | | | | | 775 | | | | | 1180 | 88 | |
| | 42 | 21 | R6 | 10 | 6 | | 43 | 5.5 | 15 | 15 | -7 | 863 | 1370 | 104 |
| | 50 | 26 | | | | 51 | -9 | | 980 | 1570 | 234 | | | |

Model LMJK-L



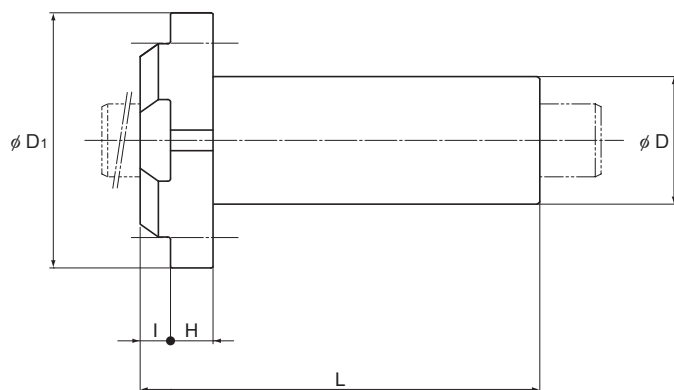
Model LMJK-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|-----------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMJK 8L | 4 | 8 | 0 -0.010 | 15 | 0 -0.013 | 45 | 0 -0.3 | 32 | 0 -0.2 |
| LMJK 10L | 4 | 10 | | 19 | 0 | 55 | | 39 | |
| LMJK 12L | 4 | 12 | | 21 | 0 -0.016 | 57 | | 42 | |
| LMJK 16L | 5 | 16 | 28 | 0 | 70 | 48 | | | |
| LMJK 20L | 5 | 20 | 32 | 0 | 80 | 54 | | | |
| LMJK 25L | 6 | 25 | 40 | 0 -0.019 | 112 | 0 -0.4 | 62 | | |

Note) Includes synthetic resin; do not use in temperatures exceeding 80°C.
If seals must be attached, please specify when placing an order.

(Example) LMJK8L UU

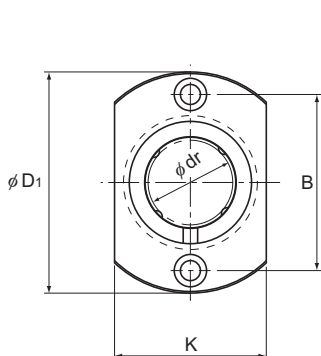
Seal attached on both ends of the nut



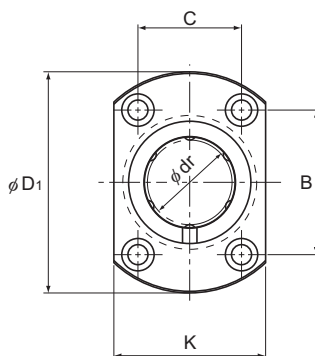
Unit: mm

| | K | B | R | H | I | C | PCD | Mounting hole d_i | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|----|----|----|---|----|------|------------------------|-------------------------|--------------------|----------------------------|-------------------|------------|-----------|
| | | | | | | | | | μm | μm | μm | C N | C_0 N | |
| | 25 | 10 | R4 | 6 | 4 | C3 | 24 | 3.4 | 15 | 15 | -5 | 431 | 784 | 32 |
| | 30 | 12 | R5 | 7 | 5 | | 29 | 4.5 | | | | 588 | 1100 | 58 |
| | 32 | 13 | | | | | 657 | | | | | 1200 | 63 | |
| | 37 | 18 | | | | | 1230 | | | | 2350 | 158 | | |
| | 42 | 21 | R6 | 10 | 6 | | 43 | 5.5 | | | 20 | 20 | -7 | 1400 |
| | 50 | 26 | | | | 51 | -9 | | 1560 | 3140 | | | 421 | |

Model LMH



Models LMH6 to 13



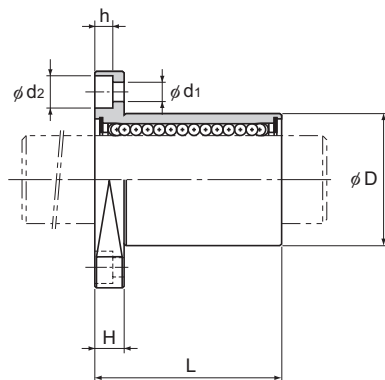
Models LMH16 to 30

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMH 6 | 4 | 6 | 0 -0.009 | 12 | 0 | 19 | 0 -0.2 | 28 | 0 -0.2 |
| LMH 8S | 4 | 8 | | 15 | | -0.011 | | 17 | |
| LMH 8 | 4 | 8 | | 15 | 24 | | | 32 | |
| LMH 10 | 4 | 10 | | 19 | 0 -0.013 | 29 | | 39 | |
| LMH 12 | 4 | 12 | | 21 | | 30 | | 42 | |
| LMH 13 | 4 | 13 | 23 | 32 | | 43 | | | |
| LMH 16 | 5 | 16 | 28 | 0 -0.016 | 37 | 48 | | | |
| LMH 20 | 5 | 20 | 32 | | 42 | 54 | | | |
| LMH 25 | 6 | 25 | 40 | | 59 | 62 | | | |
| LMH 30 | 6 | 30 | 45 | 64 | -0.3 | 74 | | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMH16 UU

└────────── Seal attached on both ends of the nut

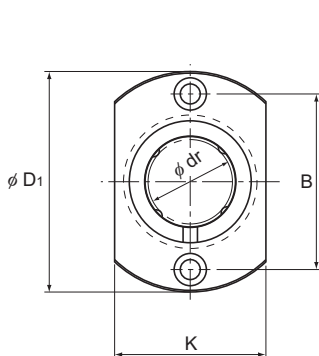


Unit: mm

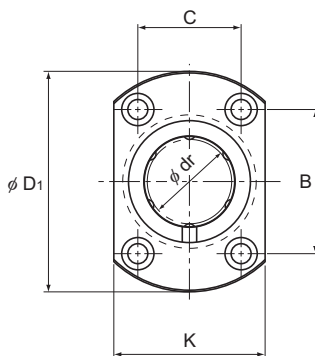
| | K | H | B | C | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|----|----|----|--|----------------------------|-----------------------|----------------------------------|-------------------|---------------------|-----------|
| | | | | | | μm | μm | μm | C N | C ₀ N | |
| | 18 | 5 | 20 | — | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 206 | 265 | 20 |
| | 21 | 5 | 24 | — | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 176 | 225 | 24 |
| | 21 | 5 | 24 | — | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 265 | 402 | 28 |
| | 25 | 6 | 29 | — | 4.5 × 8 × 4.4 | 12 | 12 | -5 | 373 | 549 | 50 |
| | 27 | 6 | 32 | — | 4.5 × 8 × 4.4 | 12 | 12 | -5 | 412 | 598 | 56 |
| | 29 | 6 | 33 | — | 4.5 × 8 × 4.4 | 12 | 12 | -7 | 510 | 775 | 69 |
| | 34 | 6 | 31 | 22 | 4.5 × 8 × 4.4 | 12 | 12 | -7 | 775 | 1180 | 111 |
| | 38 | 8 | 36 | 24 | 5.5 × 9.2 × 5.4 | 15 | 15 | -9 | 863 | 1370 | 140 |
| | 46 | 8 | 40 | 32 | 5.5 × 9.2 × 5.4 | 15 | 15 | -9 | 980 | 1570 | 279 |
| | 51 | 10 | 49 | 35 | 6.6 × 11 × 6.5 | 15 | 15 | -9 | 1570 | 2750 | 351 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMH-M (Stainless Steel Type)



Models LMH 6M to 13M



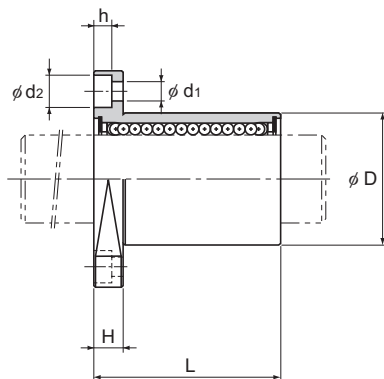
Models LMH 16M to 30M

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMH 6M | 4 | 6 | 0 -0.009 | 12 | 0 -0.011 | 19 | 0 -0.2 | 28 | 0 -0.2 |
| LMH 8SM | 4 | 8 | | 15 | | 17 | | 32 | |
| LMH 8M | 4 | 8 | | 15 | | 24 | | 32 | |
| LMH 10M | 4 | 10 | | 19 | 29 | 39 | | | |
| LMH 12M | 4 | 12 | | 21 | 30 | 42 | | | |
| LMH 13M | 4 | 13 | 23 | 32 | 43 | | | | |
| LMH 16M | 5 | 16 | 28 | 37 | 48 | | | | |
| LMH 20M | 5 | 20 | 32 | 42 | 54 | | | | |
| LMH 25M | 6 | 25 | 40 | 59 | 62 | | | | |
| LMH 30M | 6 | 30 | 45 | 64 | 74 | | | | |

Note) Since this model contains a synthetic resin retainer, do not use it in temperatures exceeding 80°C.
If an equipped seal is required, please specify when placing an order.

(Example) LMH16M UU

└─── Seal attached on both ends of the nut

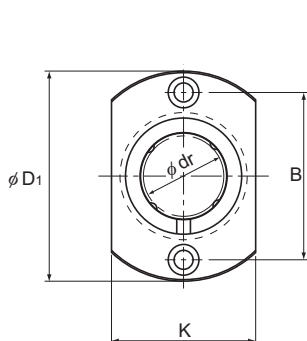


Unit: mm

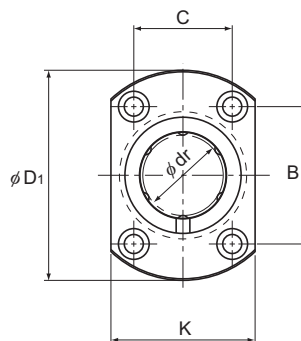
| | K | H | B | C | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity μm | Eccentricity (max) μm | Radial clearance tolerance μm | Basic load rating | | Mass g |
|--|----|----|----|----|--|----------------------------------|-----------------------------|--|-------------------|---------------------|-----------|
| | | | | | | | | | C N | C ₀ N | |
| | 18 | 5 | 20 | — | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 206 | 265 | 20 |
| | 21 | 5 | 24 | — | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 176 | 225 | 24 |
| | 21 | 5 | 24 | — | 3.4 × 6.5 × 3.3 | 12 | 12 | -5 | 265 | 402 | 28 |
| | 25 | 6 | 29 | — | 4.5 × 8 × 4.4 | 12 | 12 | -5 | 373 | 549 | 50 |
| | 27 | 6 | 32 | — | 4.5 × 8 × 4.4 | 12 | 12 | -5 | 412 | 598 | 56 |
| | 29 | 6 | 33 | — | 4.5 × 8 × 4.4 | 12 | 12 | -7 | 510 | 775 | 69 |
| | 34 | 6 | 31 | 22 | 4.5 × 8 × 4.4 | 12 | 12 | -7 | 775 | 1180 | 111 |
| | 38 | 8 | 36 | 24 | 5.5 × 9.2 × 5.4 | 15 | 15 | -9 | 863 | 1370 | 140 |
| | 46 | 8 | 40 | 32 | 5.5 × 9.2 × 5.4 | 15 | 15 | -9 | 980 | 1570 | 279 |
| | 51 | 10 | 49 | 35 | 6.6 × 11 × 6.5 | 15 | 15 | -9 | 1570 | 2750 | 351 |

Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.
If oil holes are required, please specify by adding OH to the end of the model number.
For further information, contact THK.

Model LMH-L



Models LMH6L to 13L



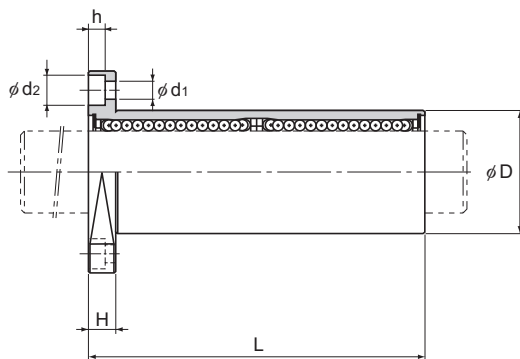
Models LMH16L to 30L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|---------------|-----------|-------------------------|-------------|----------------|-----------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| Standard type | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMH 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | 0 -0.3 | 28 | 0 -0.2 |
| LMH 8L | 4 | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMH 10L | 4 | 10 | | 19 | 55 | 39 | | | |
| LMH 12L | 4 | 12 | | 21 | 0 | 57 | | 42 | |
| LMH 13L | 4 | 13 | | 23 | -0.016 | 61 | | 43 | |
| LMH 16L | 5 | 16 | 28 | 70 | 48 | | | | |
| LMH 20L | 5 | 20 | 0 | 32 | 0 | 80 | 54 | | |
| LMH 25L | 6 | 25 | -0.012 | 40 | -0.019 | 112 | 0 | 62 | |
| LMH 30L | 6 | 30 | 45 | -0.019 | 123 | -0.4 | 74 | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMH20L UU

Seal attached on both ends of the nut

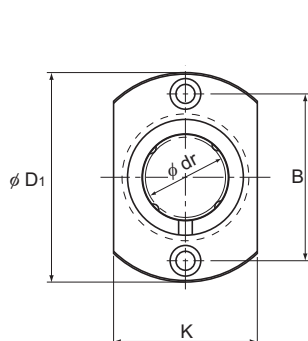


Unit: mm

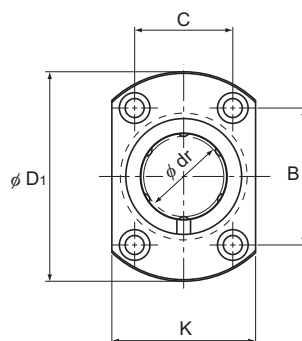
| | K | H | B | C | Mounting hole $d_1 \times d_2 \times h$ | Flange perpendicularity μm | Eccentricity (max) μm | Radial clearance tolerance μm | Basic load rating | | Mass g |
|--|----|----|----|----|--|---|--|---|-------------------|------------|-----------|
| | | | | | | | | | C N | C_0 N | |
| | 18 | 5 | 20 | — | $3.4 \times 6.5 \times 3.3$ | 15 | 15 | -5 | 324 | 529 | 27 |
| | 21 | 5 | 24 | — | $3.4 \times 6.5 \times 3.3$ | 15 | 15 | -5 | 431 | 784 | 41 |
| | 25 | 6 | 29 | — | $4.5 \times 8 \times 4.4$ | 15 | 15 | -5 | 588 | 1100 | 72 |
| | 27 | 6 | 32 | — | $4.5 \times 8 \times 4.4$ | 15 | 15 | -5 | 657 | 1200 | 81 |
| | 29 | 6 | 33 | — | $4.5 \times 8 \times 4.4$ | 15 | 15 | -7 | 814 | 1570 | 105 |
| | 34 | 6 | 31 | 22 | $4.5 \times 8 \times 4.4$ | 15 | 15 | -7 | 1230 | 2350 | 182 |
| | 38 | 8 | 36 | 24 | $5.5 \times 9.2 \times 5.4$ | 20 | 20 | -9 | 1400 | 2750 | 217 |
| | 46 | 8 | 40 | 32 | $5.5 \times 9.2 \times 5.4$ | 20 | 20 | -9 | 1560 | 3140 | 477 |
| | 51 | 10 | 49 | 35 | $6.6 \times 11 \times 6.5$ | 20 | 20 | -9 | 2490 | 5490 | 575 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMH-ML (Stainless Steel Type)



Models LMH 6ML to 13ML



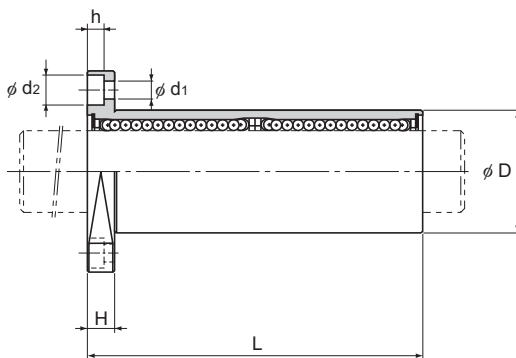
Models LMH 16ML to 30ML

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|--------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D_1 | Tolerance |
| LMH 6ML | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | 0 -0.3 | 28 | 0 -0.2 |
| LMH 8ML | 4 | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMH 10ML | 4 | 10 | | 19 | 0 -0.016 | 55 | | 39 | |
| LMH 12ML | 4 | 12 | | 21 | | 57 | | 42 | |
| LMH 13ML | 4 | 13 | | 23 | | 61 | | 43 | |
| LMH 16ML | 5 | 16 | 28 | 70 | 48 | | | | |
| LMH 20ML | 5 | 20 | 32 | 80 | 54 | | | | |
| LMH 25ML | 6 | 25 | 40 | 0 -0.019 | 112 | 0 | 62 | | |
| LMH 30ML | 6 | 30 | 45 | | 123 | -0.4 | 74 | | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If an equipped seal is required, please specify when placing an order.

(Example) LMH20ML UU

Seal attached on both ends of the nut

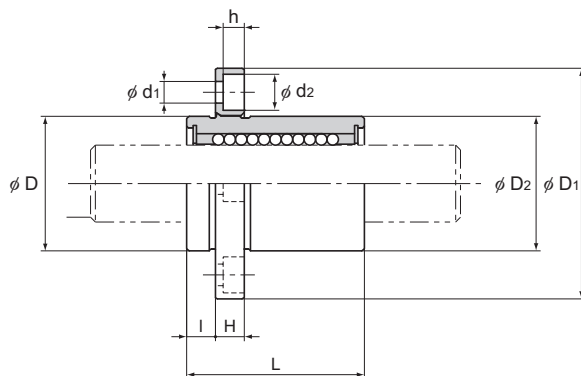


Unit: mm

| | K | H | B | C | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic load rating | | Mass g |
|--|----|----|----|----|--|----------------------------|-----------------------|----------------------------------|-------------------|---------------------|-----------|
| | | | | | | μm | μm | μm | C N | C ₀ N | |
| | 18 | 5 | 20 | — | 3.4 × 6.5 × 3.3 | 15 | 15 | -5 | 324 | 529 | 27 |
| | 21 | 5 | 24 | — | 3.4 × 6.5 × 3.3 | 15 | 15 | -5 | 431 | 784 | 41 |
| | 25 | 6 | 29 | — | 4.5 × 8 × 4.4 | 15 | 15 | -5 | 588 | 1100 | 72 |
| | 27 | 6 | 32 | — | 4.5 × 8 × 4.4 | 15 | 15 | -5 | 657 | 1200 | 81 |
| | 29 | 6 | 33 | — | 4.5 × 8 × 4.4 | 15 | 15 | -7 | 814 | 1570 | 105 |
| | 34 | 6 | 31 | 22 | 4.5 × 8 × 4.4 | 15 | 15 | -7 | 1230 | 2350 | 182 |
| | 38 | 8 | 36 | 24 | 5.5 × 9.2 × 5.4 | 20 | 20 | -9 | 1400 | 2750 | 217 |
| | 46 | 8 | 40 | 32 | 5.5 × 9.2 × 5.4 | 20 | 20 | -9 | 1560 | 3140 | 477 |
| | 51 | 10 | 49 | 35 | 6.6 × 11 × 6.5 | 20 | 20 | -9 | 2490 | 5490 | 575 |

Note) Since the nut and the balls use stainless steel, these models are highly resistant to corrosion and environment.
If oil holes are required, please specify by adding OH to the end of the model number.
For further information, contact THK.

