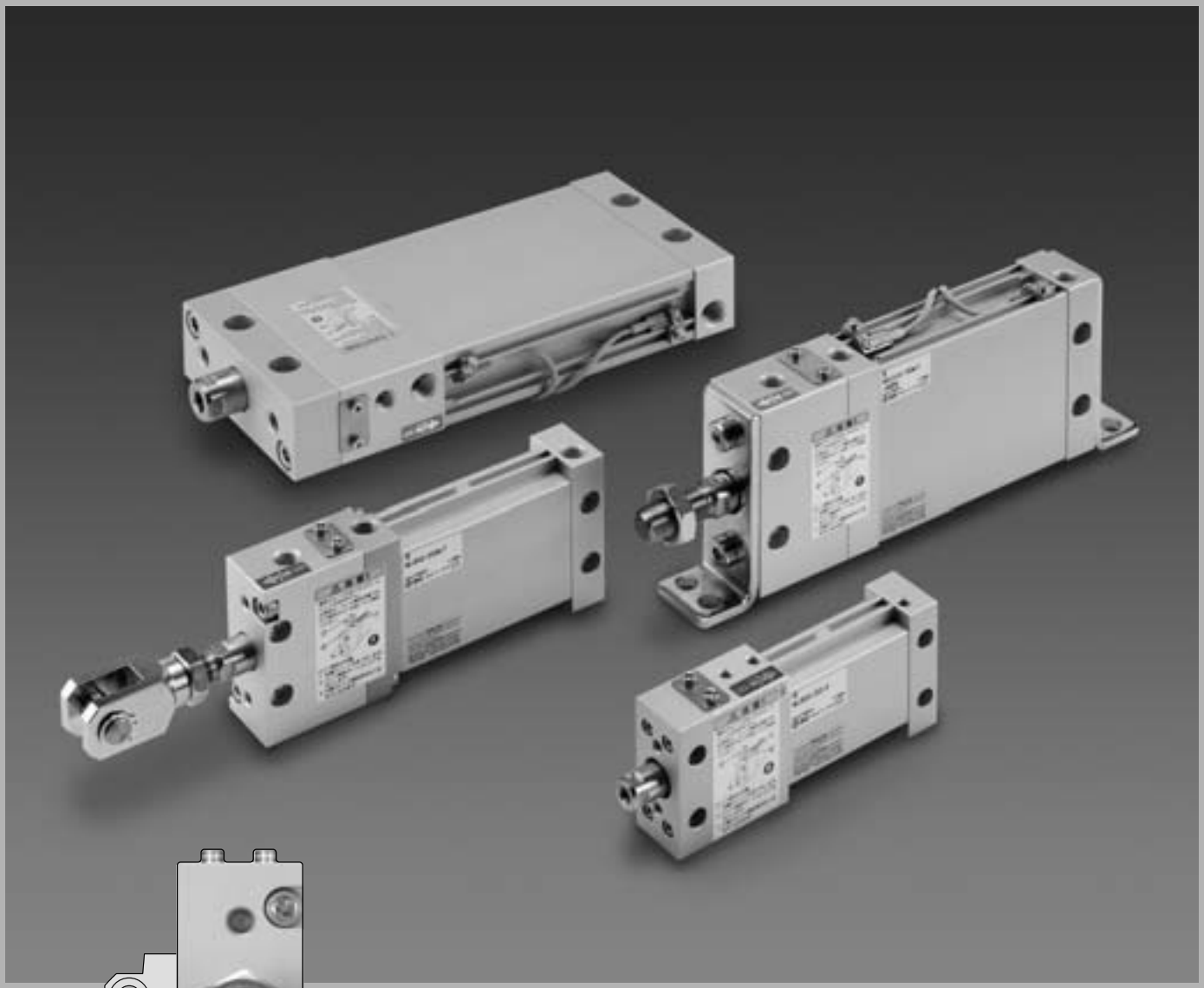
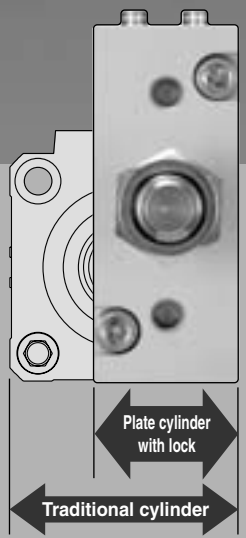
Plate Cylinder with Lock

Series *MLU*

ø25, ø32, ø40, ø50





Ideal for maintaining supply pressure to prevent dropping of the load when residual pressure is released.

Plate Cylinder with Lock

Series MLU

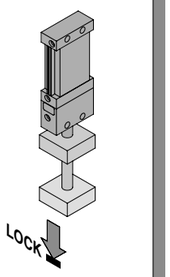
ø25, ø32, ø40, ø50

Drop prevention is possible at any point of stroke.

- **Drop prevention for middle stroke emergency stops**
- **Lock positions can be changed to accommodate the position of the external stopper and the thickness of the clamped workpiece.**

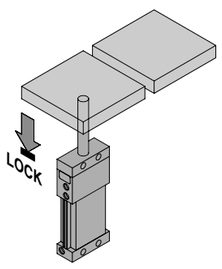
Drop prevention for press fitting jig

Extension lock



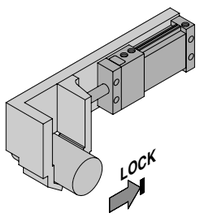
Drop prevention for litter

Retraction lock

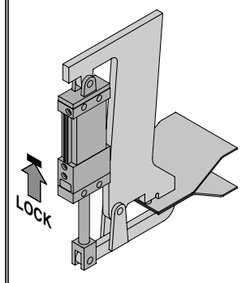


Holding clamped and unclamped positions

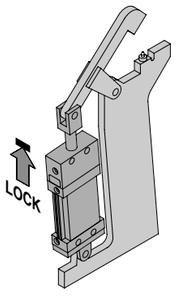
Retraction lock



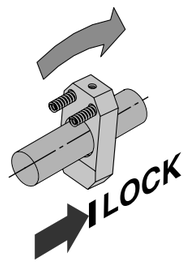
Retraction lock



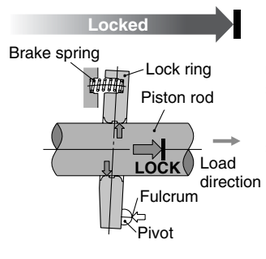
Extension lock



Simple construction: Simple and reliable locking system

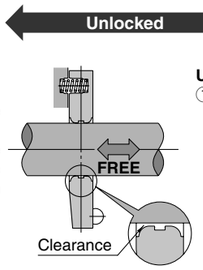


Locked



Unlocking port:
① When air is exhausted: The brake spring force tilts the lock ring.
② The load increases the tilting of the lock ring to securely lock the piston rod.

Unlocked



Unlocking port:
① When air is supplied: The lock ring becomes perpendicular to the piston, creating a gap between the piston rod and the lock ring to unlock the piston.

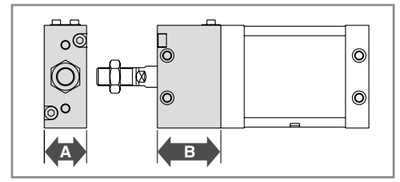
Slim and compact lock unit

- **Lock unit length**
  35 mm to 50.5 mm
- **Lock unit width**
  24 mm to 39 mm

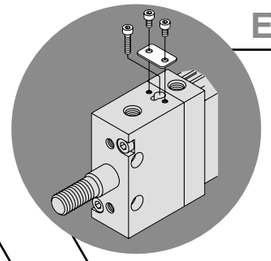
The compact lock unit does not protrude beyond the cylinder body surface.

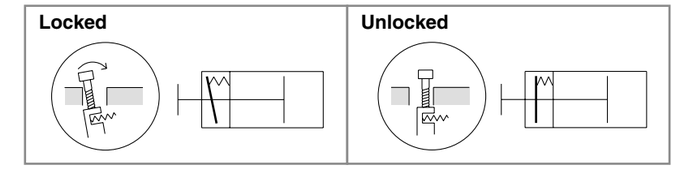
Lock unit thickness (mm)

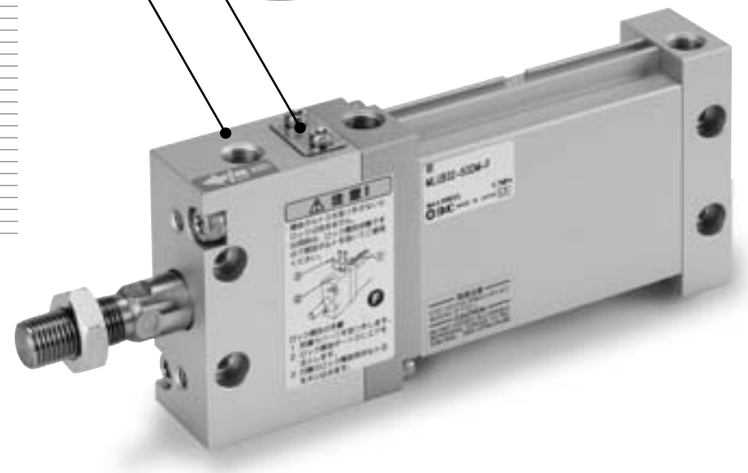
Bore size (mm)	A	B
25	24	35
32	28	42
40	32	44
50	39	50.5



Easy manual unlocking

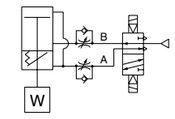




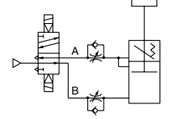


Locking direction can be selected.

