Compact Cylinders - Overview

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MISUMI low profile air cylinders are designed to be compact to save space.
The general-purpose thin-type cylinders have been standardized.
Standard-stroke compact air cylinders can be shipped immediately, while those of selectable shape (with specified stroke) can be dispatched on the fifth day after receiving an order.
Each of the MISUMI standard thin-type cylinders is equipped with a magnet rubber cushion.

■Features of Compact Air Cylinder

For the I.D. of the cylinder tube, eight types are offered.
For selectable shapes (with specified stroke), the stroke can be specified in 1mm increments, and the rod tip type can be selected.
The cylinder body can be fixed directly through four through holes.
In addition, connecting parts can be selected from two shapes: Foot and U-Shaped Clevis
Sensors can be installed at eight locations (Ø12: 3 locations; Ø16: 6 locations).

■Selection of Cylinders

①Define the requirements for the load.

1) Load (N) · · · · · · · · · · · · · · · · Refer to "Load Calculation".
2) Operating Pressure (Mpa)
3) Stroke (mm)
4) Operating Time (s)

②Calculate the cylinder output. (for Double Acting Type)

1) Determine the cylinder output. (for Outstroke)
F1 =ηxA1xP
F1 = Outstroke Thrust (N)
A_1 = Outstroke Pressure Area (mm²) · · · · · Refer to "Cylinder Pressure Area Table".
η = Load Factor Meeting the Purpose (%) · · · · · Refer to "Load Factor Coefficient Table".
P =Operating Pressure (Mpa)
2) Determine the cylinder output. (for Instroke)
F2 =ηxA2xP
F2 =Thrust of Instroke (N)
A_2 = Instroke Pressure Area (mm²) · · · · · Refer to "Cylinder Pressure Area Table".
η = Load Factor Meeting the Purpose (%) · · · · · Refer to "Load Factor Coefficient Table".
P =Operating Pressure (Mpa)

③Determine I.D. of the tube.

・Determine the I.D. of the tube based on the cylinder output (N) and load (N).
Select a cylinder for required load to be within the ▭ range in the table.
· · · · · Refer to "Tube I.D. Selection Table" and "Theoretical Output Table".
For example, if the operating pressure is 0.5MPa and the 105N cylinder is required, the cylinder diameter is selectable from following 3 sizes: Ø20 (load factor: approx. 70%), Ø25 (load factor: approx. 45%), and Ø32 (load factor: approx. 25%).

$$\text{Load Factor} = \frac{\text{Load}}{\text{Theoretical Output}}$$

Theoretical Output (N) = Pressure Area (mm²) x Operating Pressure (MPa)

④Determine the theoretical reference speed.

・Determine the theoretical reference speed based on the stroke (mm) and operating time (s).
· · · · · Refer to "Theoretical Reference Speed Selection Table".

⑤Verify the cylinder cushion mechanism.

・Check allowable kinetic energy (J) when the load is to be stopped near the end of the cylinder stroke.
E=m/2xV² · · · · · Refer to the "Allowable Kinetic Energy Table."
E=Kinetic Energy (J) m=Mass (kg) V=Velocity (m/s)
CAUTION: If load beyond the allowable kinematic energy (J) is applied to the cylinder,
1) Review the I.D. of the cylinder tube.
2) Install an external stopper.
The measures above are required.

⑥Verify the lateral load to be applied to the cylinder.

・If the lateral load is applied to the tip of the cylinder piston rod, check the allowable lateral load (N).
Verify the load based on the following three conditions. · · · · · Refer to the "Allowable Tip Lateral Load Table".
1) I.D. of Cylinder Tube
2) Cylinder Stroke (mm)
3) Lateral Load Applied to the Tip of the Rod (N)
CAUTION : If load beyond the allowable lateral load (N) is applied to the tip of the cylinder piston rod,
1) Review the I.D. of the cylinder tube.
2) Install a guiding mechanism on the piston rod to contain the applied load under the allowable lateral load.
The measures above are required.

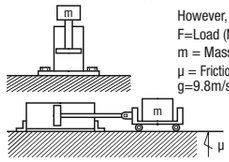
■Theoretical Output

Unit : N

Tube I.D. 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
Ø40	Push	126	251	377	503	628	754	880	1005	1131	1257
	Pull	106	211	317	422	528	633	739	844	950	1056
Ø50	Push	196	393	589	785	982	1178	1374	1571	1767	1963
	Pull	165	330	495	660	825	990	1155	1319	1484	1649
Ø63	Push	312	623	935	1247	1559	1870	2182	2494	2806	3117
	Pull	280	561	841	1121	1402	1682	1962	2242	2523	2803

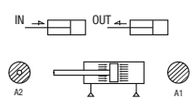
Load Calculation Calculate the load from the applied mass on the cylinder and its direction.

For vertical direction
F= mxg
For lateral direction
F= mxgxμ



However,
F=Load (N)
m = Mass of Object (kg)
μ = Friction Coefficient (Standard μ=0.3)
g=9.8m/sec²

Cylinder Pressure Area Table



Cylinder Pressure Area

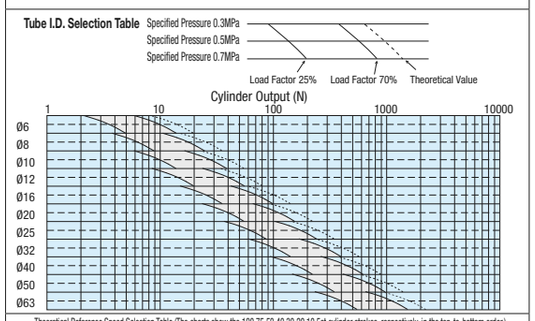
Tube I.D. (mm)	Rod Dia. (mm)	A_2 Pressure Area (mm²) IN (Pull)	A_1 Pressure Area (mm²) OUT (Push)
12	6	85	113
16	8	151	201
20	10	236	314
25	12	378	491
32	16	603	804
40	16	1056	1257
50	20	1649	1963
63	20	2803	3117

Load Factor Coefficient Table

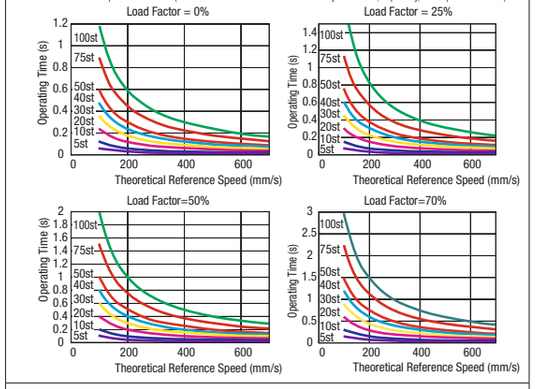
η=0.7 or Less η=0.5 or Less η=1 or Less

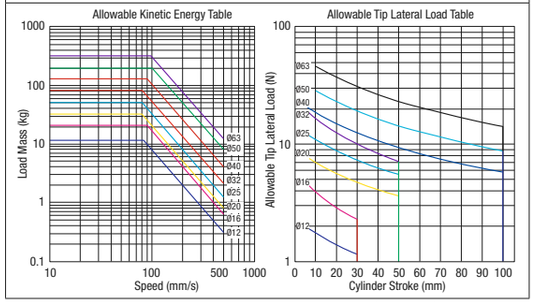
Load Factor Constant	Purpose of Work	Load Factor η
Dynamic Work	Static Work (Clamping, Vise, Low Speed Tightening, etc.)	0.7 or Less
	Lateral Direction of the Load Placed on the Guide	1 or Less
	Vertical to Horizontal Operation of Load	0.5 or Less

Tube I.D. Selection Table



Theoretical Reference Speed Selection Table (The charts show the 100.75.50.40.30.20.10.5st cylinder strokes, respectively, in the top-to-bottom order.)





Above two tables (Allowable Kinetic Energy Table and Allowable Tip Lateral Load Table) are for Compact Type Cylinders (☞P1485).
For Small Cylinders, see **P.1489** and **1490**; for Air Cylinders (Pen-Style Type), see **P.1491**.

■Air Consumption and Required Air Amounts

• Air Consumption (per Reciprocating Motion of Double Acting Cylinder)

①Volume of the air consumed by the reciprocating motion of the air cylinder, in the cylinder or between the cylinder and the changeover valve. It is required to select an air compressor or to calculate the running costs.
(Formulas)

$$Q_{cc}=(A1+A2)xL_x\frac{P+0.1013}{0.1013}x10^{-6}$$
$$Q_{cp}=2xaxℓx\frac{P}{0.1013}x10^{-6}$$
Q_c=Qcc+Qcp
Q_{cc}= Air Consumption of Air Cylinder [ℓ (ANR)]
Q_{cp}= Air Consumption of Tube or Pipe [r ((ANR)]
A1 = Extruding End Pressure Area [mm²] · · · · · Refer to "Cylinder Pressure Area Table".
A2 = Retreating End Pressure Area [mm²] · · · · · Refer to "Cylinder Pressure Area Table".
L =Cylinder Stroke [mm]
P =Operating Pressure [MPa]
ℓ = Pipe Length [mm]
a = Inner Cross-sectional Area of Pipe [mm²]
Q_c = Air Consumption Required for One Reciprocating Motion of Air Cylinder [ℓ (ANR)]

②Select a compressor that has enough capacity for the total amount of air consumed downstream by the air actuator.
Air is consumed due to leakages in the pips, or in the drain valve or pilot valve. In addition, air volume decreases with the temperature decrease.
(Formulas)

