Miniature Linear Bushing

# LMS


## Points

### 1 Compact design

The ultra-small size allows for compact machine and device design.

### 2 Wide variation

As the lineup of two types of external cylinder length are available, i.e. standard and long, you can select an optimal Linear Bushing for the specifications of your machine and device.

### 3 Stainless steel selections for excellent corrosion resistance

Products made of stainless steel are highly resistant to corrosion, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.



## Identification Number and Specification

### Example of an identification number

The specification of LMS series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a material code, a part code, and a classification symbol for each specification to apply.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| LMS | | 4 | F | UU | P |

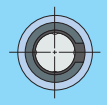
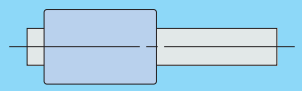
1 Model — Model code Page Ⅱ－190
2 External cylinder length — Model code Page Ⅱ－190
3 Inscribed circle diameter — Dimensions Page Ⅱ－190
4 Material type — Material code Page Ⅱ－190
5 Seal structure — Part code Page Ⅱ－190
6 Accuracy class — Classification symbol Page Ⅱ－190

## Identification Number and Specification

| | | | |
|---|---|---|---|
| 1 Model | Miniature Linear Bushing (LMS series) | : LMS | For applicable models and sizes, see Table 1. |
| 2 External cylinder length | Standard | : No symbol | |
| | Long | : L | |
| 3 Inscribed circle diameter | | | Indicate the inscribed circle diameter in mm. |
| 4 Material type | High carbon steel made | : No symbol | Specify the component part material. For applicable models and sizes, see Table 1. |
| | Stainless steel made | : F | |
| 5 Seal structure | Without seal | : No symbol | The models with two end seals incorporate seals with superior dust protection performance for preventing intrusion of foreign substances. |
| | With two end seals | : UU | |
| 6 Accuracy class | High Precision | : No symbol | For details of accuracy, see the dimension table on page Ⅱ-192. Precision applies only to the standard type. Especially when it is necessary to control clearance with the shaft strictly, the tolerance of inscribed circle diameter can be sorted by 0.002 mm before delivery. Contact IKO for further information. |
| | | : P | |

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

*Table 1 Models and sizes of LMS series*

| Shape | External cylinder length | Material type | Seal structure | Model | Size 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
|  | Standard  | High carbon steel made | Without seal | LMS | ○ | ○ | ○ |
| | | | With two end seals | LMS···UU | ○ | ○ | ○ |
| | | Stainless steel made | Without seal | LMS···F | ○ | ○ | ○ |
| | | | With two end seals | LMS···FUU | ○ | ○ | ○ |
| | Long  | High carbon steel made | Without seal | LMSL | ○ | ○ | ○ |
| | | | With two end seals | LMSL···UU | ○ | ○ | ○ |
| | | Stainless steel made | Without seal | LMSL···F | ○ | ○ | ○ |
| | | | With two end seals | LMSL···FUU | ○ | ○ | ○ |

## Relationship between Load Rating and Ball Raceway

The load rating of LMS series varies according to the loading direction and position of ball raceway. The dimension table describes two types of values shown in Fig. 1.1 and Fig. 1.2 according to the loading direction and position of ball raceway.

Fig. 1.1 shows the case where the loading direction and ball raceway position coincides with each other, representing the loading direction A in the dimension table. Generally, this is applied when the ball raceway position cannot be specified to indeterminate direction load or loading direction.

Fig. 1.2 shows the case where the loading direction is positioned between ball raceways, representing the loading direction B in the dimension table. Generally, this can be subjected to load bigger than loading direction A.

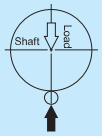



*Fig. 1.1 Loading direction A*

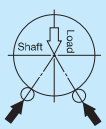



*Fig. 1.2 Loading direction B*

## Lubrication

Grease is not pre-packed in the LMS series, so please perform adequate lubrication as needed.

Both of oil lubrication and grease lubrication are available in the LMS series. For grease lubrication, it is typically applied lightly to the shaft and each row. Use of high-quality lithium-soap base grease is recommended for the grease to use.

## Related Products

### Shaft for Miniature Linear Bushing

To make full use of performance of the LMS series, we also offer shaft with high accuracy for Miniature Linear Bushing grounded after heat treatment. If you are interested, contact IKO.

## Precaution for Use

### ❶ Fitting of external cylinder

Recommended fit for the LMS series is indicated in Table 2. As the external cylinder is thin, use epoxy type adhesive agent for fixing to the housing hole, instead of press-fitting.

