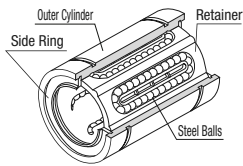


# Linear Bushings

## Cautions on Selection and Usage / Various Greases

### Structure of Linear Bushings

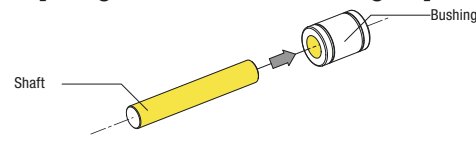


- Linear Bushings are used in combination with Linear Shafts, and it is the linear motion mechanism utilizing rolling steel balls for unlimited linear motion.
- Linear bushings imparts unlimited stroke linear motion on shafts by steel balls recirculating within the raceway grooves formed by the outer cylinder and retainer.
- Can obtain linear motion with lower friction and high accuracy compared to slide bearings, and used for many applications such as transfer equipment and semiconductor manufacturing systems.

### Cautions on Selection and Usage

#### Fitting Design

##### [Fitting of Shaft O.D. and Bushing I.D.]

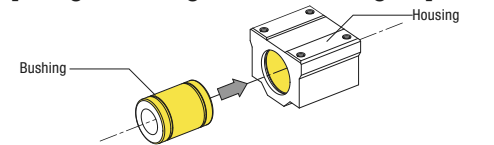


Reference: Tolerance range of I.D. of linear bushings and O.D. of shafts made by MISUMI

Dimension (mm)	Linear Bushings Single Type (LMU) I.D. Tolerance				Shaft (SF-J) O.D. Tolerance (g6)			
0								
-0.001								
-0.002								
-0.003								
-0.004								
-0.005								
-0.006								
-0.007								
-0.008								
-0.009								
-0.010								
-0.011								
-0.012								
-0.013								
-0.014								
-0.015								
-0.016								
-0.017								
-0.018								
-0.019								
-0.020								
-0.021								
-0.022								
-0.023								
-0.024								
-0.025								

For MISUMI linear bushings, use in combination with MISUMI shafts (hardened with g6 tolerance) is recommended.

##### [Fitting of Bushing O.D. and Housing I.D.]



Reference: Tolerance range of O.D. of linear bushings and diameter of housing made by MISUMI

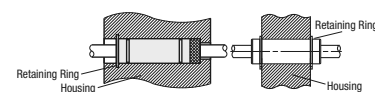
I.D. dr	Product		Customer's design	
	O.D. (D)	Tolerance	Housing Dia.	Tolerance H7
3	7		7	
4	8	0	8	+0.015
5	10	-0.009	10	0
6	12	0	12	+0.018
8	15	-0.011	15	0
10	19		19	
12	21	0	21	+0.021
13	23	-0.013	23	0
16	28		28	
20	32	0	32	+0.025
25	40	-0.016	40	0
30	45		45	
35	52	0	52	+0.030
40	60	-0.019	60	0
50	80		80	

For MISUMI Linear Bushings, mounting Housing of H7 tolerance is recommended. Bushing and Housing will be clearance fit.

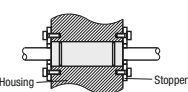
### Selection / Assembly

① Use Retaining Ring (Snap Ring), Stoppers, etc., when mounting Linear Bushings and Housing.

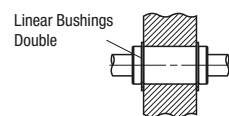
■ Mounting with Retaining Ring



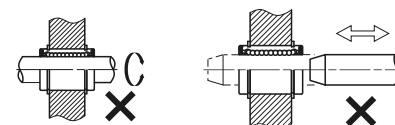
■ Mounting with Stoppers



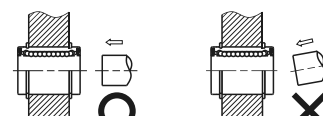
③ If large moment load (offset load) is to be applied, Short/Single Type Linear Bushings are not suitable. Use of Double Type or Multiple Linear Bushings is recommended.



② Linear Bushings are not suitable for rotating motion and uses that need repetitive insertion and extraction from shafts. Forced use may prove to be the cause of damage.



④ When assembling with linear shafts, forcing the shaft into the bushing with angular misalignment may cause the ball retainers to deform and balls to fall out. Be sure to align the centers and insert the shaft gently.



### Lubrication and Maintenance

#### At the time of delivery

Other than the MX Lubrication Units, MISUMI Linear Bushings are applied with Anti-rust Oil harmless to the bearing lubrication greases. After de-greasing the Antirust Oil, application of grease is recommended.

L, G, and H Grease filled types are also available. The MX Lubrication Units are filled with lithium soap-based grease.

#### Maintenance

Before usage, apply grease to the ball rows within the Linear bushings, then periodically apply grease during the use. The grease has an effect of reducing friction by forming a layer between the balls and shaft rolling surfaces, preventing seizures. Grease loss and deterioration will cause shorter life of linear guides.