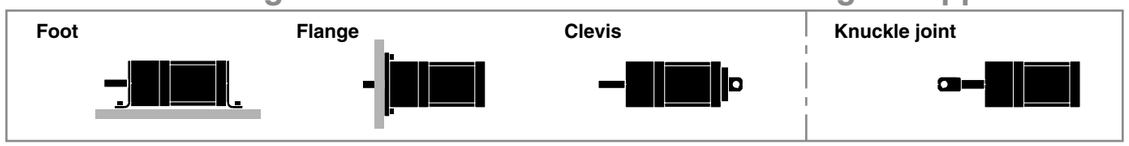
Extension lock



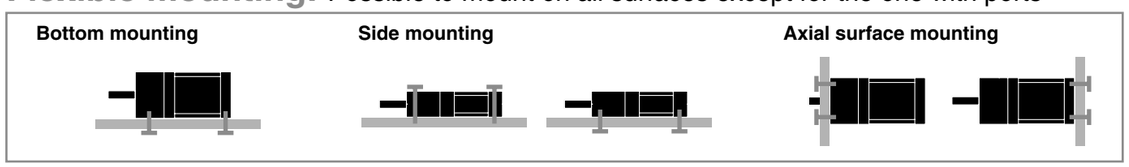
Retraction lock



Various mounting brackets to accommodate wide range of applications.



Flexible mounting: Possible to mount on all surfaces except for the one with ports



Series Variations

Series	Locking direction	Bore size (mm)	Standard stroke (mm)																	
			5	10	15	20	25	30	35	40	45	50	75	100	125	150	175	200	250	300
MLU	Extension lock / Retraction lock	25	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		40	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		50	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Series MLU
Specific Product Precautions 1

Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Selection

⚠ Warning

1. The holding force (max. static load) indicates the maximum capability to hold a static load without vibration and impact. The maximum load (workpiece mass) should be below 50% of the holding force (max. static load). Refer to 6 below when the kinetic energy of the workpiece is absorbed at the cylinder end or eccentric load is applied.

2. Do not use for intermediate cylinder stops.

This cylinder is designed for locking against inadvertent movement from a stationary condition. Intermediate stops during operation with the locking mechanism may damage the cylinder, greatly shorten the service life or cause unlocking malfunction.

3. Select the correct locking direction, as this cylinder does not generate holding force opposite to the locking direction.

The extension lock does not generate holding force in the cylinder's retracting direction, and the retraction lock does not generate holding force in the cylinder's extension direction.

4. Even when locked, there may be stroke movement of about 1 mm in the locking direction due to external forces such as the weight of the workpiece.

Even when locked, if air pressure drops, stroke movement of about 1 mm may be generated in the locking direction of the lock mechanism due to external forces such as the workpiece weight.

5. When locked, do not apply impact loads, stroke vibration or rotational force, etc.

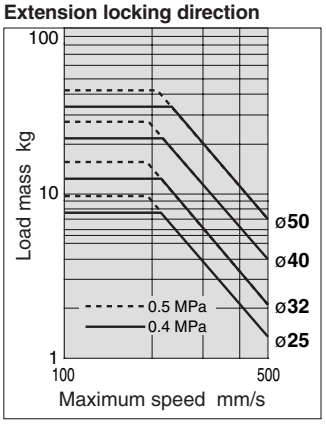
This may damage the locking mechanism, shorten the service life or cause unlocking malfunction.

6. Operate so that load mass, maximum speed and eccentric distance are within the limiting ranges in the graphs below.

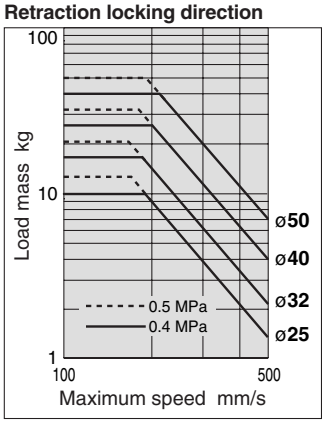
Operation beyond the limiting range will lead to cylinder damage and reduced service life, etc.

Allowable Kinetic Energy (Energy absorbable at the cylinder end)

Extension locking direction

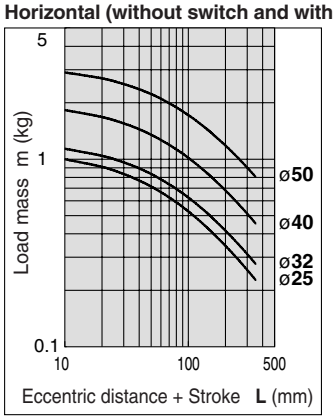


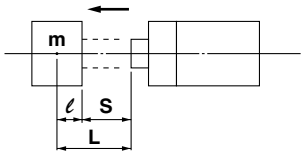
Retraction locking direction



Allowable Load Mass

Horizontal (without switch and with switch)





ℓ: Eccentric distance (mm)
S: Stroke (mm)

Pneumatic Circuit

⚠ Warning

• Drop prevention circuit

1. Do not use 3 position valves with the circuit example 1.

The lock may be released due to inflow of the unlocking pressure.

2. Install speed controllers for meter-out control. (Circuit example 1)

When they are not installed or they are used under meter-in control, it may cause malfunction.

3. Branch off the compressed air piping for the lock unit between the cylinder and the speed controller. (Circuit example 1)

Note that branching off in other sections may shorten the service life.

4. Perform piping so that the side going from the piping junction to the lock release port is short. (Circuit example 1)

If the lock release port side is longer than another side from the piping junction, this may cause unlocking malfunction or shorten the service life.

5. Be careful of reverse exhaust pressure flow from a common exhaust type valve manifold. (Circuit example 1)

Since the lock may be released due to reverse exhaust pressure flow, use an individual exhaust type manifold or single type valve.

6. Be sure to release the lock before operating the cylinder. (Circuit example 2)

When the lock release delays, the cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction. Even when the cylinder moves freely, be sure to release the lock and operate the cylinder.

Specific Product Precautions 2

Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Pneumatic Circuit

⚠ Warning

7. Be aware that the locking action may be delayed due to the piping length or the timing of exhaust. (Circuit example 2)

The locking action may be delayed due to the piping length or the timing of exhaust, which also makes the stroke movement toward the lock larger. Install the solenoid valve for locking closer to the cylinder than the cylinder drive solenoid valve.

• Emergency stop circuit

1. Perform emergency stops with the pneumatic circuit. (Circuit examples 3 and 4)

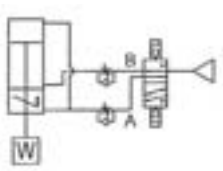
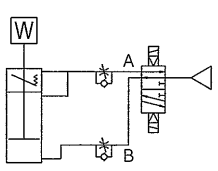
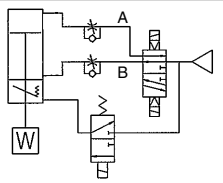
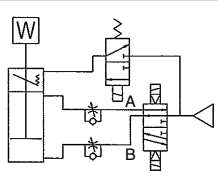
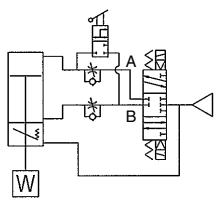
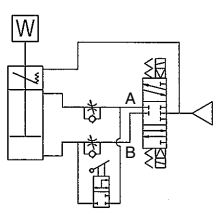
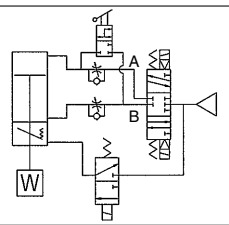
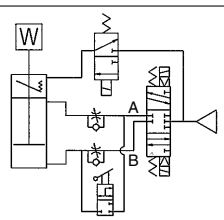
This cylinder is designed for locking against inadvertent movement from a stationary condition. Do not perform intermediate stops while the cylinder is operating, as this may cause unlocking malfunction or shorten the service life. Emergency stops must be performed with the pneumatic circuit, and workpieces must be held with the locking mechanism after the cylinder fully stops.