Q_c' = Qcxnx Number of Cylinders Used x Margin Ratio
Q_c' = Compressor Discharged Flow Rate [ℓ/min(ANR)]
n = Cylinder Reciprocating Motions per Minute
Margin Ratio=1.5 ~ (To be set by the user)

• Required Air Volume (per Minute)

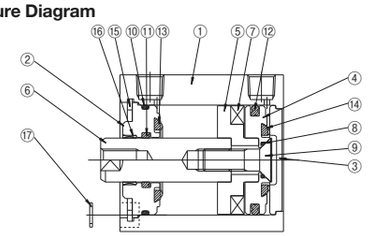
Amount of the air necessary for actuating the air cylinder at a predetermined speed. This is required for selecting a diameter of any pipe upstream of the changeover valve, or selecting the F, R and L equipment (filter, regulator and lubricator on ☞**P.1523**)
(Formulas)

$$Q_{r1}=60xA1xVx\frac{P+0.1013}{0.1013}x10^{-6}$$
$$Q_{r2}=60xA2xVx\frac{P+0.1013}{0.1013}x10^{-6}$$
Q_{r1} = Extruding End Air Requirement [ℓ/min(ANR)]
Q_{r2} = Retreating End Air Requirement [ℓ/min(ANR)]
A1 = Extruding End Pressure Area [mm²] · · · · · Refer to "Cylinder Pressure Area Table".
A2 = Retreating End Pressure Area [mm²] - - - - - - Refer to "Cylinder Pressure Area Table".
V =Maximum Piston Speed [mm/s]
P =Operating Pressure [MPa]
* For Double Acting Cylinders, use one with larger Q_{r1} and Q_{r2}.
When there are multiple air cylinders downstream in selecting the plumbing or equipment, apply the maximum amount among all cylinders in simultaneous operation.

■Compact Cylinder Basic Specifications

Tube I.D. (mm)	12~25	32~40	50	63
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~+1.0		0~+2.0	
Lubrication	Lubrication Free			
Pipe Connection Bore Dia.	M5x0.8	Rc1/8	Rc1/4	

■Compact Cylinders Basic Structure Diagram



■Compact Cylinders Parts Details

Number	Part Name	M Material Ø12~32	M Material Ø40~63	S Surface Treatment
①	Main Body	EN AW-6063-T5 Equiv.	EN AW-6063-T5 Equiv.	Clear Anodize
②	Rod Cover	EN AW-4032 Equiv.	EN AW-6061-T6 Equiv.	Clear Anodize
③	Head Cover	EN AW-6061-T6 Equiv.	EN AW-6061-T6 Equiv.	Clear Anodize
④	Piston	EN AW-6061-T6 Equiv.	EN AW-6061-T6 Equiv.	Clear Anodize
⑤	Piston R	EN AW-6061-T6 Equiv.	EN AW-6061-T6 Equiv.	Clear Anodize
⑥	Piston Rod	EN 1.4301 Equiv.	EN 1.1191 Equiv.	Hard Chrome Plating
⑦	Magnet			
⑧	Piston Gasket	NBR	NBR	
⑨	Hex Socket Flat Head Cap Screw	EN 1.4301 Equiv.	EN 1.7220 Equiv.	
⑩	Body Gasket	NBR	NBR	
⑪	Rod Gasket	NBR	NBR	
⑫	Piston Gasket	NBR	NBR	
⑬	Rod Cushion	NBR	NBR	
⑭	Head Cushion	NBR	NBR	
⑮	Stop Ring	EN 1.4301 Equiv.	EN 1.1525 Equiv.	Nickel Plating (Ø40 ~ 63)
⑯	Rod Bushing		Oil Free Bushing	
⑰	Washer	EN 1.0330 Equiv.	EN 1.0330 Equiv.	Nickel Plating

Gaskets of MSCCN and MSCCA are NB (Nitrile Rubber).

■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		5DC~28V			
Load Voltage Range	24VDC,110VAC	28VDC or Less		DC10~28V	
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	0 μ A	50 μA or Less		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 Note

[IMPORTANT] PRECAUTIONS

DANGER: A clearly dangerous state. Unless avoided, death or serious injuries might be caused.
CAUTION: A potentially dangerous state depending on usage. Unless avoided, death or injuries might be caused.
NOTE: A potentially dangerous state depending on usage. Unless avoided, low-grade to moderate injuries might be caused, or property might be damaged.

(Cylinders) ▲ CAUTION

①Check the air cylinder specifications and use the cylinder within the allowed specification range.
If the cylinder is used under pressure or temperature exceeding the specifications, or any fluid other than compressed air is used, there is a danger of personal injury or damage to the machine by broken or malfunctioning cylinders. Be sure to use the cylinder within the allowed specification range.
②Please note that there may be potential damages to the machine or human body, e.g, hands and/or legs being caught in the moving mechanisms.
If there are potential hazards to human body, install a protective cover as a safety measure.
③Provide safety measures against possible injuries and equipment damages by air cylinder malfunctions due to power and air supply troubles.
④The air cylinder and the coupling with other equipment must be fixed securely to avoid loosening.

(Cylinders) ▲ NOTE

①Use a filter and a dryer in order to supply clean and dry compressed air to the air cylinder.
Impurities in the compressed air may cause malfunctions.
②Use a speed controller to operate the air cylinder at a predetermined speed.
③A lateral load beyond the allowable range must not be applied to the piston rod.
Otherwise, the air cylinder may operate improperly, or the gaskets may be damaged.
④The air cylinder can be operated without lubrication.
For lubricating the cylinder, supply Category-1 turbine oil (ISO VG32). Once lubricated, continue to use the same lubricant. If lubrication is stopped, the initial lubricant may be lost, thus causing the cylinder to malfunction.

(Sensors for Cylinders) ▲ DANGER

①Never use the cylinder in an atmosphere containing explosion gas.
Otherwise, the sensor may cause an explosion because it does not have an explosion-proof structure.

(Sensors for Cylinders) ▲ CAUTION

①After reviewing the specifications of sensors for cylinders, use them within the specifications. If the sensor is used with a load current, voltage, temperature, impact, or any other condition outside the range of the specifications, the sensor may break the sensor may break or operate improperly.
②Do not use the sensor under conditions such as: a magnetized area; an atmosphere containing an explosive gas; water or oil may be splashed to the cylinder; the temperature may change in an extremely wide range; an impact may occur; a dusty area. Otherwise, the sensor may operate improperly or break.
③Perform wiring correctly according to the color-coded labels of the sensor lead wires.
<Contacting Sensor>
・If the wiring is reversed, the lamp will not light, although the sensor operates. (24 VDC only)
<Two-wire Non-contact Sensor>
・If the wiring is reversed, the lamp will continually stay ON.
<Three-wire Non-contact Sensor>
・If the power and output lines are wired incorrectly, the sensor will break.
④To connect a load that generates a surge voltage (e.g. relay), use a switch that contains a contact protection circuit, or use a protection circuit.
⑤If power is turned on without connecting a load such as relay, PLC (programmable controller) or a similar load to the two-wire sensor, the sensor will fail. Be sure to connect a load before turning the power on.
⑥Do not bundle sensor wires with power lines or high voltage circuits.
Otherwise, noise may be generated, resulting in malfunction of the sensor.
⑦If the wire contains insulation faults, an over-current may flow through the sensor, causing the sensor to fail.
Confirm that there is no insulation fault.
⑧If the sensor wire is too long, turning power on may generate a in-rush current, resulting in breakage of the contacts. If the wire length exceeds 5m, be sure to connect a contact protection circuit.
⑨Do not drop or bump the sensor, as the internal mechanism of the sensor may break.
⑩Fix the sensor in accordance with the tightening torque specifications. (0.1 ~ 0.2Nm)

Compact Cylinders

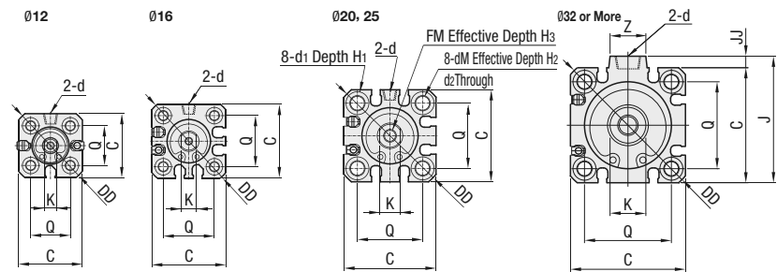
Stroke	Rod Tip	Type	Features
Fixed	Tapped	MSCCN	Standard Stroke Type is available. In-stock items. Same day shipping is available. (Sensor for Cylinder, No Bracket)
	Threaded	MSCCA	
Configurable	Shape Selectable	MSCCS	Stroke and end shape are selectable in 1mm increments.

