Mechanically Jointed Rodless Cylinder with Brake, Hy-rodless Cylinder

Series ML1C

ø25, ø32, ø40

Brake mechanism has been compactly integrated into the slide table which enables intermediate stops of the rodless cylinder.

Large holding brake force

Force from 4 brake springs hold slide tightly.

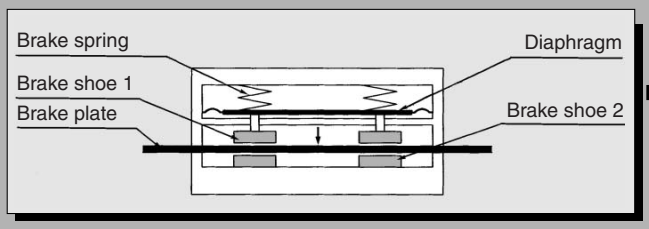
• Holding force ø25 — 320 N
ø32 — 500 N
ø40 — 800 N

Stroke adjustment unit combines a shock absorber and stopper bolt. Stroke adjusting unit

Shock absorber can absorb small to large impacts without adjustments due to self compensation.

Brake construction is designed not to allow loads on guide.

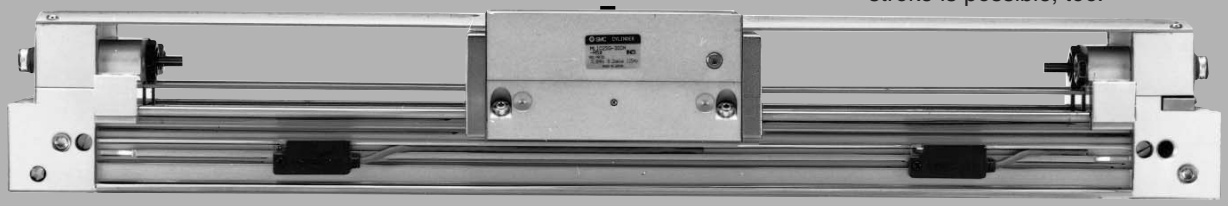
Spring force works directly on the brake-shoe and the brake plate is caught between brake shoes from top and bottom so that the slide table can stop without compromising guide performance. The brake show yields long service life due to special friction resistant material.



Stop is possible at the arbitrary position.

Locking in both directions is possible.

Locking in either side of cylinder stroke is possible, too.



Numerous applicable auto switches

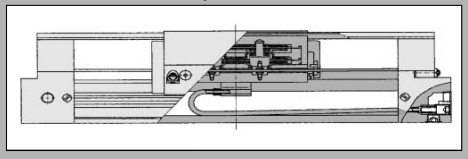
Reed switch—D-E7□A, D-E80A
Solid state switch—D-M5
2-color indication—D-M5□W
Timer equipped solid switch—D-M5□TL

Cam follower guide type

Cam follower is adopted for the guide section.
Trafficability is excellent in moment resistance.

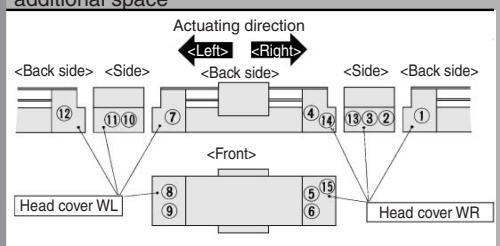
External air piping for brake release not required.

Brake releasing air flows from head cover to slide table through air tube in cylinder body. There is no restriction on piping requirements because piping to the outside of the slide table is not necessary.



"High degree of freedom"

Air connections can be done at one end for additional space



	Piping port	Side table direction	Piping port no.
A	Actuating port	Left	③④⑤⑦⑧⑩
B	Actuating port	Right	①②⑥⑨⑪⑫
C	Brake release port	—	⑬⑭⑮

There are 6 actuating ports and 3 brake release ports at head cover WR, and 6 actuating ports on the head cover WL.
The most suitable piping position can be selected by choosing each 1 port from A, B, C and combining them.

Before Operation

Maximum Allowable Moment/Maximum Load Weight

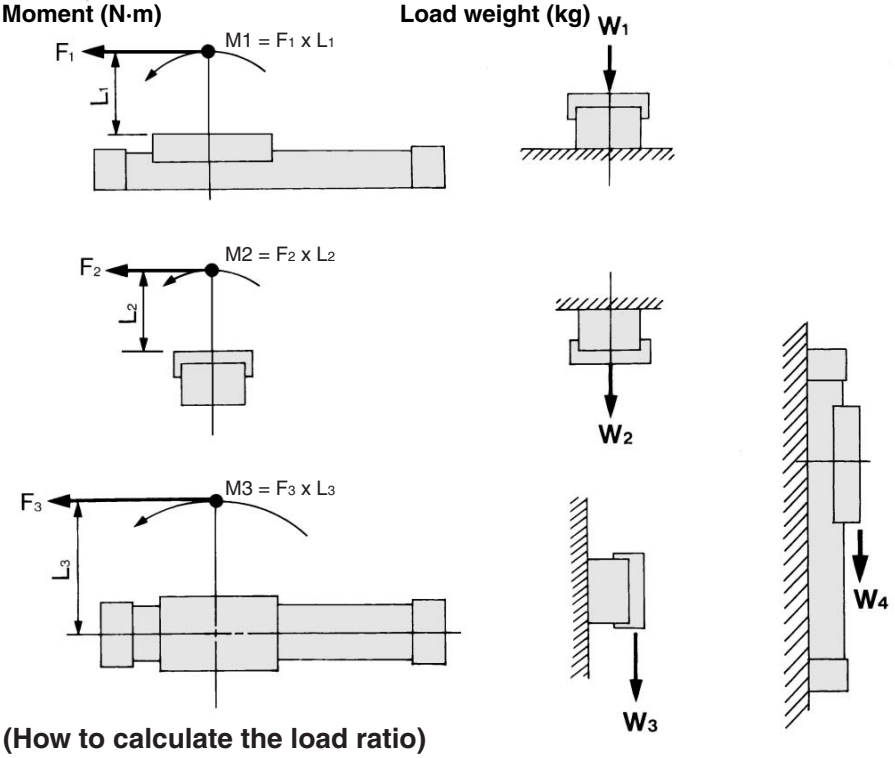
Model	Allowable moment (N·m)			Maximum load weight (kg)			
	M1	M2	M3	W1	W2	W3	W4
ML1C25	14.7	4.90	4.90	20	12	3	10
ML1C32	29.4	9.80	9.80	32	19	5	16
ML1C40	58.8	19.6	19.6	50	30	8	25

Caution on Design

Allowable moment and load Weight Maximum

Allowable moment and Maximum load weight varies depending on mounting orientation, piston speed, etc. Therefore use the cylinder within the range shown in the graph corresponding to operating conditions.