Model LMIF



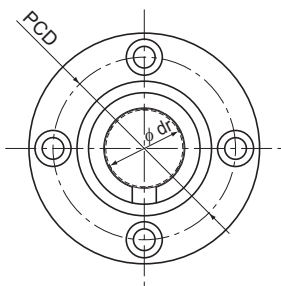
Model LMIF

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMIF 6 | 4 | 6 | 0 -0.009 | 12 | 0 | 19 | ±0.3 | 28 | 0 -0.2 |
| LMIF 8 | | 8 | | 15 | -0.011 | 24 | | 32 | |
| LMIF 10 | | 10 | | 19 | 29 | 39 | | | |
| LMIF 12 | | 12 | | 21 | 0 | 30 | | 42 | |
| LMIF 13 | | 13 | | 23 | -0.013 | 32 | | 43 | |
| LMIF 16 | 5 | 16 | 0 -0.010 | 28 | 0 -0.016 | 37 | ±0.3 | 48 | 0 -0.2 |
| LMIF 20 | | 20 | | 32 | | 42 | | 54 | |
| LMIF 25 | | 25 | | 40 | | 59 | | 62 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMIF16 UU

└── Seal attached on both ends of the nut

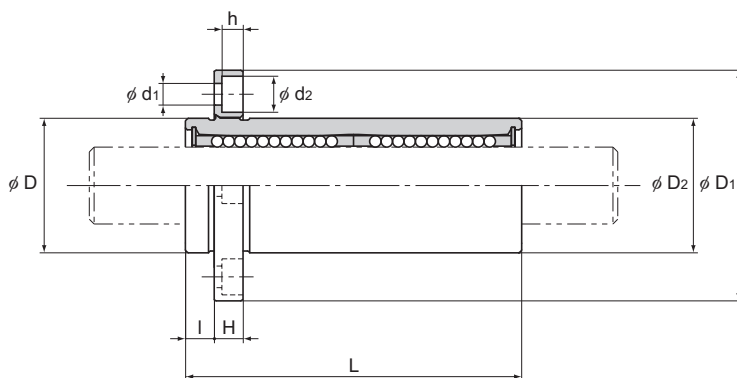


Unit: mm

| | Length | | D_2 | H | PCD | Mounting hole $d_1 \times d_2 \times h$ | Flange | Eccentricity (max) μm | Radial clearance tolerance μm | Basic Load Rating | | Mass g |
|---|--------|-----------|-------|---|-----|--|-----------------------------------|--|---|----------------------|-------|-----------|
| | l | Tolerance | | | | | perpendicularity μm | | | C | C_0 | |
| 5 | | ± 0.2 | 12 | 5 | 20 | $3.4 \times 6 \times 3.3$ | 12 | 12 | -5 | 206 | 265 | 24 |
| | | | 15 | | 24 | | 12 | | -5 | 265 | 402 | 34 |
| 6 | | ± 0.2 | 19 | 6 | 29 | $4.5 \times 7.5 \times 4.4$ | 12 | 12 | -5 | 373 | 549 | 61 |
| | | | 21 | | 32 | | 12 | | -5 | 412 | 598 | 69 |
| | | | 23 | | 33 | | 12 | | -7 | 510 | 775 | 81 |
| | | | 28 | | 38 | | 12 | | -7 | 775 | 1180 | 125 |
| 8 | | ± 0.2 | 32 | 8 | 43 | $5.5 \times 9 \times 5.4$ | 15 | 15 | -9 | 863 | 1370 | 166 |
| | | | 40 | | 51 | | 15 | | -9 | 980 | 1570 | 305 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMIF-L



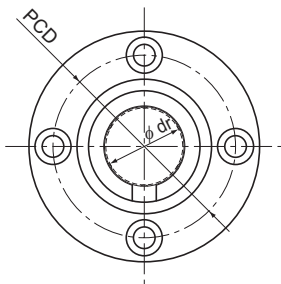
Model LMIF-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMIF 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | ±0.3 | 28 | 0 -0.2 |
| LMIF 8L | | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMIF 10L | | 10 | | 19 | 0 -0.016 | 55 | | 39 | |
| LMIF 12L | | 12 | | 21 | | 57 | | 42 | |
| LMIF 13L | 13 | 23 | 61 | 43 | | | | | |
| LMIF 16L | 5 | 16 | 0 -0.012 | 28 | 0 | 70 | ±0.3 | 48 | 0 -0.2 |
| LMIF 20L | | 20 | | 32 | 80 | 54 | | | |
| LMIF 25L | | 25 | | 40 | -0.019 | 112 | | 62 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMIF16L UU

└── Seal attached on both ends of the nut

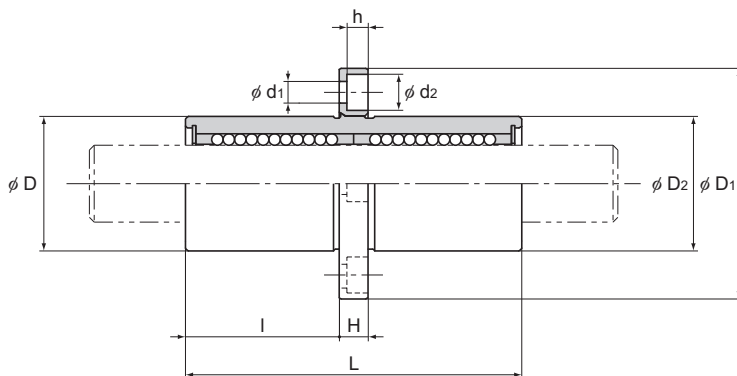


Unit: mm

| | Length | | D ₂ | H | PCD | Mounting hole d ₁ × d ₂ × h | Flange | Eccentricity (max) μm | Radial clearance tolerance μm | Basic Load Rating | | Mass g |
|---|--------|-----------|----------------|---|-----|--|------------------------|-----------------------------|--|----------------------|----------------|-----------|
| | l | Tolerance | | | | | perpendicularity μm | | | C | C ₀ | |
| 5 | | ±0.2 | 12 | 5 | 20 | 3.4 × 6 × 3.3 | 12 | 12 | -5 | 324 | 529 | 30 |
| | | | 15 | | 24 | | 12 | | -5 | 431 | 784 | 46 |
| 6 | | ±0.2 | 19 | 6 | 29 | 4.5 × 7.5 × 4.4 | 12 | 12 | -5 | 588 | 1100 | 83 |
| | | | 21 | | 32 | | 12 | | -5 | 657 | 1200 | 95 |
| | | | 23 | | 33 | | 12 | | -7 | 814 | 1570 | 117 |
| | | | 28 | | 38 | | 12 | | -7 | 1230 | 2350 | 196 |
| 8 | | ±0.2 | 32 | 8 | 43 | 5.5 × 9 × 5.4 | 15 | 15 | -9 | 1400 | 2750 | 244 |
| | | | 40 | | 51 | | 15 | | -9 | 1560 | 3140 | 498 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMCF-L



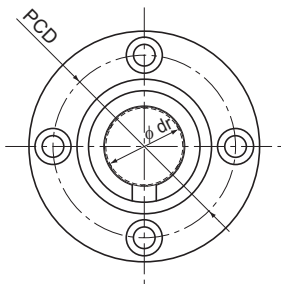
Model LMCF-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-----------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMCF 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | ±0.3 | 28 | 0 -0.2 |
| LMCF 8L | | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMCF 10L | | 10 | | 19 | 55 | 39 | | | |
| LMCF 12L | | 12 | | 21 | 0 | 57 | | 42 | |
| LMCF 13L | | 13 | | 23 | -0.016 | 61 | | 43 | |
| LMCF 16L | 5 | 16 | 0 | 28 | 0 | 70 | ±0.3 | 48 | 0 -0.2 |
| LMCF 20L | | 20 | | 32 | | 80 | | 54 | |
| LMCF 25L | | 25 | | -0.012 | | 40 | | -0.019 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMCF16L UU

└ Seal attached on both ends of the nut

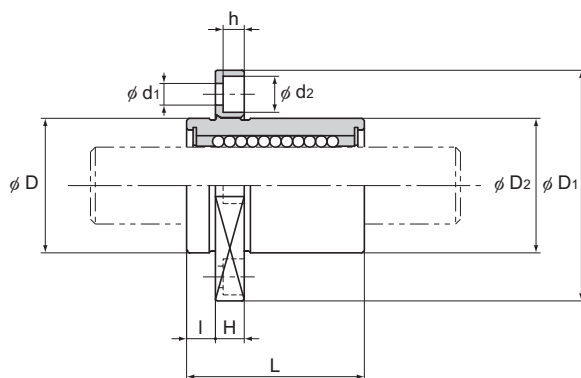


Unit: mm

| | | | | | | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic Load Rating | | Mass |
|--------|-----------|----------------|----|-----|--|----------------------------|-----------------------|----------------------------------|----------------------|------|------|
| Length | | D ₂ | H | PCD | Mounting hole d ₁ × d ₂ × h | | | | μm | μm | |
| l | Tolerance | | | | | | | | | | |
| 15 | ±0.2 | 12 | 5 | 20 | 3.4 × 6 × 3.3 | 12 | 12 | -5 | 324 | 529 | 30 |
| 20 | | 15 | | 24 | | 12 | | -5 | 431 | 784 | 46 |
| 24.5 | | 19 | | 29 | | 12 | | -5 | 588 | 1100 | 83 |
| 25.5 | | 21 | 6 | 32 | 4.5 × 7.5 × 4.4 | 12 | | -5 | 657 | 1200 | 95 |
| 27.5 | | 23 | | 33 | | 12 | | -7 | 814 | 1570 | 117 |
| 32 | | 28 | | 38 | | 12 | | -7 | 1230 | 2350 | 196 |
| 36 | | 32 | | 8 | | 43 | 5.5 × 9 × 5.4 | 15 | -9 | 1400 | 2750 |
| 52 | | 40 | 51 | | 15 | -9 | | 1560 | 3140 | 498 | |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMIK



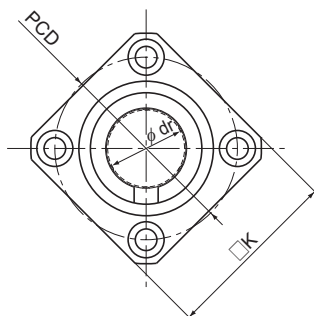
Model LMIK

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMIK 6 | 4 | 6 | 0 -0.009 | 12 | 0 | 19 | ±0.3 | 28 | 0 -0.2 |
| LMIK 8 | | 8 | | 15 | -0.011 | 24 | | 32 | |
| LMIK 10 | | 10 | | 19 | 29 | 39 | | | |
| LMIK 12 | | 12 | | 21 | 0 | 30 | | 42 | |
| LMIK 13 | | 13 | | 23 | -0.013 | 32 | | 43 | |
| LMIK 16 | 5 | 16 | 0 -0.010 | 28 | 0 -0.016 | 37 | ±0.3 | 48 | 0 -0.2 |
| LMIK 20 | | 20 | | 42 | | 54 | | | |
| LMIK 25 | | 25 | | 40 | | -0.016 | | 59 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMIK16 UU

└ Seal attached on both ends of the nut

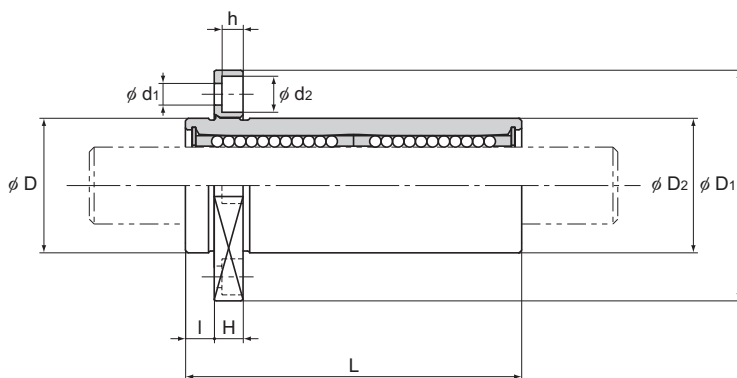


Unit: mm

| | Length | | D ₂ | H | K | PCD | Mounting hole d ₁ ×d ₂ ×h | Flange | Eccentricity (max) | Radial clearance tolerance | Basic Load Rating | | Mass | |
|---|--------|-----------|----------------|---|----|-----|--|------------------|-----------------------|----------------------------------|----------------------|------|------|-----|
| | l | Tolerance | | | | | | perpendicularity | | | μm | μm | | C |
| 5 | | ±0.2 | 12 | 5 | 22 | 20 | 3.4×6×3.3 | 12 | 12 | -5 | 206 | 265 | 18 | |
| | | | 15 | | 25 | 24 | | 12 | | | -5 | 265 | 402 | 27 |
| 6 | | ±0.2 | 19 | 6 | 30 | 29 | 4.5×7.5×4.4 | 12 | 12 | -5 | 373 | 549 | 46 | |
| | | | 21 | | 32 | 32 | | 12 | | | -5 | 412 | 598 | 52 |
| | | | 23 | | 34 | 33 | | 12 | | | -7 | 510 | 775 | 65 |
| | | | 28 | | 37 | 38 | | 12 | | | -7 | 775 | 1180 | 104 |
| 8 | | ±0.2 | 32 | 8 | 42 | 43 | 5.5×9×5.4 | 15 | 15 | -9 | 863 | 1370 | 131 | |
| | | | 40 | | 50 | 51 | | 15 | | | -9 | 980 | 1570 | 267 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMIK-L



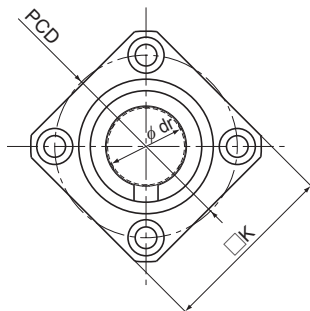
Model LMIK-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMIK 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | ±0.3 | 28 | 0 -0.2 |
| LMIK 8L | | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMIK 10L | | 10 | | 19 | 0 -0.016 | 55 | | 39 | |
| LMIK 12L | | 12 | | 21 | | 57 | | 42 | |
| LMIK 13L | | 13 | | 23 | | 61 | | 43 | |
| LMIK 16L | 5 | 16 | 0 -0.012 | 28 | 0 | 70 | ±0.3 | 48 | 0 -0.2 |
| LMIK 20L | | 20 | | 32 | 80 | 54 | | | |
| LMIK 25L | | 25 | | 40 | -0.019 | 112 | | 62 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMIK16L UU

└── Seal attached on both ends of the nut

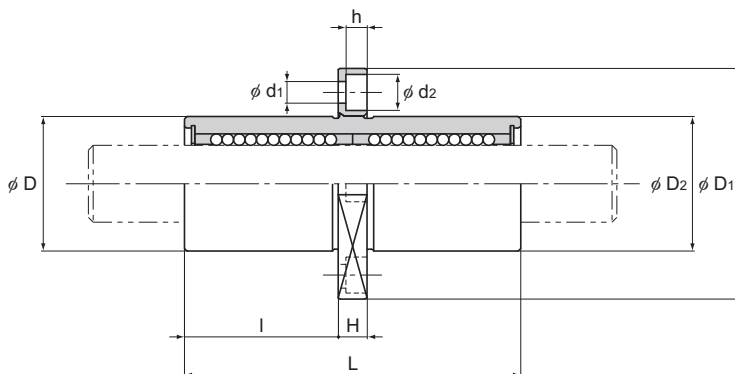


Unit: mm

| | | | | | | | | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic Load Rating | | Mass |
|--------|-----------|-------|---|----|-----|--|---------------|----------------------------|-----------------------|----------------------------------|----------------------|-----|------|
| Length | | D_2 | H | K | PCD | Mounting hole $d_1 \times d_2 \times h$ | μm | | | | μm | C | |
| l | Tolerance | | | | | | | | | | | | |
| 5 | ± 0.2 | 12 | 5 | 22 | 20 | $3.4 \times 6 \times 3.3$ | 12 | 12 | -5 | 324 | 529 | 25 | |
| | | 15 | | 25 | 24 | | 12 | | -5 | 431 | 784 | 39 | |
| 6 | | 19 | 6 | 30 | 29 | $4.5 \times 7.5 \times 4.4$ | 12 | | -5 | 588 | 1100 | 69 | |
| | | 21 | | 32 | 32 | | 12 | | -5 | 657 | 1200 | 78 | |
| 23 | 34 | 33 | | 12 | -7 | | 814 | 1570 | 101 | | | | |
| 28 | 37 | 38 | | 12 | -7 | | 1230 | 2350 | 174 | | | | |
| 8 | ± 0.2 | 32 | 8 | 42 | 43 | $5.5 \times 9 \times 5.4$ | 15 | 15 | -9 | 1400 | 2750 | 210 | |
| | | 40 | | 50 | 51 | | 15 | | -9 | 1560 | 3140 | 461 | |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMCK-L



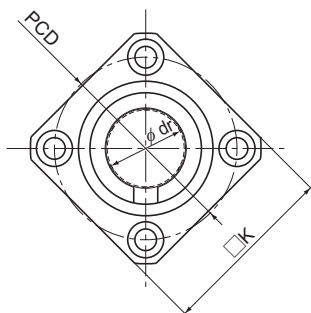
Model LMCK-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-----------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMCK 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | ±0.3 | 28 | 0 -0.2 |
| LMCK 8L | | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMCK 10L | | 10 | | 19 | 55 | 39 | | | |
| LMCK 12L | | 12 | | 21 | 0 | 57 | | 42 | |
| LMCK 13L | | 13 | | 23 | -0.016 | 61 | | 43 | |
| LMCK 16L | 5 | 16 | 0 | 28 | 0 | 70 | ±0.3 | 48 | 0 -0.2 |
| LMCK 20L | | 20 | | 32 | 80 | 54 | | | |
| LMCK 25L | | 25 | | -0.012 | 40 | -0.019 | | 112 | |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMCK16L UU

└── Seal attached on both ends of the nut

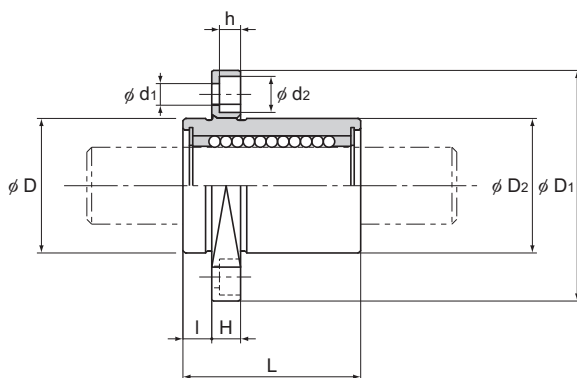


Unit: mm

| Length | | D ₂ | H | K | PCD | Mounting hole d ₁ × d ₂ × h | Flange | Eccentricity (max) μm | Radial clearance tolerance μm | Basic Load Rating | | Mass g |
|--------|-----------|----------------|----|----|-----|--|------------------------|-----------------------------|--|----------------------|----------------|-----------|
| l | Tolerance | | | | | | perpendicularity μm | | | C | C ₀ | |
| 15 | ±0.2 | 12 | 5 | 22 | 20 | 3.4 × 6 × 3.3 | 12 | 12 | -5 | 324 | 529 | 25 |
| 20 | | 15 | | 25 | 24 | | 12 | | -5 | 431 | 784 | 39 |
| 24.5 | | 19 | | 30 | 29 | 12 | -5 | | 588 | 1100 | 69 | |
| 25.5 | | 21 | 6 | 32 | 32 | 4.5 × 7.5 × 4.4 | 12 | | -5 | 657 | 1200 | 78 |
| 27.5 | | 23 | | 34 | 33 | | 12 | | -7 | 814 | 1570 | 101 |
| 32 | | 28 | | 37 | 38 | | 12 | | -7 | 1230 | 2350 | 174 |
| 36 | | 32 | | 8 | 42 | | 43 | | 5.5 × 9 × 5.4 | 15 | -9 | 1400 |
| 52 | | 40 | 50 | | 51 | 15 | -9 | | | 1560 | 3140 | 461 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMIH



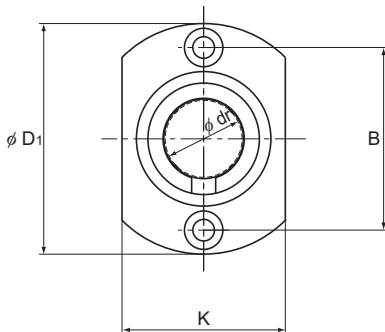
Model LMIH

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMIH 6 | 4 | 6 | 0 -0.009 | 12 | 0 | 19 | ±0.3 | 28 | 0 -0.2 |
| LMIH 8 | | 8 | | 15 | -0.011 | 24 | | 32 | |
| LMIH 10 | | 10 | | 19 | 29 | 39 | | | |
| LMIH 12 | | 12 | | 21 | 0 | 30 | | 42 | |
| LMIH 13 | | 13 | | 23 | -0.013 | 32 | | 43 | |
| LMIH 16 | 5 | 16 | 0 -0.010 | 28 | 0 -0.016 | 37 | ±0.3 | 48 | 0 -0.2 |
| LMIH 20 | | 20 | | 32 | | 42 | | 54 | |
| LMIH 25 | | 25 | | 40 | | 59 | | 62 | |

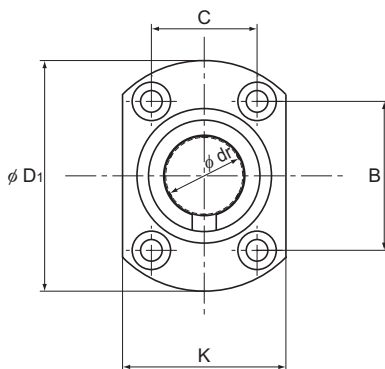
Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMIH16 UU

└ Seal attached on both ends of the nut



Models LMIH 6 to 13



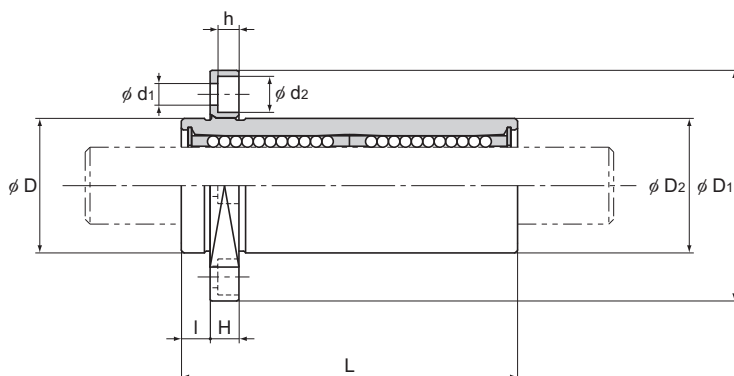
Models LMIH 16 to 25

Unit: mm

| | Length | | D ₂ | H | K | B | C | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity μm | Eccentricity (max) μm | Radial clearance tolerance μm | Basic Load Rating | | Mass g | |
|---|--------|-----------|----------------|---|----|----|----|--|----------------------------------|-----------------------------|--|----------------------|----------------|-----------|-----|
| | I | Tolerance | | | | | | | | | | C | C ₀ | | |
| 5 | | ±0.2 | 12 | 5 | 18 | 20 | — | 3.4 × 6 × 3.3 | 12 | 12 | -5 | 206 | 265 | 20 | |
| | | | 15 | | 21 | 24 | — | | 12 | | | -5 | 265 | 402 | 29 |
| 6 | | ±0.2 | 19 | 6 | 25 | 29 | — | 4.5 × 7.5 × 4.4 | 12 | 12 | -5 | 373 | 549 | 50 | |
| | | | 21 | | 27 | 32 | — | | 12 | | | -5 | 412 | 598 | 57 |
| | | | 23 | | 29 | 33 | — | | 12 | | | -7 | 510 | 775 | 70 |
| | | | 28 | | 34 | 31 | 22 | | 12 | | | -7 | 775 | 1180 | 111 |
| 8 | | ±0.2 | 32 | 8 | 38 | 36 | 24 | 5.5 × 9 × 5.4 | 15 | 15 | -9 | 863 | 1370 | 140 | |
| | | | 40 | | 46 | 40 | 32 | | 15 | | | -9 | 980 | 1570 | 276 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMIH-L



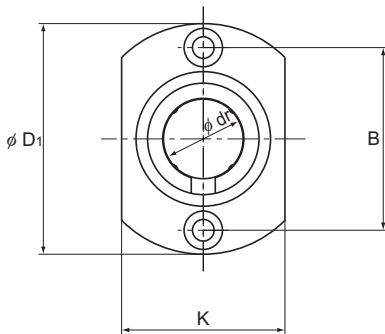
Model LMIH-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-------------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMIH 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | ±0.3 | 28 | 0 -0.2 |
| LMIH 8L | | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMIH 10L | | 10 | | 19 | 0 -0.016 | 55 | | 39 | |
| LMIH 12L | | 12 | | 21 | | 57 | | 42 | |
| LMIH 13L | | 13 | | 23 | | 61 | | 43 | |
| LMIH 16L | 5 | 16 | 0 -0.012 | 28 | 0 -0.019 | 70 | ±0.3 | 48 | 0 -0.2 |
| LMIH 20L | | 20 | | 32 | | 80 | | 54 | |
| LMIH 25L | | 25 | | 40 | | 112 | | 62 | |

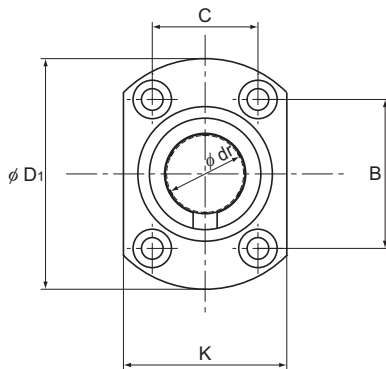
Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMIH16L UU