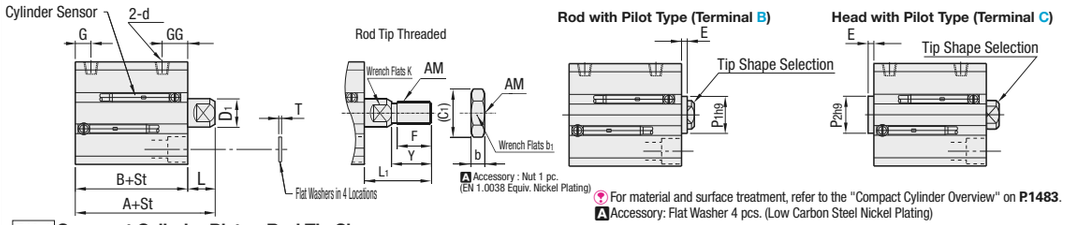
For Brackets for the Standard Stroke Cylinder, see **P.1487, 1488**

Operating Temp. Range: 5 ~ 60°C

Cylinder Body End

Standard Type (Terminal)
Rod Tip Tapped





For material and surface treatment, refer to the "Compact Cylinder Overview" on **P.1483**.
A Accessory: Flat Washer 4 pcs. (Low Carbon Steel Nickel Plating)

Table 1 Compact Cylinder Piston Rod Tip Shape

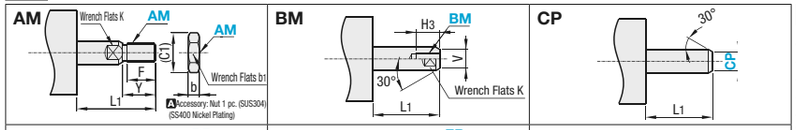


Table 2 Bracket Selection List

(Refer to the part numbers on **P.1487**)

Foot Brackets	
Type	Applicable Part Number
KFB	CFKPB
KFM	CFKPM

U-Shaped Clevis Mount Brackets	
Type	Applicable Part Number
TKB	CTKB
TKM	CTKM

For material, surface treatment and dimensions, refer to **P.1487**.

Tube I.D. (mm)	F	H3	K	* L1	S	S1	V	W	Y
12	9	6	5	14(24)	4	8	5	4	10.5
16	10	8	6	15.5(25.5)	6	12	7	5	12
20	12	7	8	18.5(28.5)	8	16	8	6	14
25	15	12	10	22.5(32.5)	10	20	10	8	17.5
32	20.5	13	14	28.5(38.5)	12	24	14	10	23.5
40	20.5	13	14	28.5(38.5)	12	24	14	10	23.5
50	26	15	17	33.5(43.5)	14	28	18	12	28.5

* When Foot Type cylinder bracket is selected, dimension will be indicated in ( ).

AM	b	b1	(C1)
M3x0.5	2.4	5.5	6.4
M4x0.7	3.2	7	8.1
M5x0.8	4	8	9.2
M6x1.0	5	10	11.5
M8x1.25	5	13	15
M10x1.25	6	17	19.6
M12x1.5	7	19	21.9
M14x1.5	8	22	25.4
M16x1.5	10	24	27.7
M18x1.5	11	27	31.2

Nominal Thread Dia.	Threaded	Tapped
M3	M3x0.5	M3x0.5
M4	M4x0.7	M4x0.7
M5	M5x0.8	M5x0.8
M6	M6x1.0	M6x1.0
M8	M8x1.25	M8x1.25
M10	M10x1.25	M10x1.5
M12	M12x1.5	-
M14	M14x1.5	-
M16	M16x1.5	-
M18	M18x1.5	-

External Dimensions for Compact Cylinders

Tube I.D. (mm)	A	B	C	D1	DD	d	d1	d2	H1	H2	dM	E	H3	G	GG	J	JJ	K	L	P1	P2	Q	T	Z	b	b1	C1	F	L1	Y
12	25.5	22	25	6	32	M5x0.8	6.5	3.5	4	7	M4x0.7	1.5	6	5	7.5	-	-	5	3.5	15	6	15.5	0.5	-	4	8	9.2	9	14	10.5
16			29	8	38								8					6		20	10	20			5	10	11.5	10	15.5	12
20	34	29.5	36	10	47		9	5.5	7	10	M6x1.0	2	7	5.5	9			8	4.5	13	13	25.5			5	13	15	12	18.5	14
25	37.5	32.5	40	12	52								12		11			10	5	15	15	28			6	17	19.6	15	22.5	17.5
32	40	33	45	16	60	Rc1/8							13	7.5	10.5	49.5	4.5	14	7	21	21	34	1	14	8	22	25.4	20.5	28.5	23.5
40	46.5	39.5	52		70									8	11	57	5			28	28	40								
50	48.5	40.5	64	20	86	Rc1/4	11	6.6	8	14	M8x1.25		15	10.5	10.5	71	7	17	8	35	35	50		19	11	27	31.2	26	33.5	28.5
63	54	46	77		103		14	9	10.5	18	M10x1.5	-			15	84				-	-	60								

Standard Stroke Type

Part Number Type	Tube I.D. (mm)	St Stroke (mm) Selection (Refer to the Price List)	L	Cylinder Body End Shape	Rod Tip MSCCN (Tapped) FM	Rod Tip MSCCA (Threaded) AM	Gasket	Unit Price MSCCN St Stroke (mm) 5	10	15	20	25	30	35	40	45	50	75	100	Unit Price MSCCA St Stroke (mm) 10	20	30	50	75	100
Rod Tip Tapped MSCCN	12	5~30	3.5	A (Standard)	M3x0.5	M5x0.8	NB (Nitrile Rubber)							-	-	-	-	-	-									
	16				M4x0.7	M6x1.0								-	-	-	-	-	-									
	20	5~50	4.5		M5x0.8	M8x1.25												-	-		-							
	25		5		M6x1.0	M10x1.25												-	-		-							
Rod Tip Threaded MSCCA	32		7		M8x1.25	M14x1.5												-	-		-							
	40	5~100																										
	50	10~100	8		M10x1.5	M18x1.5		-												-	-							
	63	30~100						-	-	-	-	-		-	-	-				-	-							

Configurable Stroke Type

Part Number Type	Tube I.D. (mm)	St Stroke (mm) 1mm Increment	Cylinder Body End Shape Selection	Piston Rod Tip Shape Table 1: Shape AM (Thread Dia.) Selection	Shape BM (Thread Dia.) Selection	Shape CP 1mm Increment	Shape DR Selection	Shape ER Selection	Shape FS (Arc Tip) Selection	Gasket Selection	Bracket for Cylinder Table 2: Type	Qty.
MSCCS	12	5~30	A (Standard Type)	3 4 5	3	3~5	2 3	2 3	3	NB (Nitrile Rubber)	(No Bracket)	0 (Without TK bracket, specify 0.)
	16			4 5 6	3 4	3~7	2 3 4	2 3 4	4		TK (Foot)	
	20		B (Rod Side Piloted)	5 6 8	3 4 5	4~8	3 4 5	3 4 5	5		KFB	
	25	5~50		5 6 8 10	4 5 6	4~10	4 5 6	4 5 6	6		KFM	1
	32			6 8 10 12 14	5 6 8	5~14	5 6 8	5 6 8	8	VT (Fluorine Rubber)		
	40	5~100	C (Head Side Piloted)	6 8 10 12 14	5 6 8	5~14	5 6 8	5 6 8	8		TKB (Clevis Mount)	2
	50	10~100		8 10 12 14 16 18	6 8 10	8~18	6 8 10	6 8 10	10		TKM	

Cylinder brackets cannot be installed on the pilot side for the types with cylinder end Shapes B and C. Please purchase sensors separately (**See below**).

Ordering Example

Part Number Type	Tube Dia.	-	St Stroke	-	Cylinder Body End Shape	-	Piston Rod Tip Shape	-	Gasket	-	Bracket for Cylinder Type	Qty.	
MSCCN	20	-	35										
MSCCS	20	-	38	-	B	-	BM4	-	VT	-	KFB	1	

Alterations

Part Number Type	Tube Dia.	-	St Stroke	-	Cylinder Body End Shape	-	Piston Rod Tip Shape	-	Gasket	-	Bracket for Cylinder Type	Qty.	-	(TC, TH)
MSCCS	20	-	50	-	B	-	DR5	-	NB	-	TK	0	-	TH

Alterations	Cold Weather Resistance Specification	Heat Resistance Specification
Code	TC	TH
Spec.	Usable in the ambient temperature range from -40°C to 60°C. Changes to low temp. resistant grease and low nitrile rubber gaskets. Low temp. resistant sensors for cylinders are not available.	Usable in the ambient temperature range from 5°C to 120°C. Changes to heat resistant grease, fluororubber gaskets and cylinder sensors are not available.

Applicable to Configurable Stroke Type only.
When specifying TC or TH alterations, select NB (Nitrile Rubber) for gaskets.

<Price Calculation Example> MSCCS20-38-A-AM5-VT-KFB1
Cylinder Body Price + Surcharge for Cylinder Body End Shape + Surcharge for Piston Rod Tip Shape

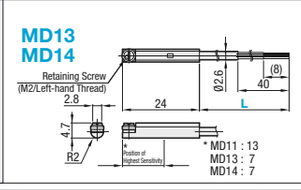
+ Surcharge for Gasket + (Bracket Unit Price x Quantity)

Tube I.D. (mm)	MSCCS Body Price St Stroke (mm) 5~10	11~20	21~30	31~40	41~50	51~75	76~100	Surcharge for Piston Rod Tip Shape (Body Price +) AM	BM	CP	DR	ER	FS
12				-	-	-	-						
16				-	-	-	-						
20						-	-						
25						-	-						
32						-	-						
40													
50													

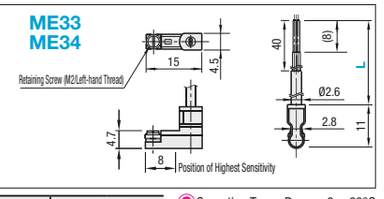
Tube I.D. (mm)	Surcharge for Cylinder Body End Shape (Body Price +) A	B	C	Surcharge for Gasket (Body Price+) NB	VT	Bracket Unit Price (Body Price +) *The bracket unit price is the price per piece. TK	KFB	KFM	TKB	TKM
12										
16										
20										
25										
32										
40										
50										

Sensors for Cylinders

MD13
MD14



ME33
ME34



Part Number Type	L	Load Voltage	Load Current	Indicator Light	Sensor Type	Line	Wire Exit	Unit Price L1 (1m)	L3 (3m)
MD13	L1 (1m) L3 (3m)	24VDC 110VAC	24VDC 5~40mA 110VAC 5~20mA	LED (Lights when ON)	Contact	2-Line	Rear		
MD14		28VDC or Less	0.1~40mA		No Contact	3-Line			
ME33		10~28VDC	5~20mA		No Contact	2-Line			
		28VDC or Less	0.1~40mA		No Contact	3-Line	Top		
ME34		10~28VDC	5~20mA		No Contact	2-Line			

Operating Temp. Range : 0 ~ 60°C
For detailed specifications of the Sensors, see **P.1484**.