Recommended Grease: Lithium soap based grease (Alvania Grease S2 by Showa Shell Sekiyu).

Recommended Greasing Interval: Normally 6 months

\* Every 3 month when travel distance is extensive, or every 1000km.

### Antirust Performance

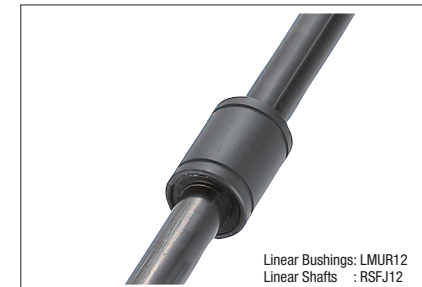
(Ref. Data)

Antirust Performance Comparison Test

Salt water spray testing method conforms to JIS H8502.  
Testing Sample: Flanged Linear Bushing Single Type

	EN 1.3505 Equiv.	EN 1.4125 Equiv.	Electroless Nickel Plating	LTBC Plating
Before Test				
72 hr				
168 hr				

### LTBC Plating



Linear Bushings: LMUR12  
Linear Shafts: RSFJ12

LTBC Plating on linear bushings is 5µm of fluoropolymer layer chemically deposited as a black film, and it has a long-lasting rust prevention effect.

Additionally, the coating is resistant to cracking from extreme and repeated bending.

Low temperature black chrome plated shafts are suitable for places where rusting or reflection of light is undesirable.

(Note) No surface treatment is applied to I.D. surface of low temperature black chrome plated linear bushings.

\* Photograph shows the condition of Linear Bushing after Sliding Test

(Sliding Test Conditions)

50km sliding test was conducted with a 412N load on the linear bushing.

No performance degradation after the test.

### Grease Service

Service to apply greases shown below at the time of shipping.

Type	Product Name	Main Features
L Type	ET-100K (Made by Kyodo Yushi)	Superior heat resistance and oxidation stability. Also high adhesion and cohesion with limited splash or leakage.
G Type	LG2 (Made by NSK Ltd.)	Suitable for clean environment due to low particle generation grease. Also good anti-rusting characteristics.
H Type	FGL(Lubriplate®)	Suitable for food, beverage and pharmaceutical industries. (NSF H-1 Reg. NO.043534)

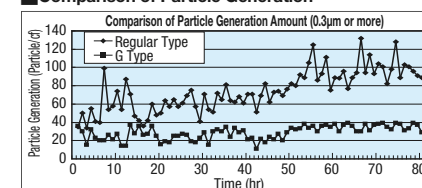
### Products with Filled Grease Options

Applicable Products	Shaft Dia. dr	Unit Price (Price for Grease Filling Service)
P305-P335 Linear Bushing Related	3~50	
* Products below are excluded. - Linear bushings without seals - Linear Ball Bushings		

### Grease Performance

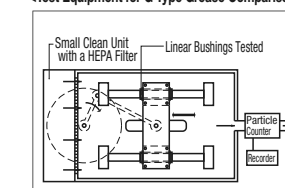
Item	Conditions	Unit	Measurement Method	L Type	G Type	H Type
Thickener	-	-	-	Aromatic Diurea	Lithium Type	Aluminum Complex Soap
Base Oil	-	-	-	Ether Synthetic Oil	Miscel Oil - Synthetic Hydrocarbon Oil	USP White Oil
Base Oil Kinetic Viscosity	40°C	mm <sup>2</sup> /s	JIS K2220 5.19	103	30	105
Viscosity	100°C	mm <sup>2</sup> /s	JIS K2220 5.3	12.8	-	11.5
Miscible Consistency	-	-	JIS K2220 5.4	280	207	310
Dropping Point	-	°C	JIS K2220 5.4	<260	200	238
Evaporation Amount	99°Cx22hr	wt%	-	0.15%	1.40%	0.27%(ASTMD-972)
Oil Separation	100°Cx24hr	wt%	JIS K2220 5.14	1.2%	0.8%	2.1%(ASTMD-1742)
Operating Temp.	In Air	°C	-	-40~200	-10~80	-12~170

### Comparison of Particle Generation



\* The data above are for reference only, and not guaranteed by the manufacturer.

### <Test Equipment for G Type Grease Comparison>



### <Testing Condition>

Linear Bushing Used

Liner Motion Speed

Stroke

Environment

Temperature

Humidity

Particle Counter

LHFS16 (Regular Type)

LHFS16G (G Type)

20m/min

100mm

Inside Clean Booth (Class100)

22.5°C±2°C

50wt%

Made by Rion Co. Ltd.

KC03A1

### Linear Bushing Models Applicable to LTBC Plating

Straight	Applicable I.D.	Page
Single LMUR	Ø3~Ø30	P315,316
Double LMUWR	Ø5~Ø30	
Flanged Type	Applicable I.D.	Page
Single LHF□R	Ø6~Ø30	P305
Double LHF□WR		P306

\* For details, refer to each page.