└── Seal attached on both ends of the nut



Models LMIH 6L to 13L



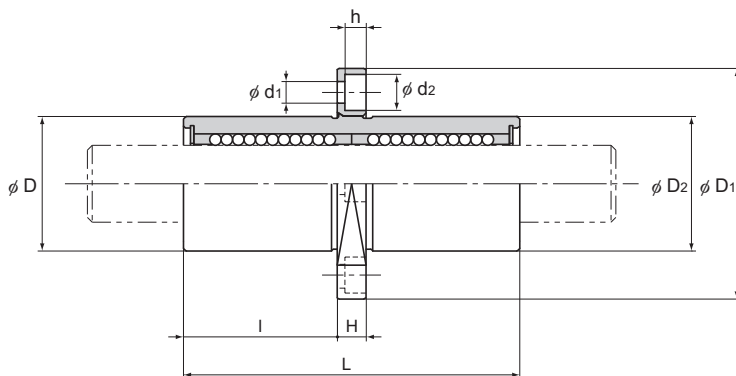
Models LMIH 16L to 25L

Unit: mm

| | Length | | D ₂ | H | K | B | C | Mounting hole d ₁ × d ₂ × h | Flange perpendicularity μm | Eccentricity (max) μm | Radial clearance tolerance μm | Basic Load Rating | | Mass g | |
|---|--------|-----------|----------------|---|----|----|----|--|----------------------------------|-----------------------------|--|----------------------|----------------|-----------|-----|
| | I | Tolerance | | | | | | | | | | C | C ₀ | | |
| 5 | | ±0.2 | 12 | 5 | 18 | 20 | — | 3.4 × 6 × 3.3 | 12 | 12 | -5 | 324 | 529 | 26 | |
| | | | 15 | | 21 | 24 | — | | 12 | | | -5 | 431 | 784 | 41 |
| 6 | | ±0.2 | 19 | 6 | 25 | 29 | — | 4.5 × 7.5 × 4.4 | 12 | 12 | -5 | 588 | 1100 | 73 | |
| | | | 21 | | 27 | 32 | — | | 12 | | | -5 | 657 | 1200 | 83 |
| | | | 23 | | 29 | 33 | — | | 12 | | | -7 | 814 | 1570 | 106 |
| | | | 28 | | 34 | 31 | 22 | | 12 | | | -7 | 1230 | 2350 | 180 |
| 8 | | ±0.2 | 32 | 8 | 38 | 36 | 24 | 5.5 × 9 × 5.4 | 15 | 15 | -9 | 1400 | 2750 | 219 | |
| | | | 40 | | 46 | 40 | 32 | | 15 | | | -9 | 1560 | 3140 | 470 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model LMCH-L



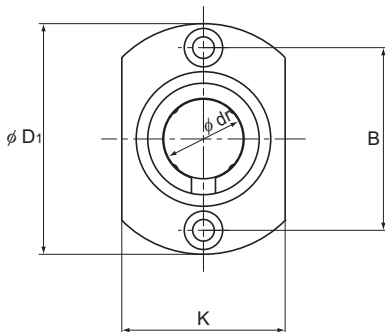
Model LMCH-L

| Model No. | Ball rows | Main dimensions | | | | | | | |
|-----------|-----------|-------------------------|-------------|----------------|-----------|----------------|-----------|-----------------|-----------|
| | | Inscribed bore diameter | | Outer diameter | | Overall length | | Flange diameter | |
| | | dr | Tolerance | D | Tolerance | L | Tolerance | D ₁ | Tolerance |
| LMCH 6L | 4 | 6 | 0 -0.010 | 12 | 0 | 35 | ±0.3 | 28 | 0 -0.2 |
| LMCH 8L | | 8 | | 15 | -0.013 | 45 | | 32 | |
| LMCH 10L | | 10 | | 19 | 55 | 39 | | | |
| LMCH 12L | | 12 | | 21 | 0 | 57 | | 42 | |
| LMCH 13L | | 13 | | 23 | -0.016 | 61 | | 43 | |
| LMCH 16L | 5 | 16 | 0 | 28 | 0 | 70 | ±0.3 | 48 | 0 -0.2 |
| LMCH 20L | | 20 | | 32 | 0 | 80 | | 54 | |
| LMCH 25L | | 25 | | -0.012 | 40 | -0.019 | | 112 | |

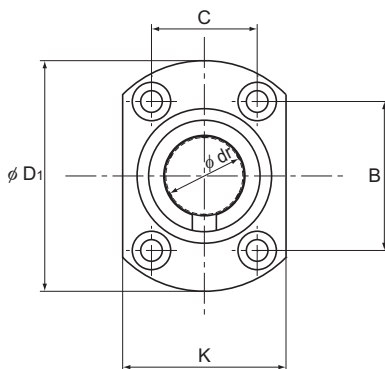
Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.
If requiring a type equipped with a seal, indicate it when placing an order.

(Example) LMCH16L UU

_____ Seal attached on both ends of the nut



Models LMCH 6L to 13L



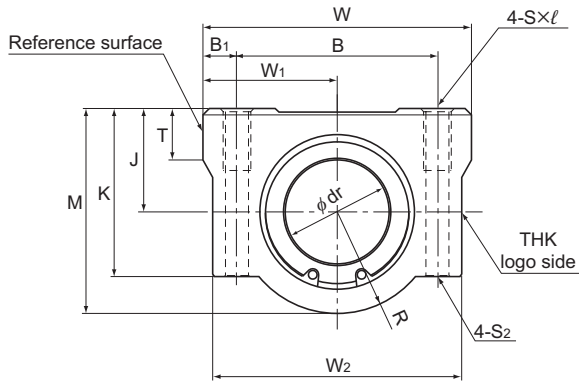
Models LMCH 16L to 25L

Unit: mm

| | | | | | | | | Flange perpendicularity | Eccentricity (max) | Radial clearance tolerance | Basic Load Rating | | Mass |
|--------|-----------|----------------|----|----|----|----|--|----------------------------|-----------------------|----------------------------------|----------------------|------|------|
| Length | | D ₂ | H | K | B | C | Mounting hole d ₁ × d ₂ × h | | | | μm | μm | |
| I | Tolerance | | | | | | | N | N | | | | |
| 15 | ±0.2 | 12 | 5 | 18 | 20 | — | 3.4 × 6 × 3.3 | 12 | 12 | -5 | 324 | 529 | 26 |
| 20 | | 15 | | 21 | 24 | — | | 12 | | -5 | 431 | 784 | 41 |
| 24.5 | | 19 | | 25 | 29 | — | 12 | -5 | | 588 | 1100 | 73 | |
| 25.5 | | 6 | 21 | 27 | 32 | — | 4.5 × 7.5 × 4.4 | 12 | | -5 | 657 | 1200 | 83 |
| 27.5 | | | 23 | 29 | 33 | — | | 12 | | -7 | 814 | 1570 | 106 |
| 32 | | | 28 | 34 | 31 | 22 | | 12 | | -7 | 1230 | 2350 | 180 |
| 36 | | | 32 | 38 | 36 | 24 | | 15 | -9 | 1400 | 2750 | 219 | |
| 52 | | 40 | 8 | 46 | 40 | 32 | 5.5 × 9 × 5.4 | 15 | 15 | -9 | 1560 | 3140 | 470 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Models SC6 to 30



Models SC6 to 30

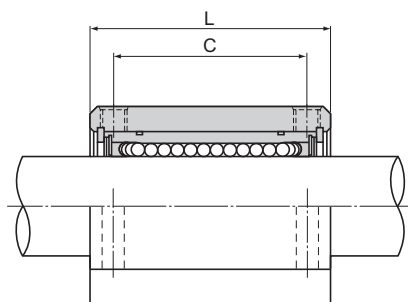
| Model No. | Outer dimensions | | | LM casing dimensions | | | | | | |
|-----------|------------------|------------|-------------|------------------------|----------------|----|--------------|---|-----------------------------|-------------------------|
| | Height M | Width W | Length L | Mounting hole position | | | Tap S × l | Through bolt model No., S ₂ | Center height J ±0.02 | W ₁ ±0.02 |
| | | | | B | B ₁ | C | | | | |
| SC 6UU | 18 | 30 | 25 | 20 | 5 | 15 | M4 × 8 | M3 | 9 | 15 |
| SC 8UU | 22 | 34 | 30 | 24 | 5 | 18 | M4 × 8 | M3 | 11 | 17 |
| SC 10UU | 26 | 40 | 35 | 28 | 6 | 21 | M5 × 12 | M4 | 13 | 20 |
| SC 12UU | 29 | 42 | 36 | 30.5 | 5.75 | 26 | M5 × 12 | M4 | 15 | 21 |
| SC 13UU | 30 | 44 | 39 | 33 | 5.5 | 26 | M5 × 12 | M4 | 15 | 22 |
| SC 16UU | 38.5 | 50 | 44 | 36 | 7 | 34 | M5 × 12 | M4 | 19 | 25 |
| SC 20UU | 42 | 54 | 50 | 40 | 7 | 40 | M6 × 12 | M5 | 21 | 27 |
| SC 25UU | 51.5 | 76 | 67 | 54 | 11 | 50 | M8 × 18 | M6 | 26 | 38 |
| SC 30UU | 59.5 | 78 | 72 | 58 | 10 | 58 | M8 × 18 | M6 | 30 | 39 |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

A stainless steel Linear Bushing model LM-MG, which is highly corrosion resistant, can also be incorporated at your request.

Example of Model Number for Use in Combination with
Linear Bushing Units

| Linear Bushing to be combined | Example of model No. | |
|--|----------------------|----------------|
| Both end attached with seal | SC 13UU | Standard stock |
| Without seal | SC 13 | Build to order |
| Made of stainless steel; both end attached with seal | SC 13MUU | Build to order |

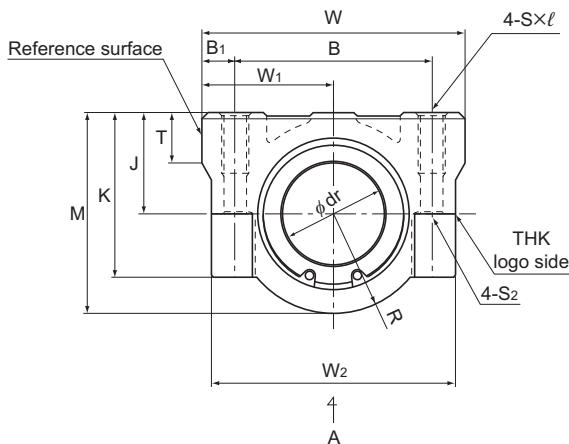


Unit: mm

| | K | W ₂ | T | R | Inscribed bore diameter | | Model No. of Linear Bushing to be combined | Basic load rating | | Unit |
|--|----|----------------|----|------|-------------------------|-------------|--|-------------------|----------------|------|
| | | | | | dr | Tolerance | | C | C ₀ | Mass |
| | | | | | | | | | | |
| | 15 | 28 | 6 | 9 | 6 | 0 -0.009 | LM6UU | 206 | 265 | 34 |
| | 18 | 32 | 6 | 11 | 8 | | LM8UU | 265 | 402 | 52 |
| | 22 | 37 | 8 | 13 | 10 | | LM10UU | 373 | 549 | 92 |
| | 25 | 39 | 8 | 14 | 12 | | LM12UU | 412 | 598 | 102 |
| | 26 | 41 | 8 | 15 | 13 | | LM13UU | 510 | 775 | 123 |
| | 35 | 46 | 9 | 19.5 | 16 | | LM16UU | 775 | 1180 | 189 |
| | 36 | 52 | 11 | 21 | 20 | 0 -0.010 | LM20UU | 863 | 1370 | 237 |
| | 41 | 68 | 12 | 25.5 | 25 | | LM25UU | 980 | 1570 | 555 |
| | 49 | 72 | 15 | 29.5 | 30 | | LM30UU | 1570 | 2750 | 685 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Models SC35 to 50



Models SC35 to 50

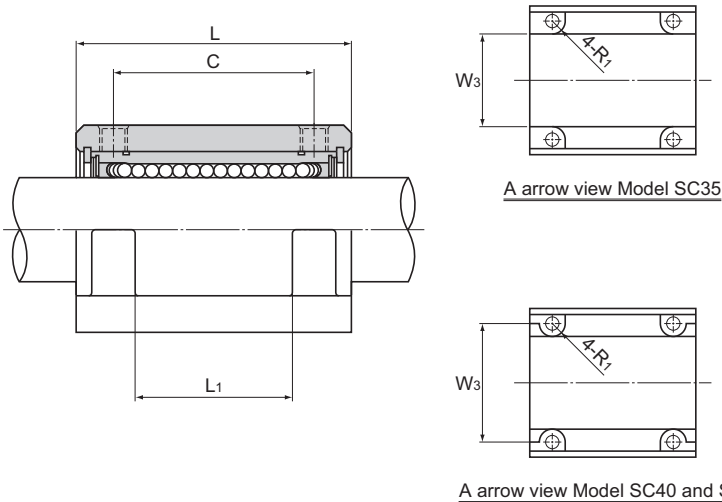
| Model No. | Outer dimensions | | | LM casing dimensions | | | | | | | |
|-----------|------------------|------------|-------------|------------------------|----------------|----|------------------------|---|-----------------------------|-------------------------|----|
| | Height M | Width W | Length L | Mounting hole position | | | Tap $S \times \ell$ | Through bolt model No., S ₂ | Center height J ±0.02 | W ₁ ±0.02 | K |
| | | | | B | B ₁ | C | | | | | |
| SC 35UU | 68 | 90 | 80 | 70 | 10 | 60 | M8×18 | M6 | 34 | 45 | 54 |
| SC 40UU | 78 | 102 | 90 | 80 | 11 | 60 | M10×25 | M8 | 40 | 51 | 62 |
| SC 50UU | 102 | 122 | 110 | 100 | 11 | 80 | M10×25 | M8 | 52 | 61 | 80 |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

A stainless steel Linear Bushing model LM-MG, which is highly corrosion resistant, can also be incorporated at your request.
(Model SC50 does not include a stainless type.)

Example of Model Number for Use in Combination with
Linear Bushing Units

| Linear Bushing to be combined | Example of model No. | |
|--|----------------------|----------------|
| Both end attached with seal | SC 40UU | Standard stock |
| Without seal | SC 40 | Build to order |
| Made of stainless steel; both end attached with seal | SC 40MUU | Build to order |

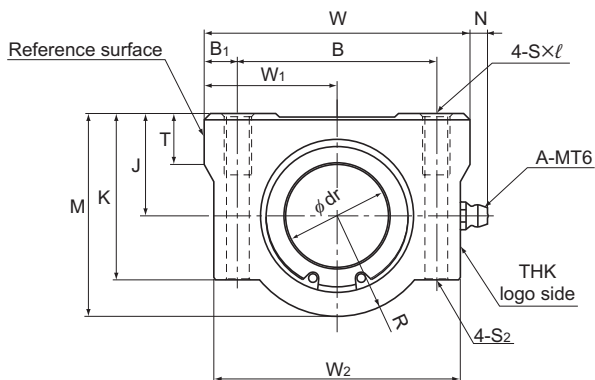


Unit: mm

| | W ₂ | W ₃ | L ₁ | T | R | R ₁ | Inscribed bore diameter | | Model No. of Linear Bushing to be combined | Basic load rating | | Unit |
|--|----------------|----------------|----------------|----|----|----------------|-------------------------|-------------|--|-------------------|----------------|-----------|
| | | | | | | | dr | Tolerance | | C | C ₀ | Mass g |
| | | | | | | | | | | N | N | |
| | 85 | 60 | 42 | 18 | 34 | 5 | 35 | 0 -0.012 | LM35UU | 1670 | 3140 | 1100 |
| | 96 | 80 | 44 | 20 | 38 | 8 | 40 | | LM40UU | 2160 | 4020 | 1600 |
| | 116 | 100 | 64 | 25 | 50 | 8 | 50 | | LM50UU | 3820 | 7940 | 3350 |

Note) If an oil hole is required, this can be indicated by appending "OH" to the end of the model number.
For further information, contact THK.

Model SL



Model SL

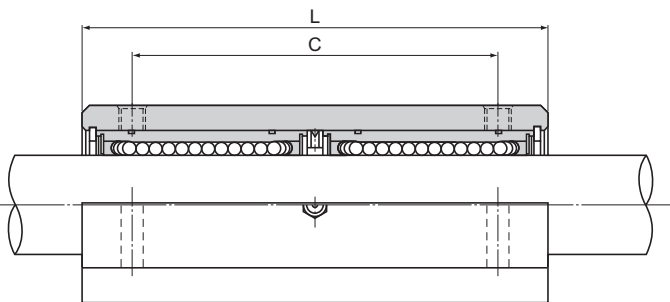
| Model No. | Outer dimensions | | | LM casing dimensions | | | | | | |
|-----------|------------------|------------|-------------|------------------------|----------------|-----|--------------|---|-----------------------------|-------------------------|
| | Height M | Width W | Length L | Mounting hole position | | | Tap S × ℓ | Through bolt model No., S ₂ | Center height J ±0.02 | W ₁ ±0.02 |
| | | | | B | B ₁ | C | | | | |
| SL 6UU | 18 | 30 | 48 | 20 | 5 | 36 | M4 × 8 | M3 | 9 | 15 |
| SL 8UU | 22 | 34 | 58 | 24 | 5 | 42 | M4 × 8 | M3 | 11 | 17 |
| SL 10UU | 26 | 40 | 68 | 28 | 6 | 46 | M5 × 12 | M4 | 13 | 20 |
| SL 12UU | 29 | 42 | 70 | 30.5 | 5.75 | 50 | M5 × 12 | M4 | 15 | 21 |
| SL 13UU | 30 | 44 | 75 | 33 | 5.5 | 50 | M5 × 12 | M4 | 15 | 22 |
| SL 16UU | 38.5 | 50 | 85 | 36 | 7 | 60 | M5 × 12 | M4 | 19 | 25 |
| SL 20UU | 42 | 54 | 96 | 40 | 7 | 70 | M6 × 12 | M5 | 21 | 27 |
| SL 25UU | 51.5 | 76 | 130 | 54 | 11 | 100 | M8 × 18 | M6 | 26 | 38 |
| SL 30UU | 59.5 | 78 | 140 | 58 | 10 | 110 | M8 × 18 | M6 | 30 | 39 |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

A stainless steel Linear Bushing model LM-MG, which is highly corrosion resistant, can also be incorporated at your request.

Example of Model Number for Use in Combination with
Linear Bushing Units

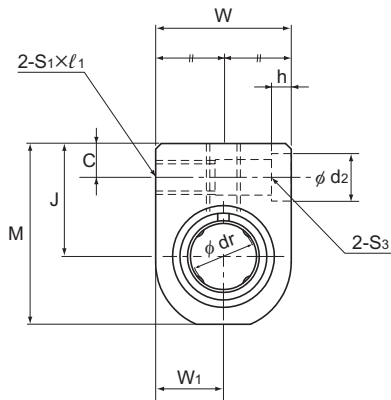
| Linear Bushing to be combined | Example of model No. | |
|--|----------------------|----------------|
| Both end attached with seal | SL 13UU | Standard stock |
| Without seal | SL 13 | Build to order |
| Made of stainless steel; both end attached with seal | SL 13MUU | Build to order |



Unit: mm

| | K | W ₂ | T | R | N | Inscribed bore diameter | | Model No. of Linear Bushing to be combined | Basic load rating | | Unit |
|--|----|----------------|----|------|-----|-------------------------|-------------|--|-------------------|----------------|------|
| | | | | | | dr | Tolerance | | C | C ₀ | Mass |
| | | | | | | | | | | | |
| | 15 | 28 | 6 | 9 | 7 | 6 | 0 -0.009 | LM6U | 324 | 529 | 68 |
| | 18 | 32 | 6 | 11 | 7 | 8 | | LM8U | 431 | 784 | 105 |
| | 22 | 37 | 8 | 13 | 7 | 10 | | LM10U | 588 | 1100 | 185 |
| | 25 | 39 | 8 | 14 | 6.5 | 12 | | LM12U | 657 | 1200 | 205 |
| | 26 | 41 | 8 | 15 | 6.5 | 13 | | LM13U | 814 | 1570 | 242 |
| | 35 | 46 | 9 | 19.5 | 6 | 16 | | LM16U | 1230 | 2350 | 403 |
| | 36 | 52 | 11 | 21 | 7 | 20 | 0 -0.010 | LM20U | 1400 | 2750 | 520 |
| | 41 | 68 | 12 | 25.5 | 4 | 25 | | LM25U | 1560 | 3140 | 1120 |
| | 49 | 72 | 15 | 29.5 | 5 | 30 | | LM30U | 2490 | 5490 | 1440 |

Model SH



Model SH

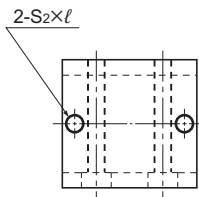
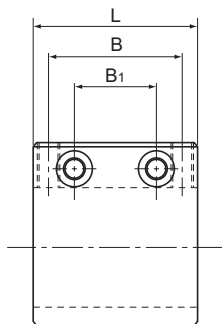
| Model No. | Outer dimensions | | | LM casing dimensions | | | | | |
|-----------|------------------|------------|-------------|------------------------|----------------|---|---------------------------------|--------------------|--|
| | Height M | Width W | Length L | Mounting hole position | | | Tap | | Through bolt model No, S ₃ |
| | | | | B | B ₁ | C | S ₁ × l ₁ | S ₂ × l | |
| SH 3UU | 14 | 10 | 13 | — | 8 | 3 | M3 × 6 | M3 × 5.5 | M2 |
| SH 4UU | 16 | 12 | 15 | — | 10 | 3 | M3 × 6 | M3 × 6 | M2 |
| SH 5UU | 18 | 14 | 17 | — | 12 | 3 | M3 × 6 | M3 × 6 | M2 |
| SH 6UU | 22 | 16 | 24 | 18 | 9 | 5 | M4 × 8 | M4 × 8 | M3 |
| SH 8UU | 26 | 20 | 27 | 20 | 10 | 5 | M4 × 8 | M5 × 8.5 | M3 |
| SH 10UU | 32 | 26 | 35 | 27 | 15 | 6 | M5 × 10 | M6 × 9.5 | M4 |
| SH 12UU | 34 | 28 | 35 | 27 | 15 | 6 | M5 × 10 | M6 × 9.5 | M4 |
| SH 13UU | 36 | 30 | 36 | 28 | 16 | 6 | M5 × 10 | M6 × 9.5 | M4 |
| SH 16UU | 42 | 36 | 40 | 32 | 18 | 6 | M5 × 10 | M6 × 10 | M4 |
| SH 20UU | 49 | 42 | 44 | 36 | 22 | 7 | M6 × 12 | M6 × 12 | M5 |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

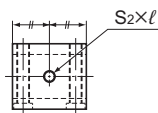
A stainless steel Linear Bushing model LM-MG, which is highly corrosion resistant, can also be incorporated at your request.