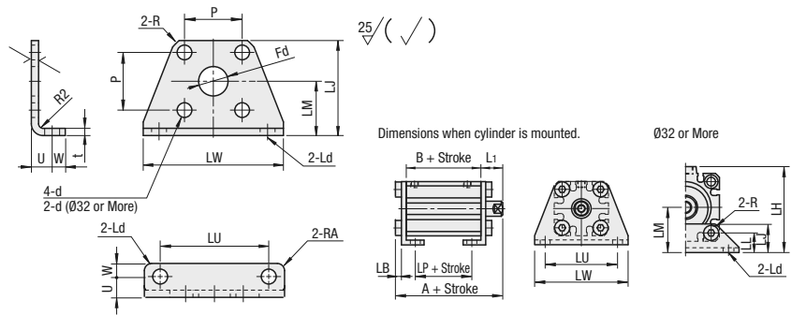
Ordering Example

Part Number
MD14L1

Brackets for Compact Cylinders

Foot Brackets

Type	M Material	S Surface Treatment
CFKPB	EN 1.0330 Equiv.	Black Oxide
CFKPM		Electroless Nickel Plating



RoHS

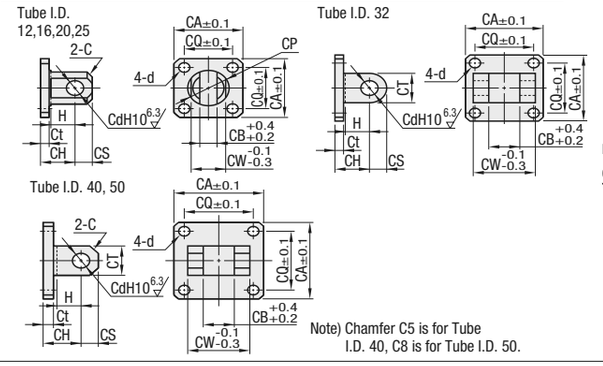
LB refers to dimensions with hex socket low head cap screws.

Part Number Type	Tube I.D. (mm)	*A	B	d	Fd	*L1	Ld	LB	LP	t	LU	LJ	LM	LW	P	R	RA	U	W	LH	LL	Unit Price CFKPB	Unit Price CFKPM
CFKPB CFKPM	12	50.8(30.3)	22	4.5	10	24(3.5)	4.5	2.8	10	2	34	29.5	17	44	15.5	16	2	8	4.5	-	-		
	16	52.3(30.3)	22	4.5	12	25.5(3.5)	4.5	2.8	10	2	38	33.5	19	48	20	19	2	8	5	-	-		
	20	65.2(41.2)	29.5	6.5	14	28.5(4.5)	6.6	4	17.5	3.2	48	42	24	62	25.5	23.5	3.2	9.2	5.8	-	-		
	25	72.2(44.7)	32.5	6.5	16	32.5(5)	6.6	4	17.5	3.2	52	46	26	66	28	26	3.2	10.7	5.8	-	-		
	32	78.7(47.2)	33	6.5	-	38.5(7)	6.6	4	17	3.2	57	19	30	71	34	3.2	3.2	11.2	5.8	57	13		
	40	85.2(53.7)	39.5	6.6	-	38.5(7)	6.6	4	23.5	3.2	64	18.5	33	78	40	3.2	3.2	11.2	7	64	13		
	50	92.2(56.7)	40.5	9	-	43.5(8)	9	5	17.5	3.2	79	21	39	95	50	3.2	3.2	14.7	8	78	14		

* ( ) dimensions are for bracket mounted MSCCN (Standard Stroke Type).

U-Shaped Clevis Mount Brackets

Type	M Material	S Surface Treatment	A Accessory
CTKB	EN 1.1191 Equiv.	Black Oxide	Pin 1 pc. (EN 1.1191 Equiv. Electroless Nickel Plating 40 ~ 45HRC) Pivot Shafts 2 pcs. (Spring Steel)
CTKM		Electroless Nickel Plating	



RoHS

Part Number Type	Tube I.D. (mm)	*A	B	*CL	*L1	Cd	CH	CS	H	Ct	CA	CQ	CB	CW	CT	CP	C	d	Unit Price CTKB	Unit Price CTKM
CTKB CTKM	12	56(45.5)	22	50.0(39.5)	14(3.5)	5	14	6	7	4	25	15.5	5	10	-	12	C2	4.5		
	16	58.5(46.5)	22	52.5(40.5)	15.5(3.5)	5	15	6	10	4	29	20	6.5	12	-	14	C2	4.5		
	20	75(61)	29.5	66.0(52.0)	18.5(4.5)	8	18	9	12	5	36	25.5	8	16	-	20	C3	6.5		
	25	85(67.5)	32.5	75.0(57.5)	22.5(5)	10	20	10	14	5	40	28	10	20	-	24	C3	6.5		
	32	91.5(70)	33	81.5(60.0)	28.5(7)	10	20	10	14	5	45	34	18	36	20	-	-	6.5		
	40	100(78.5)	39.5	90(68.5)	28.5(7)	10	22	10	14	6	52	40	18	36	20	-	C5	6.5		
	50	116(90.5)	40.5	102(76.5)	33.5(8)	14	28	14	20	7	64	50	22	44	28	-	C8	8.5		

* ( ) dimensions are for bracket mounted MSCCN (Standard Stroke Type).

Ordering Example — Part Number: CFKPB32, CTKB20

Accessories of U-Shaped Clevis Brackets

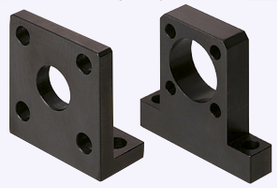
No.	Dd9	d	L2	L3	N	M	Retaining Ring
12	5 -0.030 -0.060	4.8 0 -0.04	10.2	14.6	2.2	0.7 +0.10 0	C Type for Shaft 5
16			12.2	16.6			
20	8 -0.040 -0.076	7.6 0 -0.06	16.2	21	2.4	0.9 +0.10 0	C Type for Shaft 8
25	10 -0.040 -0.076	9.6 0 -0.09	20.2	25.6	2.7	1.15 +0.14 0	C Type for Shaft 10
32			36.2	41.6			
40							
50	14 -0.050 -0.093	13.4 0 -0.11	44.2	50.6	3.2		C Type for Shaft 14

Brackets for Compact Cylinders / Cylinder Trunnion Plates

L-Shaped / T-Shaped — Fixed / Configurable

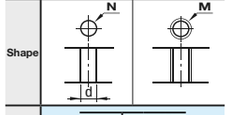
Brackets for Compact Cylinders

RoHS



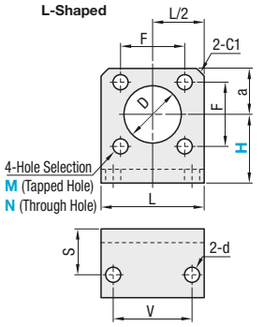
Type L-Shaped	Type T-Shaped	M Material	S Surface Treatment
MSCLB	MSCTB	EN 1.0038 Equiv.	Black Oxide

Hole Selection

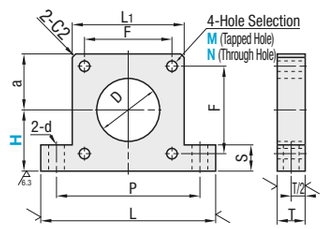
Hole Type	Through Hole	Tapped Hole (Coarse)
Code	N	M
Shape		

Machining Dimension	Nominal Dia. 3	5	6
d	4.5	6.5	9

L-Shaped



T-Shaped



L-Shaped

Part Number Type	Tube I.D. (mm)	H 1mm Increment	Hole Selection Selection	Nominal Dia.	a	B	L	T	F	D	S	V	d	Unit Price
MSCLB	12	25~40	M (Tapped Hole)	3	13	18	27	6	15.5	15.5	12	15	5.5	
	16	26~40			15		31		20	21		20		
	20	33~50	N (Through Hole)	5	18	22	38	8	25.5	14	15	25	6.5	
	25	35~50			20		42		28	16		30		
	32	42~55			23	25	47	10	34	22	18	32	9	
	40	45~60			26		54		40	29		40		
	50	51~65		6	32		66		50	36		50		

T-Shaped

Part Number Type	Tube I.D. (mm)	H 1mm Increment	Hole Selection Selection	Nominal Dia.	a	L	P	F	L1	D	T	S	d	Unit Price
MSCTB	12	20~50	M (Tapped Hole)	3	13	50	38	15.5	26	15.5	10	10	5.5	
	16				15		40	20	30	21				
	20	25~60	N (Through Hole)	5	18	65	50	25.5	36	14	12	15	6.5	
	25				20	75	60	28	40	16				
	32				23			34	46	22				
	40	30~70			26		65	40	52	29				
	50	35~80		6	32	100	82	50	64	36	16		9	

