

## Dedicated Shafts for Model LM

The LM shaft of the Linear Bushing needs to be manufactured with much consideration for hardness, surface roughness and dimensional accuracy of the shaft since balls roll directly on it. THK manufactures dedicated LM shafts for the Linear Bushing. See the specification table for standard LM shafts on **A4-104**.

Among other factors, the surface hardness of an LM shaft affects the service life of your Linear Bushing system most significantly. Therefore, take much care in selecting a material and a heat treatment method when assembling the system. In addition, as the surface hardness of the LM shaft greatly affects the service life as stated above, use care in selecting and/or handling a material and heat treatment.

### [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.

### [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.

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

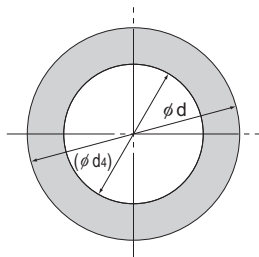


Table1 Dimensions of Hollow LM Shafts Unit: mm

Supported model numbers	LM shaft outer diameter d	Inner diameter (φda)	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

## Standard LM Shafts

THK manufactures high quality, dedicated LM shafts for Linear Bushing model LM series.

### Model number coding

<b>SF25</b>	<b>g6</b>	<b>-500L</b>	<b>K</b>
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.

- [Major materials]  
SUJ2 (high-carbon chromium bearing steel)  
THK5SP (THK standard material)  
SUS440C equivalent  
[Hardness]  
58 to 64 HRC  
[Hardened layer depth]  
0.8 to 2.5mm(varies with shaft diameter)  
[Surface roughness]  
Ra0.20 to Ra0.40  
[Straightness of the LM shaft]  
50  $\mu$ m/300 mm or less
- Precision-grade LM shafts with shaft diameter tolerance of g5 or h5 are also manufactured as standard.
- Corrosion resistance, martensite stainless steel LM shafts are also available.
- When asking an estimate or placing an order, refer to the model number coding shown on the left.



Model No.	Shaft diameter		Overall LM shaft length: L mm													Supported model numbers	
	d	Tolerance g6um	100	200	300	400	500	600	700	800	1000	1200	1300	1500	2000		3000
SF 3	3	$^{-2}_{-8}$	⊙	⊙													LM 3
SF 4	4		⊙	⊙													LM 4
SF 5	5	-4	⊙	⊙	⊙												LM 5
SF 6	6	-12	⊙	⊙	⊙	⊙											LM 6
SF 8	8	-5	⊙	⊙	⊙	⊙	⊙										LM 8, 8S
SF 10	10	-14	⊙	⊙	⊙	⊙	⊙	⊙	⊙								LM 10
SF 12	12			⊙	⊙	⊙	⊙		⊙	⊙							LM 12
SF 13	13	-6	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙							LM 13
SF 16	16	-17	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			⊙			LM 16
SF 20	20			⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				LM 20
SF 25	25	-7		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙				LM 25
SF 30	30	-20			⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		LM 30
SF 35	35					⊙	⊙		⊙	⊙	⊙		⊙	⊙			LM 35
SF 38	38	-9					⊙			⊙	⊙			⊙			LM 38
SF 40	40	-25				⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	LM 40
SF 50	50					⊙	⊙		⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	LM 50
SF 60	60	-10								⊙	⊙				⊙	⊙	LM 60
SF 80	80	-29								⊙	⊙				⊙	⊙	LM 80
SF 100	100	$^{-12}_{-34}$								⊙	⊙				⊙	⊙	LM 100

Note) ⊙ indicates standard stock; ○ indicates semi-standard stock.

## 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.

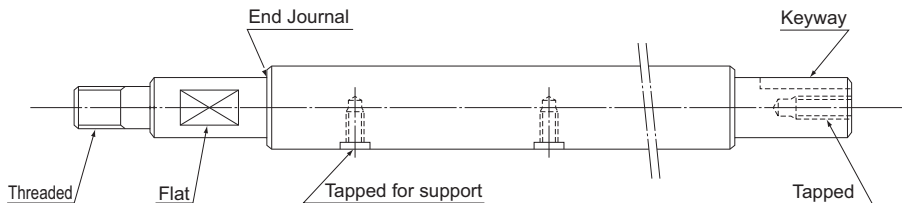


Fig.1

## 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	—	3	25
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.