Example of Model Number for Use in Combination with Linear Bushing Units

| Linear Bushing to be combined | Example of model No. | |
|--|----------------------|----------------|
| Both end attached with seal | SH 13UU | Standard stock |
| Without seal | SH 13 | Build to order |
| Made of stainless steel; both end attached with seal | SH 13MUU | Build to order |



Top surface of models SH6 to SH20

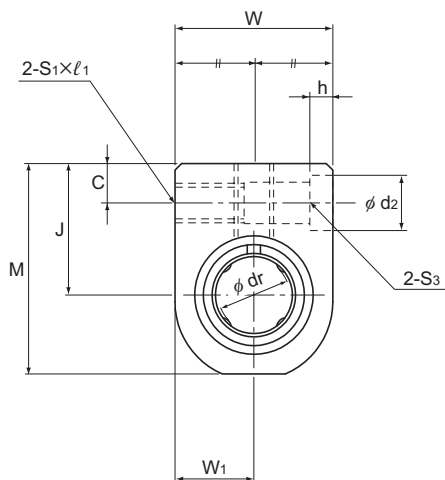


Top surface of models SH3 to SH5

Unit: mm

| | Center height J ± 0.02 | W_1 ± 0.02 | d_2 | h | Inscribed bore diameter | | Model No. of Linear Bushing to be combined | Basic load rating | | Unit |
|--|----------------------------------|---------------------|-------|-----|-------------------------|-------------|--|-------------------|-------|------|
| | | | | | dr | Tolerance | | C | C_0 | Mass |
| | | | | | | | | | | |
| | 9 | 5 | 4.2 | 1.5 | 3 | 0 -0.008 | LM3UU | 88.2 | 108 | 4.5 |
| | 10 | 6 | 4.2 | 1.5 | 4 | | LM4UU | 88.2 | 127 | 7 |
| | 11 | 7 | 4.2 | 1.5 | 5 | | LM5UU | 167 | 206 | 11 |
| | 14 | 8 | 6.5 | 3.3 | 6 | 0 -0.009 | LM6UU | 206 | 265 | 21 |
| | 16 | 10 | 6.5 | 3.3 | 8 | | LM8UU | 265 | 402 | 34 |
| | 19 | 13 | 8 | 4.4 | 10 | | LM10UU | 373 | 549 | 67 |
| | 20 | 14 | 8 | 4.4 | 12 | | LM12UU | 412 | 598 | 74 |
| | 21 | 15 | 8 | 4.4 | 13 | | LM13UU | 510 | 775 | 91 |
| | 24 | 18 | 8 | 4.4 | 16 | | LM16UU | 775 | 1180 | 157 |
| | 28 | 21 | 9.5 | 5.4 | 20 | 0 -0.010 | LM20UU | 863 | 1370 | 206 |

Model SH-L



Model SH-L

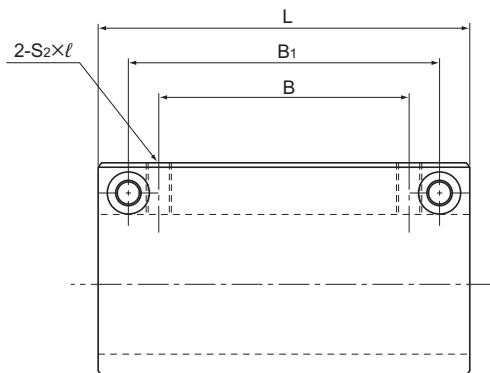
| Model No. | Outer dimensions | | | LM casing dimensions | | | | | |
|-----------|------------------|------------|-------------|------------------------|----------------|---|---------------------------------|--------------------|--|
| | Height M | Width W | Length L | Mounting hole position | | | Tap | | Through bolt model No, S ₃ |
| | | | | B | B ₁ | C | S ₁ × ℓ ₁ | S ₂ × ℓ | |
| SH 3LUU | 14 | 10 | 23 | 10 | 18 | 3 | M3 × 6 | M3 × 5.5 | M2 |
| SH 4LUU | 16 | 12 | 27 | 14 | 22 | 3 | M3 × 6 | M3 × 6 | M2 |
| SH 5LUU | 18 | 14 | 32 | 18 | 26 | 3 | M3 × 6 | M3 × 6 | M2 |
| SH 6LUU | 22 | 16 | 40 | 20 | 30 | 5 | M4 × 8 | M4 × 8 | M3 |
| SH 8LUU | 26 | 20 | 52 | 30 | 42 | 5 | M4 × 8 | M5 × 8.5 | M3 |
| SH 10LUU | 32 | 26 | 60 | 36 | 50 | 6 | M5 × 10 | M6 × 9.5 | M4 |
| SH 12LUU | 34 | 28 | 62 | 36 | 50 | 6 | M5 × 10 | M6 × 9.5 | M4 |
| SH 13LUU | 36 | 30 | 66 | 40 | 54 | 6 | M5 × 10 | M6 × 9.5 | M4 |
| SH 16LUU | 42 | 36 | 76 | 52 | 66 | 6 | M5 × 10 | M6 × 10 | M4 |
| SH 20LUU | 49 | 42 | 86 | 58 | 72 | 7 | M6 × 12 | M6 × 12 | M5 |

Note) Since this model contains a synthetic resin retainer, do not use it at temperature exceeding 80°C.

A stainless steel Linear Bushing model LM-MG, which is highly corrosion resistant, can also be incorporated at your request.

Example of Model Number for Use in Combination with Linear Bushing Units

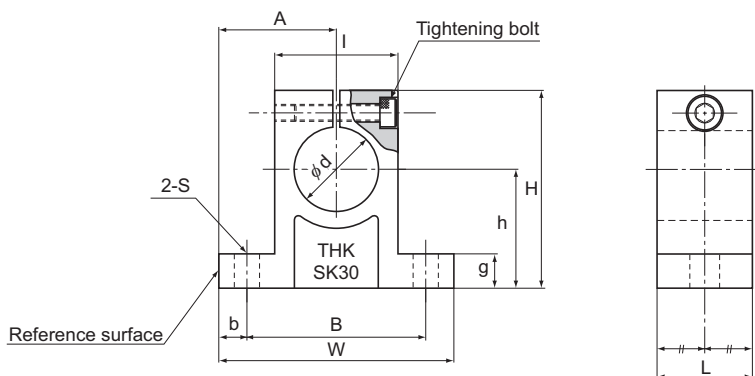
| Linear Bushing to be combined | Example of model No. | |
|--|----------------------|----------------|
| Both end attached with seal | SH 13LUU | Standard stock |
| Without seal | SH 13L | Build to order |
| Made of stainless steel; both end attached with seal | SH 13MLUU | Build to order |



Unit: mm

| | Center height J ±0.02 | W ₁ ±0.02 | d ₂ | h | Inscribed bore diameter | | Model No. of Linear Bushing to be combined | Basic load rating | | Unit | |
|--|-----------------------------|-------------------------|----------------|-----|-------------------------|-------------|--|-------------------|----------------|------|-----|
| | | | | | dr | Tolerance | | C | C ₀ | Mass | |
| | | | | | | | | | | N | N |
| | 9 | 5 | 4.2 | 1.5 | 3 | 0 -0.008 | LM3U | 139 | 216 | 8.6 | |
| | 10 | 6 | 4.2 | 1.5 | 4 | | LM4U | 139 | 254 | 14 | |
| | 11 | 7 | 4.2 | 1.5 | 5 | | LM5U | 263 | 412 | 22 | |
| | 14 | 8 | 6.5 | 3.3 | 6 | | LM6U | 324 | 529 | 37 | |
| | 16 | 10 | 6.5 | 3.3 | 8 | | LM8U | 431 | 784 | 68 | |
| | 19 | 13 | 8 | 4.4 | 10 | 0 -0.009 | LM10U | 588 | 1100 | 125 | |
| | 20 | 14 | 8 | 4.4 | 12 | | LM12U | 657 | 1200 | 140 | |
| | 21 | 15 | 8 | 4.4 | 13 | | LM13U | 814 | 1570 | 176 | |
| | 24 | 18 | 8 | 4.4 | 16 | | LM16U | 1230 | 2350 | 309 | |
| | 28 | 21 | 9.5 | 5.4 | 20 | | 0 -0.010 | LM20U | 1400 | 2750 | 413 |
| | | | | | | | | | | | |

Model SK



Unit: mm

| Model No. | Main dimensions | | | | | | | | | | | | | Mass g |
|-----------|-----------------|-----|----|----|-----|-------------------------------|-----------------|-----------------|-----|----|----|------------------------|---------------------------------|-----------|
| | H | W | L | B | S | Mounting bolt model No. | h ± 0.02 | A ± 0.05 | b | g | l | Shaft diameter d | Tightening bolt model No. | |
| SK 10 | 32.8 | 42 | 14 | 32 | 5.5 | M5 | 20 | 21 | 5 | 6 | 18 | 10 | M4 | 24 |
| SK 12 | 37.5 | 42 | 14 | 32 | 5.5 | M5 | 23 | 21 | 5 | 6 | 20 | 12 | M4 | 30 |
| SK 13 | 37.5 | 42 | 14 | 32 | 5.5 | M5 | 23 | 21 | 5 | 6 | 20 | 13 | M4 | 30 |
| SK 16 | 44 | 48 | 16 | 38 | 5.5 | M5 | 27 | 24 | 5 | 8 | 25 | 16 | M4 | 40 |
| SK 20 | 51 | 60 | 20 | 45 | 6.6 | M6 | 31 | 30 | 7.5 | 10 | 30 | 20 | M5 | 70 |
| SK 25 | 60 | 70 | 24 | 56 | 6.6 | M6 | 35 | 35 | 7 | 12 | 38 | 25 | M6 | 130 |
| SK 30 | 70 | 84 | 28 | 64 | 9 | M8 | 42 | 42 | 10 | 12 | 44 | 30 | M6 | 180 |
| SK 35 | 83 | 98 | 32 | 74 | 11 | M10 | 50 | 49 | 12 | 15 | 50 | 35 | M8 | 270 |
| SK 40 | 96 | 114 | 36 | 90 | 11 | M10 | 60 | 57 | 12 | 15 | 60 | 40 | M8 | 420 |

Standard LM Shafts

THK manufactures high quality, dedicated LM shafts for linear bushings.

(1) [Major materials]

SUJ2 (high-carbon chromium bearing steel)

THK5SP (THK standard material)

SUS440C equivalent

[Hardness] 58 to 64 HRC (SUJ2, THK5SP), 56 HRC or above (SUS440C or equivalent)

[Hardened layer depth] 0.8 to 2.5 mm (varies with shaft diameter)

[Surface roughness] Ra 0.4 or less

[Straightness of the LM shaft] 50 μ m/300 mm or less

(2) Precision-grade LM shafts with shaft diameter tolerance of g5 or h5 are also manufactured as standard.



Unit: mm

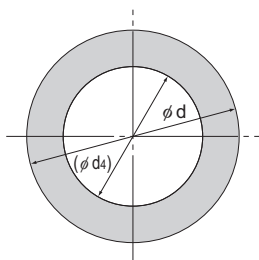
| Model No. | Shaft diameter | | Manufactured length L | |
|-----------|----------------|-------------------------|-----------------------|------------|
| | d | Tolerance g6 μ m | Min length | Max length |
| SF 3 | 3 | -2 -8 | 20 | 400 |
| SF 4 | 4 | -4 -12 | 20 | 400 |
| SF 5 | 5 | | 20 | 500 |
| SF 6 | 6 | -5 -14 | 20 | 1500 |
| SF 8 | 8 | | 20 | 1500 |
| SF 10 | 10 | -6 -17 | 30 | 1500 |
| SF 12 | 12 | | 30 | 1500 |
| SF 13 | 13 | -7 -20 | 30 | 1500 |
| SF 16 | 16 | | 40 | 3000 |
| SF 20 | 20 | -9 -25 | 40 | 3000 |
| SF 25 | 25 | | 50 | 3000 |
| SF 30 | 30 | -10 -29 | 60 | 3000 |
| SF 35 | 35 | | 70 | 3000 |
| SF 38* | 38 | -12 -34 | 100 | 3000 |
| SF 40 | 40 | | 100 | 3000 |
| SF 50 | 50 | -12 -34 | 100 | 3000 |
| SF 60* | 60 | | 200 | 3000 |
| SF 80* | 80 | | 200 | 3000 |
| SF 100* | 100 | | 200 | 3000 |

Note)*Made to order

[Dimensions of Hollow LM Shafts]

If a hollow LM shaft is required for purposes such as weight reduction, use the desired material from Table1 for the dimensions of hollow LM shafts that THK keeps in stock.

Table1 Dimensions of Hollow LM Shafts Unit: mm



| Supported model numbers | LM shaft outer diameter d | Inner diameter (ϕd_i) | Mass (kg/m) | |
|-------------------------|---------------------------|-------------------------------|-------------|--------------|
| | | | Solid shaft | Hollow shaft |
| LM 8 | 8 | 3 | 0.4 | 0.34 |
| LM 10 | 10 | 4 | 0.62 | 0.52 |
| LM 12 | 12 | 6 | 0.89 | 0.67 |
| LM 13 | 13 | 7 | 1.05 | 0.75 |
| LM 16 | 16 | 9 | 1.59 | 1.09 |
| LM 20 | 20 | 10 | 2.47 | 1.86 |
| LM 20 | 20 | 14 | 2.47 | 1.26 |
| LM 25 | 25 | 15 | 3.86 | 2.47 |
| LM 30 | 30 | 16 | 5.56 | 3.98 |
| LM 35 | 35 | 20 | 7.57 | 5.1 |
| * LM 38 | 38 | 22 | 8.92 | 5.93 |
| LM 40 | 40 | 22 | 9.88 | 6.89 |
| LM 50 | 50 | 25 | 15.5 | 11.6 |
| LM 60 | 60 | 32 | 22.3 | 16.0 |
| * LM 80 | 80 | 52.5 | 39.6 | 22.5 |
| * LM 100 | 100 | 67.5 | 61.8 | 33.7 |

Models marked with “*” are build-to-order items.

Model number coding

SF25 g6 -500L K

Model number

LM shaft outer diameter tolerance

Overall LM shaft length (in mm)

Special symbol*

no symbol: solid shaft K: standard hollow shaft
M: special material F: with surface treatment

*If two or more symbols are given, they are shown in an alphabetical order.

Specially Machined Types

THK also supports special machining processes such as tapping, milling, threading, through hole and end journals, as shown in the Fig.1 , at your request.

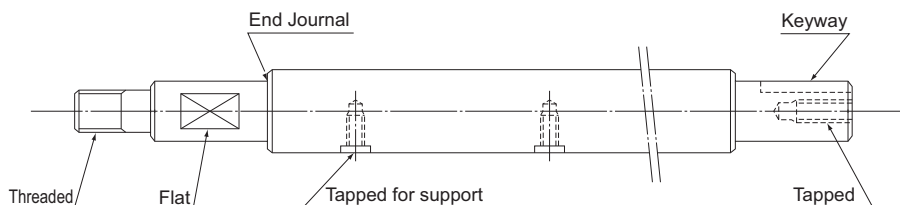


Fig.1

Dedicated Shafts

As the dedicated shafts for linear bushings come into direct contact with the ball bearings, the manufacturing tolerances for hardness, surface roughness, and the dimensional precision of the shaft are tight.

When manufacturing dedicated shafts, the surface hardness of the shaft will have a large impact on the overall service life. Check the following material and heat treatment specifications.

[Material]

Generally, the following materials are used for surface hardening through induction-hardening.

- SUJ2 (JIS G 4805: high-carbon chromium bearing steel)
- SK3 to 6 (JIS G 4401: carbon tool steel)
- S55C (JIS G 4051: carbon steel for machine structural use)

For special applications, martensite stainless steel SUS440C, which is corrosion resistant, may also be used.

[Hardness]

We recommend surface hardness of 58 HRC (\approx 653 HV) or higher. The depth of the hardened layer is determined by the size of the Linear Bushing; we recommend approximately 2 mm for general use.

[Surface Roughness]

To achieve smooth motion, the surface should preferably be finished to Ra0.40 or less.

Table of Rows of Balls and Masses for Clearance-adjustable Types and Open Types of the Linear Bushing

| Shaft diameter | Clearance-adjustable Type | | | Open Type | | |
|----------------|---------------------------|---------------|--------|-----------|---------------|--------|
| | Model No. | Rows of balls | Mass g | Model No. | Rows of balls | Mass g |
| 6 | LM 6-AJ | 4 | 7.8 | — | — | — |
| 8 | LM 8S-AJ | 4 | 10 | — | — | — |
| | LM 8-AJ | 4 | 14.7 | — | — | — |
| 10 | LM 10-AJ | 4 | 29 | — | — | — |
| 12 | LM 12-AJ | 4 | 31 | — | — | — |
| 13 | LM 13-AJ | 4 | 42 | LM 13-OP | 3 | 34 |
| 16 | LM 16-AJ | 5(4) | 68 | LM 16-OP | 4(3) | 52 |
| 20 | LM 20-AJ | 5 | 85 | LM 20-OP | 4 | 69 |
| 25 | LM 25-AJ | 6(5) | 216 | LM 25-OP | 5(4) | 188 |
| 30 | LM 30-AJ | 6 | 245 | LM 30-OP | 5 | 210 |
| 35 | LM 35-AJ | 6 | 384 | LM 35-OP | 5 | 350 |
| 38 | LM 38-AJ | 6 | 475 | LM 38-OP | 5 | 400 |
| 40 | LM 40-AJ | 6 | 579 | LM 40-OP | 5 | 500 |
| 50 | LM 50-AJ | 6 | 1560 | LM 50-OP | 5 | 1340 |
| 60 | LM 60-AJ | 6 | 1820 | LM 60-OP | 5 | 1650 |
| 80 | LM 80-AJ | 6 | 4320 | LM 80-OP | 5 | 3750 |
| 100 | LM 100-AJ | 6 | 8540 | LM 100-OP | 5 | 7200 |
| 120 | LM 120-AJ | 8 | 14900 | LM 120-OP | 6 | 11600 |

Note)The numbers of ball rows in the table apply to types using a resin retainer. Those of types using a metal retainer are indicated in parentheses.

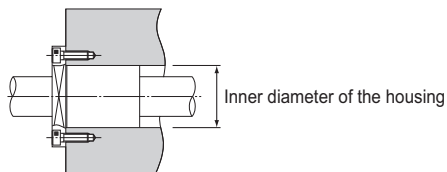
Assembling the Linear Bushing

[Inner Diameter of the Housing]

Table1 shows recommended housing inner-diameter tolerance for the Linear Bushing. When fitting the Linear Bushing with the housing, loose fit is normally recommended. If the clearance needs to be smaller, provide transition fit.

Table1 Housing Inner-diameter Tolerance

| Type | | Housing | |
|-----------|---------------------------------------|-----------|----------------|
| Model No. | Accuracy | Loose fit | Transition fit |
| LM | High accuracy grade (no symbol) | H7 | J7 |
| | Precision Grade (P) | H6 | J6 |
| LME | — | H7 | K6, J6 |
| LMF | High accuracy grade (no symbol) | H7 | J7 |
| LMK | | | |
| LMH | | | |
| LM-L | | | |
| LMF-L | | | |
| LMK-L | | | |
| LMH-L | | | |
| LMIF | | | |
| LMIK | | | |
| LMIH | | | |
| LMIF-L | | | |
| LMIK-L | | | |
| LMIH-L | | | |
| LMCF-L | | | |
| LMCK-L | | | |
| LMCH-L | | | |



[Clearance between the Nut and the LM Shaft]

When using the Linear Bushing in combination with an LM shaft, use normal clearance in ordinary use and small gap if the clearance is to be minimized.

Note1) If the clearance after installation is to be negative, it is preferable not to exceed the radial clearance tolerance indicated in the specification table.

Note2) The shaft tolerance for Linear Bushing models SC, SL SH and SH-L falls under high accuracy grade (no symbol).

Table2 Shaft Outer-diameter Tolerance

| Type | | LM Shaft | |
|-----------|---------------------------------------|------------------|-----------|
| Model No. | Accuracy | Normal clearance | Small gap |
| LM | High accuracy grade (no symbol) | f6, g6 | h6 |
| | Precision Grade (P) | f5, g5 | h5 |
| LME | — | h7 | k6 |
| LMF | High accuracy grade (no symbol) | f6, g6 | h6 |
| LMK | | | |
| LMH | | | |
| LM-L | | | |
| LMF-L | | | |
| LMK-L | | | |
| LMH-L | | | |
| LMIF | | | |
| LMIK | | | |
| LMIH | | | |
| LMIF-L | | | |
| LMIK-L | | | |
| LMIH-L | | | |
| LMCF-L | | | |
| LMCK-L | | | |
| LMCH-L | | | |

[Mounting the Nut]

Although the Linear Bushing does not require a large amount of strength for securing it in the axial direction, do not rely only on a press fit to support the nut. For the housing inner-diameter tolerance, see Table1 on **A4-112**.

- **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.

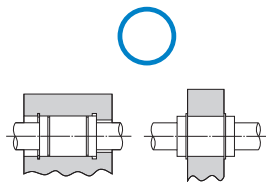


Fig. 1 Secured by snap ring

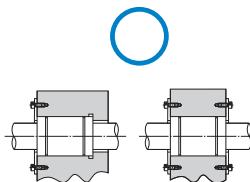


Fig. 2 Secured by stopper plate

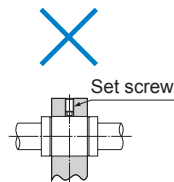


Fig. 3

■ Snap Ring for Installation

The snap ring types shown in Table 3 can be used for securing the standard Model LM.

Note 1) For models indicated with parentheses, use C-shape concentric snap rings.

Note 2) Table 3 commonly applies to models LM, LM-GA, LM-MG and LM-L.