2. When restarting the cylinder from the locked state, remove the workpiece and exhaust the residual pressure in the cylinder. (Circuit examples 3 and 4)

A cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction.

3. Be sure to release the lock before operating the cylinder. (Circuit example 4)

When the lock release delays, the cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction. Even when the cylinder moves freely, be sure to release the lock and operate the cylinder.

		Extension locking: **F**	Retraction locking: **B**
Drop prevention	1		
	2		
Emergency stop	3		
	4		

Mounting

⚠ Caution

1. Be sure to connect the load to the rod end with the cylinder in an unlocked condition.

If this is done when in a locked condition, it may cause damage to the lock mechanism.

2. When fixing a work piece at the end of the piston rod, first retract the piston rod to the back end. Use the spanner hook at the end of the rod to keep the torque below the allowable tightening torque.

3. Always apply the piston rod load in the axial direction. Avoid operation where rotational torque is applied. If it is the only possible way, be sure to use it within the allowable range shown in the table below.

Allowable Rotational Torque (N·m)

Size	25	32	40	50
Allowable rotational torque	0.25	0.25	0.55	1.25
Allowable torque for workpiece mounting	1.7	1.9	2.0	4.9

4. The piston speed may exceed the maximum operating speed of 500 mm/s if the piping is directly connected to the cylinder. Please use speed controllers by SMC to adjust the piston speed so that it will not exceed 500 mm/s.

Preparing for Operation

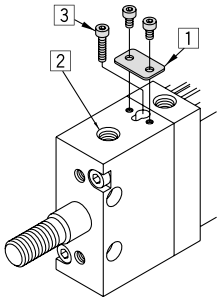
⚠ Warning

1. When starting operation from the locked position, be sure to restore air pressure to the B line in the pneumatic circuit.

When pressure is not applied to the B line, the load may drop or the cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause unlocking malfunction. When applying pressure to the B line, be sure to confirm whether the environment is safe since a workpiece may move.

2. Shipped in the unlocked condition maintained by the unlocking bolt. Be sure to remove the unlocking bolt following the procedures below before operation.

The locking mechanism will not be effective without the removal of the unlocking bolt.



1) Confirm that there is no air pressure inside the cylinder, and remove dust cover 1.
2) Supply air pressure of 0.2 MPa or more to unlocking port 2 shown in the drawing on the left.
3) Use a hexagon wrench (ø25, ø32: Width across flats 2.5, ø40, ø50: Width across flats 3) to remove unlocking bolt 3.

Series MLU
Specific Product Precautions 3

Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Manually Unlocking

⚠ Warning

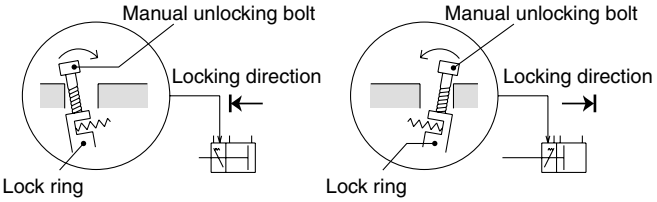
1. Do not perform unlocking when an external force such as a load or spring force is being applied.

This is very dangerous because the cylinder will move suddenly. Release the lock after preventing cylinder movement with a lifting device such as a jack.

2. After confirming safety, operate the manual release following the steps shown below.

Carefully confirm that no one is inside the load movement range, etc., and that there is no danger even if the load moves suddenly.

Manually unlocking



Extension locking direction

1) Remove the dust cover.
2) Screw a manual unlocking bolt (a conventional bolt of ø25, ø32: M3 x 0.5 x 25 ℓ or more, ø40, ø50: M4 x 0.7 x 35 ℓ or more) into the lock ring threads as shown above, and lightly push the bolt in the direction of the arrow (head side) to unlock.

Retraction locking direction

1) Remove the dust cover.
2) Screw a manual unlocking bolt (a conventional bolt of ø25, ø32: M3 x 0.5 x 25 ℓ or more, ø40, ø50: M4 x 0.7 x 35 ℓ or more) into the lock ring threads as shown above, and lightly push the bolt in the direction of the arrow (rod side) to unlock.

Maintenance

⚠ Caution

1. In order to maintain good performance, operate with clean unlubricated air.

If lubricated air, compressor oil or drainage, etc., enter the cylinder, there is a danger of sharply reducing the locking performance.

2. Do not apply grease to the piston rod.

There is a danger of sharply reducing the locking performance.

3. Never disassemble the lock unit.

It contains a heavy duty spring which is dangerous. There is also a danger of reducing the locking performance.

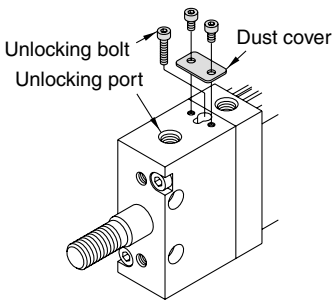
Holding the Unlocked State

⚠ Warning

1. Sizes MLU can hold the unlocked condition.

<Holding the unlocked condition>

1) Remove the dust cover.
2) Supply air pressure of 0.2 MPa or more to the unlocking port, and set the lock ring to the perpendicular position.
3) Screw the unlocking bolt which is included (hexagon socket head screw ø25, ø32: M3 x 12 ℓ, ø40, ø50: M4 x 16 ℓ) into the lock ring to hold the unlocked condition.



2. To use the locking mechanism again, be sure to remove the unlocking bolt.

The locking mechanism will not function with the unlocking bolt screwed-in. Remove the unlocking bolt according to the procedures described in the section “Preparing for Operation”.

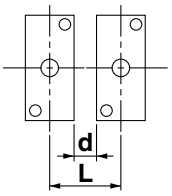
Auto Switch Handling Precautions

⚠ Warning

1. If two or more cylinders are used in close proximity, the auto switches may malfunction affected by the magnets built in the nearby cylinder.

Please keep the cylinder mounting pitch larger than the values in the table below.

Minimum cylinder mounting pitch



(mm)

Size	25	32	40	50
L (d)	33 (10)	32 (5)	36 (5)	38 (0)

When the mounting pitch is equal to or smaller than the value shown above, it has to be shielded by an iron plate or a magnetic shielding plate (Part No. MU-S025) purchased separately. Please contact SMC for more information.

Plate Cylinder with Lock

Series MLU

ø25, ø32, ø40, ø50

How to Order

MLU B 25 □ – 30 D □ – F

With auto switch **MDLU B 25 □ – 30 D □ – F – M9BW S**

With auto switch
(Built-in magnet)

Mounting style

B	Basic style
L	Axial foot style
F	Rod flange style
G	Head flange style
C	Single clevis style
D	Double clevis style

∗ Mounting brackets are shipped together (not assembled).

Size

25	Pressure receiving area equivalent to that of ø25 type
32	Pressure receiving area equivalent to that of ø32 type
40	Pressure receiving area equivalent to that of ø40 type
50	Pressure receiving area equivalent to that of ø50 type

Port thread type

Nil	M thread	ø25
	Rc	ø32, ø40, ø50
TN	NPT	
TF	G	

Cylinder stroke (mm)
Refer to "Standard Stroke" on page 871.

Action

D	Double acting

Rod end shape

Nil	Rod end female thread
M	Rod end male thread

Locking direction

F	Extension locking
B	Retraction locking

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

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

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDLU32-30D-B

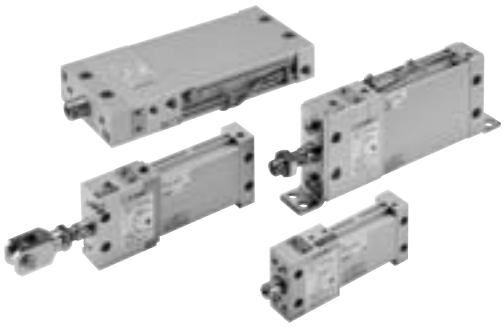
Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry direction	Indicator light	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead-wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	—	Grommet	Yes	3-wire (NPN)	5 V,12 V	—	M9NV	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV	M9P	●	●	●	○	—	○		
				2-wire	12 V		M9BV	M9B	●	●	●	○	—	○	—	
		Connector					J79C	—	●	—	●	●	●	—		
	Diagnostic indication (2-color display)	Grommet		3-wire (NPN)	5 V,12 V		M9NWV	M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV	M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BWV	M9BW	●	●	●	○	—	○	—	
	Water resistant (2-color display)			3-wire (NPN)	5 V,12 V		M9NAV	M9NA	○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV	M9PA	○	○	●	○	—	○		
				2-wire	12 V		M9BAV	M9BA	○	○	●	○	—	○	—	
	With diagnostic output (2-color display)			4-wire (NPN)	5 V,12 V		—	F79F	●	—	●	○	—	○	IC circuit	
	Magnetic field resistant (2-color display)			2-wire(Non-polar)	—		—	P4DW	—	—	●	●	—	○	—	
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	—	A76H	●	—	●	—	—	—	IC circuit	—
				2-wire	—	200 V	A72	A72H	●	—	●	—	—	—	—	Relay, PLC
					24 V	12 V	100 V	A73	A73H	●	—	●	●	—	—	
			No				100 V or less	A80	A80H	●	—	●	—	—	—	IC circuit
		Connector	Yes			—	A73C	—	●	—	●	●	●	—	—	
			No				A80C	—	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color display)	Grommet	Yes		—		A79W	—	●	—	●	—	—	—	—	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ
None ····· N (Example) J79CN

∗ Solid state auto switches marked with a "○" are produced upon receipt of order.
∗ D-A9□/A9□V cannot be mounted.
∗ D-P4DW type can only be mounted on the types for tubing of ø40 and ø50. Only D-P4DW is mounted when shipped.