*Table 2 Recommended fit*
*(Tolerances of dimensions for shaft and housing hole)* unit: μm

| Item / Accuracy class | Shaft | Housing hole |
|---|---|---|
| High | −6<br>−14 | +12<br>0 |
| Precision | −4<br>−9 | +8<br>0 |

### ❷ Raceway

LMS series operates with a shaft as a raceway surface, the shaft should be heat-treated and ground. Recommended surface hardness, roughness, and minimum effective hardening depth of shaft are indicated in Table 3.

*Table 3 Surface hardness, roughness, and effective hardening depth of shaft*

| Item | Recommended value | Remark |
|---|---|---|
| Surface hardness | 58~64HRC | When the surface hardness is low, multiply the load rating by hardness factor (1). |
| Surface roughness | 0.2 μmRa or lower (0.8 μmRy or lower) | – |
| Effective hardening depth | 0.8 mm or higher | – |

Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

### ❸ When accompanied by rotational motion

LMS series units support only linear motion but do not support rotational motion. When performing rotational motion and linear motion of short stroke length, IKO Miniature Stroke Rotary Bushing is recommended to be used.

### ❹ Insertion of shaft

When inserting a shaft to the external cylinder, be careful not to let the shaft pried open as it may cause dropping of balls or deformation of the retainer.

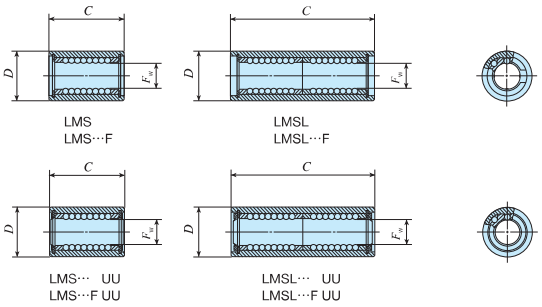
### ❺ Operating temperature

The maximum operating temperature is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.



# IKO Miniature Linear Bushing

| Shape | LMS |
|---|---|
| Shaft diameter | 3 4 5 |




| Shaft diameter mm | Identification number | Ball raceway | Mass (Ref.) g | Nominal dimensions and tolerances mm: Dim. Fw | Dim. Fw tolerance μm P | Dim. Fw tolerance μm H | D | Dim. D tolerance μm P | Dim. D tolerance μm H | C | Dim. C tolerance μm | Eccentricity Maximum μm P | Eccentricity Maximum μm H | Basic dynamic load rating C Load direction A N | Basic dynamic load rating C Load direction B N | Basic static load rating $C_0$ Load direction A N | Basic static load rating $C_0$ Load direction B N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | LMS 3<br>LMS 3 F<br>LMS 3 UU<br>LMS 3 F UU | 4 | 1.8 | 3 | 0<br>−5 | 0<br>−8 | 7 | 0<br>−7 | 0<br>−8 | 10 | 0<br>−120 | 2 | 4 | 18.4 | 21.2 | 39.4 | 55.8 |
| | LMSL 3<br>LMSL 3 F<br>LMSL 3 UU<br>LMSL 3 F UU | | 3.0 | | – | 0<br>−10 | | – | 0<br>−13 | 19 | 0<br>−300 | – | 5 | 30.0 | 34.4 | 78.9 | 112 |
| 4 | LMS 4<br>LMS 4 F<br>LMS 4 UU<br>LMS 4 F UU | 4 | 2.8 | 4 | 0<br>−5 | 0<br>−8 | 8 | 0<br>−7 | 0<br>−8 | 12 | 0<br>−120 | 2 | 4 | 23.5 | 27.0 | 48.6 | 68.7 |
| | LMSL 4<br>LMSL 4 F<br>LMSL 4 UU<br>LMSL 4 F UU | | 4.3 | | – | 0<br>−10 | | – | 0<br>−13 | 23 | 0<br>−300 | – | 5 | 38.1 | 43.8 | 97.2 | 137 |
| 5 | LMS 5<br>LMS 5 F<br>LMS 5 UU<br>LMS 5 F UU | 4 | 3.8 | 5 | 0<br>−5 | 0<br>−8 | 10 | 0<br>−7 | 0<br>−8 | 15 | 0<br>−120 | 2 | 4 | 51.3 | 59.0 | 108 | 152 |
| | LMSL 5<br>LMSL 5 F<br>LMSL 5 UU<br>LMSL 5 F UU | | 6.7 | | – | 0<br>−10 | | – | 0<br>−13 | 29 | 0<br>−300 | – | 5 | 83.4 | 95.8 | 215 | 304 |

Remark: "P" and "H" in Dim. $F_w$ tolerance and Eccentricity represent precision and high, respectively.



1N=0.102kgf=0.2248lbs.
1mm=0.03937inch