Cylinders with Guides - Overview

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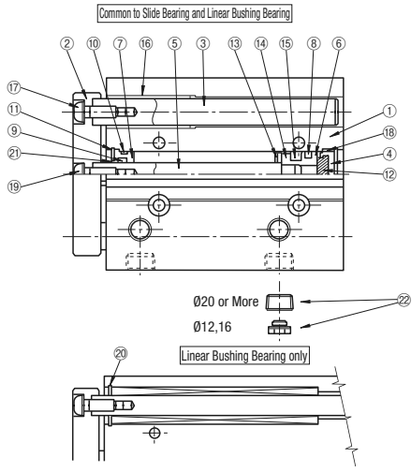
The MISUMI cylinders with guides provide more enhanced lateral load capacity, rigidity and accuracy compared to the compact type cylinders.

- High Rigidity
  The integrated two robust guide rods and one cylinder assure high rigidity.
- High Accuracy
  The twin guide mechanism ensures excellent non-rotating and locating accuracy.
- Easy Installation
  There are three ways of mounting the cylinder body.
- A magnet is provided as standard equipment.
  One piece of magnet is included as a standard equipment as shown in the "Basic Specifications of Cylinders with Guides: No. ⑮"

Basic Specifications of Cylinders with Guides



Cylinders with Guides: Component List

Number	Name		Material	Surface Treatment	Qty.
①	Main Body	Ø12~32	EN AW-6063-T5 Equiv.	Clear Anodize	1
		Ø50	EN AW-6061 Equiv.	Clear Anodize	
②	Link Bars	Ø12~32,50	EN 1.0038 Equiv.	Electroless Nickel Plating	1
③	Guide Rod	Plain Bushing	EN 1.1191 Equiv.	Hard Chrome Plating	2
		Linear Bushing	EN 1.3505 Equiv.	Hard Chrome Plating	
④	End Cover	Ø12,50	EN AW-6061 Equiv.	Clear Anodize	1
		Ø16~32	EN 1.0038 Equiv.	Nickel Plating	
⑤	Piston Rod	Ø12~20	EN 1.4305 Equiv.	Hard Chrome Plating	1
		Ø25~50	EN 1.1191 Equiv.	Hard Chrome Plating	
⑥	Piston		A6061	Clear Anodize	1
⑦	Rod Cover	Ø12~32	EN AW-4032 Equiv.	Clear Anodize	1
		Ø50	EN AW-6061 Equiv.	Clear Anodize	
⑧	Piston Gasket		NBR		1
⑨	Rod Gasket		NBR		1
⑩	Body Gasket #1		NBR		1
⑪	Stop Ring		EN 1.1525 Equiv.	Black Oxide	1/2
⑫	Head Cushion		NBR		1
⑬	Rod Cushion		NBR		1
⑭	Magnet Holder	Ø12~32	SUS304		1
		Ø50	EN AW-6061 Equiv.		
⑮	Magnet				1
⑯	Bushing	Sliding Bearing	Oil Free Bushing		4
		Linear Bushing	Linear Ball Bushing		2/4
⑰	Hex Socket Head Cap Screw	Linear Bushing Ø12	EN 1.7220 Equiv.	Black Oxide	2
	Hex Socket Low Head Cap Screw	Ø50	EN 1.7220 Equiv.	Nickel Plating	
	Hex Socket Low Head Cap Screw	All other than above	EN 1.7220 Equiv.	Black Oxide	
⑱	Body Gasket #2		NBR		1
⑲	Hex Socket Head Cap Screw	Ø12	EN 1.7220 Equiv.	Black Oxide	1
	Hex Socket Low Head Cap Screw	Ø16~32	EN 1.7220 Equiv.	Black Oxide	
	Hex Socket Low Head Cap Screw	Ø50	EN 1.7220 Equiv.	Nickel Plating	
⑳	Stop Ring	Linear Bushing	EN 1.1525 Equiv.	Black Oxide	2
㉑	Bushing	Ø50 only	Oil Free Bushing		1
㉒	Plug	Ø12,16	EN CW614N Equiv.	Electroless Nickel Plating	2
		Ø20~50	EN 1.0038 Equiv.	Nickel Plating	

[IMPORTANT]Notes on Cylinders with Guides

* Be sure to read the precautions [IMPORTANT!] in the "Compact Air Cylinder Overview" on **P.1484**

(Cylinders with Guides) ▲ CAUTION

Never touch any moving part while the cylinder is in operation.
It is extremely dangerous because fingers may be caught between moving parts.