Moment (N·m) **Load weight (kg)**



(How to calculate the load ratio)

A. Consider (1) max. load weight, (2) static moment, (3) dynamic moment (when stopper collides) when calculating the max. allowable moment and load weight.

∗ Evaluate (1) and (2) as υa (average speed), and (3) as υ (collision speed υ = 1.4 υa). Calculate (1) (Wmax) from the graph of max. payload (W1, W2, W3) and calculate (2) and (3) (Mmax) from the maximum allowable moment graph (M1, M2, M3).

$$\text{Sum of the load factors } \Sigma\alpha = \frac{\text{Load weight [m]}}{\text{Maximum load weight [m·max]}} + \frac{\text{Static moment [M]}^{\text{Note 1)}}}{\text{Static allowable moment [Mmax]}} + \frac{\text{Dynamic moment [ME]}^{\text{Note 2)}}}{\text{Dynamic allowable moment [MEmax]}} \leq 1$$

Note 1) Moment generated by load, etc. when the cylinder stops.
Note 2) Moment generated by load equivalent to impact at stroke end (when stopper collides).
Note 3) Depending on the shape of the workpiece, multiple moments may occur. When this happens, the sum of the load factors ($\Sigma\alpha$) is the total of all such moments.

B. Reference formula [Dynamic moment at impact]

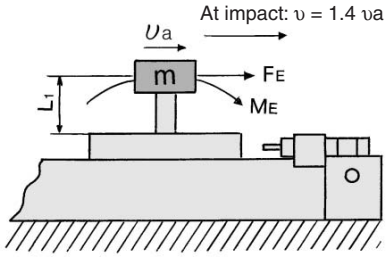
Refer to following calculation for dynamic moment considering the impact when stopper collides.

W : Weight (kg)
F : Load (N)
F_E : Load equivalent to impact (N)
υ_a : Average speed (mm/s)
M : Static moment (N·m)
υ : Collision speed (mm/s)
L_1 : Distance to the center of load gravity (m)
M_E : Dynamic moment (N·m)
g : Gravitational acceleration (9.8 m/s²)

$$\upsilon = 1.4\,\upsilon a \text{ (mm/s)} \quad F_E = \frac{1.4}{100}\,\upsilon a \cdot g \cdot W$$

$$\therefore M_E = \frac{1^{\text{Note 4)}}}{3} \cdot F_E \cdot L_1 = 0.05\,\upsilon a g W L_1 \text{ (N·m)}$$

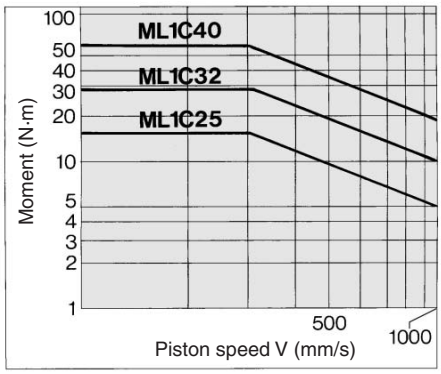
Note 4) Average load coefficient (This coefficient is meant to average the maximum load moment at the time of impact with stopper in the light of calculating the service life.)



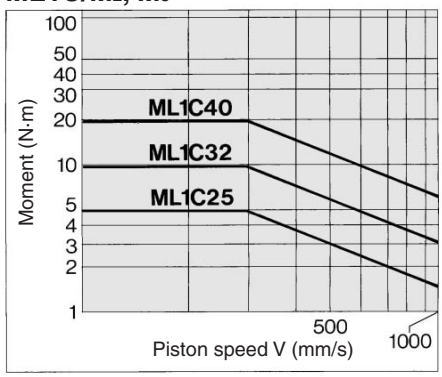
Maximum Allowable Moment

Select the moment within the limits shown in the graphs below. Note that the maximum payload value in some cases may exceed maximum allowable payload despite being within the limit shown in the graph; therefore, payload on the operating conditions should be checked.

ML1C/M1



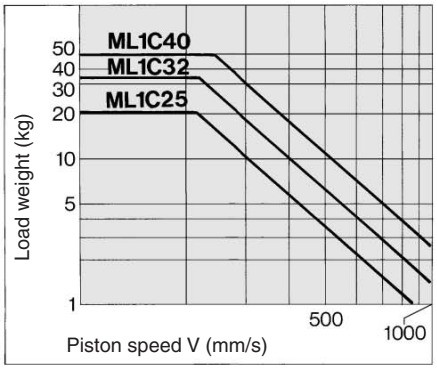
ML1C/M2, M3



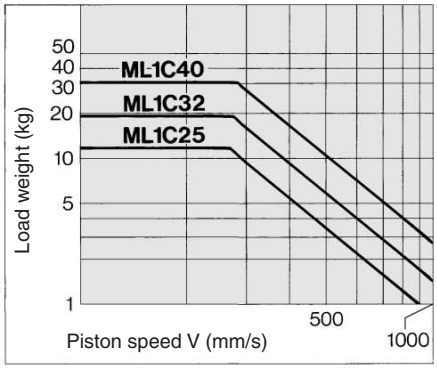
Maximum Load Weight

Select the maximum load weight to be applied within the limits shown in the graph. Note that the maximum allowable moment may in some cases exceed Maximum allowable moment despite being within the limit shown in the graph: therefore, allowable moment on operating conditions should be checked.