Ordering Example — Part Number: H: Hole Selection

MSCLB16 - H30 - N3
MSCTB40 - H60 - M5

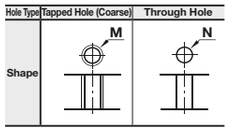
Cylinder Trunnion Plates

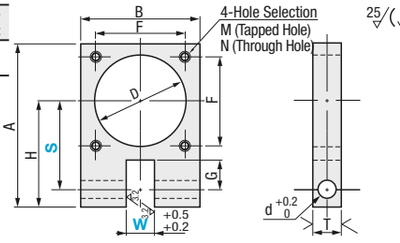
For Compact Cylinders

RoHS

Mounting Hole	Type Fixed	Type Configurable	M Material	S Surface Treatment
Tapped Hole	CYPN	CYPF	EN 1.0038 Equiv.	Black Oxide
Through Hole	CYPT	-		

Hole Selection

Hole Type	Tapped Hole (Coarse)	Through Hole
Shape		

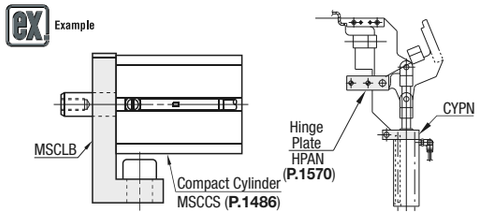


Part Number Type	No.	S Fixed	S Configurable 1mm Increment	W Fixed	W Configurable 1mm Increment	D	A Fixed	A Configurable	H Fixed	H Configurable	B	F	Mounting Hole M (Coarse)	Mounting Hole N (Through Hole)	G	T	d	Applicable Cylinder Tube I.D.	Tapped Hole CYPN Unit Price 1~4 pc(s).	Tapped Hole CYPN Volume Discount Rate 5~10	Tapped Hole CYPF Unit Price 1~4 pc(s).	Tapped Hole CYPF Volume Discount Rate 5~10	Through Hole CYPT Unit Price 1~4 pc(s).	Through Hole CYPT Volume Discount Rate 5~10
(Fixed) CYPN CYPT (Configurable) CYPF	12	19	19~29	10	8~10	16	40	H+15	25	S+6	30	15.5	M3	-	6	9	5	Ø12	-	-			-	-
	16	21	21~31			21	42		27			20						Ø16					-	-
	20	27	27~37	12	10~12	25	52	H+18	34	S+7	38	25.5	M5	6.5	8	12	6	Ø20						
	25	29	29~39			28	57	H+21	36		44	28						Ø25						
	32	35	35~45	16	10~16	32	66	H+23	43	S+8	50	34			12	16	8	Ø32						
	40	40	40~50			42	75	H+26	49	S+9	55	40			14		10	Ø40						
	50	50	50~60	19	12~19	54	95	H+33	62	S+12	65	50	M6	9	17	19	12	Ø50						
	63	60	60~70			62	111	H+39	72		80	60	M8	-	20			Ø63					-	-

Ordering Example — Part Number: S - W

CYPN32 - S55 - W19
CYPF50 - S55 - W19

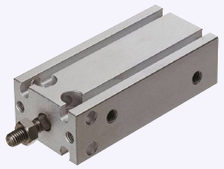
Example



Small Cylinders / Panel Mount Single Acting

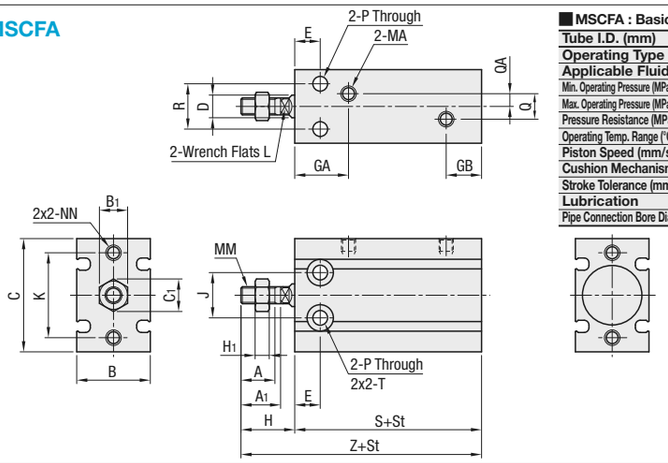
Tip Shape Selectable

■Small Cylinders



RoHS

MSCFA



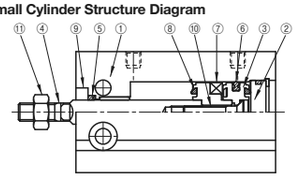
■MSCFA : Basic Specifications

Tube I.D. (mm)	6	10,16	20,25	32
Operating Type	Double Acting			
Applicable Fluid	Air			
Min. Operating Pressure (MPa)	0.12	0.06	0.05	
Max. Operating Pressure (MPa)	0.7			
Pressure Resistance (MPa)	1.0			
Operating Temp. Range (°C)	5~60			
Piston Speed (mm/s)	50~500			
Cushion Mechanism	NBR			
Stroke Tolerance (mm)	0~+2.0			
Lubrication	Lubrication Free			
Pipe Connection Bore Dia.	M5x0.8			Rc1/8

Tube I.D. (mm)	A	A1	B	B1	C	C1	D	E	GA	GB	H	H1	J	K	L	MA	MM	NN	P	Q	QA	R	S	T	Z
6	7	-	13	5.5	22	6.4	3	7	15	10	13	1.8	10	17	-	M5x0.8	M3x0.5	M3x0.5 Depth 5	3.2	-	-	7	33	Ø6 Counterbore Depth 4.8	46
10	10	-	15	7	24	8.1	4	7	16.5	10	16	2.4	11	18	-	M5x0.8	M4x0.7	M3x0.5 Depth 5	3.2	-	-	9	36	Ø6 Counterbore Depth 5	52
16	11	12.5	20	8	32	9.2	6	7	16.5	11.5	16	4	14	25	5	M5x0.8	M5x0.8	M4x0.7 Depth 6	4.5	4	2	12	40	Ø7.6 Counterbore Depth 6.5	56
20	12	14	26	10	40	11.5	8	9	19	12.5	19	5	16	30	6	M5x0.8	M6x1.0	M5x0.8 Depth 8	5.2	9	4.5	16	46	Ø9.3 Counterbore Depth 8	65
25	15.5	18	32	13	50	15	10	10	21.5	13	23	5	20	38	8	M5x0.8	M8x1.25	M5x0.8 Depth 8	5.5	9	4.5	20	50	Ø9.3 Counterbore Depth 9	73
32	19.5	22	40	17	62	19.6	12	11	23	12.5	27	6	24	48	10	Rc1/8	M10x1.25	M6x1.0 Depth 9	6.6	13.5	4.5	24	52	Ø11 Counterbore Depth 11.5	79

Part Number Type	Tube I.D. (mm)	St Stroke (mm) Selection	Body Price St Stroke (mm) 10	20	30	50
MSCFA	6	10 20 30				-
	10					-
	16					-
	20	10 20 30 50				
	25					
	32					

■Small Cylinder Structure Diagram

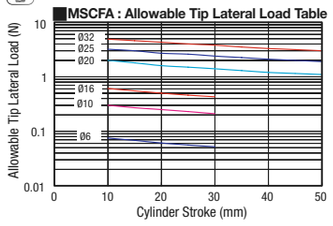


■MSCFA : Part List

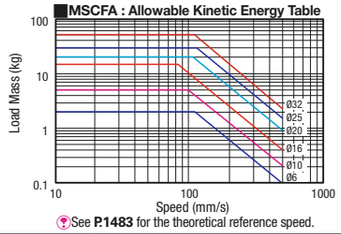
Number	Part Name	Ø6	Ø10	Ø16	Ø20	Ø25	Ø32
①	Main Body	EN AW-6061 Equiv.					
②	End Cover	EN AW-6061 Equiv.	EN AW-5052 Equiv.		EN AW-6061 Equiv.		
③	Piston (*)	A6061x2 pcs.					
④	Piston Rod	EN 1.4305 Equiv.			EN 1.1191 Equiv.		
⑤	Rod Gasket	NBR					
⑥	Piston Gasket	NBR					
⑦	Magnet	Plastic Magnet					
⑧	Cushion	NBR	NBR				
⑨	Rod Cover	EN AW-6061 Equiv.					
⑩	Piston Bolt	EN 1.4305 Equiv.				EN 1.7220 Equiv.	
⑪	Rod Nut	EN 1.0038 Equiv.					

(*) One piece of EN AW-6061 Equiv. and EN CW614N Equiv. each are applied for Ø16 rod piston.

■MSCFA : Allowable Tip Lateral Load Table



■MSCFA : Allowable Kinetic Energy Table



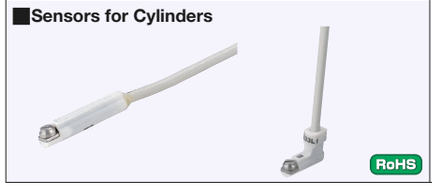
See **P.1483** for the theoretical reference speed.