(Cylinders with Guides) ▲ NOTE

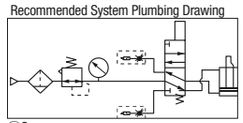
① Protect the sliding sections of the piston rods and piston guide rods from being scratched and dented.

② Mounting Orientation
Load should be applied in the direction of the piston rod axis or at 90°.

③ Installing the Speed Controller
Install the speed controller (meter out: throttle on the exhaust side) to the air pressure outlet side.
The performance of the speed controller affects the operation of the cylinder.
Use a speed controller with low cracking pressure.

④ Installing Conditioning Equipment
Cylinder failures are mostly caused by foreign materials in the atmosphere or drains.
Protect the cylinder from trouble by installing an air dryer or air filter upstream.

Recommended System Plumbing Drawing



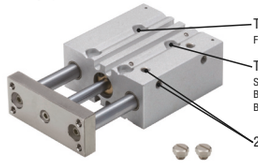
⑤ Space
Provide sufficient space around the equipment to ensure easy handling.

⑥ Flushing
Before plumbing, flush the pipe thoroughly to protect it from solids or seal tape fragments.

⑦ Ambient Environment
Do not use the cylinder in the following environments:
An area filled with oil or grease. (It may cause dust to adhere to the sliding section.)
An area where intense vibrations may occur.
An area where the equipment may be affected by chemicals.

Features of Cylinders with Guides

Two Types of Bearings: sliding type and linear bushing type are available as guide rod bearings.
There are three ways of mounting the cylinder body: mounting it from the front, back, or bottom faces.
The sensors can be installed in four locations: 2 locations on the front face and 2 locations on the bottom face.
Plumbing is possible from two directions: the front and the sides.



Basic Specifications for Cylinders with Guide

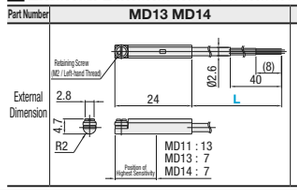
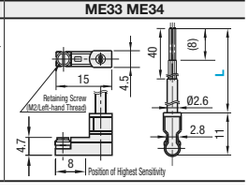
Tube I.D. (mm)		12	16	20	25	32	50
Operating Type		Double Acting					
Applicable Fluid		Air					
Min. Operating Pressure (MPa)		0.1					
Max. Operating Pressure (MPa)		1.0					
Pressure Resistance (MPa)		1.5					
Operating Temp. Range (°C)		5~60					
Piston Speed (mm/s)		50~500					
Cushion Mechanism		NBR					
Stroke Tolerance (mm)		0~+1.5				0~+2.0	
Lubrication		Lubrication Free					
Pipe Connection Bore Dia.		M5x0.8		Rc1/8			Rc1/4
Mounting Part	Screw on Body Bottom Face	M4x0.7 Depth 9	M5x0.8 Depth 11	M5x0.8 Depth 13	M6x1.0 Depth 15	M8x1.25 Depth 18	M10x1.5 Depth 22
	Screw on Body Side (Outside)	M4x0.7 Depth 7	M5x0.8 Depth 7		M6x1.0 Depth 9	M8x1.25 Depth 11	
	Screw on Body Side (Inside)	M5x0.8 Depth 10		M6x1.0 Depth 12		M8x1.25 Depth 16	M10x1.5 Depth 20
	Screw Through Hole	For M4		For M5		For M6	For M8