Table 3 Types of Snap Rings

| Model No. | Snap ring | | | |
|-----------|-------------------|--------------|-------------------|--------------|
| | For outer surface | | For inner surface | |
| | Needle snap | C-shape snap | Needle snap | C-shape snap |
| LM 3 | — | — | AR 7 | — |
| LM 4 | — | — | 8 | — |
| LM 5 | WR 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 38 | — | 56•58 | 57 | — |
| LM 40 | — | 60 | 60 | 60 |
| LM 50 | — | 80 | 80 | 80 |
| LM 60 | — | 90 | 90 | 90 |
| LM 80A | — | 120 | 120 | 120 |
| LM 100A | — | (150) | 150 | — |
| LM 120A | — | (180) | 180 | — |

[Inserting the Nut]

When inserting the standard linear bushing into a housing, do not directly hit the seal or side plate. Use a jig to evenly drive in the nut, or place a flatter piece of metal on the nut and gently hit that. (See Fig. 4)

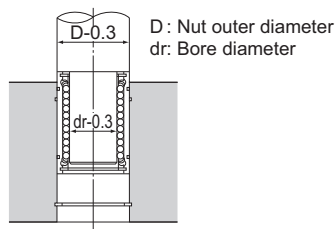


Fig. 4

Point of Design

Assembling the Linear Bushing

● Installing a Clearance-adjustable Type

To adjust the clearance of a clearance-adjustable type (-AJ), use a housing that allows adjustment of the nut outer diameter so as to facilitate the adjustment of the clearance between the Linear Bushing and the LM shaft. Positioning the slit of the Linear Bushing at an angle of 90° with the housing's slit will provide uniform deformation in the circumferential direction. (See Fig.5 .)

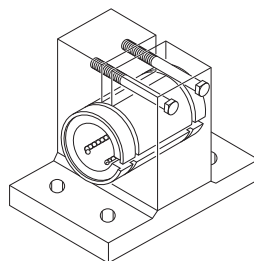


Fig.5

● Mounting an Open Type

For an open type (-OP), also use a housing that allows adjustment of the nut outer diameter as shown in Fig.6 .

Open types are normally used with a light preload. Be sure not to give an excessive preload.

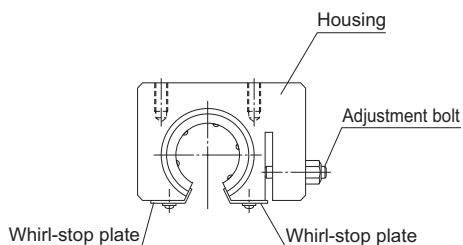


Fig.6

[Precautions on Installing an Open Three-ball-row Type Linear Bushing]

When installing an open three-ball-row type Linear Bushing, mount it while taking into account the load distribution as indicated in Fig.7 .

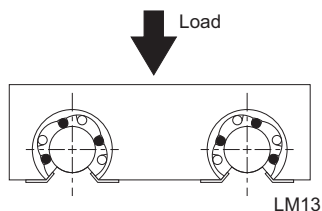
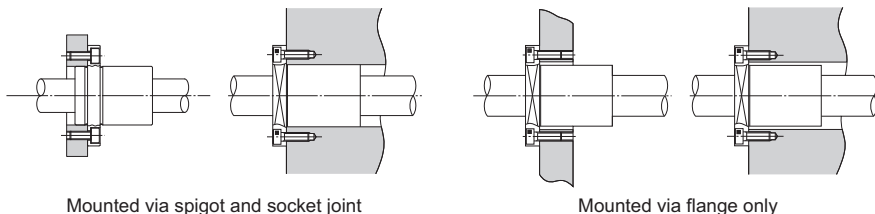


Fig.7

● Installing the Flanged Type

With models LMF, LMK, LMH, LMIF, LMCF, LMIK, LMCK, LMIH, and LMCH, the nut is integrated with a flange. Therefore, the linear bushing can be mounted only via the flange.



However, the Model LMJK must be mounted via a spigot and socket joint. Please do not mount using just the flange.



[Installing the LM Case Unit]

● Attaching Model SC (SL)

Models SC and SL can be affixed from either above or below using bolts. (See Fig. 8)

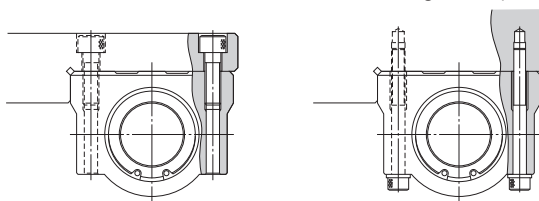


Fig. 8

● Attaching the Model SH (SH-L)

Models SH and SH-L can be affixed in any direction using bolts. (See Fig. 9)

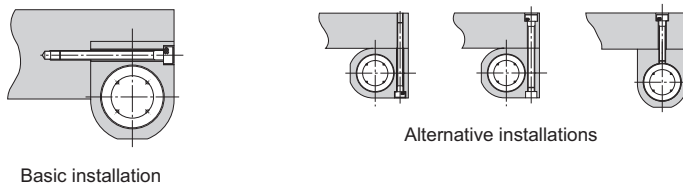


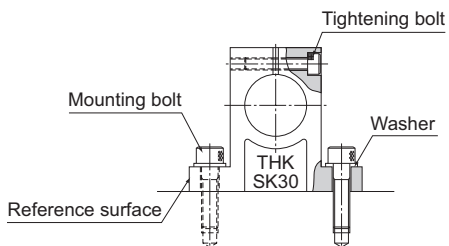
Fig. 9

Point of Design

Assembling the Linear Bushing

[Mounting the Shaft End Support]

Shaft end support model SK can easily be secured to the table using mounting bolts. Model SK enables the LM shaft to firmly be secured using tightening bolts.



[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. (See Fig.10 .)

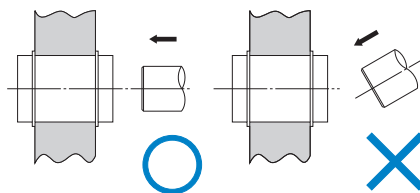


Fig.10

[When Under a Moment Load]

When using the Linear Bushing, make sure the load is evenly distributed on the whole ball raceway. In particular, if a moment load is applied, use two or more Linear Bushing units on the same LM shaft and secure an adequately large distance between the units.

If using the Linear Bushing under a moment load, also calculate the equivalent radial load and identify the correct model number. (See **A4-39** .)

[Rotational Use 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.

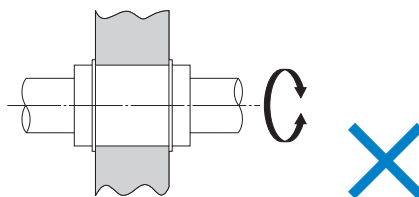


Fig.11

[Attaching Felt Seal Model FLM]

The felt seal can be press-fit into a housing finished to H7, but cannot be used as a stopper for preventing the Linear Bushing from coming off. Be sure to use the felt seal by attaching it as indicated in the Fig.12 .

Also make sure to impregnate the felt with sufficient lubricant before attaching it.

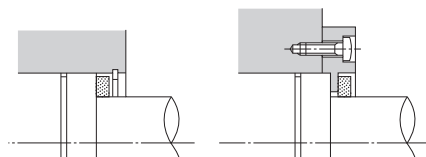


Fig.12

Lubrication

The Linear Bushing requires grease or oil as a lubricant for its operation.

[Grease Lubrication]

Before mounting the product onto the LM shaft, apply grease to each row of balls inside the Guide Ball Bushing.

Thereafter apply grease as necessary, in accordance with usage and other conditions noted above, or attach housing as shown in Fig. 1, or apply grease directly to the LM shaft.

We recommend using lithium soap-based grease No. 2.

[Oil Lubrication]

Apply the required amount of oil or grease-based lubricant onto the LM shaft and set it in the housing as shown in Fig. 1.

Commonly used lubricants include turbine oil, machine oil, and spindle oil.

In addition to the procedures described the above, an oil hole or grease nipple can also be used for lubrication. For further information, contact THK.

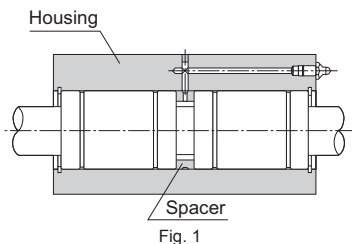


Fig. 1

Material and Surface Treatment

For the Linear Bushing and the LM shaft, highly corrosion-resistant stainless steel types are available for some models.

Although the LM shaft can be surface treated, some types may not be suitable for the treatment. Contact THK for details.

Dust prevention

Entrance of dust or other foreign material into the Linear Bushing will cause abnormal wear or shorten the service life. When entrance of dust or other foreign material is a possibility, it is important to select effective seals and/or a dust-control device that meets the service environment conditions.

For the Linear Bushing, a special synthetic rubber seal that is highly resistant to wear and a felt seal (highly dust preventive with low seal resistance) are available as contamination protection accessories.

In addition, THK produces round bellows. Contact us for details.

Felt Seal Model FLM

Linear Bushing model LM series include types equipped with a special synthetic rubber seal (LM...UU, U). If desiring to have an additional contamination protection measure, or desiring to lower the seal resistance, use the felt seal model FLM. (See Table1)

[Dimensions of the Felt Seal]

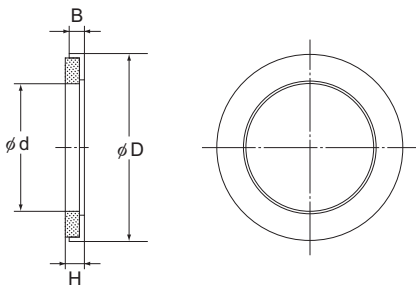


Table1 Major Dimensions of FLM

Unit: mm

| Model No. | Main dimensions | | | | Supported linear bushing model |
|-----------|-----------------|-----|----|----|--------------------------------|
| | d | D | B | H | |
| FLM 6 | 6 | 12 | 2 | 2 | LM 6 |
| FLM 8 | 8 | 15 | 2 | 2 | LM 8 |
| FLM 10 | 10 | 19 | 3 | 3 | LM 10 |
| FLM 12 | 12 | 21 | 3 | 3 | LM 12 |
| FLM 13 | 13 | 23 | 3 | 3 | LM 13 |
| FLM 16 | 16 | 28 | 4 | 5 | LM 16 |
| FLM 20 | 20 | 32 | 4 | 5 | LM 20 |
| FLM 25 | 25 | 40 | 5 | 6 | LM 25 |
| FLM 30 | 30 | 45 | 5 | 6 | LM 30 |
| FLM 35 | 35 | 52 | 5 | 6 | LM 35 |
| FLM 38 | 38 | 57 | 5 | 6 | LM 38 |
| FLM 40 | 40 | 60 | 5 | 6 | LM 40 |
| FLM 50 | 50 | 80 | 10 | 11 | LM 50 |
| FLM 60 | 60 | 90 | 10 | 11 | LM 60 |
| FLM 80 | 80 | 120 | 10 | 11 | LM 80 |
| FLM 100 | 100 | 150 | 10 | 11 | LM 100 |

Model Number Coding

Model number configurations differ depending on the model features. Refer to the corresponding sample model number configuration.

[Linear Bushing]

- LM, LME, LM-L, LMF, LMF-L, LMK, LMK-L, LMJK, LMJK-L, LMH, LMH-L, LMIF, LMIF-L, LMCF-L, LMIK, LMIK-L, LMCK-L, LMIH, LMIH-L, LMCH-L, SC, SL, SH, SH-L

LM20 **L** **UU**
 Model No. | With nut seal
 Long type

- LM-M, LM-MG, LMF-M, LMF-ML, LMK-M, LMK-ML, LMH-M, LMH-ML

LMF20 **M** **L** **UU**
 Model No. | | With nut seal
 Made of stainless steel Long type

- LM-GA, LM-MGA, LME-GA

LM20 **M** **GA** **UU**
 Model No. | | With nut seal
 Made of stainless steel Metal retainer specification

■Notes on Ordering

For high temperature applications, seals (symbol: UU) can be attached to both ends of the nut on linear bushes used with metal cages (symbol: A). However, cages without seals are recommended, since the seals are only heat-resistant to a temperature of 80°C.

[LM Shaft End Support]● **Model SK****SK20**

Model No.

[LM Shaft]● **Model SF**

| | | | |
|-------------|-----------------------------------|---------------------------------|---|
| SF25 | g6 | -500L | K |
| Model No. | LM shaft outer diameter tolerance | Overall LM shaft length (in mm) | Special symbol* no symbol: solid shaft K: standard hollow shaft M: special material F: with surface treatment |

*If two or more symbols are given, they are shown in an alphabetical order.

*For information shaft diameters, permissible shaft diameter error and standard stock lengths, see **A4-109**.**[Felt Seal]**● **Model FLM****FLM 20**

Model No.

Precautions on Use

Linear Bushing

[Handling]

- (1) Disassembling each part may cause dust to enter the system or degrade mounting accuracy of parts. Do not disassemble the product.
- (2) Take care not to drop or strike the Linear Bushing. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
- (3) When handling the product, wear protective gloves, safety shoes, etc., as necessary to ensure safety.

[Precautions on Use]

- (1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
- (2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
- (3) Do not use the product at temperature of 80°C or higher. Exposure to higher temperatures may cause the resin/rubber parts to deform/be damaged.
- (4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
- (5) Micro-strokes tend to obstruct oil film to form on the raceway in contact with the rolling element, and may lead to fretting corrosion. Take consideration using grease offering excellent fretting prevention. It is also recommended that a stroke movement corresponding to the length of the outer cylinder be made on a regular basis to make sure oil film is formed between the raceway and rolling element.
- (6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate permanent deformation on the raceway, leading to loss of functionality.
- (7) Insert the shaft straight through the opening. Inserting the shaft at an angle can introduce foreign matter, damage internal components, or cause balls to fall out.
- (8) Using this product with any balls removed may result in premature damage.
- (9) Please contact THK if any balls fall out; do not use the product if any balls are missing.
- (10) If an attached component is insufficiently rigid or mounted incorrectly, the bearing load will be concentrated at one location and performance will decline significantly. Make sure the housing and base are sufficiently rigid, the anchoring bolts are strong enough, and the component is mounted correctly.

[Lubrication]

- (1) Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
- (2) Do not mix different lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
- (3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
- (4) To lubricate the product, apply lubricant directly to the raceway surface and execute a few preliminary strokes to ensure that the interior is fully lubricated.
- (5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the Linear Bushing also changes as the consistency of grease changes.

- (6) After lubrication, the slide resistance of the Linear Bushing may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
- (7) Excess grease may scatter immediately after lubrication, so wipe off scattered grease as necessary.
- (8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
- (9) The greasing interval varies depending on the use condition and service environment. Set the final lubrication interval/amount based on the actual machine.

[Storage]

When storing the Linear Bushing, enclose it in a package designated by THK and store it in a room while avoiding high temperature, low temperature and high humidity.

[Disposal]

Dispose of the product properly as industrial waste.



Guide Ball Bushing/Linear Bushing

THK General Catalog

Guide Ball Bushing/Linear Bushing

THK General Catalog

B Support Book

| | | | |
|--|--------|---------------------------------|--------|
| Features and Types | B 4-4 | Precautions on Use | B 4-50 |
| Features of the Guide Ball Bushing | B 4-4 | | |
| • Structure and Features | B 4-4 | | |
| • Examples of Changing the Linear Bushing to the Guide Ball Bushing .. | B 4-6 | | |
| Types of the Guide Ball Bushing | B 4-7 | | |
| • Types and Features | B 4-7 | | |
| Point of Selection | B 4-8 | | |
| Flowchart for Selecting a Guide Ball Bushing .. | B 4-8 | | |
| • Steps for Selecting a Guide Ball Bushing .. | B 4-8 | | |
| Rated Load and Nominal Life | B 4-9 | | |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | B 4-12 | | |
| Mounting Procedure and Maintenance .. | B 4-13 | | |
| Assembling the Guide Ball Bushing | B 4-13 | | |
| Options | B 4-16 | | |
| Lubrication | B 4-16 | | |
| Dust prevention | B 4-16 | | |
| Model No. | B 4-17 | | |
| • Model Number Coding | B 4-17 | | |
| Precautions on Use | B 4-18 | | |
| Features and Types | B 4-20 | | |
| Features of the Linear Bushing | B 4-20 | | |
| • Structure and Features | B 4-20 | | |
| Types of the Linear Ball Bushing | B 4-22 | | |
| • Types and Features | B 4-22 | | |
| Classification Table | B 4-32 | | |
| Point of Selection | B 4-34 | | |
| Flowchart for Selecting a Linear Bushing .. | B 4-34 | | |
| • Steps for Selecting a Linear Bushing | B 4-34 | | |
| Rated Load and Nominal Life | B 4-35 | | |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | B 4-38 | | |
| Mounting Procedure and Maintenance .. | B 4-39 | | |
| Assembling the Linear Bushing | B 4-39 | | |
| Options | B 4-46 | | |
| Lubrication | B 4-46 | | |
| Material and Surface Treatment | B 4-46 | | |
| Dust prevention | B 4-47 | | |
| Felt Seal Model FLM | B 4-47 | | |
| Model No. | B 4-48 | | |
| • Model Number Coding | B 4-48 | | |

A Product Descriptions (Separate)

| | | | |
|--|-------|--|--------|
| Features and Types | A4-4 | Model LME | A4-48 |
| Features of the Guide Ball Bushing | A4-4 | Model LM-L | A4-50 |
| • Structure and Features | A4-4 | Model LMF | A4-52 |
| • Examples of Changing the Linear Bushing to the Guide Ball Bushing .. | A4-6 | Model LMF-M (Stainless Steel Type) | A4-54 |
| Types of the Guide Ball Bushing | A4-7 | Model LMF-L | A4-56 |
| • Types and Features | A4-7 | Model LMF-ML (Stainless Steel Type) .. | A4-58 |
| Point of Selection | A4-8 | Model LMK | A4-60 |
| Flowchart for Selecting a Guide Ball Bushing .. | A4-8 | Model LMK-M (Stainless Steel Type) | A4-62 |
| • Steps for Selecting a Guide Ball Bushing .. | A4-8 | Model LMK-L | A4-64 |
| Rated Load and Nominal Life | A4-9 | Model LMK-ML (Stainless Steel Type) .. | A4-66 |
| Table of Equivalent Factors | A4-13 | Model LMJK | A4-68 |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | A4-13 | Model LMJK-L | A4-70 |
| Accuracy Standards | A4-13 | Model LMH | A4-72 |
| Dimensional Drawing, Dimensional Table | | Model LMH-M (Stainless Steel Type) | A4-74 |
| Model LG | A4-14 | Model LMH-L | A4-76 |
| Point of Design | A4-16 | Model LMH-ML (Stainless Steel Type) .. | A4-78 |
| Assembling the Guide Ball Bushing | A4-16 | Model LMIF | A4-80 |
| Options | A4-19 | Model LMIF-L | A4-82 |
| Lubrication | A4-19 | Model LMCF-L | A4-84 |
| Dust prevention | A4-19 | Model LMIK | A4-86 |
| Model No. | A4-20 | Model LMIK-L | A4-88 |
| • Model Number Coding | A4-20 | Model LMCK-L | A4-90 |
| Precautions on Use | A4-21 | Model LMIH | A4-92 |
| Features and Types | A4-23 | Model LMIH-L | A4-94 |
| Features of the Linear Bushing | A4-23 | Model LMCH-L | A4-96 |
| • Structure and Features | A4-23 | Models SC6 to 30 | A4-98 |
| Types of the Linear Ball Bushing | A4-24 | Models SC35 to 50 | A4-100 |
| • Types and Features | A4-24 | Model SL | A4-102 |
| Classification Table | A4-34 | Model SH | A4-104 |
| Point of Selection | A4-36 | Model SH-L | A4-106 |
| Flowchart for Selecting a Linear Bushing .. | A4-36 | Model SK | A4-108 |
| • Steps for Selecting a Linear Bushing | A4-36 | • Standard LM Shafts | A4-109 |
| Rated Load and Nominal Life | A4-37 | • Specially Machined Types | A4-110 |
| Table of Equivalent Factors | A4-41 | • Dedicated Shafts | A4-111 |
| Precautions To Be Taken if an Eccentric Load Is Applied .. | A4-41 | • Table of Rows of Balls and Masses for Clearance-adjustable Types and Open Types of the Linear Bushing | A4-111 |
| Accuracy Standards | A4-41 | Point of Design | A4-112 |
| Dimensional Drawing, Dimensional Table | | Assembling the Linear Bushing | A4-112 |
| Model LM | A4-42 | Options | A4-119 |
| Model LM-GA (Metal Retainer Type) | A4-44 | Lubrication | A4-119 |
| Model LM-MG (Stainless Steel Type) | A4-46 | Material and Surface Treatment | A4-119 |
| | | Dust prevention | A4-120 |
| | | Felt Seal Model FLM | A4-120 |
| | | Model No. | A4-121 |
| | | • Model Number Coding | A4-121 |
| | | Precautions on Use | A4-123 |

Features of the Guide Ball Bushing

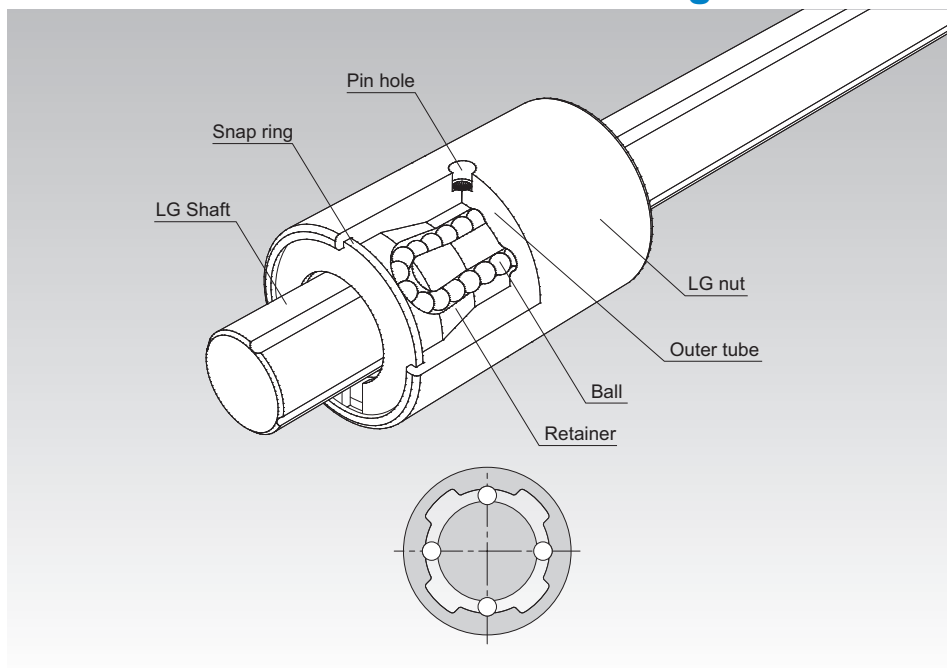


Fig.1 Structure of the Guide Ball Bushing model LG

Structure and Features

Since model LG has 4 rows of circular arc grooves (raceways), it does not need a mechanism to prevent the outer tube from rotating. In addition, its load rating is much larger than Linear Bushing model LM with the same dimensions. Therefore, replacing the Linear Bushing with the Guide Ball Bushing will reduce the size and cost of the guide unit and extend the service life.