∗ Besides the models in the above table, there are some other auto switches that are applicable. For more information, refer to page 880.
∗ Refer to pages 1784 and 1785 for the details of auto switches with a pre-wired connector.



Cylinder Specifications

Size	25	32	40	50
Action	Double acting, Single rod			
Fluid	Air			
Proof pressure	1.05 MPa			
Maximum operating pressure	0.7 MPa			
Minimum operating pressure	0.2 MPa Note)			
Ambient and fluid temperature	−10 to 60°C (with no freezing)			
Lubrication	Non-lube			
Cushion	Rubber bumper (Standard)			
Stroke length tolerance	$^{+1.4}_{0}$			
Piston speed	50 to 500 mm/s			
Cylinder port size (Rc, NPT, G)	M5 x 0.8	1/8		1/4

Note) The minimum operating pressure of the cylinder is 0.1 MPa when the cylinder and lock are connected to separate ports.

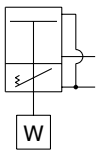
Lock Specifications

Size	25	32	40	50
Locking action	Spring locking (Exhaust locking)			
Unlocking pressure	0.2 MPa or more			
Locking pressure	0.05 MPa or less			
Locking direction	One direction (Either extension locking or retraction locking)			
Maximum operating pressure	0.7 MPa			
Unlocking port connection size (Rc, NPT, G)	M5 x 0.8	1/8		
Holding force N (maximum static load) Note)	245	403	629	982

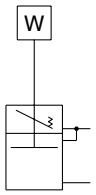
Note) Be sure to make cylinder selections in accordance with the method given on page 866.

JIS Symbol

Extension locking



Retraction locking



Non-rotating Rod Accuracy

Size	25	32	40	50
Non-rotating rod accuracy	±1°	±0.8°	±0.5°	

Standard Stroke

Size	Standard stroke (mm)	Max. manufacturable stroke
25, 32, 40, 50	5, 10, 15, 20, 25, 30, 35, 40, 45, 50 75, 100, 125, 150, 175, 200, 250, 300	300

∗ Strokes other than listed above will be produced upon request of order. Please consult with SMC.
∗∗ Strokes longer than 300 mm are not available.

Mass

Unit: kg

	Size	25	32	40	50
Basic mass	Basic style	0.34	0.58	0.87	1.52
	Axial foot style	0.41	0.72	1.08	1.86
	Flange style: Rod/Head	0.44	0.72	1.10	1.98
	Single clevis style	0.40	0.70	1.09	1.92
	Double clevis style (with pin)	0.41	0.74	1.13	1.99
Additional mass per each 50 mm of stroke		0.12	0.16	0.22	0.34
Attached metal mass	Single clevis style (Double clevis bracket)	0.06	0.12	0.22	0.40
	Double clevis style (Single clevis bracket)	0.07	0.16	0.26	0.47
	Single knuckle joint	0.03	0.04	0.07	0.16
	Double knuckle joint (with pin)	0.05	0.09	0.14	0.29

Note) The mass of the attached metal single clevis and double clevis include the mass of two pieces of mounting bolts.

Calculation method–Example: **MDLUL32-100D-F**
- Basic mass ..... 0.72 (axial foot type · size 32)
- Additional mass ..... 0.16/50 stroke
- Stroke ..... 100 stroke

0.72 +100/50 x 0.16 = 1.04 kg

Refer to pages 878 to 880 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Theoretical Output

Unit: N

Size	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)					
				0.2	0.3	0.4	0.5	0.6	0.7
25	**12**	OUT	491	98	147	196	246	295	344
		IN	378	76	113	151	189	227	265
32	**14**	OUT	804	161	241	322	402	482	563
		IN	650	130	195	260	325	390	455
40	**16**	OUT	1257	251	377	503	629	754	880
		IN	1056	211	317	422	528	634	739
50	**20**	OUT	1963	393	589	785	982	1178	1374
		IN	1649	330	495	660	824	989	1154

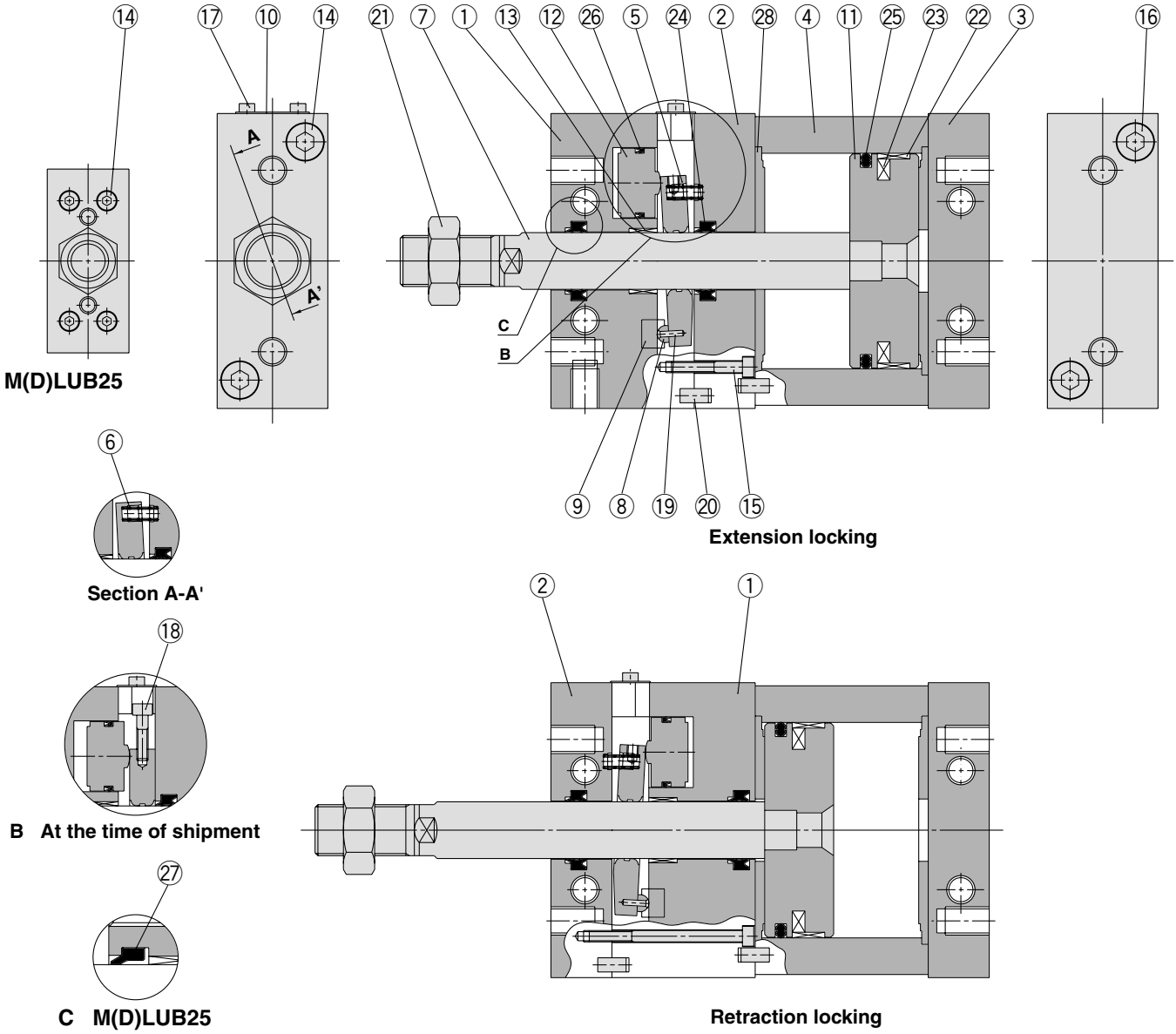
Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Mounting Bracket Part No.