■MSCFA : Theoretical Output

Unit : (N)

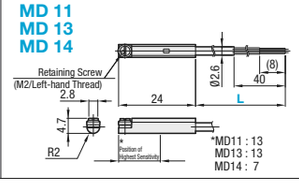
Tube I.D. (mm)	Operating Direction	Operating Pressure (MPa) 0.2	0.3	0.4	0.5	0.6	0.7
6	Push	5.7	8.5	11.3	14.1	17.0	19.8
	Pull	4.2	6.4	8.5	10.6	12.7	14.8
10	Push	15.7	23.6	31.4	39.3	47.1	55.0
	Pull	13.2	19.8	26.4	33.0	39.6	46.2
16	Push	40	60	80	101	121	141
	Pull	35	52	69	86	104	121
20	Push	63	94	126	157	188	220
	Pull	53	79	106	132	158	185
25	Push	98	147	196	245	295	344
	Pull	82	124	165	206	247	289
32	Push	161	241	322	402	483	563
	Pull	138	207	276	346	415	484

■Sensors for Cylinders

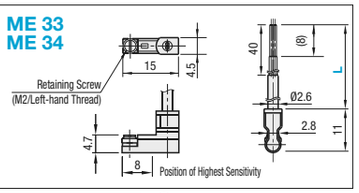


RoHS

MD 11 MD 13 MD 14



ME 33 ME 34



Part Number Type	L	Load Voltage	Load Current	Indicator Light	Sensor Type	Line	Wire Exit	Unit Price L1 (1m)	L3 (3m)
MD13	L1 (1m) L3 (3m)	24VDC 110VAC	24VDC 5~40mA 110VAC 5~20mA	LED (Lights when ON)	Contact	2-Line	Rear		
MD14		28VDC or Less	0.1~40mA		No Contact	3-Line			
ME33		10~28VDC	5~20mA		No Contact	2-Line			
ME34		28VDC or Less	0.1~40mA		No Contact	3-Line	Top		
		10~28VDC	5~20mA		No Contact	2-Line			

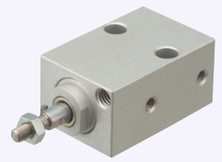
Operating Temp. Range: 0 ~ 60°C

For detailed specifications of the Sensors, see **P.1484**.

Ordering Example

- Small Cylinders: Part Number **MSCFA6** - St Stroke **10**
- Sensors for Cylinders: Part Number **MD14L1**

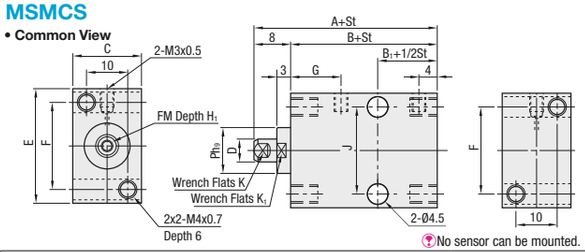
■Small Cylinders Tip Shape Selectable



RoHS

MSMCS

• Common View



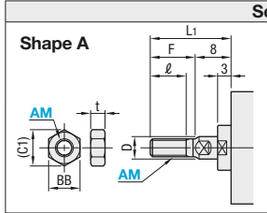
■Small Cylinder : Basic Specifications

Tube I.D. (mm)	6~10
Operating Type	Double Acting
Applicable Fluid	Air
Min. Operating Pressure (MPa)	0.2
Max. Operating Pressure (MPa)	0.7
Pressure Resistance (MPa)	1.0
Operating Temp. Range (°C)	5~60
Piston Speed (mm/s)	50~500
Cushion Mechanism	No
Stroke Tolerance (mm)	0~+0.5
Lubrication	Lubrication Free
Pipe Connection Bore Dia.	M3×0.5

The shared diagram of Rod Tip Shape in the right-hand box is for the Standard Stroke Type (MSMCN) available on our website. Please visit our website at : http://fa.misumi.jp/hp-item.jsp

Select Tip Shape for Selectable Type.

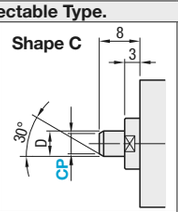
Shape A



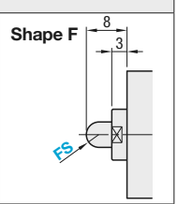
Accessory : Nut 1 pc. (EN 1.4301 Equiv.)

AM	BB	(C1)	t
3	5.5	6.4	1.8
4	7	8.1	2.4
5	8	9.2	3.2

Shape C



Shape F



Tube I.D. (mm)	A	B	B1	E	C	D	F	FM	G	H1	J	K	K1	Ph9
6	28	20	6.5	20	15	4	15	M2.5x0.45	11	5	14	3.5	9	10
8	30	22	8	25		5	19	M3x0.5	10		19	4	9.5	
10						6				6		5	11	12

Part Number Type	Tube I.D. (mm)	St Stroke (mm) Selection	Piston Rod Tip Shape: Shape A AM (Thread Dia.) Selection	Shape C CP (mm)	Shape F FS (mm)	Body Price St Stroke (mm) 5	10	15	20	25	30	Surcharge for Piston Rod Tip Shape (Body Price +) AM	CP	FS
MSMCS	6	5 10 15 20	3	3	2					-	-			
	8	5 10 15 20 25 30	3 4	4	2.5									
	10		4 5	5	3									

Features: Tip shape of cylinder rod is selectable.

Ordering Example: Part Number **MSMCS8** - St Stroke **10** - Piston Rod Tip Shape **AM4**

■Dimensions for Shape A Selection

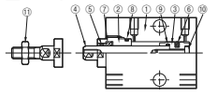
Tube I.D. (mm)	ℓ	L1	F
6	6	16	8
8	8	18	10
10	10	21	13

■Small Cylinder : Theoretical Output

Unit : (N)

Tube I.D. (mm)	Operating Direction	Operating Pressure (MPa) 0.2	0.3	0.4	0.5	0.6	0.7
6	Push	5.7	8.5	11.3	14.1	17.0	19.8
	Pull	3.1	4.7	6.3	7.9	9.4	11.0
8	Push	10.1	15.1	20.1	25.1	30.2	35.2
	Pull	6.1	9.2	12.3	15.3	18.4	21.4
10	Push	15.7	23.6	31.4	39.3	47.1	55.0
	Pull	10.1	15.1	20.1	25.1	30.2	35.2

■Small Cylinders Tip Shape Selectable Structural Diagram

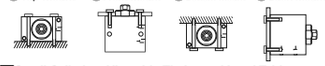


■Small Cylinder : Part List

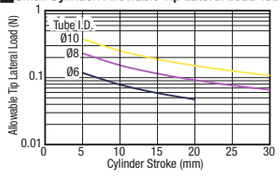
Number	Part Name		M Material	S Surface Treatment and Others
①	Main Body		Aluminum	Clear Anodize
②	Rod Cover		Aluminum	Clear Anodize
③	Piston	Ø6	Stainless Steel	
		Ø8,10	Aluminum	Clear Anodize
④	Piston Rod		Stainless Steel	Hard Chrome Plating
⑤	Bearing		PTFE Type	
⑥	Piston Gasket		NBR	
⑦	Rod Gasket		NBR	
⑧	Body Gasket		NBR	
⑨	Piston Gasket		NBR	Ø8 and Ø10 only
⑩	Mounting Screw		Stainless Steel	Ø8 and Ø10 only
⑪	Nut		Stainless Steel	For Threaded Type only

Example: It can be installed in four directions.

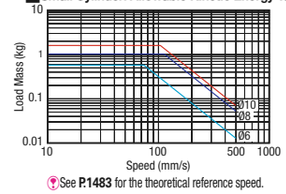
①Top Mount ②Front Mount ③Bottom Mount ④Back Mount



■Small Cylinder: Allowable Tip Lateral Load Table



■Small Cylinder: Allowable Kinetic Energy Table

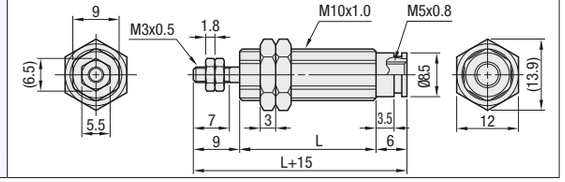


See **P.1483** for the theoretical reference speed.

■Panel Mount Single Acting

RoHS

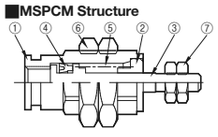
MSPCM (Panel Mount Single Acting)



Part Number Type	Tube I.D. (mm)	St Stroke (mm) Selection	L	Unit Price
MSPCM	6	5	12.5	
		10	19.5	
		15	26.5	

Ordering Example: Part Number **MSPCM6** - St Stroke **5**

■MSPCM Structure



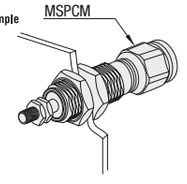
■MSPCM : Parts List

Number	Part Name	M Material	S Surface Treatment
①	Main Body	EN CW614N Equiv.	Electroless Nickel Plating
②	Cover	JIS-C5441B	
③	Piston Rod	EN 1.4305 Equiv.	
④	Piston Gasket	NBR	

■MSPCM Basic Specifications

Tube I.D. (mm)	6
Operating Type	Single Acting Outstroke Type
Applicable Fluid	Air
Min. Operating Pressure Â(MPa)	0.2
Max. Operating Pressure (MPa)	0.7
Pressure Resistance (MPa)	1.0
Operating Temp. Range (°C)	5~60
Piston Speed (mm/s)	50~500
Cushion Mechanism	No
Stroke Tolerance (mm)	0~+1.0
Lubrication	Lubrication Free
Pipe Connection Bore Dia.	M5x0.8