Features and Types

Features of the Guide Ball Bushing

[Higher Load Rating than the Linear Bushing]

Since model LG ensures an R contact through the use of circular arc grooves for ball contact, it achieves a load rating more than twice that of point-contact Linear Bushing model LM with the same size.

[A Rotation Stopper is Unnecessary Because of Raceways]

Since model LG has circular arc grooves, it does not need a rotation stopper required for Linear Bushing model LM, and allows the machine design to be compact.

[Interchangeable in Dimensions with Linear Bushing Model LM]

Since the outer tube of model LG has the same outer diameter and length as that of Linear Bushing model, LM, it is possible to replace Linear Bushing model LM with Guide Ball Bushing model LG as assemblies.

[Various Combinations of Nut and Shaft are Available (Any Combination is Allowed)]

As with the Linear Bushing, any combination of the LG nut and the LG shaft of model LG is allowed.

Examples of Changing the Linear Bushing to the Guide Ball Bushing

[Advantage of using the Guide Ball Bushing 1: Longer service life]

Since model LG has a rated load more than 2.4 times the Linear Bushing with the same dimensions, replacing the Linear Bushing with model LG will increase the service life by more than 13.8 times.

Table1 Comparison of the service life between Guide Ball Bushing mode LG and Linear Bushing model LM

| Model No. | Basic dynamic load rating: C [N] | Load rating ratio | Service life ratio |
|-----------|-------------------------------------|-------------------|--------------------|
| LG4S | 335 | 3.8 times | 54.8 times |
| LM4 | 88.2 | | |
| LG6S | 494 | 2.4 times | 13.8 times |
| LM6 | 206 | | |
| LG8S | 796 | 3.0 times | 27.0 times |
| LM8 | 265 | | |

[Advantage of using the Guide Ball Bushing 2: Smaller machine size]

Since the Linear Bushing is not suitable for applications where a load in the rotational direction is applied, it is necessary to use two or more Linear Bushing units in parallel or have a rotation stopper mechanism even under conditions where a torque is not applied. In contrast, the Guide Ball Bushing, which has a structure containing four rows of circular arc grooves, is operable with a single shaft and therefore contributes to downsizing the machine, unless an excessive load is applied.

Achieves a load carrying capacity approximately three times the Linear Bushing in a half space

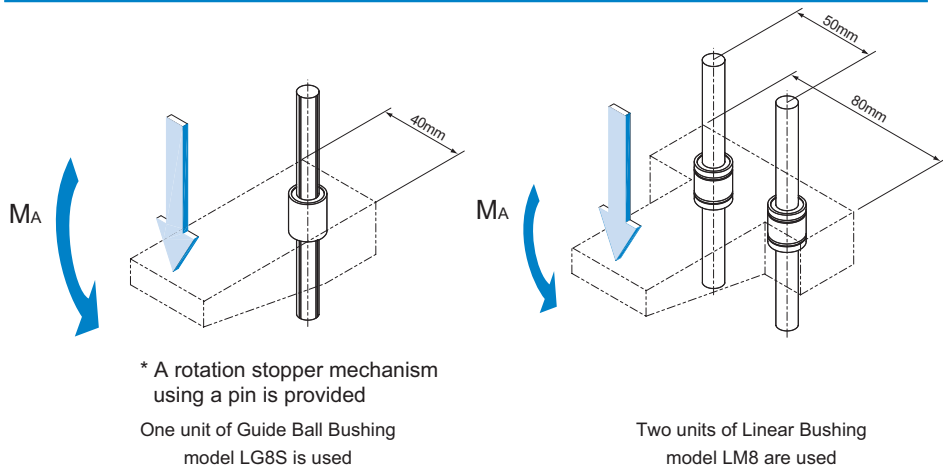


Table2 Comparison of the permissible moment between Guide Ball Bushing mode LG and Linear Bushing model LM

| Model No. | Permissible moment: M_A [N·m] |
|---------------------------|---------------------------------|
| One unit of LG8S is used | 1.46 |
| Two units of LM8 are used | 0.45 |

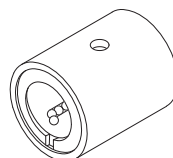
Types of the Guide Ball Bushing

Types and Features

Model LG-S

Specification Table⇒ [A4-14](#)

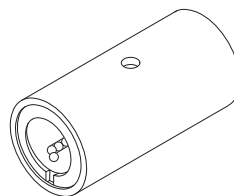
In this type, the diameter and the length of the LG nut are the same as that of Linear Bushing model LM. This type is dimensionally interchangeable with model LM.



Model LG-L

Specification Table⇒ [A4-14](#)

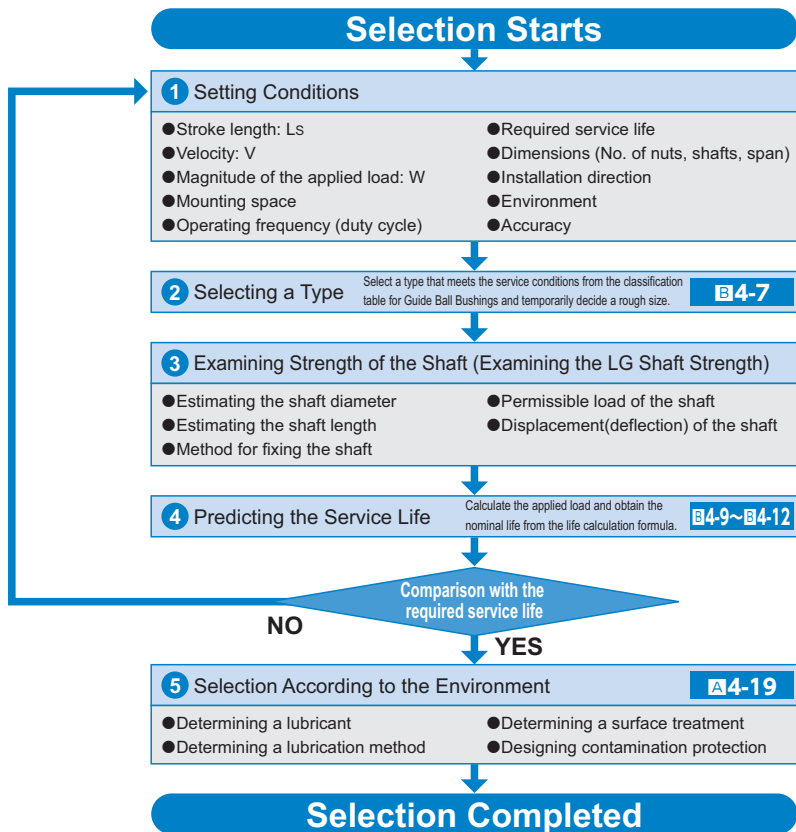
Model LG-L is a long type in which the overall length of the LG nut is longer than that of model LG-S to increase the load carrying capacity.



Flowchart for Selecting a Guide Ball Bushing

Steps for Selecting a Guide Ball Bushing

The following flowchart should be used as a guide for selecting a Guide Ball Bushing.



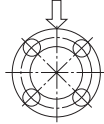
Rated Load and Nominal Life

[Load Rating]

The rated load of the Guide Ball 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 Guide Ball Bushing is mounted so that two rows of balls evenly receive the load in the load direction, the rated load changes as shown in Table1.

Table1 Rated load of the Guide Ball Bushing

| Rows of balls | Ball position | Load Rating |
|---------------|---|-----------------|
| 4 rows |  | $1.41 \times C$ |

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

[Calculating the Nominal Life]

The nominal life of the THK guide ball bushing is defined as 50 km. The nominal life (L_{10}) is calculated from the basic dynamic load rating (C) and the load acting on the guide ball bushing (P_c) using the following formula.

$$L_{10} = \left(\frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots(1)$$

L_{10} : Nominal life (km)
 C : Basic dynamic load rating (N)
 P_c : Calculated load (N)

*This nominal life formula may not apply if the length of the stroke is less than or equal to twice the length of the nut.

When comparing the nominal life (L_{10}), you must take into account whether the basic dynamic load rating was defined based on 50 km or 100 km. Convert the basic dynamic load rating based on ISO 14728-1 as necessary.

ISO-regulated basic dynamic load rating conversion formula:

$$C_{100} = \frac{C_{50}}{1.26}$$

C_{50} : Basic dynamic load rating based on a nominal life of 50 km
 C_{100} : Basic dynamic load rating based on a nominal life of 100 km

[Calculating the Modified Nominal Life]

During use, a guide ball bushing may be subjected to vibrations and shocks as well as fluctuating loads, which are difficult to detect. In addition, the surface hardness of the raceways, the operating temperature, and having blocks arranged directly behind one another will have a decisive impact on the service life. Taking these factors into account, the modified nominal life (L_{10m}) can be calculated according to the following formula (2).

•Modified factor α

$$\alpha = \frac{f_H \cdot f_T \cdot f_c}{f_w}$$

α : Modified factor
 f_H : Hardness factor (see Fig.1 on **B4-11**)
 f_T : Temperature factor
 f_c : Contact factor (see Table2 on **B4-12**)
 f_w : Load factor (see Table 3 on **B4-12**)

•Modified nominal life L_{10m}

$$L_{10m} = \left(\alpha \times \frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots(2)$$

L_{10m} : Modified nominal life (km)
 C : Basic dynamic load rating (N)
 P_c : Calculated load (N)

● **When a Moment Load is Applied to a Single Nut or Two Nuts in Close Contact with Each Other**

When a moment load is applied to a single nut or two nuts in close contact with each other, calculate the equivalent radial load at the time the moment is applied.

$$P_v = K \cdot M$$

P_v : Equivalent radial load (N)
(with a moment applied)

K : Equivalent factors
(see Table4 to Table5 on **A4-13**)

M : Applied moment (N·mm)

However, " P_v " is assumed to be within the basic static load rating (C_0).

● **When a Moment Load and a Radial Load are Simultaneously Applied**

When a moment and a radial load are applied simultaneously, calculate the service life based on the sum of the radial load and the equivalent radial load.

■ **f_H : Hardness Factor**

To maximize the load capacity of the Guide Ball Bushing, the hardness of the raceways needs to be between 58 to 64 HRC.

If the hardness is lower than this range, the basic dynamic load rating and the basic static load rating decrease. Therefore, it is necessary to multiply each rating by the respective hardness factor (f_H).

Normally, $f_H = 1.0$ since the Guide Ball Bushing has sufficient hardness.

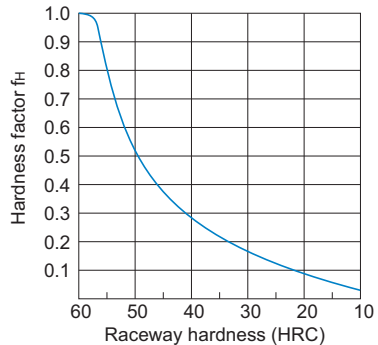


Fig.1 Hardness Factor (f_H)

■ **f_T : Temperature Factor**

The temperature of the environment where the Guide Ball Bushing is used must be 80°C or below. Therefore, adopt a temperature factor $f_T = 1.0$.

The Guide Ball Bushing does not support high temperature. Therefore, if the environment temperature exceeds 80°C, it is necessary to use another product.

■ f_c : Contact Factor

When multiple nuts are used in close contact with each other, their linear motion is affected by moments and mounting accuracy, making it difficult to achieve uniform load distribution. In such applications, multiply the basic load rating (C) and (C₀) by the corresponding contact factor in Table2.

Note) If uneven load distribution is expected in a large machine, take into account the respective contact factor indicated in Table2.

Table2 Contact Factor (f_c)

| Number of nuts in close contact with each other | Contact factor f_c |
|---|----------------------|
| 2 | 0.81 |
| 3 | 0.72 |
| 4 | 0.66 |
| 5 | 0.61 |
| Normal use | 1 |

■ f_w : Load Factor

In general, reciprocating machines tend to experience vibrations or impacts during operation, and it is extremely difficult to accurately determine the vibrations generated during high-speed operation and impacts during frequent starts and stops. Therefore, when the actual load applied to a guide ball bushing cannot be obtained, or when speed and vibrations have a significant influence, divide the basic dynamic load rating (C) by the corresponding load factor in Table 3, which has been empirically obtained.

Table 3 Load Factor (f_w)

| Vibrations/ impact | Speed(V) | f_w |
|--------------------|-------------------------------------|------------|
| Faint | Very low $V \leq 0.25\text{m/s}$ | 1 to 1.2 |
| Weak | Slow $0.25 < V \leq 1\text{m/s}$ | 1.2 to 1.5 |
| Medium | Medium $1 < V \leq 2\text{m/s}$ | 1.5 to 2 |
| Strong | High $V > 2\text{m/s}$ | 2 to 3.5 |

[Calculating the Service Life Time]

When the nominal life (L_{10}) has been obtained, if the stroke length and the number of reciprocations per minute are constant, the service life time is obtained using the following equation.

$$L_h = \frac{L_{10} \times 10^3}{2 \times \ell_s \times n_1 \times 60}$$

L_h : Service life time (h)

ℓ_s : Stroke length (m)

n_1 : Number of reciprocations per minute (min⁻¹)

Precautions To Be Taken if an Eccentric Load Is Applied

Model LG achieves a much higher load-carrying capacity in receiving the eccentric load (moment and torque) than Linear Bushing model LM because of 4 rows of raceways. However, under conditions where the eccentric load is larger, the product may result in poor operation or early failure. In such cases, we recommend using Ball Spline model LBS or LT, both of which have larger load-carrying capacities (see **B3-4** onward).

Assembling the Guide Ball Bushing

[Inner Diameter of the Housing]

Table1 shows recommended housing inner-diameter tolerance for the Guide Ball Bushing. When fitting the Guide Ball Bushing with the housing, loose fit is normally recommended. If the clearance needs to be smaller, provide transition fit.

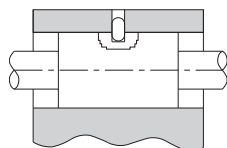
Table1 Housing Inner-diameter Tolerance

| | |
|---|----|
| General conditions | H6 |
| If the accuracy does not need to be very high | H7 |

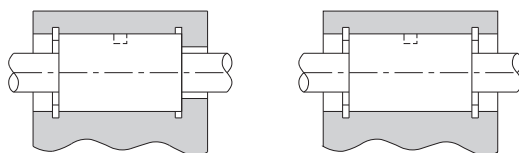
[Mounting the Nut]

Although the Guide Ball Bushing does not require a large amount of strength for securing it in the LG shaft direction, do not support the nut only with driving fitting. For the housing inner-diameter tolerance, see Table1.

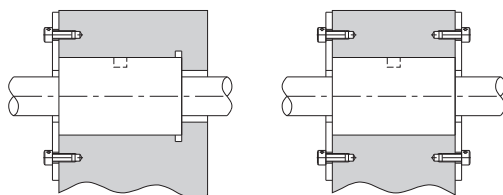
● Mounting model LG using a pin



● Mounting model LG as with the conventional Linear Bushing



Snap Ring



Stopper Plate

■Snap Ring for Installation

To secure the Guide Ball Bushing model LG, snap rings indicated in Table2 are available.

Table2 Types of Snap Rings

| Model No. | Snap ring | |
|-----------|-------------------|-------------------|
| | For inner surface | |
| | Needle snap ring | C-shape snap ring |
| LG 4 | 8 | — |
| LG 6 | 12 | 12 |
| LG 8 | 15 | 15 |

■Set Screws Not Allowed

Securing the nut by pressing the outer surface with one set screw as shown in Fig.1 will cause the nut to be deformed.

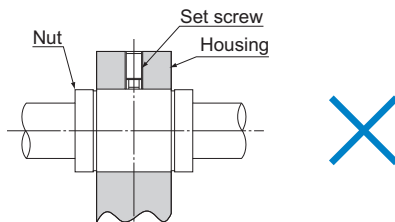


Fig.1

[Incorporating the Nut]

When incorporating the Guide Ball Bushing into a housing, use a jig and drive in the nut, or use a flatter plate and gently hit the nut, instead of directly hitting the side plate or the seal. (see Fig.2).

Unit: mm

| Model No. | dr | Tolerance |
|-------------|-----|--------------|
| LG 4S/LG 4L | 3.6 | -0.1 -0.3 |
| LG 6S/LG 6L | 5.6 | |
| LG 8S/LG 8L | 7.5 | |

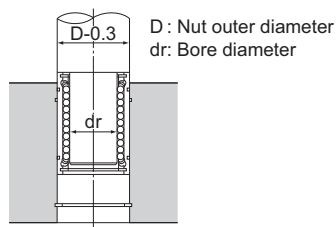


Fig.2

[Inserting the LG Shaft]

When inserting the LG shaft into the Guide Ball Bushing, align the center of the shaft with that of the nut and gently insert the shaft straight-forward into the nut. If the shaft is slanted while it is inserted, balls may fall off or the retainer may be deformed (see Fig.3).

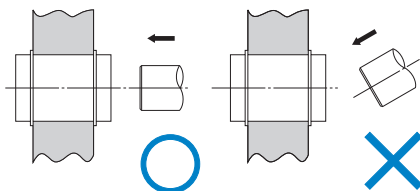


Fig.3

Mounting Procedure and Maintenance

Assembling the Guide Ball Bushing

[When Under a Moment Load]

When using the Guide Ball Bushing, make sure that the load is evenly distributed on the whole ball raceway. In particular, if a moment load is applied, use two or more Guide Ball Bushing units on the same LG shaft and secure an adequately large distance between the units.

If using the Guide Ball Bushing under a moment load, also calculate the equivalent radial load and identify the correct model number. (See **B4-11**.)

Lubrication

The Guide Ball Bushing requires grease or oil as a lubricant for its operation.

[Grease Lubrication]

Before mounting the product onto the LG shaft, apply grease to each row of balls inside the Guide Ball Bushing.

Thereafter apply grease as necessary, in accordance with usage and other conditions noted above, or attach housing as shown in Fig.1, or apply grease directly to the LG shaft.

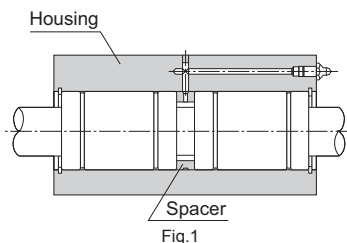
We recommend using lithium soap-based grease No. 2.

[Oil Lubrication]

To lubricate, apply lubricant to the LG shaft one drop at a time, as needed, or attach housing as shown in Fig.1, in the same manner as when lubricating with grease.

Commonly used lubricants include turbine oil, machine oil, and spindle oil.

In addition to the procedures described the above, an oil hole or grease nipple can also be used for lubrication. For further information, contact THK.



Dust prevention

Entrance of dust or other foreign material into the Guide Ball Bushing will cause abnormal wear or shorten the service life. When entrance of dust or other foreign material is a possibility, it is important to select effective seals and/or dust-control device that meets the service environment conditions.

In addition, THK produces round bellows. Contact us for details.

Model Number Coding

Model number configurations differ depending on the model features. Refer to the corresponding sample model number configuration.

[Guide Ball Bushing]

Estimates and orders should be made for LG shafts alone or LG nuts alone in principle.

A set consisting of an LG shaft and an LH nut is also available if desired by the customer. Contact THK for details.

● Models LG-S and LG-L

- LG shaft only

LG4 -100L

Model No.
of LG shaft

Overall LG shaft length (in mm)

- LG nut only

LG4S

Model No. of LG nut

- Combination of
LG shaft and LG nut

2 LG4S +100L

Number of LG nuts on one shaft
(no symbol for one nut)

Model No.
of LG nut

Overall LG shaft length (in mm)

A special radial clearance, designated grease application (standard product is applied with antirust oil only), and surface treatment (THK AP-C treatment, THK AP-CF treatment, THK AP-HC treatment) are also available. Contact THK for details.

[Handling]

- (1) Disassembling each part may cause dust to enter the system or degrade mounting accuracy of parts. Do not disassemble the product.
- (2) Take care not to drop or strike the Guide Ball Bushing. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
- (3) When handling the product, wear protective gloves, safety shoes, etc., as necessary to ensure safety.

[Precautions on Use]

- (1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
- (2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
- (3) Do not use the product at temperature of 80°C or higher. Exposure to higher temperatures may cause the resin/rubber parts to deform/be damaged.
- (4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
- (5) Micro-strokes tend to obstruct oil film to form on the raceway in contact with the rolling element, and may lead to fretting corrosion. Take consideration using grease offering excellent fretting prevention. It is also recommended that a stroke movement corresponding to the length of the outer cylinder be made on a regular basis to make sure oil film is formed between the raceway and rolling element.
- (6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate permanent deformation on the raceway, leading to loss of functionality.
- (7) Insert the shaft straight through the opening. Inserting the shaft at an angle can introduce foreign matter, damage internal components, or cause balls to fall out.
- (8) Using this product with any balls removed may result in premature damage.
- (9) Please contact THK if any balls fall out; do not use the product if any balls are missing.
- (10) If an attached component is insufficiently rigid or mounted incorrectly, the bearing load will be concentrated at one location and performance will decline significantly. Make sure the housing and base are sufficiently rigid, the anchoring bolts are strong enough, and the component is mounted correctly.

[Lubrication]

- (1) Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
- (2) Do not mix different lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
- (3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
- (4) To lubricate the product, apply lubricant directly to the raceway surface and execute a few preliminary strokes to ensure that the interior is fully lubricated.
- (5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the Guide Ball Bushing also changes as the consistency of grease changes.

Precautions on Use

- (6) After lubrication, the slide resistance of the Guide Ball Bushing may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
- (7) Excess grease may scatter immediately after lubrication, so wipe off scattered grease as necessary.
- (8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
- (9) The greasing interval varies depending on the use condition and service environment. Set the final lubrication interval/amount based on the actual machine.

[Assembling the LG Nut with the LG Shaft of the Guide Ball Bushing]

- (1) When assembling the LG nut with the LG shaft, align the position of the balls inside the LG nut with the position of the groove of the LG shaft, then insert the LG shaft into the LG nut straight-forward and gradually. If the LG shaft is tilted when it is inserted, balls may bounce out or damage the circulating part.
- (2) If the LG shaft is stuck in the middle of insertion, do not force it into the nut. Instead, but pull it out first, re-check the ball position and the LG shaft groove position, and then insert it straight-forward and gradually.
- (3) After assembling the LG nut with the LG shaft, check that the LG nut or the LG shaft smoothly moves. If the shaft was forced into the nut, function could be lost even if the product looks intact.

[Storage]

When storing the Guide Ball Bushing, enclose it in a package designated by THK and store it in a room while avoiding high temperature, low temperature and high humidity.

[Disposal]

Dispose of the product properly as industrial waste.

