Linear Bushing

Linear Bushing G
Linear Bushing
Miniature Linear Bushing

Linear Bushing G

LMG

Points

1 High load capacity

The structure that balls in two rows have contact with the track groove of the shaft allows greater rigidity and larger load capacity.

2 Solid shaft and hollow shaft

There are two types of shafts with grooved raceway: a solid shaft and a hollow shaft. The hollow shaft is useful for piping, wiring, air removal, etc.

3 Dimensionally compatible with Linear Bushing LM

LMG series are dimensionally compatible with Linear Bushing LM to allow easy replacement.

Identification Number and Specification

Example of an identification number

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

Interchangeable specification	1	2	3	4	5	6
Single external cylinder	LMG		10	C1		/U
Single shaft with grooved raceway	LMG	T	10		R300	
Assembled set	LMG	T	10	C1	R300	/U

1 **Model** — Model code Page Ⅱ−155

2 **Shape of shaft with grooved raceway** — Model code Page Ⅱ−155

3 **Size** — Dimensions Page Ⅱ−155

4 **Number of external cylinders** — Part code Page Ⅱ−155

5 **Length of shaft with grooved raceway** — Part code Page Ⅱ−155

6 **Special specification** — Supplemental code Page Ⅱ−155

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

Identification Number and Specification –Model · Shape of Shaft · Size · Number of External Cylinders · Length of Shaft · Special Specification–

1 Model

Linear Bushing G (LMG series) : LMG

For applicable models and sizes, see Table 1.

2 Shape of shaft with grooved raceway

Solid shaft : No symbol
Hollow shaft : T

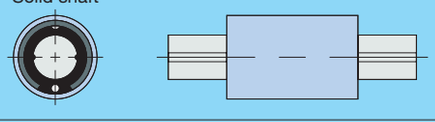
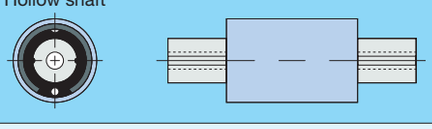
For applicable models and sizes, see Table 1.

3 Size

6, 8, 10, 13, 16, 20

Indicate the shaft diameter in mm.
For applicable models and sizes, see Table 1.

Table 1 Models and sizes of LMG series

Shape	Model	Size					
		6	8	10	13	16	20
Solid shaft 	LMG	○	○	○	○	○	○
Hollow shaft 	LMGT	○	○	○	○	○	○

Remark: LMG series are all interchangeable specification. Non-interchangeable specification is not available.

4 Number of external cylinders

: C○

For an assembled set, indicates the number of external cylinders assembled on a shaft with grooved raceway.
For a single external cylinder, only "C1" is specified.

5 Length of shaft with grooved raceway

: R○

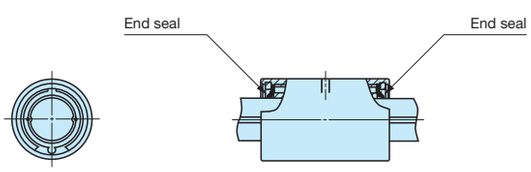
Indicate the length of the shaft with grooved raceway in mm.
For standard and maximum lengths, see the dimension table.

6 Special specification

With end seal /U

Applicable to all models and sizes.

With end seal /U



End seals are attached to both ends of the external cylinder to prevent foreign substances from entering.

Accuracy

Table 2 Twist of grooves with respect to effective length of track groove

unit: μm

Allowable value	33

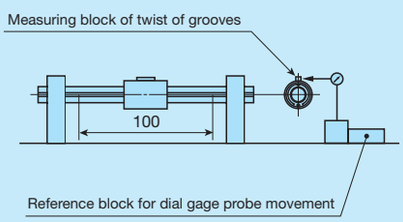
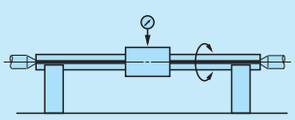
Remark: The values can be applied to 100 mm of the effective length of the track groove part at any position.

Table 3 Allowable values of total radial runout of shaft with grooved raceway axial line unit: μm

Overall length of shaft with grooved raceway mm		Size				
Over	Incl.	6	8	10	13	16, 20
–	200	142	142	129	129	126
200	315	203	203	153	153	141
315	400	–	255	173	173	153
400	500	–	306	193	193	165
500	630	–	–	221	221	182
630	800	–	–	–	260	207
800	1 000	–	–	–	–	240

Remark: These are values when an internal clearance is 0 μm.