Bracket \ Size	**25**	**32**	**40**	**50**
Foot Note 1)	MU-L02	MU-L03	MU-L04	MU-L05
Flange	MU-F02	MU-F03	MU-F04	MU-F05
Single clevis	MU-C02	MU-C03	MU-C04	MU-C05
Double clevis Note 3)	MU-D02	MU-D03	MU-D04	MU-D05

Note 1) When ordering foot brackets, order 2 pieces for each cylinder.
Note 2) The parts included with each bracket are shown below.
Foot, Flange, Single clevis/Body mounting bolt
Double clevis/Pins for clevis, Type C retaining ring for axis, Body mounting
Note 3) Clevis pin and retaining ring are included with the double clevis type.

Construction



Component Parts

No.	Description	Material	Note
1	**Lock body**	Aluminium alloy	Hard anodized
2	**Cover**	Aluminium alloy	Hard anodized
3	**Head cover**	Aluminium alloy	Hard anodized
4	**Cylinder tube**	Aluminium alloy	Hard anodized
5	**Lock ring**	Carbon steel	Heat treatment
6	**Brake spring**	Steel wire	Zinc chromated
7	**Piston rod**	Carbon steel	Hard chromium electro plating
8	**Pivot**	Carbon steel	Heat treatment, zinc chromated
9	**Pivot key**	Carbon steel	Heat treatment, zinc chromated
10	**Dust proof cover**	Stainless steel	
11	**Piston**	Aluminium alloy	Chromate
12	**Release piston**	Special steel	Heat treatment
13	**Bushing**	Sinteringoil impregnated alloy	M(D)LUB25, 32
		Copper alloy	M(D)LUB40, 50
14	Hexagon socket head cap bolt A	Stainless steel	

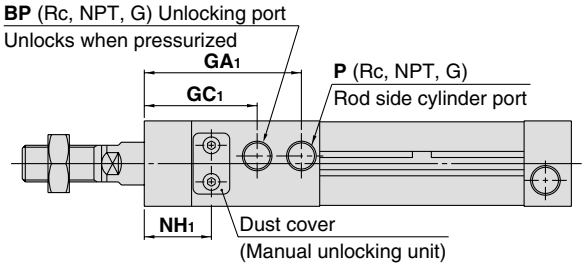
No.	Description	Material	Note
15	Hexagon socket head cap bolt B	Stainless steel	
16	Hexagon socket head cap bolt C	Stainless steel	
17	Hexagon socket head cap bolt D	Chrome molybdenum steel	Nickel plated
18	Hexagon socket head cap bolt E	Chrome molybdenum steel	Nickel plated
19	**Spring pin**	Carbon steel	JIS B2808
20	**Parallel pin**	Stainless steel	JIS B1354
21	**Rod end nut**	Rolling steel	Only for use with nickel plated rod end male thread
22	**Wear ring**	Resin	
23	**Magnet**	—	Only for use with built-in magnet type
24	**Rod seal**	NBR	Use one piece with M(D)LUB25
			Use 2 pieces with M(D)LUB32 to 50
25	**Piston seal**	NBR	
26	**Release piston seal**	NBR	
27	**Scraper**	NBR	Only for use with M(D)LUB25
28	**Bumper**	Urethane rubber	

Dimensions

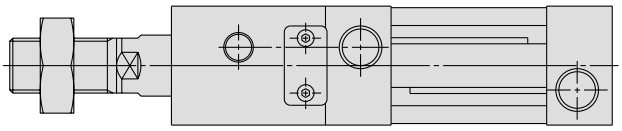
Basic style

M(D)LUB25, 32

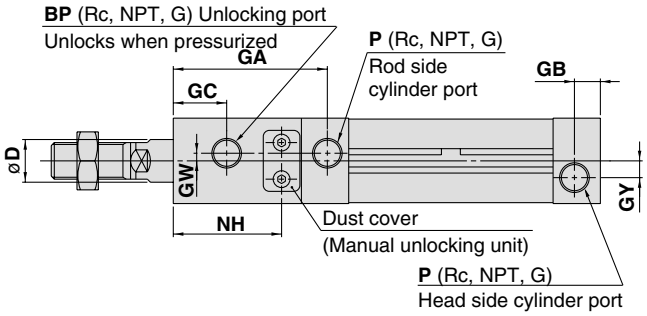
Retraction locking



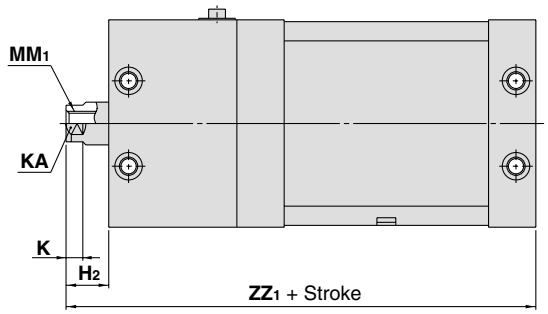
M(D)LUB40, 50

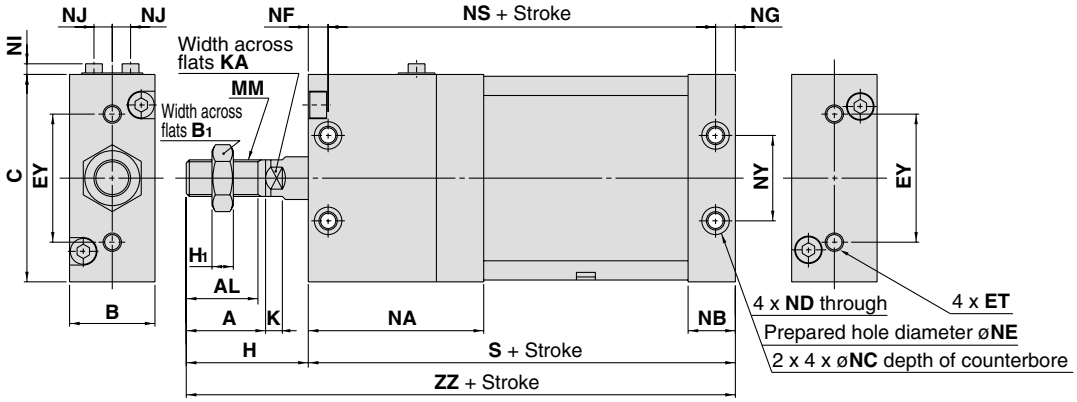


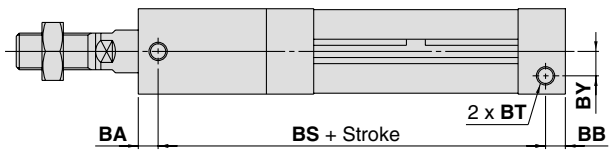
Extension locking



Rod end female thread







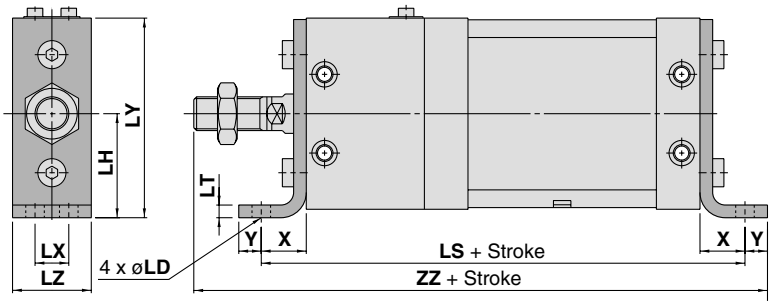
(mm)

Model	Stroke range	A	AL	B	B1	BA	BB	BP	BS	BT	BY	C	D	ET	EY	GA	GA1	GB	GC	GC1	GW	GY	H	H1
MLUB25	5 to 300	22	19.5	24	17	8	9	M5 x 0.8	73	M5 x 0.8 depth 7.5	7	54	12	M5 x 0.8 depth 11	26	45	45	10	15.5	32.5	2.5	5	36	6
MLUB32	5 to 300	26	23.5	28	19	6.5	6.5	1/8	87	M6 x 1 depth 12	8	68	14	M6 x 1 depth 11	42	50.5	51.5	8.5	17.5	37	0	5.5	40	7
MLUB40	5 to 300	30	27	32	22	9	8	1/8	87	M8 x 1.25 depth 13	9	86	16	M8 x 1.25 depth 11	54	53	53	9	18.5	38.5	0	7	45	8
MLUB50	5 to 300	35	32	39	27	12	10	1/8	102.5	M10 x 1.5 depth 14.5	9	104	20	M10 x 1.5 depth 15	64	62	62	11.5	23	43	6	8	53	11