Sensors for Cylinders Specifications

Part Number		MD13	ME33	MD14	ME34
Cable Exit Direction	Rear	Rear	Top	Rear	Top
Contact Type	Contact	No Contact			
Power Supply Voltage Range		5~28VDC			
Load Voltage Range	24VDC,AC110V	28VDC or Less		10~28VDC	
Load Current Range	24VDC : 5~40mA 110VAC : 5~20mA	0.1~40mA		5~20mA	
Internal Voltage Drop	3V or Less	0.5V or Less		5V or Less	
Leakage Current	0μA	50μA or Less (24VDC, 25°C)		1mA or Less (24VDC, 25°C)	
Consumption Current	10mA or Less				
Response Time	1ms or Less				
Reset Time	1ms or Less				
Insulation Resistance	100mΩ or more with 500 VDC (between Case and Code)				
Withstand Voltage	1 min. with 1500VAC (between Case and Code)				
Impact Resistance	294m/s²				
Vibration Resistance	Lateral Amplitude 1.5mm, 10 ~ 55Hz (1 sweep/min, 2 hours in each of X, Y, Z directions)				
Ambient Temperature	0 ~ +60°C (Non-Freezing)				
Connection Method	PVC 0.2mm² 2 Conductors O.D. Ø2.6mm	PVC 0.15mm² 3 Conductors O.D. Ø2.6mm		PVC 0.2mm² 2 Conductors O.D. Ø2.6mm	
Lead Wire Length	1m, 3m				
Protection Structure	IP67 (IEC Standard), JIS0920 (Water Resistant Type)				
Protection Circuit	No	Yes			
Indicator Light	LED (Lights when ON)				
Applicable Load	Small Relay ~ PLC				
Electrical Circuit	Brown [+] Blue [-]	Brown [+] Black [OUT] Blue [-]		Brown [+] Blue [-]	

Caution : If an inductive load (e.g., small relay) is used, be sure to install a protection circuit to the load.

External Dimensions of Sensors for Cylinders

Part Number	MD13 MD14	ME33 ME34
External Dimension		

Application Based Cylinder Selection

- As a Stopper (with a Stopper Plate).

① Obtain the intersection point of the amount of conveyed material and the conveyance speed from the [Allowable Stopper Capability Chart].
Ex.) If the amount of conveyed material is 50 kg and the conveyance speed is 10 m/min, the intersection point is at 1.

② Select a desired cylinder with an I.D. above the intersection point in the chart.
Ex.) For Intersection Point 1, cylinders with Ø20 or larger can stop conveyed objects.

Note that the "Allowable Stopper Capability Chart" below refers to 30mm and 25mm strokes for Ø12 ~ Ø25 and Ø32 ~ Ø50, respectively. Conversion is required to use the cylinder with more than the above strokes.

Conv. Formula : Converted Value of Max. Amount of Conveyed Material = [Max. Amount of Conveyed Mat. in "Allowable Stopper Capability Chart"]x [Convers. Coefficient (K) /L]
L : Distance from the Top Face of the Cylinder Body to the Top of the Link Bar Used in Upward Motion of the Cylinder
= Conversion Coefficient(K) + Stroke Used (mm) - Stroke in the "Allowable Stopper Capability Chart" (mm)

Ex.) Ø32-100mm, Conveyance Speed =10m/min
Converted Value of Maximum Amount of Conveyed Material =230(kg)x44/(44+100 (mm)-25(mm))=85(kg)
Any conveyed material up to 85 (kg) can be stopped.

- As A Stopper (with a Stopper Plate).

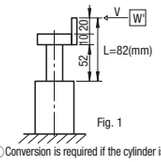
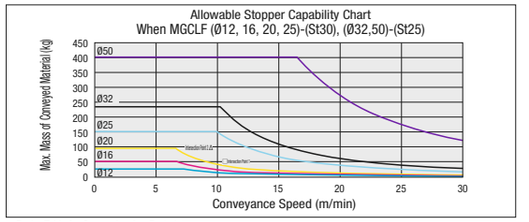


Fig. 1

<Conditions>
Mass of Conveyed Material : 50kg
Conveyance Speed: 10m/min
I.D. of Cylinder : Ø25
Stopper Plate : 30mm
L=82mm

① Conversion is required if the cylinder is used with more than the strokes in the "Allowable Stopper Capability Chart" below.
Conv. Formula : Converted Value of Max. Amount of Conveyed Material = [Max. Amount of Conveyed Mat. in "Allowable Stopper Capability Chart"] x [Convers. Coefficient (K) /L]
L: Distance from the Top Face of the Cylinder Body to the Tip of the Stopper Plate Used in Upward Motion of the Cylinder
= [Outer Dimension of the Plate from the Link Bar (mm)]+ [Conversion Coefficient]+ [Stroke Used (mm)] - [Stroke in Allowable Stopper Capability Chart (mm)]
Ex.) If the outer dimension of the plate is 30 (mm) relative to the link bar in the conditions of Ø32-100 mm and the conveyance speed 10m/min,
Maximum Amount of Conveyed Material =230 (kg)x44/(30+44+100 (mm)-25 (mm))=68 (kg)
Any conveyed material up to 68 (kg) can be stopped.