Example



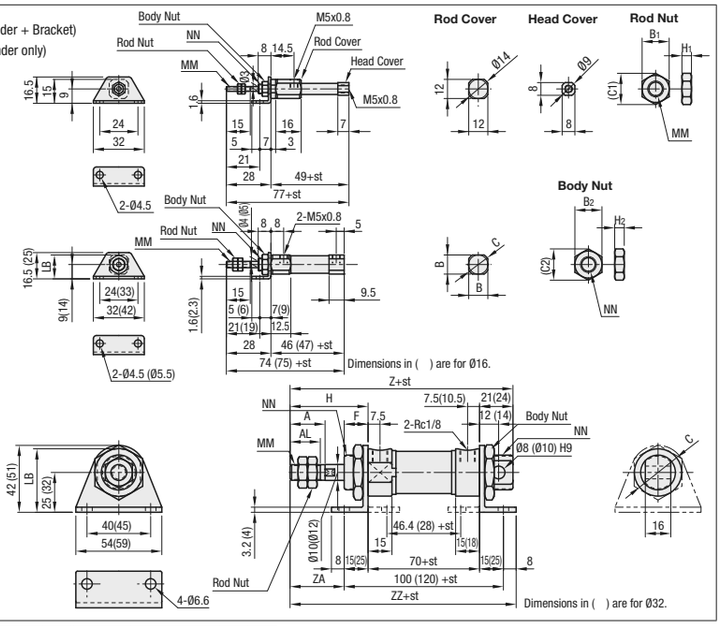
Air Cylinders
Pen-Style Type (Double Acting)

Coupling Rods for Air Cylinders / Thread Conversion Adapters
L Selectable / L Configurable / L and F Configurable

■Pen-Style Type

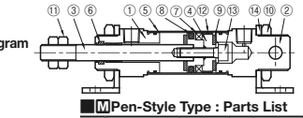
RoHS

MSPCB (Cylinder + Bracket)
MSPCN (Cylinder only)



Tube I.D. (mm)	A	AL	B	B1	B2	C	C1	C2	F	H	H1	H2	LB	MM	NN	Z	ZA	ZZ
6	-	-	-	5.5	8	-	6.4	9.2	-	-	2.4	4	-	M3x0.5	M6x1.0	-	-	-
10	-	-	12	7	11	14	8.1	12.7	-	-	3.2	4	15	M4x0.7	M8x1.0	-	-	-
16	-	-	18	8	14	20	9.2	16.2	-	-	4	4	23	M5x0.8	M10x1.0	-	-	-
20	20	18	-	13	30	28	15	34.6	12	38	5	6	38.4	M8x1.25	M22x1.5	129	23	131
25	22	20	-	17	30	33.5	19.6	34.6	15	49	6	6	39.9	M10x1.25	M22x1.5	140	34	142
32	22	20	-	17	32	37.5	19.6	37	18	52	6	8	50	M10x1.25	M24x2.0	146	27	155

■Air Cylinder - Pen-Style - Structure Diagram



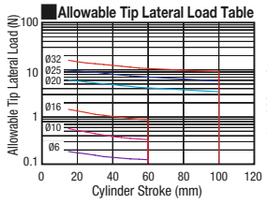
■Ⓜ Pen-Style Type : Parts List

Number	Part Name	Ø6	Ø10	Ø16	Ø20	Ø25	Ø32
①	Rod Cover	EN AW-6061 Equiv.					
②	Head Cover	EN AW-6061 Equiv.					
③	Piston Rod	EN 1.4305 Equiv.	EN 1.1191 Equiv.				
④	Piston	EN AW-6061 Equiv. (Note)					
⑤	Tube	EN 1.4301 Equiv.					
⑥	Rod Gasket	NBR					
⑦	Magnet	Plastic Magnet					
⑧	Piston Gasket	NBR					
⑨	Cushion	NBR					
⑩	Body Nut	EN CW614N Equiv.	EN 1.0038 Equiv.				
⑪	Rod Nut	EN CW614N Equiv.	EN 1.0038 Equiv.				
⑫	Wear Contact	Teflon					
⑬	Piston Bolt	EN 1.7220 Equiv.					
⑭	Foot	EN 1.0038 Equiv.					

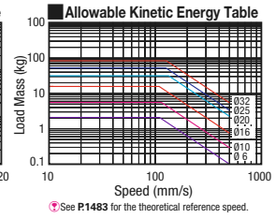
(Note) JIS-EN CW614N Equiv. is for Ø10 and Ø16, POM is for Ø25.

Part Number		St Stroke (mm)	MSPCB Unit Price Stroke (mm)							MSPCN Unit Price Stroke (mm)						
Type	Tube I.D. (mm)		15	25	30	45	50	60	100	15	25	30	45	50	60	100
(Cylinder + Bracket) MSPCB	6	15 30 45 60		-			-		-		-			-		-
	10	15 30 45 60		-			-		-		-			-		-
	16	15 30 45 60		-			-		-		-			-		-
(Cylinder only) MSPCN	20	15 25 50 100			-	-		-				-	-		-	
	25	15 25 50 100			-	-		-				-	-		-	
	32	15 25 50 100			-	-		-				-	-		-	

■Allowable Tip Lateral Load Table



■Allowable Kinetic Energy Table



See P1483 for the theoretical reference speed.

■Theoretical Output

Unit (N)

Tube I.D. (mm)	Operating Direction	Operating Pressure (MPa) 0.2	0.3	0.4	0.5	0.6	0.7
6	Push	5.7	8.5	11.3	14.1	17	19.8
	Pull	4.2	6.4	8.5	10.6	12.7	14.8
10	Push	15.7	23.6	31.4	39.3	47.1	55
	Pull	13.2	19.8	26.4	33	39.6	46.2
16	Push	40	60	80	101	121	141
	Pull	36	54	73	91	109	127
20	Push	63	94	126	157	189	220
	Pull	47	71	94	118	141	165
25	Push	98	147	196	245	295	344
	Pull	83	124	165	206	247	289
32	Push	161	241	322	402	483	563
	Pull	138	207	277	346	415	484

■Pen-Style : Basic Specification

Tube I.D. (mm)	6	10, 16	20~32
Operating Type	Double Acting		
Applicable Fluid	Air		
Min. Operating Pressure (MPa)	0.12	0.06	
Max. Operating Pressure (MPa)	0.7		
Pressure Resistance (MPa)	1.0		
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	

See P1483 for the theoretical reference speed.

■Specifications : Special Sensor for Pen-Style Type

Type	MSRCS		MSRNS	
No.	6~16	20~32	6~16	20~32
Contact Type	Contact		No Contact	
Contact Structures	Normally Open			
Operating Supply Voltage Range	5~240VAC,DC	5~220VAC	5~28VDC	5~30VDC
Load Current Range	100mA or Less	40mA or Less	200mA or Less	40mA or Less
Impact Resistance	30G		50G	
Internal Voltage Drop	2.5V or Less	2.0V or Less	0.5V or Less	1.5V or Less
Response Time	1ms or Less			
Operating Temperature	5 ~ 60°C			
Lead Wire	2 Conductors Ø2.9	3 Conductors Ø3.3	2 Conductors Ø2.9	3 Conductors Ø3.3
Lead Wire Length	2m			
Protection Structure	IP67	IP66	IP67	IP66
Indicator Light	Lights when ON			
Indicator Light Color	Green	Green	Red	Green

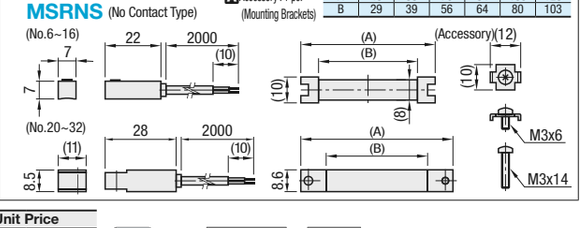
■Pen-Style Sensors for Cylinders

RoHS

MSRNS (Contact Type) (No Contact Type)

Ⓐ Accessory : 1 pc. (Mounting Brackets)

No.	Ø6	Ø10	Ø16	Ø20	Ø25	Ø32
A	43	53	70	84	100	123
B	29	39	56	64	80	103



Part Number Type	No.	Applicable Cylinder	Unit Price MSRNS
MSRNS	6	MSPC□6-□	
	10	MSPC□10-□	
	16	MSPC□16-□	
	20	MSPC□20-□	
	25	MSPC□25-□	
	32	MSPC□32-□	

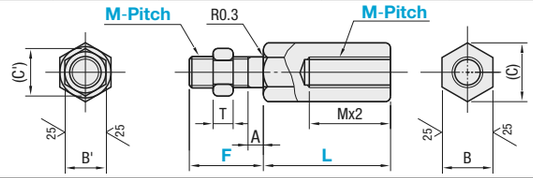
Ordering Example: Part Number MSPCB6 - Stroke 30

■Extension Rod for Air Cylinders

RoHS

Type L Selectable	Type L Configurable	Type L and F Configurable	Ⓜ Material	Ⓢ Surface Treatment	Ⓐ Accessory Ⓜ Material	Ⓐ Accessory Ⓢ Surface Treatment
FJEBC	FJEB	FJEBF	EN 1.1191 Equiv.	Black Oxide	EN 1.0038 Equiv.	Trivalent Bright Chromate
FJERC	FJER	FJERF		Electroless Nickel Plating		
FJESC	FJES	-	EN 1.4301 Equiv.	-	EN 1.4301 Equiv.	-

6.3 (25)



Part Number Type	M-Pitch	L Selectable	L Configurable (1mm Increment)	F Standard	F Configurable (1mm Increment)	A	B	(C)	Included Nut B'	Included Nut (C')	Included Nut T	Included Nut Qty.	Unit Price FJEBC	FJERC	FJESC	FJEB	FJER	FJES	FJEBF	FJERF
L Selectable FJEBC FJERC FJESC	3-0.5	20 25 30 35 40 50 75 100	20~100	17.5	10~15	2.5	6	6.9	5.5	6.4	2.4	2 pcs.								
	4-0.7				12~20		8	9.2	7	8.1	3.2									
	5-0.8				14~20				8	9.2	4									
	6-1.0		24~100		14~30		10	11.5	10	11.5	5	1 pc.								
L Configurable FJEB FJER FJES	8-1.0	*30 35 40 50 75 100 150 200	32~200	18	14~40		14(13)	16.2(15)	13	15										
	8-1.25																			
	10-1.25*		40~200	22	14~50		17	19.6	17	19.6	6									
	10-1.5*																			
L and F Configurable FJEBF FJERF	12-1.25	*40 50 75 100 150 200	48~200	24	16~60	3	21(19)	24.2(21.9)	19	21.9	7									
	12-1.5																			
	14-1.5*		56~200		17~70		23(22)	26.6(25.4)	22	25.4	8									
	18-1.5*		72~200	30	25~80		26(27)	30(31.2)	27	31.2	15									
	20-1.5	75 100 150 200	80~200	35	30~80	5	30	34.6	30	34.6	16									
	22-1.5			40			32	37	32	37	18									

The dimension in the brackets ( ) is for FJEBC, FJEB, FJESC, FJES.