Model	H2	K	KA	MM	MM1	NA	NB	NC	ND	NE	NF	NG	NH	NH1	NI	NJ	NS	NY	P	S	ZZ	ZZ1
MLUB25	14	5.5	10	M10 x 1.25	M6 x 1 depth 12	49	14	7.5 depth 4.5	M5 x 0.8	4.3	8	6	30	19	3.5	6	76	26	M5 x 0.8	90	126	104
MLUB32	14	5.5	12	M12 x 1.25	M8 x 1.25 depth 13	57.5	15.5	9 depth 5.5	M6 x 1	5.1	6.5	6.5	35.5	22	3.5	6	87	28	1/8	100	140	114
MLUB40	15	6	14	M14 x 1.5	M8 x 1.25 depth 13	60	16	10.5 depth 6.5	M8 x 1.25	6.9	9	8	37.5	22.5	3.5	9	87	36	1/8	104	149	119
MLUB50	18	7	18	M18 x 1.5	M10 x 1.5 depth 15	72	21.5	13.5 depth 8.5	M10 x 1.5	8.7	12	10	44	28	3.5	9	102.5	42	1/4	124.5	177.5	142.5

Dimensions

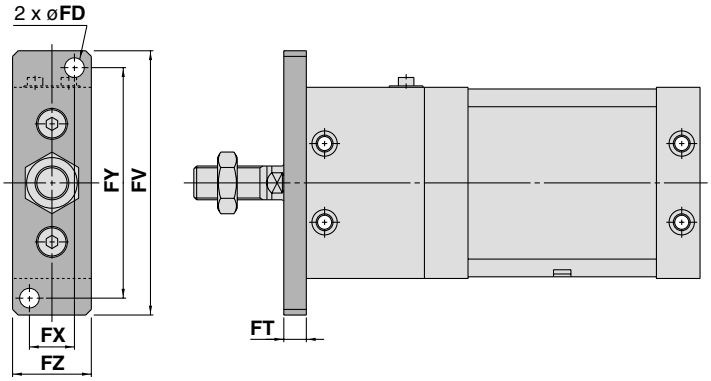
Axial foot style



(mm)

Model	LD	LH	LS	LT	LX	LY	LZ	X	Y	ZZ
MLUL25	5.5	29	114	3.2	11	56	23	12	6	144
MLUL32	6.6	37	132	4.5	12	71	27	16	8	164
MLUL40	9	46	140	4.5	15	89	31	18	10	177
MLUL50	11	57	166.5	5	18	109	37	21	11	209.5

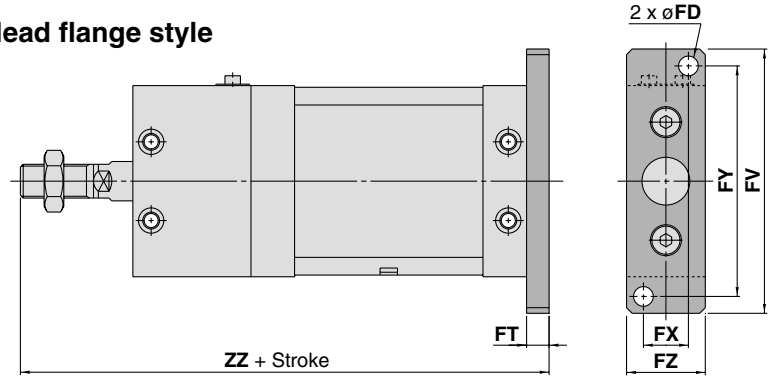
Rod flange style



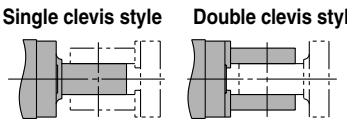
(mm)

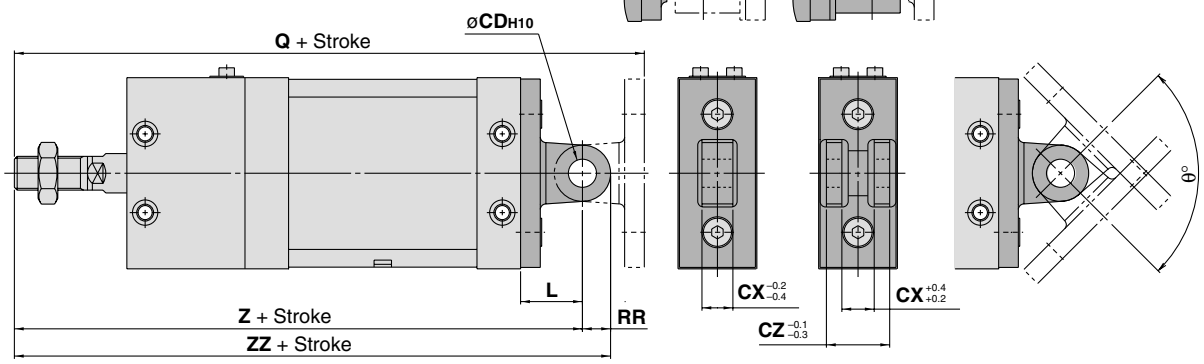
Model	FD	FT	FV	FX	FY	FZ	ZZ
MLUF25, MLUG25	5.5	8	76	14	66	24	134
MLUF32, MLUG32	7	8	94	16	82	28	148
MLUF40, MLUG40	9	9	118	18	102	32	158
MLUF50, MLUG50	11	12	144	22	126	39	189.5

Head flange style



Single clevis style
Double clevis style





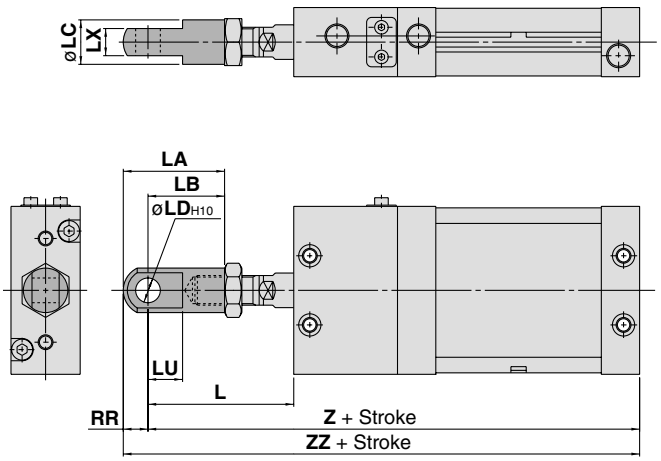
(mm)

Model	CD_{H10}	CX	CZ	L	Q	RR	Z	ZZ	Rotation angle
MLUC25, MLUD25	$8^{+0.058}_{0}$	9	18	17	160	8	143	151	100
MLUC32, MLUD32	$10^{+0.058}_{0}$	11	22	22	184	10	162	172	90
MLUC40, MLUD40	$10^{+0.058}_{0}$	13	26	27	203	10	176	186	80
MLUC50, MLUD50	$14^{+0.070}_{0}$	16	32	32	241.5	14	209.5	223.5	80

∗ Clevis pins and retaining rings are included in the double clevis style.

Accessory Bracket Dimensions

Single knuckle joint

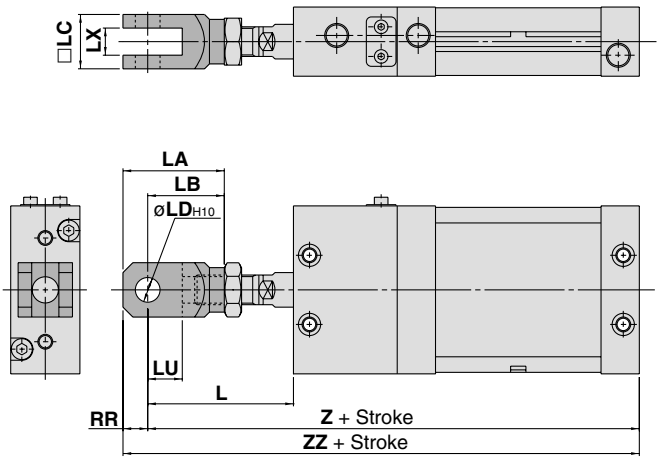


(mm)

Model	L	LA	LB	LC	LD	LU	LX	RR	Z	ZZ
MLU□25	52.5	35.5	27	16	$8^{+0.058}_{0}$	11	$9^{-0.2}_{-0.4}$	8.5	142.5	151
MLU□32	59	41	31	18	$10^{+0.058}_{0}$	14	$11^{-0.2}_{-0.4}$	10	159	169
MLU□40	67	47	36	20	$10^{+0.058}_{0}$	15	$13^{-0.2}_{-0.4}$	11	171	182
MLU□50	81	62	46	28	$14^{+0.070}_{0}$	20	$16^{-0.2}_{-0.4}$	16	205.5	221.5

The “L”, “Z” and “ZZ” dimensions are reference dimensions when mounting a single knuckle joint. Please use them as guidelines.