Table 4 Measuring methods of accuracy

Item	Measuring method	Illustration of measuring method
Twist of grooves with respect to effective length of track groove (See Table 2)	While supporting the shaft with grooved raceway, apply a unidirectional torsion moment load to the external cylinder, place the dial gage probe vertically to the shaft with grooved raceway on the side face of the measuring block of twist of grooves attached on the external cylinder, and measure the deflection when the external cylinder and the dial gage probe are moved 100 mm in the axial direction at any position on the effective length of track groove of the shaft with grooved raceway. However, the dial gage probe should be applied as near as possible to the outer peripheral face of the external cylinder.	
Total radial runout of axial line of shaft with grooved raceway (See Table 3)	While supporting the shaft with grooved raceway at its supporting parts or at both centers, place a dial gage probe on the outer peripheral face of the external cylinder, and measure the deflection from one rotation of the shaft with grooved raceway at several positions in the axial direction to obtain the maximum value.	

Internal Clearance

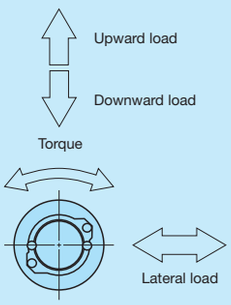
The internal clearance of LMG series is approximately 10 μm.

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

Load Direction and Load Rating

The LMG series must be used with its load rating corrected in accordance to the load direction. The basic dynamic load rating and basic static load rating shown in the dimension table should be corrected to values in Table 4.

Table 4 Load ratings corrected for load direction

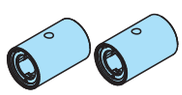


Load rating and load direction / Size	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
6~20	C	C	1.43C	C_0	C_0	1.73C_0

Identification number and quantity for ordering

To order an assembled set of LMG series, please specify the number of sets based on the number of shafts with grooved raceway. For external cylinders or single shafts with grooved raceway, please specify the number of units.

Single external cylinder



(When 2 pieces are needed)

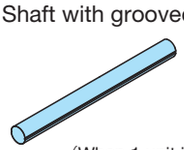
Example of identification number indication

LMG 10 C1 /U

Only C1 can be specified.

Order quantity
2 pieces

Shaft with grooved raceway



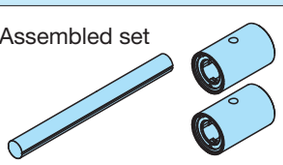
(When 1 unit is needed)

Example of identification number indication

LMG T 10 R300

Order quantity
1 unit

Assembled set



(When 1 set is needed)

Example of identification number indication

LMG T 10 C2 R300 /U

Order quantity
1 set

Moment of Inertia of Sectional Area and Section Coefficient of Shaft with Grooved Raceway

Table 5 Moment of inertia of sectional area and section coefficient of shaft with grooved raceway

Size	Moment of inertia of sectional area mm^4		Section coefficient mm^3	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
6	60	59	20	20
8	190	190	49	48
10	470	460	95	93
13	1 360	1 300	210	200
16	3 130	2 930	390	360
20	7 720	7 230	770	720

Lubrication

Grease is not pre-packed in the LMG series, so please perform adequate lubrication as needed.
Both oil lubrication and grease lubrication are available in the LMG series. For grease lubrication, use of high-quality lithium-soap base grease is recommended.

Dust Protection

No dust protection seal is provided for LMG series. For applications in other than clean environment, cover the entire unit with a protective case, etc. to prevent harmful foreign substances such as dust and particles from outside from entering.
The special specification with end seals (supplemental code / U) has a dust protection effect. However, if large amount of contaminant or dust are floating, or if large particles of foreign substances such as chips or sand may adhere to the shaft with grooved raceway, it is recommended to attach a protective cover to the linear motion mechanism.

Precaution for Use

❶ Fitting of external cylinder

Generally, clearance fit (H7) is recommended for fitting between the external cylinder and the housing bore. The transition fit (J7) may be applied for special use.

❷ Typical mounting structure

Mounting examples of the external cylinder are shown in Fig. 1. The fixing thread depth of mounting screws for the external cylinder must not exceed the maximum fixing thread depth indicated in the dimension table. Since the screw hole for the external cylinder is penetrated, the shaft with grooved raceway will be pushed by the screw if the fixing thread depth is too deep, and the running accuracy and life will be adversely affected.