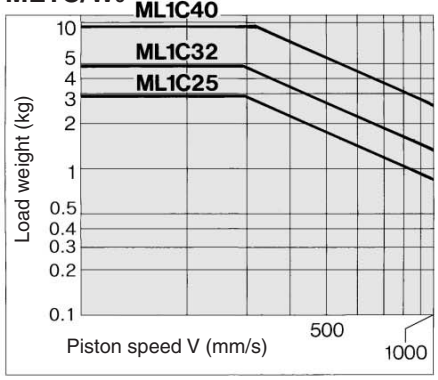
ML1C/W1



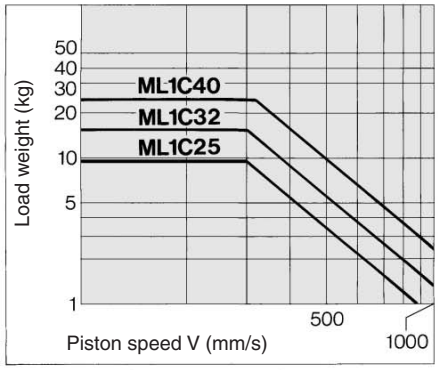
ML1C/W2



ML1C/W3



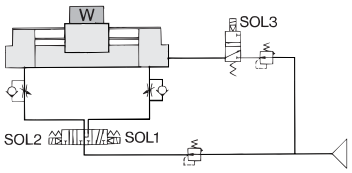
ML1C/W4



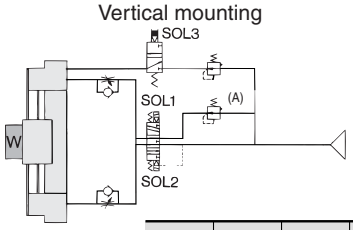
Caution on Pneumatic Circuit Design

Operating pneumatic circuit

Horizontal, Lateral mounting



Vertical mounting



∗ Be sure to use the circuit above. Please consult with SMC in case of using other circuits.

SOL1	SOL2	SOL3	Actuation
OFF	OFF	OFF	Stop
ON	OFF	ON	To left
OFF	ON	ON	To right

Solenoid Valve for Driving and Braking

<Solenoid valve for driving>
Horizontal, lateral mounting orientation
Use pressure center style valve.
Control the operation with a meter-out system.
Vertical
Use exhaust center style valve (external pilot style or direct operated style).

<Solenoid valve for braking>

- Use the solenoid valve for braking which has the effective area equivalent to the one of solenoid valve for driving. If the effective area is smaller, it may encounter an unexpected sudden slide table movement.
- Install a solenoid valve for braking as close to the cylinder as possible. If there is a long distance between the cylinder and valve, it may cause fluctuations in the stop accuracy or unexpected sudden slide table movements.

<Recommended solenoid valve example>

	Horizontal, lateral mounting	Vertical
Solenoid valve for driving	VFS2500	VFS2400R
Solenoid valve for braking	VP300 or VFS2100	

∗ Determine the size of the solenoid valve according to the operating cylinder speed.

Air Balance

On both above mentioned circuit, the air balance is made by pressurizing to both sides of cylinder on the condition of the intermediate stop.
In the case of the vertical orientation, reduce the pressure of the upside by regulator (A) to keep the balance is not made, it may cause unexpected sudden slide table movements after the intermediate stop operation, once the reverse operation occurs, resulting in compromised accuracy of the cylinder.

Supply Pressure

- Set the supply pressure at 0.25 to 0.5 MPa. If setting at less than 0.25 MPa, malfunction of the release brake may occur.
- If line pressure is used directly as supply pressure, any fluctuation in pressure will appear in the form of changes in cylinder characteristics. Therefore, make sure to use a pressure regulator to convert line pressure into supply pressure for the actuating valve and the brake valve. In order to actuate multiple cylinders at once, use a pressure regulator that can handle a large air flow volume and also consider installing a surge tank.

⚠Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 9-19-3 to 9-19-6.

Adjustment

⚠Caution

1. Even though Hy-rodless cylinder can be loaded within the max. allowable payload, precise alignment is required if connected to a payload which has external support structure. The longer the stroke is, the larger the declination of axis center is. Thus, take the connecting method (floating mechanism) into consideration, so that misalignment could be absorbed prior to operation.
2. Due to factory pre-adjusted guide and brake plate, re-adjustment is not required under normal operating conditions. Accordingly, do not change the setting on adjustment section.
3. Do not operate the cylinder in an environment in which the cylinder will be exposed to cutting chips, dust (paper debris, lint, etc.), spatter or cutting fluid (gas oil, water, warm water, etc.), which could lead to operational problems.
4. It is recommended that grease be applied periodically to the sliding portion of the bearing and to the dust seal band to increase their service life.
5. Take precautions under operating conditions in which negative pressure is increased inside the cylinder by external forces or inertial forces. Air leakage may occur due to separation of the seal belt.

Caution on Mounting

⚠Caution

1. Take care not to mark or damage the outside surface of the cylinder tube. This may result in damaged bearings or scraper, which will cause cylinder malfunction.
2. Take care not to apply any loads to the dust proof cover. It can cause a cylinder malfunction.
3. Because the slider is supported by precision bearings, take care not to apply strong impacts or excessive moments to the table when loading a workpiece.

Mechanically Jointed Rodless Cylinder with Brake, Hy-rodless Cylinder

Series ML1C

ø25, ø32, ø40

How to Order

Hy-rodless cylinder (With brake)

ML1C | **25** | **G** — | **300** | | | — **M5BW** | |

Bore size (mm)

25	25 mm
32	32 mm
40	40 mm

Standard stroke

Bore size (mm)	Standard stroke (mm)*	Maximum manufacturable stroke (mm)
25	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000	2000
32	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000	2000
40	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000	2000

* When stroke is required, which is longer than the standard stroke, refer to the "Made to Order Specifications" for long stroke type (XB11).

Stroke adjusting unit

Nil	Without adjusting unit
H	Shock absorber + Adjusting bolt

Shock absorber for stroke adjusting unit

ø25	ø32	ø40
RB1412	RB2015	RB2015

Suffix for stroke adjusting unit

Nil	2 pcs.
S	1 pc.

Auto switch

Nil	Without auto switch (Built-in magnet)

* For the applicable auto switch model, refer to the table below.
* Auto switches are shipped together, (but not assembled).

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Applicable Auto Switch/Refer to page 9-15-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m)* 0.5 (Nil)	3 (L)	5 (Z)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**E76A**	●	●	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	**E73A**	●	●	—	—	—	Relay, PLC
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M5N**	●	●	●	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M5P**	●	●	●	○		
				2-wire		12 V		**M5B**	●	●	●	○	—	
	Diagnostic indication (2-color indication)			3-wire (NPN)		5 V, 12 V		**M5NW**	●	●	●	○	IC circuit	
				3-wire (PNP)				**M5PW**	●	●	●	○		
				2-wire		12 V		**M5BW**	●	●	●	○	—	
	With timer			3-wire (NPN)		5 V, 12 V		**M5NT**	—	●	●	○	IC circuit	
				3-wire (PNP)				**M5PT**	—	●	●	○		

* Lead wire length symbols: 0.5 m·····Nil (Example) E76A
3 m·····L (Example) E76AL
5 m·····Z (Example) M5NTZ

* Solid state switches marked with "○" are produced upon receipt of order.