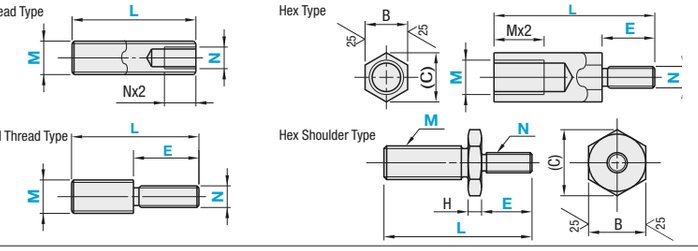
* For M Pitch 10-1.25(M10-1.5)L=30, M Pitch 14-1.5 L=40 and M Pitch 18-1.5 L=40, the effective thread length of Tap is Mx1.5.

■Thread Conversion Adapters

RoHS

Type Full Thread	Stepped Thread	Hex	Hex Shoulder	Ⓜ Material	Ⓢ Surface Treatment
SAA	SAB	SAC	SAD	EN 1.1191 Equiv.	Black Oxide
SAAM	SABM	SACM	SADM		Electroless Nickel Plating
SAAS	SABS	SACS	SADS	EN 1.4301 Equiv.	-

6.3 (25)



Part Number Type	M Coarse	M Fine Thread	M Fine (Nominal)	L 1mm Increment	M (Coarse)	NS (Fine)	E 1mm Increment	H	B	(C)
SAA	5	-	-	20~100	3 4*	-	5~16	3	8	9.2
SAB	6	-	-	20~100	3 4 5*	-	6~20		10	11.5
SAC	8	8S	M8x1.0	30~150	4 5 6*	-	8~24		13	15
SAD	10	10S	M10x1.25	30~150	5 6* 8*	8*	10~32	4	17	19.6
SAAM	12	12S	M12x1.25	40~200	6 8 10*	8 10*	12~40	5	19	21.9
SABM	14	14S	M14x1.5	40~200	6 8 10* 12*	8 10* 12*	14~48	6	22	25.4
SACM	16	16S	M16x1.5	40~200	8 10 12* 14*	8 10 12* 14*	16~56	7	24	27.7
SADM	18	18S	M18x1.5	50~200	10 12 14* 16*	10 12 14* 16*	18~64	8	27	31.2
SAAS	20	20S	M20x1.5	50~200	10 12 14 16* 18*	10 12 14 16* 18*	20~72	10	30	34.6
SABS										
SACS										
SADS										

⊗* marked dimensions are not available for SAA, SAAM and SAAS. (NS (Fine Thread) pitch is same as M Fine Thread (Nominal Thread Dia.).

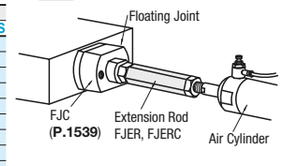
SAA, SAAM, SAAS are L≥Nx4 SAB, SABM, SABS are L≥Mx2+E SAC, SACM, SACS are L≥Mx4+E SAD, SADM, SADS are M+H+E≤L≤Mx4+H+N(NS)x4

Part Number - L - N - E - F (MWC, NWC)
FJERC10-1.5 - 30
FJEBF14-1.5 - 100 - 50
SAB16 (Coarse) - 50 - NS10 (Fine) - E20

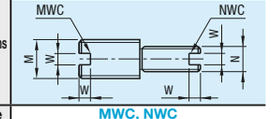
Alterations: Part Number - L - N - E - (MWC, NWC)
SABS14 - 100 - N6 - E18 - NWC

M Coarse	M Fine Thread	SAA	SAB	SAC	SAD	SAAM	SABM	SACM	SADM	SAAS	SABS	SACS	SADS
5	-												
6	-												
8	8S												
10	10S												
12	12S												
14	14S												
16	16S												
18	18S												
20	20S												

Example



Alterations: Slitting



Code: MWC, NWC

Spec.

Ordering Code MWC, NWC

For W dimensions, refer to the table on the right.

Ⓐ Applicable to SAA, SAAM, SAAS, SAB, SABM and SABS.

M, N	W
3	0.6
4, 5	1
6, 8	1.5
10	2
12, 14, 16	2.5
18, 20	3

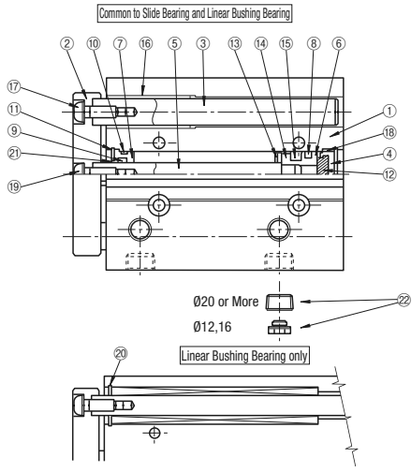
Cylinders with Guides - Overview

Cylinders with Guides - Overview

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

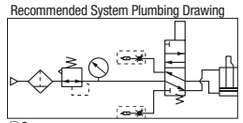
① Protect the sliding sections of the piston rods and piston guide rods from being scratched and dented.

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



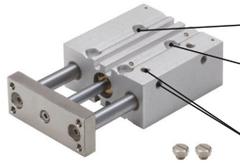
⑤ Space
Provide sufficient space around the equipment to ensure easy handling.

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

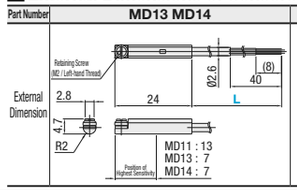
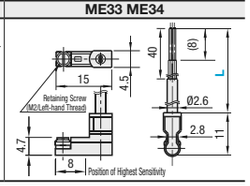
Tube I.D. (mm)		12	16	20	25	32	50
Operating Type		Double Acting					
Applicable Fluid		Air					
Min. Operating Pressure (MPa)		0.1					
Max. Operating Pressure (MPa)		1.0					
Pressure Resistance (MPa)		1.5					
Operating Temp. Range (°C)		5~60					
Piston Speed (mm/s)		50~500					
Cushion Mechanism		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).

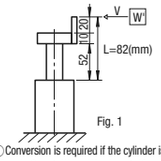
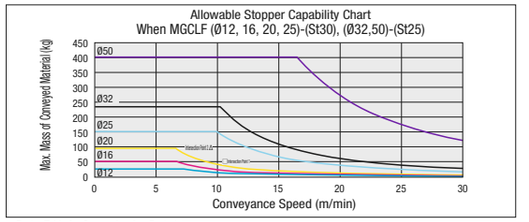


Fig. 1

<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.

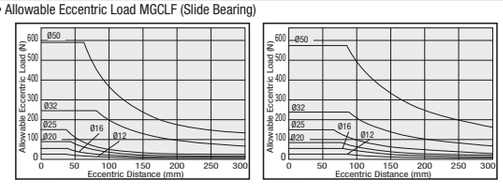
***Cylinders with Twin Guides (MGCLB and MGCLBN) cannot be used as stoppers.**



- Factor Table for Conversion (k : Factor)

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

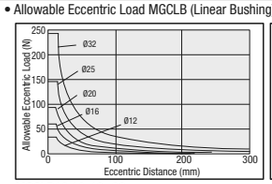
- Allowable Eccentric Load MGCLF (Slide Bearing)



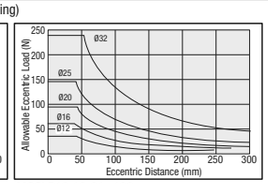
MGCLF12,16-10~50
MGCLF20,25-20~50
MGCLF32,50-25~50

MGCLF12~50-51~100

- Allowable Eccentric Load MGCLB (Linear Bushing)



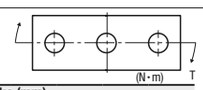
MGCLB12,16-10~30
MGCLB20,25-20~30
MGCLB32-25~50



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

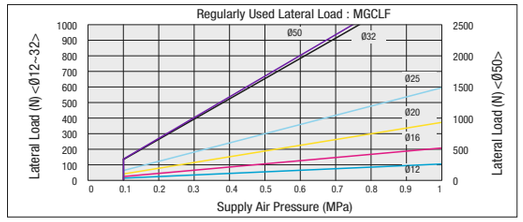
- As a Stopper (Verification of Allowable Lateral Load)

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.

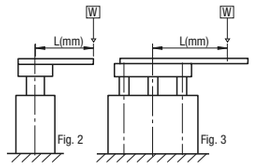
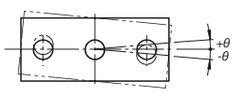


Fig. 2 Fig. 3

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.

Non-rotational Accuracy

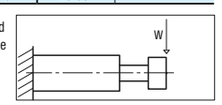
A deviation angle centered on the piston rod, expressing the backlash caused by the clearance between the guide rod and the bearing.



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