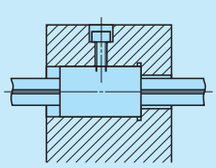


Fig. 1 Mounting examples of external cylinder

❸ Multiple external cylinders used in close proximity

When using multiple external cylinders in close distance to the same housing, it is recommended to ensure that the distance between the external cylinders is three times as long as the length of the external cylinder. When using multiple external cylinders in closer distance, contact IKO.

❹ Loaded condition with rotating torque

Use IKO Linear Ball Spline G under loaded conditions with a rotating torque bi-directionally or repeatedly.

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.

❻ Mounting of external cylinder

When press-fitting the external cylinder to the housing, assemble them correctly by using a press and a suitable jig fixture. (See Fig. 2.)

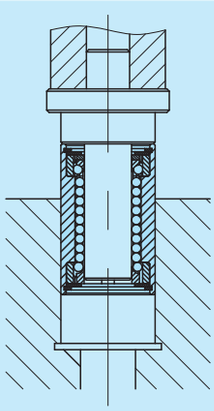
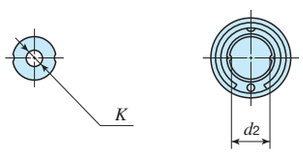


Fig. 2 Press-fitting of external cylinder

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

IKO Linear Bushing G

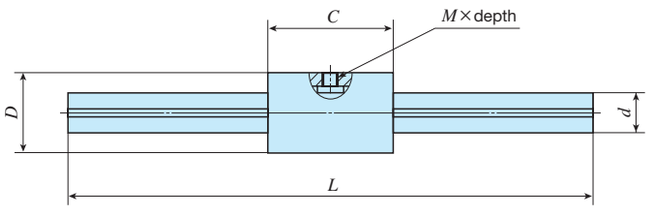
Shape	LMG
Size	6 8 10 13 16 20



Hollow shaft dimension for LMGT

Identification number	Interchangeable	Mass (Ref.) g		Nominal dimensions and tolerances mm							
		External cylinder	Shaft with grooved raceway (1)	D	Dim. D tolerance	C	Dim. C tolerance	M×depth (2)	d	Dim. d tolerance	
LMG 6	○	9.4	22.0	12	0 −0.011	19	0 −0.200	M2.5×1.9 (2.5)	6	0 −0.012	
LMGT 6	○		19.5								
LMG 8	○	15.7	39.3	15	0 −0.011	24	0 −0.200	M3 ×2.4 (3)	8	0 −0.015	
LMGT 8	○		33.7								
LMG 10	○	31.5	61.2	19	0 −0.013	29	0 −0.200	M3 ×3.1 (4)	10	0 −0.015	
LMGT 10	○		51.4								
LMG 13	○	45.4	104	23	0 −0.013	32	0 −0.200	M3 ×3.4 (4.5)	13	0 −0.018	
LMGT 13	○		81.4								
LMG 16	○	78.2	157	28	0 −0.013	37	0 −0.200	M4 ×4.1 (5.5)	16	0 −0.018	
LMGT 16	○		118								
LMG 20	○	110	246	32	0 −0.016	42	0 −0.200	M4 ×4.1 (5.5)	20	0 −0.021	
LMGT 20	○		185								

Notes (1) The mass of the shaft with grooved raceway is the value per 100 mm of the track groove part.
(2) The values in ( ) are the maximum fixing thread depth.
(3) d_2 represents the maximum diameter for end machining.
(4) Represents standard length. We can produce other than the standard length, please specify the length of the shaft with grooved raceway by indicating the length in mm with the identification number.
(5) Applicable under loaded conditions with an unidirectional torque at all times.
Use IKO Linear Ball Spline G under loaded conditions with a rotating torque bi-directionally or repeatedly.
Remark: Linear Bushing G are all interchangeable specification.



	d_2(3)	K	L(4)	Maximum length	Basic dynamic load rating C N	Basic static load rating C_0 N	Dynamic (5) torque rating T N · m	Static (5) torque rating T_0 N · m
	5.2	– 2	150 200	300	587	641	2.1	2.2
	7	– 3	150 200 250	500 400	769	962	3.5	4.3
	8.9	– 4	200 300	600	1 410	1 710	8.0	9.7
	11.9	– 6	200 300 400	800	1 880	2 150	13.7	15.7
	14	– 8	200 300 400	1 000	2 590	2 930	23.1	26.1
	17.5	– 10	300 400 500 600	1 000	3 010	3 660	32.8	39.9

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