• Since there are other applicable auto switches than listed, refer to page 9-14-11 for details.
• For details about auto switches with pre-wire connector, refer to page 9-15-66.

Cylinder Specifications

Bore size (mm)		25	32	40
Guide type		Cam follower guide type		
Fluid		Air		
Action		Double acting		
Operating pressure range (MPa)		0.1 to 0.8		
Proof pressure (MPa)		1.2		
Ambient and fluid temperature		5 to 60°C (No freezing)		
Piston speed (mm/s)		100 to 1000		
Cushion		Air cushion on both ends (Standard)		
Lubrication		Non-lube		
Stroke length tolerance (mm)		$^{+1.8}_{0}$		
Port size Rc	Front port, Side port, Bottom port	1/8		1/4

Brake Specifications

Lock operation	Spring locking (Exhaust lock)
Fluid	Air
Maximum operating pressure (MPa)	0.5
Brake releasing pressure (MPa)	0.25
Brake activating pressure (MPa)	0.18
Braking direction	Both directions

Stroke Adjusting Unit Specifications

Applicable cylinder size (mm)		25	32	40
Stroke adjustment range		Any position on the entire stroke		
Stroke fine adjusting range (mm)		0 to –11.5	0 to –12	0 to –16
Shock absorber model		RB1412	RB2015	RB2015
Max. absorbing energy (J)		19.6	58.8	58.8
Stroke absorption (mm)		12	15	15
Max. collision speed (mm/s)		1000	1000	1000
Max. operating frequency (cycle/min)		45	25	25
Spring force (N)	When extended	6.86	8.34	8.34
	When retracted	15.98	20.50	20.50
Operating temperature range		5 to 60°C		

Weight

(kg)

Bore size (mm)	Basic weight	Additional weight per each 50mm of stroke	Side support weight (per set)		Stroke adjustment unit weight (per unit)
			Type A	Type B	
25	3.86	0.275	0.015	0.016	0.25
32	6.05	0.425	0.040	0.041	0.41
40	8.38	0.545	0.076	0.080	0.50

Theoretical Output

(N)

Bore size (mm)	Piston area (mm^2)	Operating pressure (MPa)						
		0.2	0.3	0.4	0.5	0.6	0.7	0.8
25	490	98	147	196	245	294	343	392
32	804	161	241	322	402	483	563	643
40	1256	251	377	502	628	754	879	1005

Made to Order

Made to Order Specifications (For details, refer to page 9-16-1.)

Symbol	Specifications
-XB11	Long stroke
-X416	Holder mounting bracket I
-X417	Holder mounting bracket II

Stroke Adjusting Unit Part No.

Bore size (mm)	25	32	40
Unit no.	ML1-A25H	ML1-A32H	ML1-A40H

Side Support Part No.

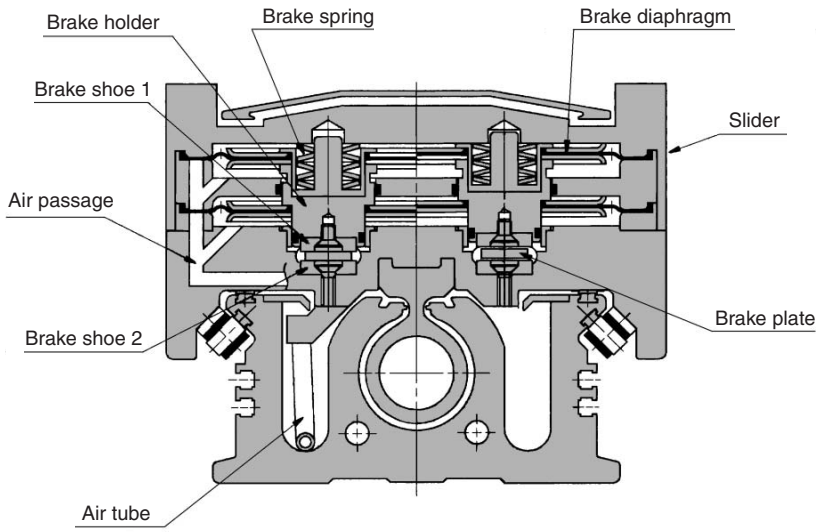
Type \ Bore size (mm)	25	32	40
Side support A	MY-S25A	MY-S32A	MY-S40A
Side support B	MY-S25B	MY-S32B	MY-S40B

For details about dimensions, etc., refer to page 9-14-9.

Auto Switch Mounting Bracket Part No.

Bore size (mm)	Mounting bracket part no.	Note	Auto switch part no.
25 32 40	BMY1 -025	• Switch mounting screw M2.5 x 10ℓ • Switch mounting nut	D-E73A/ 76A/80A
	BMY2 -025	• Switch mounting screw M2.5 x 12ℓ • Switch mounting nut	D-M5N/ M5P/M5B D-M5NW/ M5PW/ M5BW D-M5NTL/ M5PTL

Construction Principle of Brake



(Brake operating state) (Brake released state)

[Anatomy of Brake Operation]

Brake force is generated by a brake spring acting on a brake shoe 1 attached to brake holder, brake rails and holds brake plate between brake shoe 1 and brake shoe 2 fixed to slider side so that slider will stop.

[Brake releasing]

Air pressure supplied from the head cover side goes to the slide table through the air tube and acts on the brake diaphragm, reducing the spring.

Brake Capacity

Holding Force (Maximum static load)

Bore size (mm)	25	32	40
Holding force	320 N	500 N	800 N

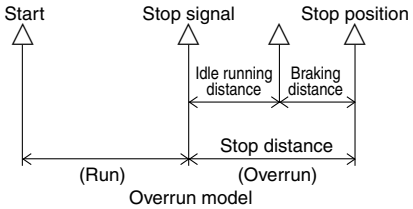
1. The holding force is the lock's ability to hold a static load that does not involve vibrations or shocks, after it is locked without a load. Therefore, to use the cylinder near the upper limit of the constant holding force, be aware of the following:
- Select the cylinder bore size so that the load is less than 80% of the holding force.
- If slipping occurs when the load is over holding force, the brake shoe will be damaged, and it is possible the holding force will become smaller or the cylinder life shortened.