Features of the Linear Bushing

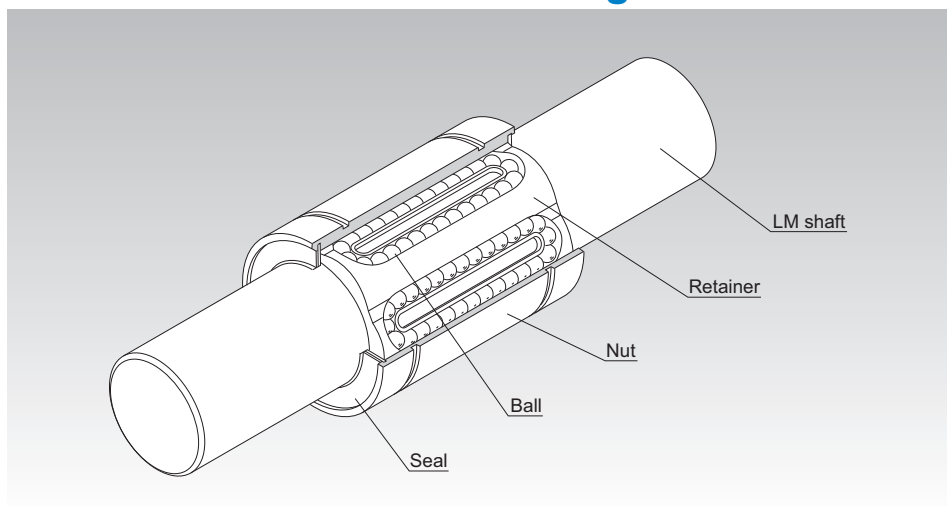


Fig.1 Structure of Linear Bushing Model LM···UU

Structure and Features

The linear bushing is a linear motion product that is used in combination with a cylindrical LM shaft. The ball bearings in the load area offer point contact with the LM shaft. This allows straight motion with minimal friction resistance and therefore smooth motion.

High-carbon chromium bearing steel is used for the nut, and the outer and inner surfaces are ground and heat-treated.

Linear bushings are used for medical equipment, packing equipment, and lightweight OA equipment that is not subject to vibration, shock, etc.

However, they cannot be used for applications in which loads are applied in a rotational direction.

Features and Types

Features of the Linear Bushing

[Interchangeability]

The linear bushing and LM shaft are interchangeable, allowing for use in any combination.

[Low Noise]

A molded resin retainer is incorporated into the standard type in order to prevent the balls from falling out. This also provides silent and smooth operation.

[Wide Array of Types]

A wide array of types are available, such as the Standard Type, Clearance-adjustable Type, Open Type, Long Type, Fitted Flange Type, and Flanged Linear Bushing, allowing the user to select a type that suits the intended application.

Types of the Linear Ball Bushing

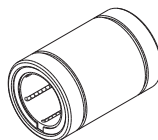
Types and Features

Standard Type

Specification Table⇒ [A4-42](#)/[A4-44](#)/[A4-46](#)/[A4-48](#)

The most standard type with a wide range of applications.

- Model LM SUJ2 Type
This product series has commonly used dimensions
- Model LM-GA SUJ2 Type
Features the Model LM-GA metal retainer
- Model LM-MG SUS Type
- Model LME SUJ2 Type
This product series has dimensions commonly used in Europe



Standard Type

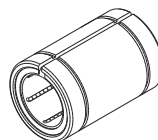
Clearance-adjustable Type

Specification Table⇒ [A4-42](#)/[A4-44](#)/[A4-46](#)/[A4-48](#)

A standard nut with a slit in the direction of the LM shaft.

The clearance between the LM shaft and housing can be adjusted by installing the shaft to a housing with an adjustable inner diameter.

- Models LM-AJ/LM-GA-AJ/LME-AJ... Made of SUJ2
- Model LM-MG-AJ SUS Type



Clearance-adjustable Type

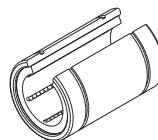
Open Type

Specification Table⇒ [A4-42](#)/[A4-44](#)/[A4-46](#)/[A4-48](#)

The nut features a cut equal to the width of one row of ball bearings (50° to 80°).

This enables it to be used even in locations where the LM shaft is supported by a column or fulcrum. In addition, the clearance can be adjusted.

- Models LM-OP/LM-GA-OP/LME-OP... Made of SUJ2
- Model LM-MGA-OP SUS Type



Open Type

Features and Types

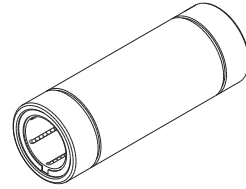
Types of the Linear Ball Bushing

Long Type

Incorporates two standard type retainers, giving it a large net rated load.

Model LM-L SUJ2 Type

Specification Table⇒ **A** 4-50



Long Type

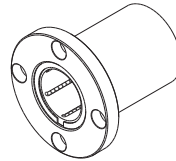
Flanged Type (Round)

Easy to mount because the spline nut can be directly attached to the housing.

Model LMF SUJ2 Type

Model LMF-M SUS Type

Specification Table⇒ **A** 4-52/ **A** 4-54



Flanged Type (Round)

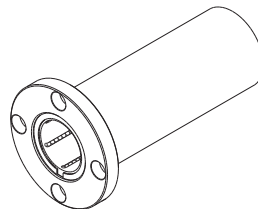
Flanged Type (Round) - Long

Incorporates two standard type retainers, giving it a large net rated load.

Model LMF-L SUJ2 Type

Model LMF-ML SUS Type

Specification Table⇒ **A** 4-56/ **A** 4-58



Flanged Type (Round) - Long

Flanged Type (Square)

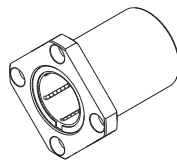
Features a Model LMF flange that has been flattened on four sides.

The lower core height compared to circular flanges allows for more compact designs.

Model LMK SUJ2 Type

Model LMK-M SUS Type

Specification Table⇒ [A4-60/A4-62](#)



Flanged Type (Square)

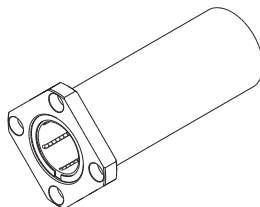
Flanged Type (Square) - Long

Incorporates two standard type retainers, giving it a large net rated load.

Model LMK-L SUJ2 Type

Model LMK-ML SUS Type

Specification Table⇒ [A4-64/A4-66](#)



Flanged Type (Square) - Long

Lightweight Flanged Type (Square) NEW

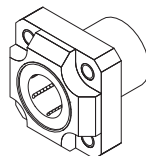
Features a flange made using high strength plastic.

Weighs less than metal flanges.

Mounting this type to moving parts reduces the overall weight.

Model LMJK SUJ2 Type

Specification Table⇒ [A4-68](#)

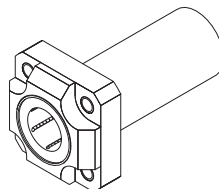


Lightweight Flanged Type (Square)

Lightweight Flanged Type (Square) - Long NEW Specification Table⇒ [A4-70](#)

Incorporates two standard type retainers, giving it a large net rated load.

Model LMJK-L SUJ2 Type



Lightweight Flanged Type (Square) - Long

Features and Types

Types of the Linear Ball Bushing

Flanged Type (Cut Flange)

Features a Model LMF flange that has been flattened on two sides.

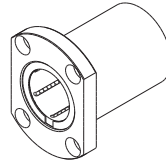
The lower core height compared to square flanges allows for more compact designs.

The rows of bearings are aligned so that a load from one of the flattened sides will be supported by two rows of bearings.

Model LMH SUJ2 Type

Model LMH-M SUS Type

Specification Table⇒ [A4-72/A4-74](#)



Flanged Type (Cut Flange)

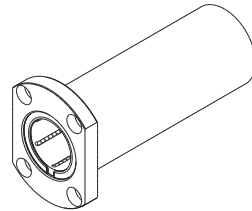
Flanged Type (Cut Flange) - Long

Incorporates two standard type retainers, giving it a large net rated load.

Model LMH-L SUJ2 Type

Model LMH-ML SUS Type

Specification Table⇒ [A4-76/A4-78](#)



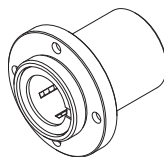
Flanged Type (Cut Flange) - Long

Fitted Flanged Type (Round)

Specification Table⇒ [A4-80](#)

Since the fitted part is short, the linear bushing tends not to protrude into the other side, so space is saved on the side opposite the mounting.

Model LMIF SUJ2 Type



Fitted Flanged Type (Round)

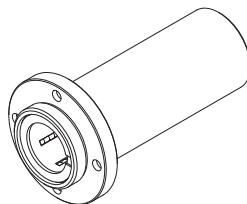
Fitted Flanged Type (Round) - Long

Specification Table⇒ [A4-82](#)

Model LMIF - Long.

Incorporates two standard type retainers, giving it a large net rated load.

Model LMIF-L SUJ2 Type



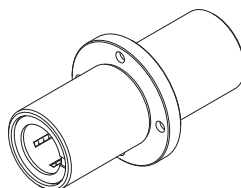
Fitted Flanged Type (Round) - Long

Center Flanged Type (Round) - Long

Specification Table⇒ [A4-84](#)

As work pieces can be mounted around the center of the nut, the load can be distributed and spaced evenly on either side of the flange. Ideal for making the stroke even in both directions.

Model LMCF-L SUJ2 Type



Center Flanged Type (Round) - Long

Features and Types

Types of the Linear Ball Bushing

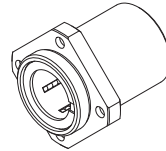
Fitted Flanged Type (Square)

Specification Table⇒ [A-4-86](#)

The flange is similar to the Model LMIF, but flattened in four places.

The lower core height compared to circular flanges allows for more compact designs.

Model LMIK SUJ2 Type



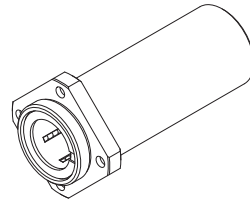
Fitted Flanged Type (Square)

Fitted Flanged Type (Square) - Long

Specification Table⇒ [A-4-88](#)

Incorporates two standard type retainers, giving it a large net rated load.

Model LMIK-L SUJ2 Type



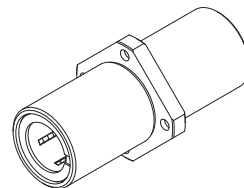
Fitted Flanged Type (Square) - Long

Center Flanged Type (Square) - Long

Specification Table⇒ [A-4-90](#)

As work pieces can be mounted around the center of the nut, the load can be distributed and spaced evenly on either side of the flange. Ideal for making the stroke even in both directions.

Model LMCK-L SUJ2 Type



Center Flanged Type (Square) - Long

Fitted Flanged Type (Ovular)

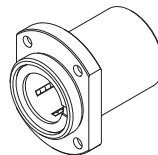
Specification Table⇒ **A4-92**

Features a Model LMIF flange that has been flattened on two sides.

The lower core height compared to square flanges allows for more compact designs.

The rows of bearings are aligned so that a load from one of the flattened sides will be supported by two rows of bearings.

Model LMIH SUJ2 Type



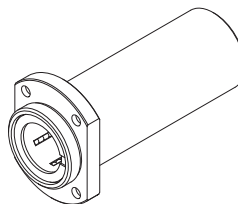
Fitted Flanged Type (Ovular)

Fitted Flanged Type (Ovular) - Long

Specification Table⇒ **A4-94**

Incorporates two standard type retainers, giving it a large net rated load.

Model LMIH-L SUJ2 Type



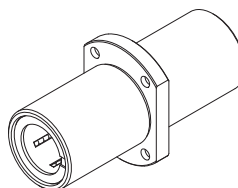
Fitted Flanged Type (Ovular) - Long

Center Flanged Type (Ovular) - Long

Specification Table⇒ **A4-96**

As work pieces can be mounted around the center of the nut, the load can be distributed and spaced evenly on either side of the flange. Ideal for making the stroke even in both directions.

Model LMCH-L SUJ2 Type



Center Flanged Type (Ovular) - Long

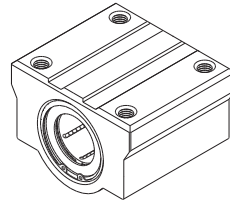
Features and Types

Types of the Linear Ball Bushing

Linear Bushing Model SC

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

Specification Table⇒ **A**4-98

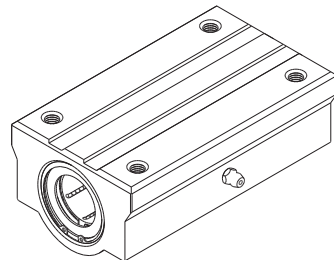


Linear Bushing Model SC

Linear Bushing (Long) Model SL

A case unit that features two standard linear bushings embedded within an aluminum casing.

Specification Table⇒ **A**4-102

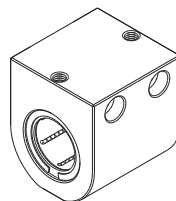


Linear Bushing (Long) Model SL

Linear Bushing Model SH

It is a case unit where the standard type of Linear Bushing is incorporated into a smaller and lighter aluminum casing than model SC. This model allows even more compact design than model SC. It also has flexibility in mounting orientation. Additionally, it is structured so that two rows of balls receive the load from the top of the casing, allowing a long service life to be achieved.

Specification Table⇒ [A4-104](#)

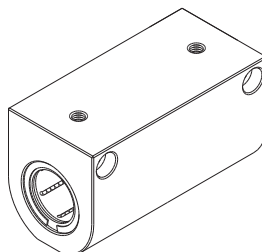


Linear Bushing Model SH

Linear Bushing (Long) Model SH-L

A long version of model SH, this model is a case unit that contains two units of the standard type Linear Bushing in an aluminum casing.

Specification Table⇒ [A4-106](#)



Linear Bushing (Long) Model SH-L

Features and Types

Types of the Linear Ball Bushing

Standard LM Shafts

LM shafts for use with the high quality linear bushing model LM series.

Specification Table⇒ [A-4-109](#)



Standard LM Shafts

Build-to-order LM Shafts

Machined shaft ends available upon request.

Specification Table⇒ [A-4-111](#)



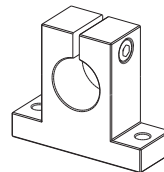
Build-to-order LM Shafts

LM Shaft End Support Model SK

A lightweight aluminum fulcrum for securing an LM shaft.

Allows the LM shaft to be secured without having to machine the LM shaft ends.

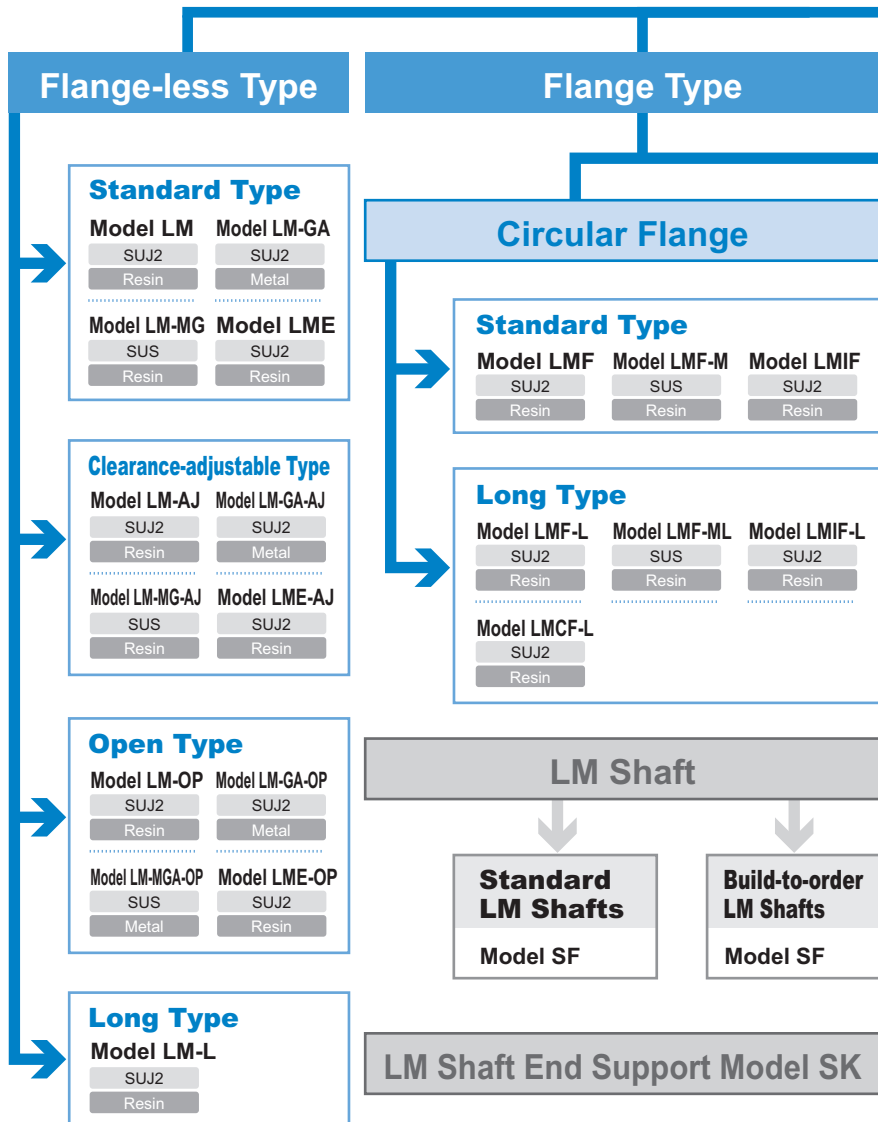
Specification Table⇒ [A-4-108](#)



LM Shaft End Support Model SK

Classification Table

Linear Bushing



Features and Types

Classification Table

Type of Material

Model No.

Nut Material

- SUJ2 (High-carbon Chromium Bearing Steel)

- SUS (Martensite Stainless Steel)

Retainer Material

Case Material

Square Flange

Standard Type

Model LMK

SUJ2

Resin

Model LMK-M

SUS

Resin

NEW

Model LMIK

SUJ2

Resin

Model LMJK

SUJ2, Resin

Resin

Long Type

Model LMK-L

SUJ2

Resin

Model LMK-ML

SUS

Resin

Model LMIK-L

SUJ2

Resin

Model LMCK-L

SUJ2

Resin

NEW

Model LMJK-L

SUJ2, Resin

Resin

Cut Flange

Standard Type

Model LMH

SUJ2

Resin

Model LMH-M

SUS

Resin

Model LMIH

SUJ2

Resin

Long Type

Model LMH-L

SUJ2

Resin

Model LMH-ML

SUS

Resin

Model LMIH-L

SUJ2

Resin

Model LMCH-L

SUJ2

Resin

Encased Type

Standard Type

Model SC

SUJ2

Resin

Aluminum

Model SH

SUJ2

Resin

Aluminum

Long Type

Model SL

SUJ2

Resin

Aluminum

Model SH-L

SUJ2

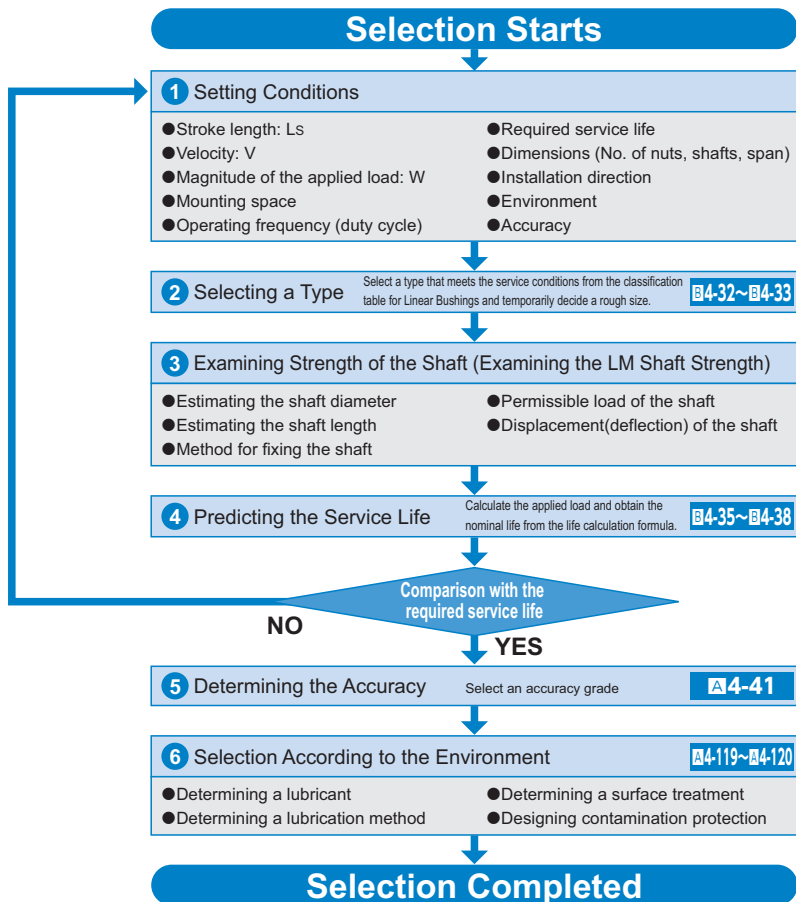
Resin

Aluminum

Flowchart for Selecting a Linear Bushing

Steps for Selecting a Linear Bushing

The following flowchart should be used as a guide for selecting a Linear Bushing.



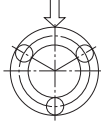
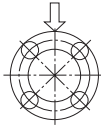
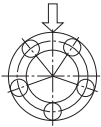
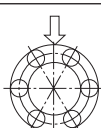
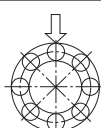
Rated Load and Nominal Life

[Load Rating]

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 in Table1.

Table1 Rated load of the Linear Bushing

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

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

[Calculating the Nominal Life]

The nominal life of the THK linear bushing is defined as 50 km. The nominal life (L_{10}) is calculated from the basic dynamic load rating (C) and the load acting on the linear bushing (P_c) using the following formula.

$$L_{10} = \left(\frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots(1)$$

| | | |
|----------|-----------------------------|------|
| L_{10} | : Nominal life | (km) |
| C | : Basic dynamic load rating | (N) |
| P_c | : Calculated load | (N) |

*This nominal life formula may not apply if the length of the stroke is less than or equal to twice the length of the nut.

When comparing the nominal life (L_{10}), you must take into account whether the basic dynamic load rating was defined based on 50 km or 100 km. Convert the basic dynamic load rating based on ISO 14728-1 as necessary.