Double knuckle joint

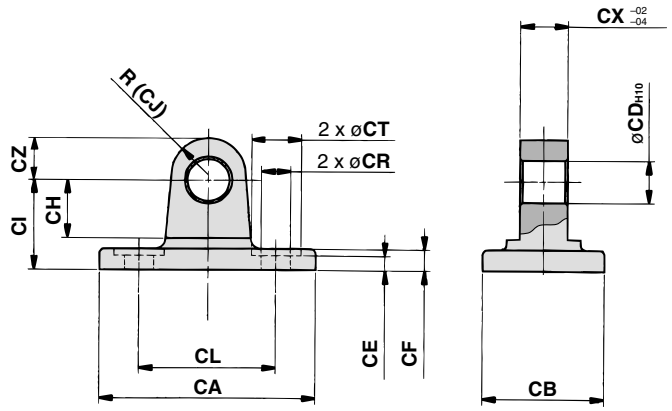


(mm)

Model	L	LA	LB	□LC	LD	LU	LX	RR	Z	ZZ	Applicable pin no.
MLU□25	52.5	35	27	18	$8^{+0.058}_{0}$	13	$9^{+0.4}_{+0.2}$	8	142.5	150.5	CD-MU02
MLU□32	59	41	31	22	$10^{+0.058}_{0}$	14	$11^{+0.4}_{+0.2}$	10	159	169	CD-MU03
MLU□40	67	46	36	26	$10^{+0.058}_{0}$	17	$13^{+0.4}_{+0.2}$	10	171	181	CD-MU04
MLU□50	81	62	46	32	$14^{+0.070}_{0}$	23	$16^{+0.4}_{+0.2}$	16	205.5	221.5	CD-MU05

The “L”, “Z” and “ZZ” dimensions are reference dimensions when mounting a double knuckle joint. Please use them as guidelines.

Single clevis (Double clevis bracket)

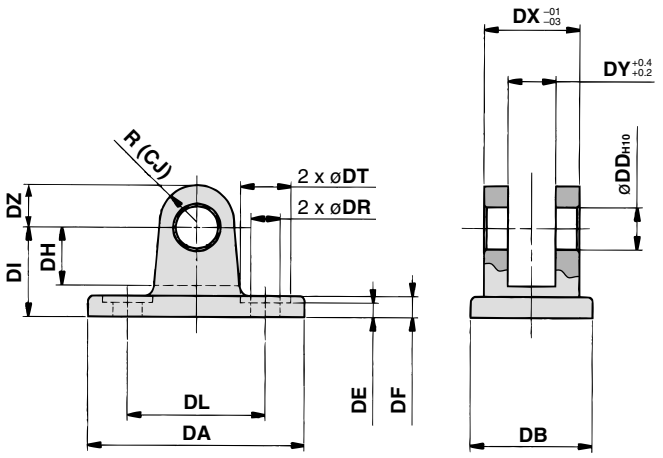


(mm)

Model	Size	CA	CB	CD_{H10}	CE	CF	CH	CI	CJ
MU-C02	25	53	23	$8^{+0.058}_{0}$	3.5	4	11	17	7
MU-C03	32	67	27	$10^{+0.058}_{0}$	3.5	7	13	22	10
MU-C04	40	85	31	$10^{+0.058}_{0}$	3.5	10	13	27	10
MU-C05	50	103	37	$14^{+0.070}_{0}$	5.5	12	17	32	14

Model	CL	CR	CT	CX	CZ
MU-C02	26	5.3	9.5	9	8
MU-C03	42	6.4	11	11	10
MU-C04	54	8.4	14	13	10
MU-C05	64	10.5	17	16	14

Double clevis (Single clevis bracket)



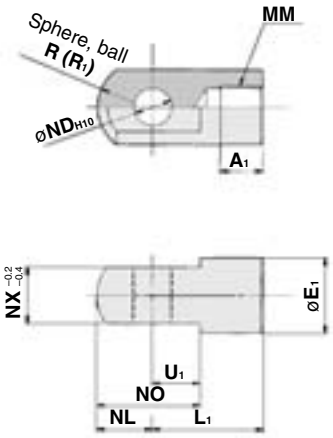
(mm)

Model	Size	DA	DB	DD_{H10}	DE	DF	DH	DI	DJ
MU-D02	25	53	23	$8^{+0.058}_{0}$	3.5	4	11	17	7
MU-D03	32	67	27	$10^{+0.058}_{0}$	3.5	7	13	22	10
MU-D04	40	85	31	$10^{+0.058}_{0}$	3.5	10	13	27	10
MU-D05	50	103	37	$14^{+0.070}_{0}$	5.5	12	17	32	14

Model	DL	DR	DT	DX	DY	DZ	Applicable pin no.
MU-D02	26	5.3	9.5	18	9	8	CD-MU02
MU-D03	42	6.4	11	22	11	10	CD-MU03
MU-D04	54	8.4	14	26	13	10	CD-MU04
MU-D05	64	10.5	17	32	16	14	CD-MU05

Clevis pins and retaining rings are included with the double clevis type.

Single knuckle joint

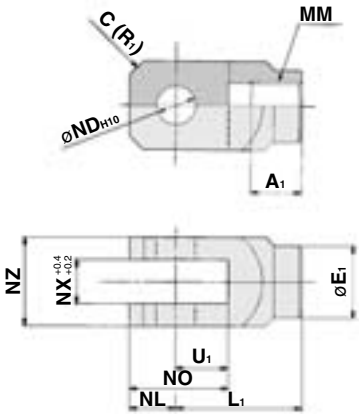


(mm)

Part no.	Size	A_1	E_1	L_1	MM
I-MU02	25	10.5	16	27	M10 x 1.25
I-MU03	32	12	18	31	M12 x 1.25
I-MU04	40	14	20	36	M14 x 1.5
I-MU05	50	18	28	46	M18 x 1.5

Part no.	ND_{H10}	NL	NO	NX	R_1	U_1
I-MU02	$8^{+0.058}_{0}$	8.5	19.5	9	8.5	11
I-MU03	$10^{+0.058}_{0}$	10	24	11	10	14
I-MU04	$10^{+0.058}_{0}$	11	26	13	11	15
I-MU05	$14^{+0.070}_{0}$	16	36	16	16	20

Double knuckle joint



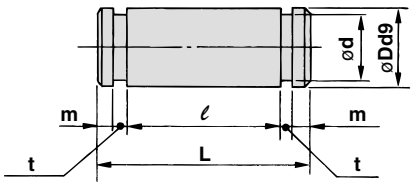
(mm)

Part no.	Size	A_1	E_1	L_1	MM	ND_{H10}
Y-MU02	25	10.5	14	27	M10 x 1.25	$8^{+0.058}_{0}$
Y-MU03	32	12	18	31	M12 x 1.25	$10^{+0.058}_{0}$
Y-MU04	40	14	20	36	M14 x 1.5	$10^{+0.058}_{0}$
Y-MU05	50	18	28	46	M18 x 1.5	$14^{+0.070}_{0}$

Part no.	NL	NO	NX	NZ	R_1	U_1	Applicable pin no.
Y-MU02	8	21	9	18	3	13	CD-MU02
Y-MU03	10	24	11	22	4	14	CD-MU03
Y-MU04	10	27	13	26	5	17	CD-MU04
Y-MU05	16	39	16	32	6	23	CD-MU05

∗ Knuckle pin and retaining ring are included.

Clevis pin and knuckle pin



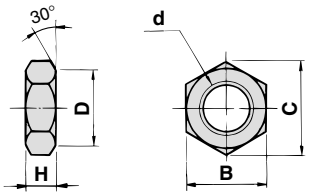
(mm)

Part no.	Size	Dd9	L	d	ℓ
CD-MU02	25	$8^{-0.040}_{-0.076}$	23	7.6	18.2
CD-MU03	32	$10^{-0.040}_{-0.076}$	27	9.6	22.2
CD-MU04	40	$10^{-0.040}_{-0.076}$	31	9.6	26.2
CD-MU05	50	$14^{-0.050}_{-0.093}$	38	13.4	32.2

Part no.	m	t	Retaining ring
CD-MU02	1.5	0.9	C8 type for pivot
CD-MU03	1.25	1.15	C10 type for pivot
CD-MU04	1.25	1.15	C10 type for pivot
CD-MU05	1.75	1.15	C14 type for pivot

∗ Included with the double clevis and double knuckle joint as standard.
∗ Retaining rings are included.