Allowable Kinetic Energy

Bore size (mm)	25	32	40
Allowable kinetic energy (J)	0.43	0.68	1.21

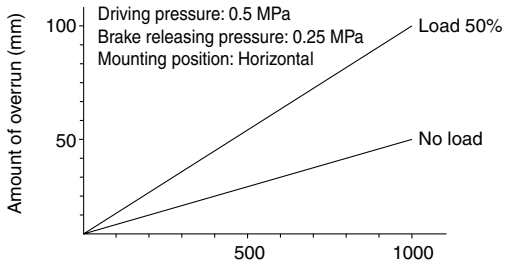
Overrun

Overrun



Overrun model

When cylinder is stopped at intermediate strokes, "idle running distance" is from detection of stop signal to beginning of brake operation and "braking distance" is from beginning of brake operation to the stop of slider.



Piston speed just before stop (mm/s)
Amount of overrun

The graph above shows the relation between piston speed and overrun. (The length of overrun is changed, dependent on piston speed, load, piping conditions and control method. Be sure to adjust the stop signal position, etc. by trial operation with the actual machine.)

Stop dispersion

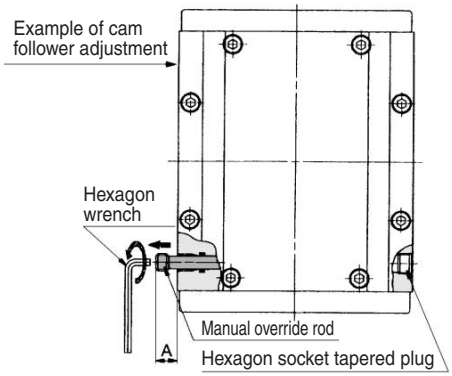
When cylinder is stopped at intermediate stroke, there is dispersion of stop position. Dispersion of stop position is changed dependent on piston speed, load, piping condition and control method. Use values in the table below as reference.

Stopping Accuracy

Piston speed (mm/s)	100	300	500	800	1000
Stopping accuracy (mm)	±0.5	±1.0	±2.0	±3.0	±4.0

Conditions Driving pressure: 0.5 MPa
Brake releasing pressure: 0.25 MPa
Load: 25%
Solenoid valve for releasing brake is connected to cylinder directly. Dispersion of the control system is not included.

Manual Operation



⚠ Warning

In the case of manual operation, be sure to supply air for brake releasing.
If not, this may result in damage to the brake, which will cause a cylinder malfunction.

[Brake releasing]

1. Supply the air for releasing the brake to the braking air port on the head cover. This should be 0.4 to 0.5 MPa.
2. Loosen the manual override (nickel plated) rod on the slide table, and draw the rod until it reaches to the end. The size of the hexagon wrench should be 3 mm (ML1C25, 32) or 4 mm (ML1C40).
3. Exhaust the air to release the brake.

Manual Rod Drawing Dimensions

Model	A
ML1C25	23
ML1C32	27
ML1C40	32

[Brake operation]

1. Supply the air for releasing the brake to the braking air port on the head cover. This should be 0.4 to 0.5 MPa.
2. Push the manual rod and then screw it until it is housed inside a slider completely.
3. Exhaust the air to release the brake.

Cushion Capacity

Cushion selection

<Air cushion>

Air cushion is standard on Hy-rodless cylinder. The air cushion mechanism is incorporated to prevent excessive impact of the piston at the stroke end during high speed operation.
Air cushion is not applied for slow piston operation around the stroke end.
A range of the weights and speeds that an air cushion can absorb is within the limits shown in the graph, “Air Cushion Absorbing Kapacity”.

<Stroke adjustment unit with shock absorber>

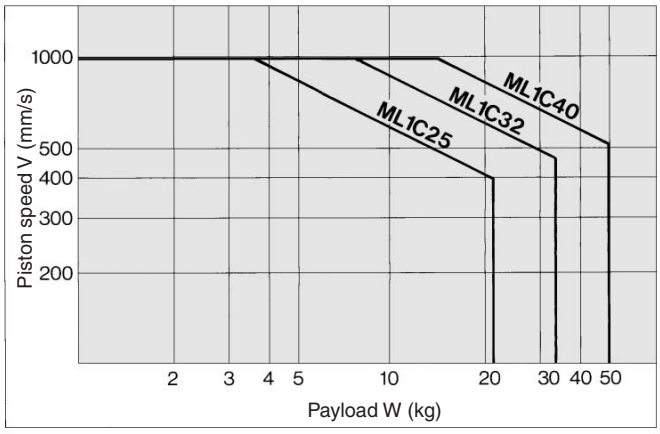
Use this unit to decelerate the cylinder when weight and speed are beyond the air cushion limit lines or when the stroke adjustment causes limited or no cushion engagement.
Note)

1. Adjust the shock absorber so that stroke will be fully utilized to near the limit of allowable energy, because absorption capacity becomes extremely small if the absorber’s effective stroke is short due to a stroke adjustment.
2. When the shock absorber is used within the air cushion stroke range, almost open the air cushion needle (about 1 turn from the fully closed position).

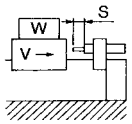
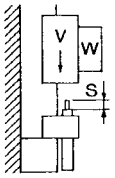
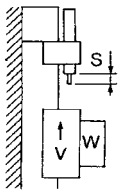
Air Cushion Stroke

Bore size (mm)	Cushion stroke
25	15
32	19
40	24

Air Cushion Absorption Capability



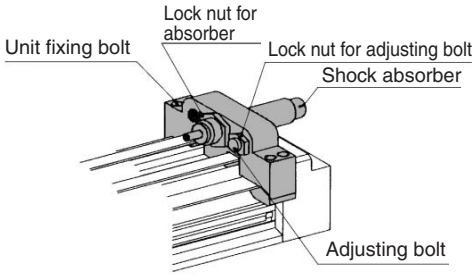
Stroke Adjusting Unit with Shock Absorber/ Calculation of Absorbed Energy

	Horizontal collision	Vertical (Downward)	Vertical (Upward)
Type of impact			
Kinetic energy E_1	$\frac{W}{2g}\cdot V^2$		
Thrust energy E_2	F·s	F·s + W·s	F·s – W·s
Absorbed energy E	$E_1 + E_2$		

Symbol
V: Impact speed (m/s) g: Gravitational acceleration (m/s²)
W: Impact object weight (kg) F: Cylinder thrust (N)
s: Stroke length of shock absorber (m)

Note) The speed of the impact object is measured at the moment of impact with the shock absorber.