ISO-regulated basic dynamic load rating conversion formula:

$$C_{100} = \frac{C_{50}}{1.26}$$

| | |
|-----------|---|
| C_{50} | : Basic dynamic load rating based on a nominal life of 50 km |
| C_{100} | : Basic dynamic load rating based on a nominal life of 100 km |

[Calculating the Modified Nominal Life]

During use, a linear bushing may be subjected to vibrations and shocks as well as fluctuating loads, which are difficult to detect. In addition, the surface hardness of the raceways, the operating temperature, and having blocks arranged directly behind one another will have a decisive impact on the service life. Taking these factors into account, the modified nominal life (L_{10m}) can be calculated according to the following formula (2).

• Modified factor α

$$\alpha = \frac{f_H \cdot f_T \cdot f_c}{f_w}$$

| | | |
|----------|----------------------|--------------------------------|
| α | : Modified factor | |
| f_H | : Hardness factor | (see Fig.1 on B4-37) |
| f_T | : Temperature factor | (see Fig.2 on B4-37) |
| f_c | : Contact factor | (see Table2 on B4-38) |
| f_w | : Load factor | (see Table 3 on B4-38) |

• Modified nominal life L_{10m}

$$L_{10m} = \left(\alpha \times \frac{C}{P_c} \right)^3 \times 50 \quad \dots\dots(2)$$

| | | |
|-----------|-----------------------------|------|
| L_{10m} | : Modified nominal life | (km) |
| C | : Basic dynamic load rating | (N) |
| P_c | : Calculated load | (N) |

● **When a Moment Load is Applied to a Single Nut or Two Nuts in Close Contact with Each Other**

When a moment load is applied to a single nut or two nuts in close contact with each other, calculate the equivalent radial load at the time the moment is applied.

$$P_v = K \cdot M$$

P_v : Equivalent radial load (N)
(with a moment applied)

K : Equivalent factors
(see Table4 to Table6 on **A4-41**)

M : Applied moment (N·mm)

However, " P_v " is assumed to be within the basic static load rating (C_0).

● **When a Moment Load and a Radial Load are Simultaneously Applied**

When a moment and a radial load are applied simultaneously, calculate the service life based on the sum of the radial load and the equivalent radial load.

■ **f_H : Hardness Factor**

To maximize the load capacity of the Linear Bushing, the hardness of the raceways needs to be between 58 to 64 HRC.

If the hardness is lower than this range, the basic dynamic load rating and the basic static load rating decrease. Therefore, it is necessary to multiply each rating by the respective hardness factor (f_H).

Normally, $f_H = 1.0$ since the Linear Bushing has sufficient hardness.

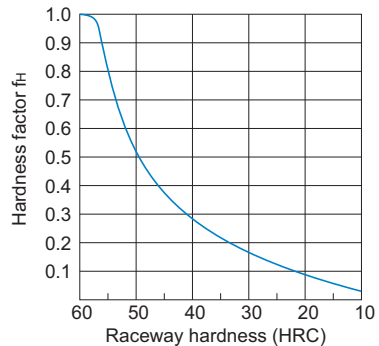


Fig.1 Hardness Factor (f_H)

■ **f_T : Temperature Factor**

If the temperature of the environment surrounding the operating Linear Bushing exceeds 100°C, take into account the adverse effect of the high temperature and multiply the basic load ratings by the temperature factor indicated in Fig.2.

Also note that the Linear Bushing itself must be of high temperature type.

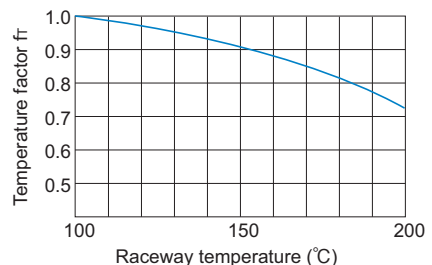


Fig.2 Temperature Factor (f_T)

Note) If the environment temperature exceeds 80°C, use a Linear Bushing type equipped with metal retainer plates.

■ f_c : Contact Factor

When multiple nuts are used in close contact with each other, their linear motion is affected by moments and mounting accuracy, making it difficult to achieve uniform load distribution. In such applications, multiply the basic load rating (C) and (C_0) by the corresponding contact factor in Table2.

Note) If uneven load distribution is expected in a large machine, take into account the respective contact factor indicated in Table2.

Table2 Contact Factor (f_c)

| Number of nuts in close contact with each other | Contact factor f_c |
|---|----------------------|
| 2 | 0.81 |
| 3 | 0.72 |
| 4 | 0.66 |
| 5 | 0.61 |
| Normal use | 1 |

■ f_w : Load Factor

In general, reciprocating machines tend to experience vibrations or impacts during operation, and it is extremely difficult to accurately determine the vibrations generated during high-speed operation and impacts during frequent starts and stops. Therefore, when the actual load applied to a linear bushing cannot be obtained, or when speed and impacts have a significant influence, divide the basic dynamic load rating (C) by the corresponding load factor in Table 3, which has been empirically obtained.

Table 3 Load Factor (f_w)

| Vibrations/ impact | Speed(V) | f_w |
|--------------------|-------------------------------------|------------|
| Faint | Very low $V \leq 0.25\text{m/s}$ | 1 to 1.2 |
| Weak | Slow $0.25 < V \leq 1\text{m/s}$ | 1.2 to 1.5 |
| Medium | Medium $1 < V \leq 2\text{m/s}$ | 1.5 to 2 |
| Strong | High $V > 2\text{m/s}$ | 2 to 3.5 |

[Calculating the Service Life Time]

When the nominal life (L_{10}) has been obtained, if the stroke length and the number of reciprocations per minute are constant, the service life time is obtained using the following equation.

$$L_h = \frac{L_{10} \times 10^3}{2 \times \ell_s \times n_1 \times 60}$$

L_h : Service life time (h)

ℓ_s : Stroke length (m)

n_1 : Number of reciprocations per minute (min^{-1})

Precautions To Be Taken if an Eccentric Load Is Applied

Since Linear Bushing is not suitable for application of an eccentric load, we recommend using Guide Ball Bushing or Ball Spline.

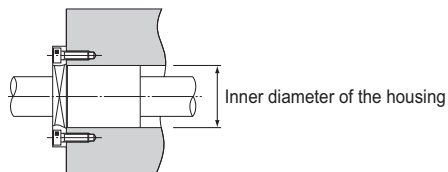
Assembling the Linear Bushing

[Inner Diameter of the Housing]

Table1 shows recommended housing inner-diameter tolerance for the Linear Bushing. When fitting the Linear Bushing with the housing, loose fit is normally recommended. If the clearance needs to be smaller, provide transition fit.

Table1 Housing Inner-diameter Tolerance

| Type | | Housing | |
|-----------|---------------------------------------|-----------|----------------|
| Model No. | Accuracy | Loose fit | Transition fit |
| LM | High accuracy grade (no symbol) | H7 | J7 |
| | Precision Grade (P) | H6 | J6 |
| LME | — | H7 | K6, J6 |
| LMF | High accuracy grade (no symbol) | H7 | J7 |
| LMK | | | |
| LMH | | | |
| LM-L | | | |
| LMF-L | | | |
| LMK-L | | | |
| LMH-L | | | |
| LMIF | | | |
| LMIK | | | |
| LMIH | | | |
| LMIF-L | | | |
| LMIK-L | | | |
| LMIH-L | | | |
| LMCF-L | | | |
| LMCK-L | | | |
| LMCH-L | | | |



[Clearance between the Nut and the LM Shaft]

When using the Linear Bushing in combination with an LM shaft, use normal clearance in ordinary use and small gap if the clearance is to be minimized.

Note1) If the clearance after installation is to be negative, it is preferable not to exceed the radial clearance tolerance indicated in the specification table.

Note2) The shaft tolerance for Linear Bushing models SC, SL SH and SH-L falls under high accuracy grade (no symbol).

Table2 Shaft Outer-diameter Tolerance

| Type | | LM Shaft | |
|-----------|---------------------------------------|------------------|-----------|
| Model No. | Accuracy | Normal clearance | Small gap |
| LM | High accuracy grade (no symbol) | f6, g6 | h6 |
| | Precision Grade (P) | f5, g5 | h5 |
| LME | — | h7 | k6 |
| LMF | High accuracy grade (no symbol) | f6, g6 | h6 |
| LMK | | | |
| LMH | | | |
| LM-L | | | |
| LMF-L | | | |
| LMK-L | | | |
| LMH-L | | | |
| LMIF | | | |
| LMIK | | | |
| LMIH | | | |
| LMIF-L | | | |
| LMIK-L | | | |
| LMIH-L | | | |
| LMCF-L | | | |
| LMCK-L | | | |
| LMCH-L | | | |

[Mounting the Nut]

Although the Linear Bushing does not require a large amount of strength for securing it in the axial direction, do not rely only on a press fit to support the nut. For the housing inner-diameter tolerance, see Table1 on [B4-39](#).

● 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.

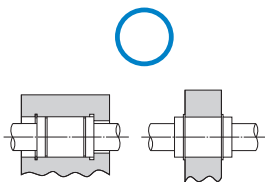


Fig. 1 Secured by snap ring

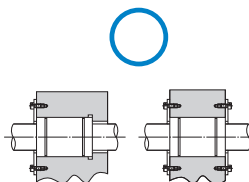


Fig. 2 Secured by stopper plate

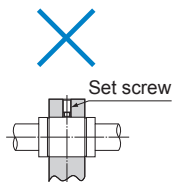


Fig. 3

Mounting Procedure and Maintenance

Assembling the Linear Bushing

■ Snap Ring for Installation

The snap ring types shown in Table 3 can be used for securing the standard Model LM.

Note 1) For models indicated with parentheses, use C-shape concentric snap rings.

Note 2) Table 3 commonly applies to models LM, LM-GA, LM-MG and LM-L.

Table 3 Types of Snap Rings

| Model No. | Snap ring | | | |
|-----------|-------------------|--------------|-------------------|--------------|
| | For outer surface | | For inner surface | |
| | Needle snap | C-shape snap | Needle snap | C-shape snap |
| LM 3 | — | — | AR 7 | — |
| LM 4 | — | — | 8 | — |
| LM 5 | WR 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 38 | — | 56•58 | 57 | — |
| LM 40 | — | 60 | 60 | 60 |
| LM 50 | — | 80 | 80 | 80 |
| LM 60 | — | 90 | 90 | 90 |
| LM 80A | — | 120 | 120 | 120 |
| LM 100A | — | (150) | 150 | — |
| LM 120A | — | (180) | 180 | — |

[Inserting the Nut]

When inserting the standard linear bushing into a housing, do not directly hit the seal or side plate. Use a jig to evenly drive in the nut, or place a flatter piece of metal on the nut and gently hit that. (See Fig. 4)

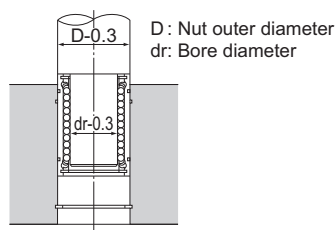


Fig. 4

● Installing a Clearance-adjustable Type

To adjust the clearance of a clearance-adjustable type (-AJ), use a housing that allows adjustment of the nut outer diameter so as to facilitate the adjustment of the clearance between the Linear Bushing and the LM shaft. Positioning the slit of the Linear Bushing at an angle of 90° with the housing's slit will provide uniform deformation in the circumferential direction. (See Fig.5 .)

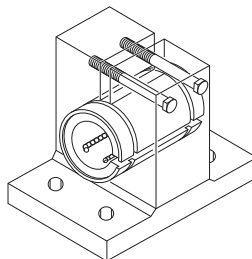


Fig.5

● Mounting an Open Type

For an open type (-OP), also use a housing that allows adjustment of the nut outer diameter as shown in Fig.6 .

Open types are normally used with a light preload. Be sure not to give an excessive preload.

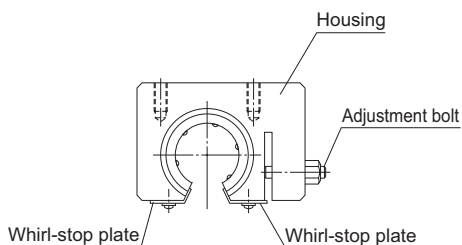


Fig.6

[Precautions on Installing an Open Three-ball-row Type Linear Bushing]

When installing an open three-ball-row type Linear Bushing, mount it while taking into account the load distribution as indicated in Fig.7 .

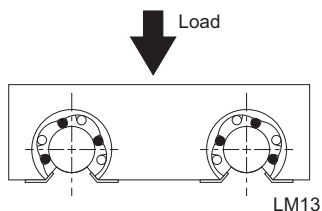


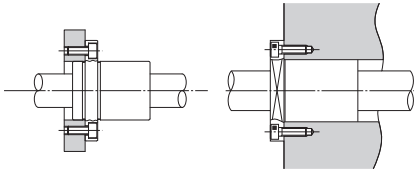
Fig.7

Mounting Procedure and Maintenance

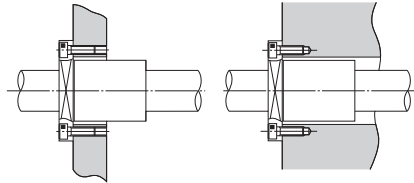
Assembling the Linear Bushing

● Installing the Flanged Type

With models LMF, LMK, LMH, LMIF, LMCF, LMIK, LMCK, LMIH, and LMCH, the nut is integrated with a flange. Therefore, the linear bushing can be mounted only via the flange.

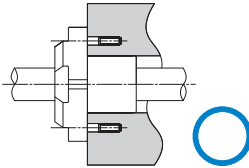


Mounted via spigot and socket joint

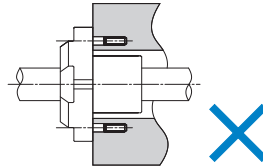


Mounted via flange only

However, the Model LMJK must be mounted via a spigot and socket joint. Please do not mount using just the flange.



Mounted via spigot and socket joint



Mounted via flange only

[Installing the LM Case Unit]

● Attaching Model SC (SL)

Models SC and SL can be affixed from either above or below using bolts. (See Fig. 8)

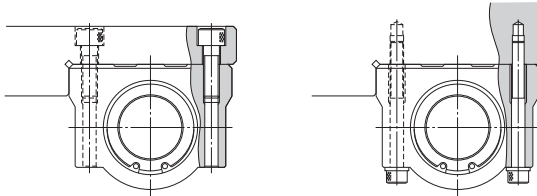
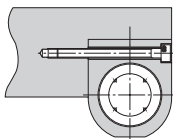


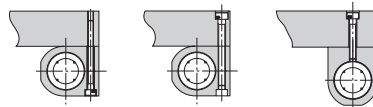
Fig. 8

● Attaching the Model SH (SH-L)

Models SH and SH-L can be affixed in any direction using bolts. (See Fig. 9)



Basic installation

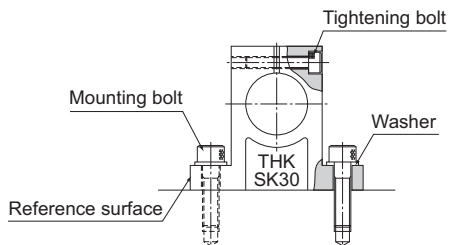


Alternative installations

Fig. 9

[Mounting the Shaft End Support]

Shaft end support model SK can easily be secured to the table using mounting bolts. Model SK enables the LM shaft to firmly be secured using tightening bolts.



[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. (See Fig.10 .)

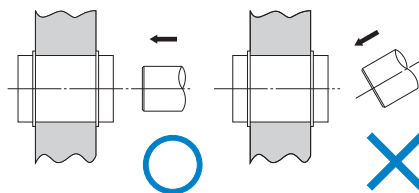


Fig.10

[When Under a Moment Load]

When using the Linear Bushing, make sure the load is evenly distributed on the whole ball raceway. In particular, if a moment load is applied, use two or more Linear Bushing units on the same LM shaft and secure an adequately large distance between the units.

If using the Linear Bushing under a moment load, also calculate the equivalent radial load and identify the correct model number. (See [B4-37](#) .)

Mounting Procedure and Maintenance

Assembling the Linear Bushing

[Rotational Use 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.

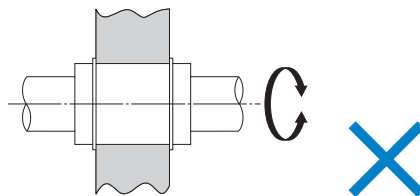


Fig.11

[Attaching Felt Seal Model FLM]

The felt seal can be press-fit into a housing finished to H7, but cannot be used as a stopper for preventing the Linear Bushing from coming off. Be sure to use the felt seal by attaching it as indicated in the Fig.12 .

Also make sure to impregnate the felt with sufficient lubricant before attaching it.

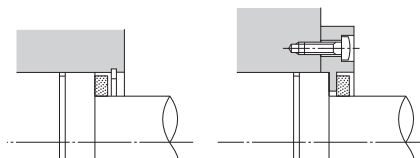


Fig.12

Lubrication

The Linear Bushing requires grease or oil as a lubricant for its operation.

[Grease Lubrication]

Before mounting the product onto the LM shaft, apply grease to each row of balls inside the Guide Ball Bushing.

Thereafter apply grease as necessary, in accordance with usage and other conditions noted above, or attach housing as shown in Fig. 1, or apply grease directly to the LM shaft.

We recommend using lithium soap-based grease No. 2.

[Oil Lubrication]

Apply the required amount of oil or grease-based lubricant onto the LM shaft and set it in the housing as shown in Fig. 1.

Commonly used lubricants include turbine oil, machine oil, and spindle oil.

In addition to the procedures described the above, an oil hole or grease nipple can also be used for lubrication. For further information, contact THK.

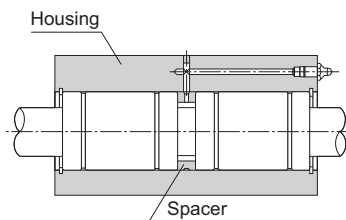


Fig. 1

Material and Surface Treatment

For the Linear Bushing and the LM shaft, highly corrosion-resistant stainless steel types are available for some models.

Although the LM shaft can be surface treated, some types may not be suitable for the treatment. Contact THK for details.

Dust prevention

Entrance of dust or other foreign material into the Linear Bushing will cause abnormal wear or shorten the service life. When entrance of dust or other foreign material is a possibility, it is important to select effective seals and/or a dust-control device that meets the service environment conditions.

For the Linear Bushing, a special synthetic rubber seal that is highly resistant to wear and a felt seal (highly dust preventive with low seal resistance) are available as contamination protection accessories.

In addition, THK produces round bellows. Contact us for details.

Felt Seal Model FLM

● For detailed dimensions, see [A4-120](#).

Linear Bushing model LM series include types equipped with a special synthetic rubber seal (LM···UU, U). If desiring to have an additional contamination protection measure, or desiring to lower the seal resistance, use the felt seal model FLM.

Model Number Coding

Model number configurations differ depending on the model features. Refer to the corresponding sample model number configuration.

[Linear Bushing]

- LM, LME, LM-L, LMF, LMF-L, LMK, LMK-L, LMJK, LMJK-L, LMH, LMH-L, LMIF, LMIF-L, LMCF-L, LMIK, LMIK-L, LMCK-L, LMIH, LMIH-L, LMCH-L, SC, SL, SH, SH-L

LM20 **L** **UU**
 Model No. | With nut seal
 Long type

- LM-M, LM-MG, LMF-M, LMF-ML, LMK-M, LMK-ML, LMH-M, LMH-ML

LMF20 **M** **L** **UU**
 Model No. | | With nut seal
 Made of stainless steel Long type

- LM-GA, LM-MGA, LME-GA

LM20 **M** **GA** **UU**
 Model No. | | With nut seal
 Made of stainless steel Metal retainer specification

■Notes on Ordering

For high temperature applications, seals (symbol: UU) can be attached to both ends of the nut on linear bushes used with metal cages (symbol: A). However, cages without seals are recommended, since the seals are only heat-resistant to a temperature of 80°C.

Model No.

[LM Shaft End Support]

● Model SK

SK20

Model No.

[LM Shaft]

● Model SF

SF25 g6 -500L K

| | | | | |
|-----------|-----------------------------------|---------------------------------|--|---|
| Model No. | LM shaft outer diameter tolerance | Overall LM shaft length (in mm) | Special symbol* no symbol: solid shaft M: special material | K: standard hollow shaft F: with surface treatment |
|-----------|-----------------------------------|---------------------------------|--|---|

*If two or more symbols are given, they are shown in an alphabetical order.

*For information shaft diameters, permissible shaft diameter error and standard stock lengths, see **A4-109**.

[Felt Seal]

● Model FLM

FLM 20

Model No.

[Handling]

- (1) Disassembling each part may cause dust to enter the system or degrade mounting accuracy of parts. Do not disassemble the product.
- (2) Take care not to drop or strike the Linear Bushing. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
- (3) When handling the product, wear protective gloves, safety shoes, etc., as necessary to ensure safety.

[Precautions on Use]

- (1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
- (2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
- (3) Do not use the product at temperature of 80°C or higher. Exposure to higher temperatures may cause the resin/rubber parts to deform/be damaged.
- (4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
- (5) Micro-strokes tend to obstruct oil film to form on the raceway in contact with the rolling element, and may lead to fretting corrosion. Take consideration using grease offering excellent fretting prevention. It is also recommended that a stroke movement corresponding to the length of the outer cylinder be made on a regular basis to make sure oil film is formed between the raceway and rolling element.
- (6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate permanent deformation on the raceway, leading to loss of functionality.
- (7) Insert the shaft straight through the opening. Inserting the shaft at an angle can introduce foreign matter, damage internal components, or cause balls to fall out.
- (8) Using this product with any balls removed may result in premature damage.
- (9) Please contact THK if any balls fall out; do not use the product if any balls are missing.
- (10) If an attached component is insufficiently rigid or mounted incorrectly, the bearing load will be concentrated at one location and performance will decline significantly. Make sure the housing and base are sufficiently rigid, the anchoring bolts are strong enough, and the component is mounted correctly.

[Lubrication]

- (1) Thoroughly wipe off anti-rust oil and feed lubricant before using the product.
- (2) Do not mix different lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
- (3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
- (4) To lubricate the product, apply lubricant directly to the raceway surface and execute a few preliminary strokes to ensure that the interior is fully lubricated.
- (5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the Linear Bushing also changes as the consistency of grease changes.

Precautions on Use

- (6) After lubrication, the slide resistance of the Linear Bushing may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
- (7) Excess grease may scatter immediately after lubrication, so wipe off scattered grease as necessary.
- (8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
- (9) The greasing interval varies depending on the use condition and service environment. Set the final lubrication interval/amount based on the actual machine.

[Storage]

When storing the Linear Bushing, enclose it in a package designated by THK and store it in a room while avoiding high temperature, low temperature and high humidity.

[Disposal]

Dispose of the product properly as industrial waste.