***Cylinders with Twin Guides (MGCLB and MGCLBN) cannot be used as stoppers.**



- Factor Table for Conversion (k : Factor)

Tube I.D. (mm)	Ø12	Ø16	Ø20	Ø25	Ø32	Ø50
k	40	42	42	42	44	53

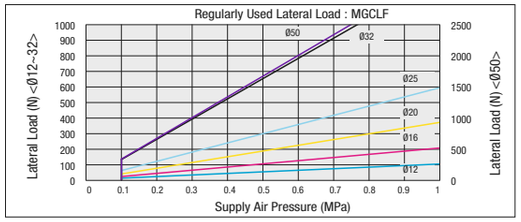
- As a Stopper (Verification of Allowable Lateral Load)

To use the cylinder as a stopper, make sure that the cylinder can be lowered with conveyed objects on.

<Calculating the Lateral Load>
(Example of Calculation Conditions)
・Supply Air Pressure: 0.4 MPa. ・Mass of Workpiece: 50 kg. ・Gravitational Acceleration : 9.8 m/sec²
・Friction Coefficient of Conveyor: μ=0.2

① Obtain the lateral load (N).
Lateral load (N) = Mass of Workpiece (kg) x Gravitational Acceleration (9.8 m/sec²) x Friction Coefficient of Conveyor (μ)
Ex.) Lateral Load (N) =50 (kg)x9.8 (m/sec²)x0.2=98 (N)

② Obtain the intersection point between "Air Supply Pressure (MPa)" and "Lateral Load (N)" in the "Regularly Used Lateral Load" chart below. Tube I.D. above the intersection point can be used.
Ex.) The intersection point between the lateral load 98 (N) and supply air pressure 0.4 (MPa) shows that the applicable tube I.D. are Ø20, Ø25, Ø32 and Ø50.



- As a Lifter

① Obtain the total mass (kg) of the workpiece to be lifted.
② If the center of gravity of the workpiece is placed in the center of the cylinder, select a tube I.D. with the mass of work (kg) approximately 60% or lower of the theoretical thrust (N).
③ If the center of gravity of the workpiece is eccentrically located from the center of the cylinder (Fig. 2), obtain the intersection point between the eccentric distance (mm) and the allowable eccentric load (N) from the "Allowable Eccentric Load" chart.
If the cylinder is to be used with a supply pressure other than 0.5 MPa, the load factor must be within 60% of the theoretical output.

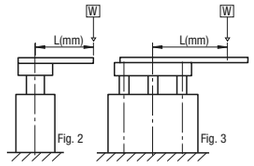
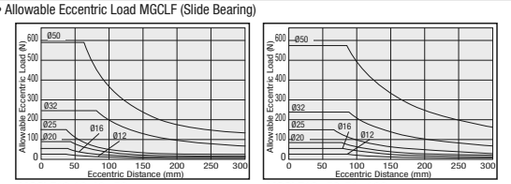


Fig. 2 Fig. 3

④ The cylinder ability is 50% if it is used in the direction of eccentricity of the workpiece as shown in Figure 3. Double the mass of workpiece for selection.