Adjusting Procedure



<Moving and fixing unit>

Remove the dust proof cover, loosen the four fixing bolts to move the unit body.
The unit body can be fixed by tightening four holding bolts evenly at an arbitrary position. However, there is a possibility that the adjustment mechanism will be tilted due to high impact energy. Since the holder mounting bracket for adjustment is available as an option for -X416, -X417, we recommend that you use it. Please refer to holder mounting bracket in Made to Order Specifications (2). If any other length is desired, please consult with SMC.

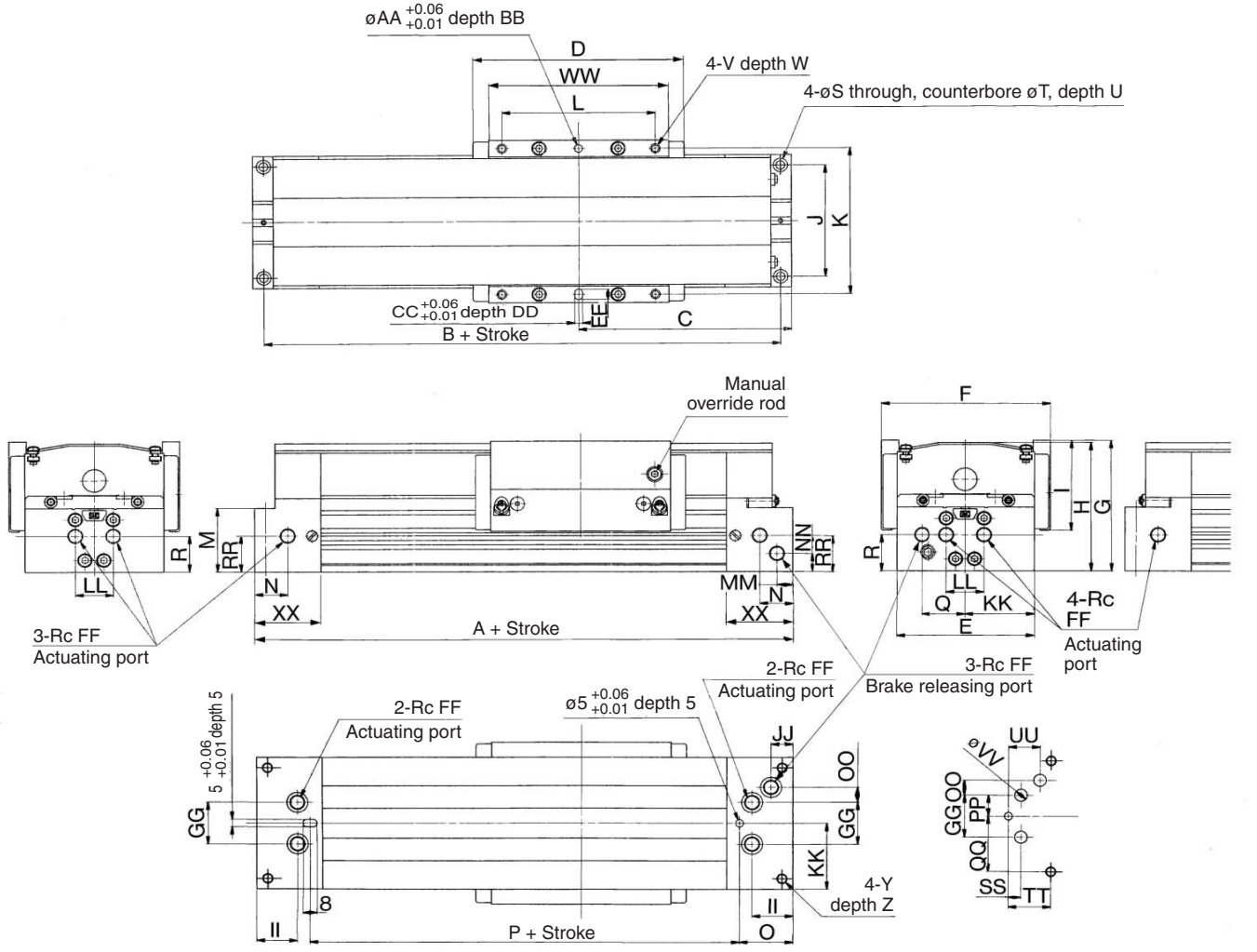
<Stroke adjustment of adjusting bolt>

After loosening the lock nut for adjusting bolt, adjust the stroke with hexagon wrench. Then, tighten lock nut.

<Stroke adjusting of shock absorber>

After loosening the lock nut for the shock absorber, adjust the stroke by rotating shock absorber, then fix the shock absorber by tightening lock nut. Do not over tighten the lock nut.

Basic Type



Bottom Side Piping Port Size

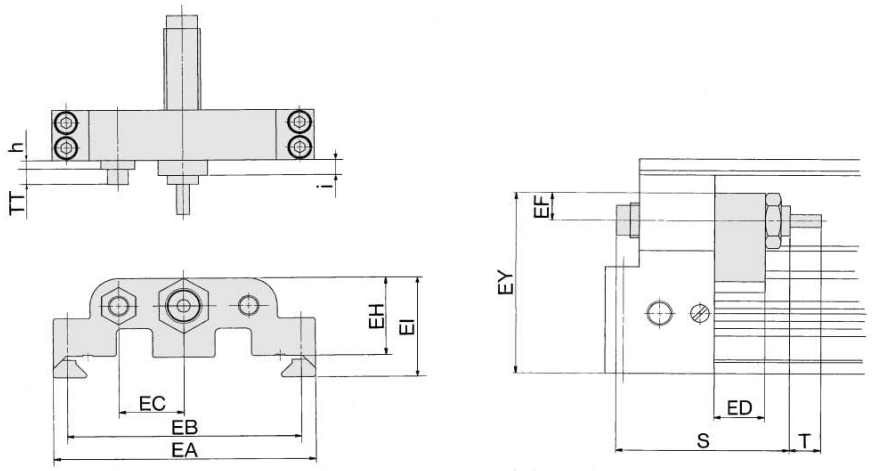
(Mounting side should be processed according to the dimensions below.) (mm)

Model	OO	PP	QQ	RR	SS	TT	UU	VV	Applicable gasket
ML1C25	10	14	37	24	8	27	20	8	C11.2
ML1C32	16.5	18	46	30	12	32	22	8	C11.2
ML1C40	17	23.5	53	40	12.5	34	26	10	C14