Rod end nut



(mm)

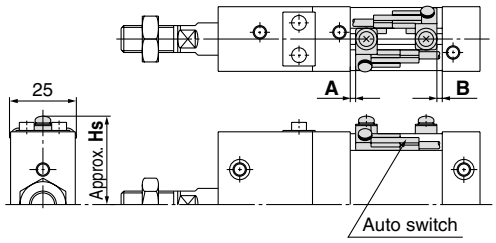
Part no.	Size	d	H	B	C	D
NT-03	25	M10 x 1.25	6	17	19.6	16.5
NT-MU03	32	M12 x 1.25	7	19	21.9	18
NT-04	40	M14 x 1.5	8	22	25.4	21
NT-05	50	M18 x 1.5	11	27	31.2	26

∗ One piece is included with the rod end male thread as standard.

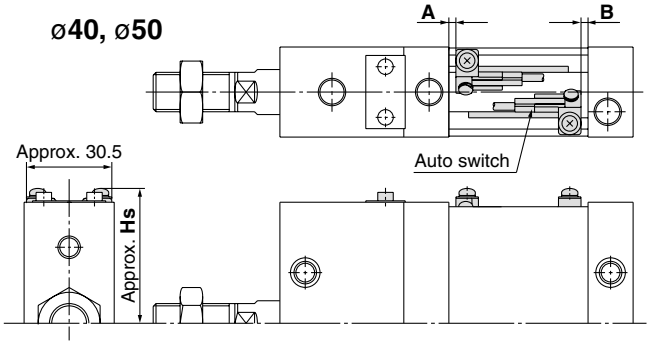
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

D-M9□
D-M9□V
D-M9□W
D-M9□WV
D-M9□AL
D-M9□AVL

ø25, ø32

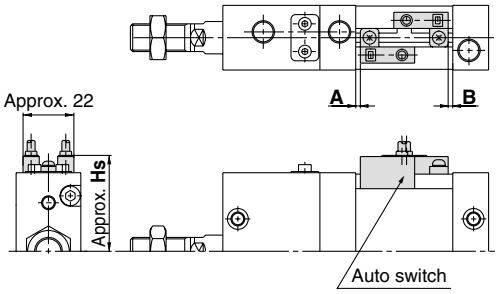


ø40, ø50

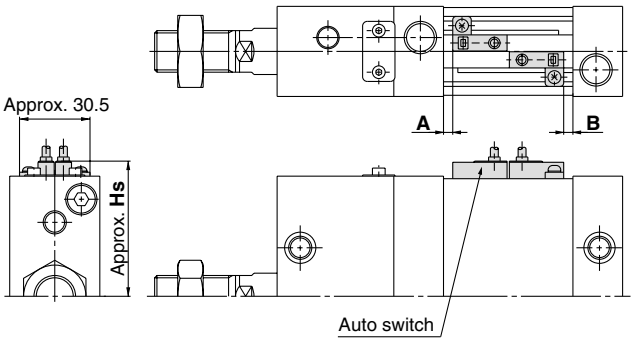


D-A7□
D-A80
D-A7□H
D-A80H
D-F7□
D-J79
D-F7□W
D-J79W
D-F79F
D-F7NT
D-F7BAL
D-A73C
D-A80C
D-J79C
D-A79W
D-F7□WV
D-F7□V
D-F7BAVL

ø25, ø32

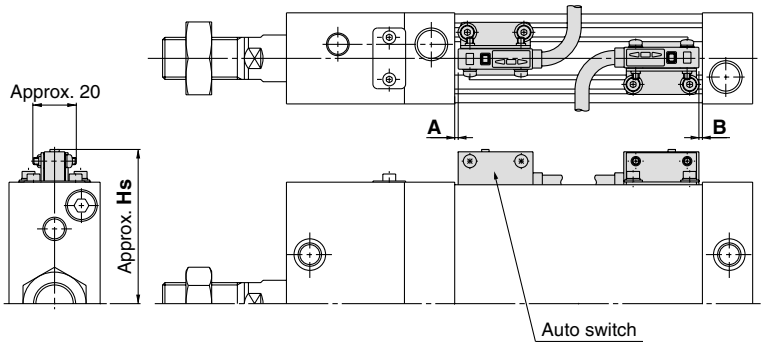


ø40, ø50



D-P4DW

ø40, ø50



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL		D-A73 D-A80		D-A72 D-A7□H D-A80H D-F7□ D-F7□V D-J79 D-F7□W D-F7□WV D-J79W D-F7BAL D-F7BAVL D-F79F		D-A73C D-A80C D-J79C		D-A79W		D-F7NTL		D-P4DWL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
25	5.5	6	4	4.5	4.5	5	4.5	5	1.5	2	9.5	10	—	—
32	5.5	6	4	4.5	4.5	5	4.5	5	1.5	2	9.5	10	—	—
40	6	6.5	4.5	5	5	5.5	0	0	2	2.5	10	10.5	0.5	1
50	7.5	8	6	6.5	6.5	7	0.5	1	3.5	4	11.5	12	2	2.5
63	8.5	8.5	6.5	7	7	7.5	1	1.5	4	4.5	12	12.5	2.5	3

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

(mm)

Auto switch model / Bore size (mm)	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL	D-A7□ D-A80	D-A7□H D-80H D-F7□ D-J79 F-F7□W D-79W D-F7NTL D-F79F D-F7BAL	D-A73C D-A80C	D-F7□V D-F7□WV D-F7BAVL	D-J79C	D-A79W	D-P4DWL
	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs
25	33.5	32	33	39	35.5	37.5	34.5	—
32	40.5	39	40	46	42.5	44.5	41.5	—
40	48.5	47	48	54	50.5	52.5	49.5	56.5
50	58	56	57	63	59.5	61.5	58.5	66

Minimum Stroke for Auto Switch Mounting

(mm)

Number of auto switches	D-F7□V D-J79C	D-M9□V D-A7□ D-A80 D-A73C D-A80C	D-M9□WV D-F7□WV D-F7BAVL	D-M9□ D-M9□W D-A7□H/A80H D-A79W D-F7□/J79 D-F7□W/J79W D-F7BAL/F7NTL D-F79F	D-P4DWL*	
					Different side(s)	Same side
2 pcs.	5	5	10	15	20	
1 pc.	5	10	15	15	20	75

* Only size 40 and 50 can be mounted.

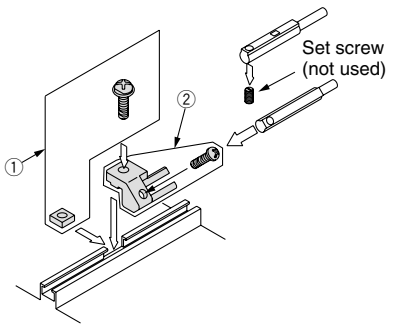
Operating Range

(mm)

Auto switch model	Bore size			
	25	32	40	50
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	4.5	5.5	7	7
D-A7□/A80 D-A7□H/A80H D-A73C/A80C	13	13	13	13
D-A79W	13	13	14	14
D-F7□/J79 D-F7□V/J79C D-F7□W/F7□WV D-J79W/F7NTL D-F7BAL/F7BAVL D-F79F	6.5	7	6.5	6.5
D-P4DWL	—	—	5	5

* Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)			
	ø25	ø32	ø40	ø50
D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL	①BMU1-025 ②BQ2-012 Two kinds of auto switch mounting brackets are used as a set.			
				
D-A7□/A80 D-A73C/A80C D-A7□H/A80H D-A79W D-F7□/J79 D-F7□V D-J79C D-F7□W/J79W D-F7□WV D-F7BAL/F7BAVL D-F79F/F7NTL	BMU1-025			
D-P4DWL	—		BMU2-040	

[Mounting screw set made of stainless steel]

The following set of mounting screws made of stainless steel (including nuts) is available. Use it in accordance with the operating environment.

BBA2: For D-A7/A8/F7/J7 types

D-F7BAL/D-F7BAVL are set on the cylinder with the stainless steel screws above when shipped.

When an auto switch is shipped independently, BBA2 is attached.

Note 1) Refer to page 1817 for the details of BBA2.

Note 2) When mounting D-M9□A(V)L, order auto switch mounting brackets, stainless steel screw set BBA2 and BQ2-012S separately.

Other than the applicable auto switches listed in “How to Order”, the following auto switches can be mounted. For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry direction	Features	Applicable bore size
Solid state	D-F7NV, F7PV, F7BV	Grommet (perpendicular)	—	ø25 to ø50
	D-F7NWV, F7BWV		Diagnostic indication (2-color display)	
	D-F7BAVL		Water resistant (2-color display)	
	D-F79, F7P, J79	Grommet (in-line)	—	
	D-F79W, F7PW, J79W		Diagnostic indication (2-color display)	
	D-F7NTL		With timer	
	D-F7BAL		Water resistant (2-color display)	
	D-P5DWL		Magnetic field resistant (2-color display)	ø40, ø50

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785.

∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.