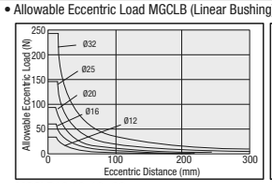
- Allowable Eccentric Load MGCLF (Slide Bearing)



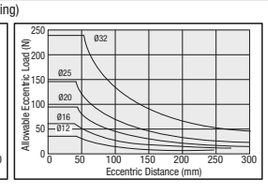
MGCLF12,16-10~50
MGCLF20,25-20~50
MGCLF32,50-25~50

MGCLF12~50-51~100

- Allowable Eccentric Load MGCLB (Linear Bushing)



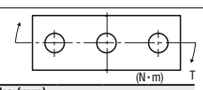
MGCLB12,16-10~30
MGCLB20,25-20~30
MGCLB32-25~50



MGCLB12,16-31~100
MGCLB20,25-31~100
MGCLB32-51~100

Allowable Rotational Torque

The followings show dynamic allowable values with rotational torque T applied to the tips of the guide rod.



Tube I.D. (mm)	Bearing Type	Stroke (mm) 10	20	25	30	40	50	75	100
Ø12	Plain Bushing	0.50	0.40	-	0.33	0.28	0.25	0.77	0.65
	Linear Ball Bushing	0.41	0.31	-	0.25	0.69	0.59	0.40	0.32
Ø16	Plain Bushing	0.91	0.75	-	0.64	0.56	0.49	1.25	1.06
	Linear Ball Bushing	0.76	0.60	-	0.49	1.14	1.02	0.79	0.65
Ø20	Plain Bushing	-	1.43	-	1.23	1.08	0.96	1.51	1.27
	Linear Ball Bushing	-	1.12	-	0.93	2.12	1.90	1.50	1.24
Ø25	Plain Bushing	-	2.26	-	1.94	1.71	1.52	2.38	2.00
	Linear Ball Bushing	-	1.98	-	1.65	3.75	3.37	2.68	2.22
Ø32	Plain Bushing	-	-	6.71	-	-	5.24	4.30	3.64
	Linear Ball Bushing	-	-	3.61	-	-	2.55	6.48	5.41
Ø50	Plain Bushing	-	-	13.0	-	-	10.8	-	10.6

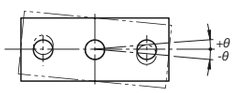
Theoretical Output

(N)

Tube Dia. (mm)	Operating Direction	Operating Pressure (MPa) 0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Ø12	Push	11	23	34	45	57	68	79	90	102	113
	Pull	8	17	25	34	42	51	59	68	76	85
Ø16	Push	20	40	60	80	101	121	141	161	181	201
	Pull	15	30	45	60	75	90	106	121	136	151
Ø20	Push	31	63	94	126	157	188	220	251	283	314
	Pull	24	47	71	94	118	141	165	188	212	236
Ø25	Push	49	98	147	196	245	295	344	393	442	491
	Pull	38	76	113	151	189	227	264	302	340	378
Ø32	Push	80	161	241	322	402	483	563	643	724	804
	Pull	60	121	181	241	302	362	422	483	543	603
Ø50	Push	196	393	589	785	982	1178	1374	1571	1767	1963
	Pull	165	330	495	660	825	990	1155	1319	1484	1649

Non-rotational Accuracy

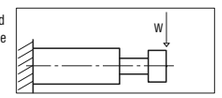
A deviation angle centered on the piston rod, expressing the backlash caused by the clearance between the guide rod and the bearing.



Tube I.D. (mm)	Non-rotating Accuracy of Link Bar Tip: Plain Bushing	Linear Bushing
Ø12	±0.12°	±0.06°
Ø16	±0.10°	±0.06°
Ø20	±0.09°	±0.05°
Ø25	±0.08°	±0.05°
Ø32	±0.06°	±0.04°
Ø50	±0.05°	-

Allowable Lateral Load

The followings show dynamic allowable values with lateral load W (load perpendicular to the guide rod) applied to the tips of the guide rod.



(N)

Part Number	Tube Dia. (mm)	Stroke (mm) 10	20	25	30	40	50	75	100
MGCLF (Slide Bearing)	Ø12	24	19		16	14	12	37	31
	Ø16	40	33		28	24	21	55	46
	Ø20		52		45	39	35	55	46
	Ø25		69		60	52	47	73	62
	Ø32			166			131	107	91
	Ø50			296			245		241
MGCLB (Linear Bushing)	Ø12	20	15		12	33	29	19	16
	Ø16	33	26		21	50	44	34	28
	Ø20		41		34	77	69	54	45
	Ø25		61		51	115	104	82	68
	Ø32			90			34	162	135