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y	Z
ML1C25	274	260	137	140	88	108	87	85.5	60	74	97	100	42.5	26	34	206	28	24	5.6	9	5.5	M5 x 0.8	8.5	M6 x 1	9.5
ML1C32	322	306	161	160	108	131	101	99.5	64	92	118	120	53.5	28	40	242	36.5	30	6.8	11	6.6	M6 x 1	12	M8 x 1.25	16
ML1C40	372	354	186	190	124	158	118	116.5	73	106	144	140	64	30.5	43	286	40.5	35	8.6	14	8.5	M8 x 1.25	14	M10 x 1.5	15

Model	AA	BB	CC	DD	EE	FF	GG	II	JJ	KK	LL	MM	NN	WW	XX
ML1C25	5	5	5	5	7	1/8	28	26	14	44	20	16	12.5	120	42
ML1C32	6	5	6	5	8	1/8	36	28	18	54	36	18	12.5	140	48
ML1C40	6	5	6	5	8	1/4	47	30.5	17	62	30	22	16.5	170	51

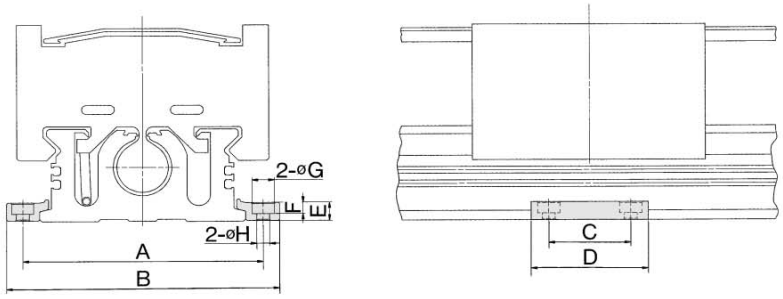
Stroke Adjusting Unit



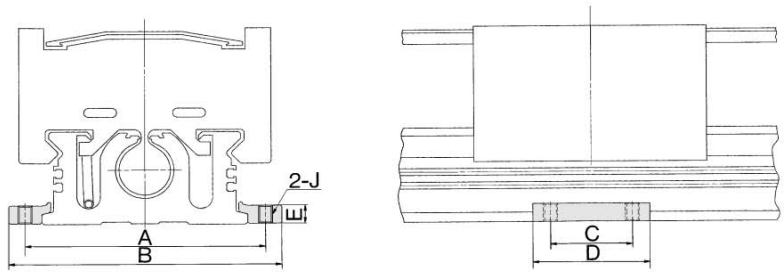
Part no.	Applicable bore (mm)	EA	EB	EC	ED	EF	EY	S	T	EH	EI	TT	h	i	Shock absorber model
ML1-A25H	**ML1C25**	101	90	25	20	11	72	67.3	12	31	39.5	Max. 16.5	4.5	3	RB1412
ML1-A32H	**ML1C32**	120	107	30	25	16	93	73.2	15	38	49	Max. 20	5.5	6	RB2015
ML1-A40H	**ML1C40**	147	129	30	31	16	105.5	73.2	15	40.5	54.5	Max. 25	5.5	6	

Side Support

Side support A

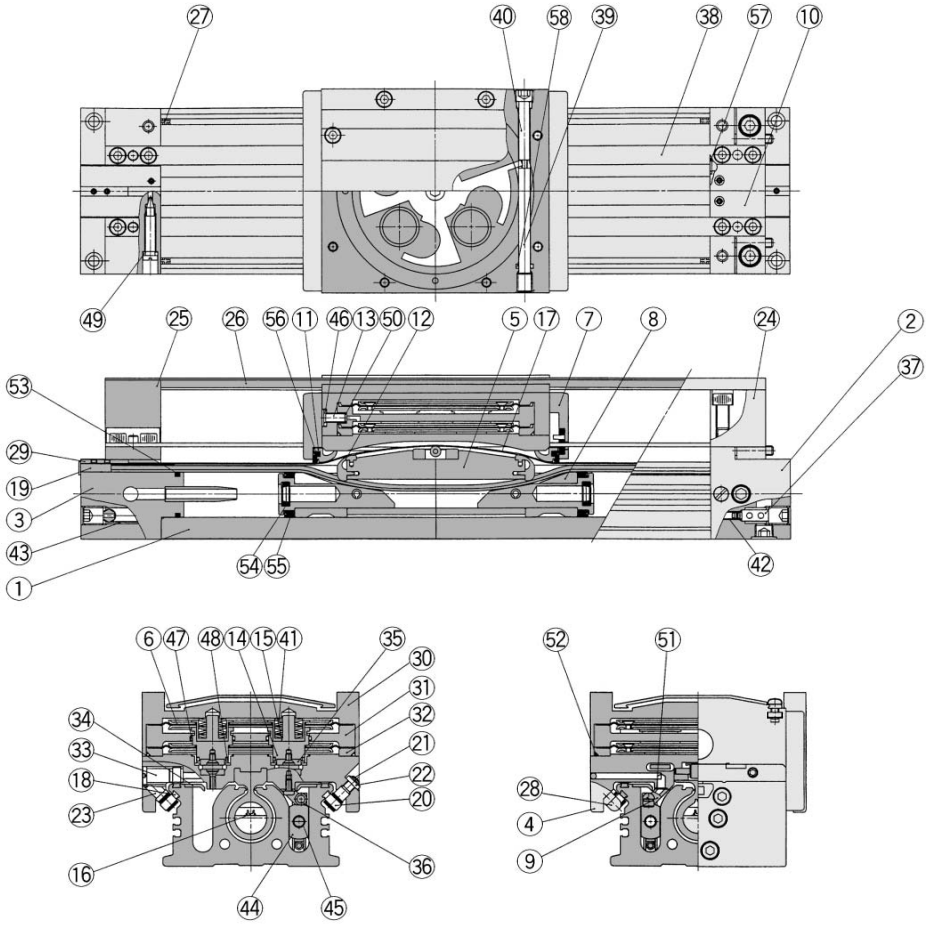


Side support B



Part no.	Applicable bore (mm)	A	B	C	D	E	F	G	H	J
MY-S25 A/B	**ML1C25**	103	117	35	50	8	5	9.5	5.5	M6 x 1
MY-S32 A/B	**ML1C32**	128	146	45	64	11.7	6	11	6.6	M8 x 1.25
MY-S40 A/B	**ML1C40**	148	170	55	80	14.8	5	14	9	M10 x 1.5

Construction



Component Parts

No.	Description	Material	Note
①	Cylinder tube	Aluminum alloy	Hard anodized
②	Head cover WR assembly	Aluminum alloy	Hard anodized
③	Head cover WL assembly	Aluminum alloy	Hard anodized
④	Slide table	Aluminum alloy	Hard anodized
⑤	Piston assembly	Aluminum alloy	Hard anodized
⑥	Brake diaphragm assembly	—	
⑦	End Cover	Chrome molybdenum steel	Nickel plated
⑧	Wear ring	Special resin	
⑨	Air joint assembly	—	
⑩	Plate tensile table	Rolled steel	Nickel plated
⑪	Backup plate	Special resin	
⑫	Belt separator	Special resin	
⑬	Port joint	Stainless steel	
⑭	Brake holder assembly	Carbon steel	Gas soft nitrided
⑮	Spring holder	Carbon steel	Gas soft nitrided
⑯	Seal belt	Special resin	
⑰	Dust seal band	Stainless steel	
⑱	Rail	Hard steel wire material	
⑲	Belt clamp	Special resin	
⑳	Cam follower	—	
㉑	Eccentric screw cap	Stainless steel	
㉒	Lock nut	Stainless steel	
㉓	Bushing	Stainless steel	
㉔	Dust proof cover mountable R	Aluminum alloy	Hard anodized
㉕	Dust proof cover mountable L	Aluminum alloy	Hard anodized
㉖	Dust cover	Aluminum alloy	Hard anodized
㉗	End spacer	Special resin	
㉘	Magnet assembly	Aluminum alloy	Anodized
㉙	Seal lock plate	Rolled steel	Nickel plated
㉚	Slider cover assembly	Aluminum alloy	Hard anodized
㉛	Diaphragm plate assembly	Aluminum alloy	Chromated
㉜	Diaphragm ring	Aluminum alloy	Chromated (ø25 only)

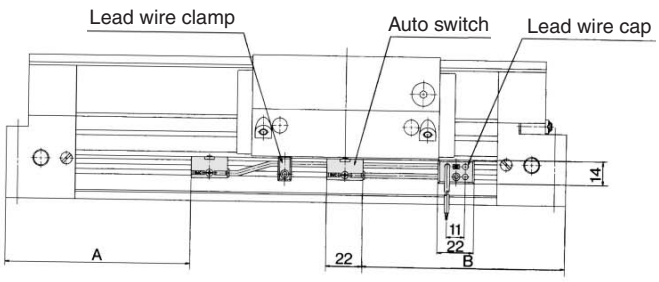
No.	Description	Material	Note
㉝	Cam follower cap	Aluminum alloy	Hard anodized
㉞	Tube cover	Aluminum alloy	Hard anodized
㉟	Brake shoe	Special friction material	
㊱	Joint ring	Stainless steel	
㊲	Air coupler 2	Stainless steel	
㊳	Brake plate	Stainless steel	Hard chrome plated
㊴	Manual rod 1	Carbon steel	
㊵	Manual rod 2	Carbon steel	
㊶	Brake spring		
㊷	Air tube	Special resin	
㊸	Cable	Stainless steel	
㊹	Tube guide assembly		
㊺	Guide rod	Stainless steel	

Seal List

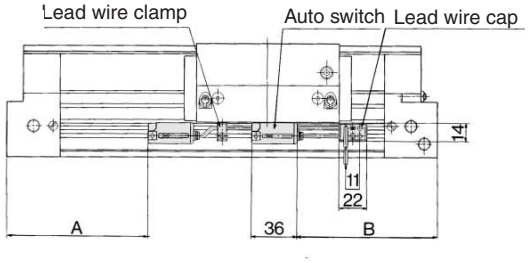
Part no.	Description	Material	ML1C25G	ML1C32G	ML1C40G
㊻	O-ring	NBR	C-7	C-7	C-7
㊼	O-ring	NBR	SO-015-22	SO-015-24	SO-020-31
㊽	O-ring	NBR	SO-015-16	SO-016-9	SO-015-20
㊾	Needle gasket	NBR	8.3 x 4.5 x 1.9	C-4	C-4
㊿	O-ring	NBR	SO-010-16	SO-010-16	SO-010-16
(51)	O-ring	NBR	SO-010-16	C-6	C-8
(52)	O-ring	NBR	C-100	AS568-048	C-150
(53)	Tube gasket	NBR	TMY-25	TMY-32	TMY-40
(54)	Cushion seal	NBR	RCS-8	RCS-10	RCS-12
(55)	Piston seal	NBR	GMY25	GMY32	GMY40
(56)	Scraper	NBR	M1L025-17A82076C	M1L032-17A82077C	M1L040-17A82078C
(57)	Bypass gasket	NBR	C-6	C-7	C-9
(58)	O-ring	NBR	P-6	P-6	P-8

Proper Auto Switch Mounting Position (Detection at stroke end)

D-E7□A, D-E80A



D-M5□
D-M5□W
D-M5□TL



Note) Position auto switch's indicator sight toward the slide table side.

Lead Wire Clamp/Lead Wire Cap (Option)

Series	Lead wire clamp	Lead wire cap
ML1C	LC-01	LP-01

(mm)

Series	Mounting position	ø25	ø32	ø40
ML1C	A	124.8	148.8	173.8
	B	113.2	137.2	162.2

Lead Wire Clamp/Lead Wire Cap (Option)

Series	Lead wire clamp	Lead wire cap
ML1C	LC-01	LP-01

Series	Mounting position	ø25	ø32	ø40
ML1C	A	128.5	152.5	177.5
	B	123.5	147.5	172.5

Minimum Stroke for Auto Switch Mounting

(mm)

No. of auto switches mounted	Applicable auto switch	
	D-E7□A, D-E80A	**D-M5□, D-M5□W, D-M5□TL**
1 pc.	10	5
2 pcs.	15	10

Besides the models listed in "How to Order", the following auto switches are applicable. For detailed specifications, refer to page 9-15-1.

Type	Model	Electrical entry	Features
Reed switch	D-E80A	Grommet	Without indicator light

Operating Range

Auto switch model	Bore size (mm)		
	25	**32**	**40**
D-E7□A/E80A	6	6	6
D-M5□/M5□W/M5□TL	4	4	4

∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.