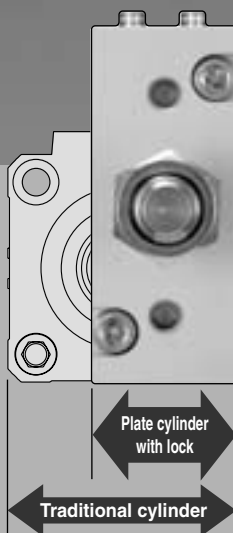
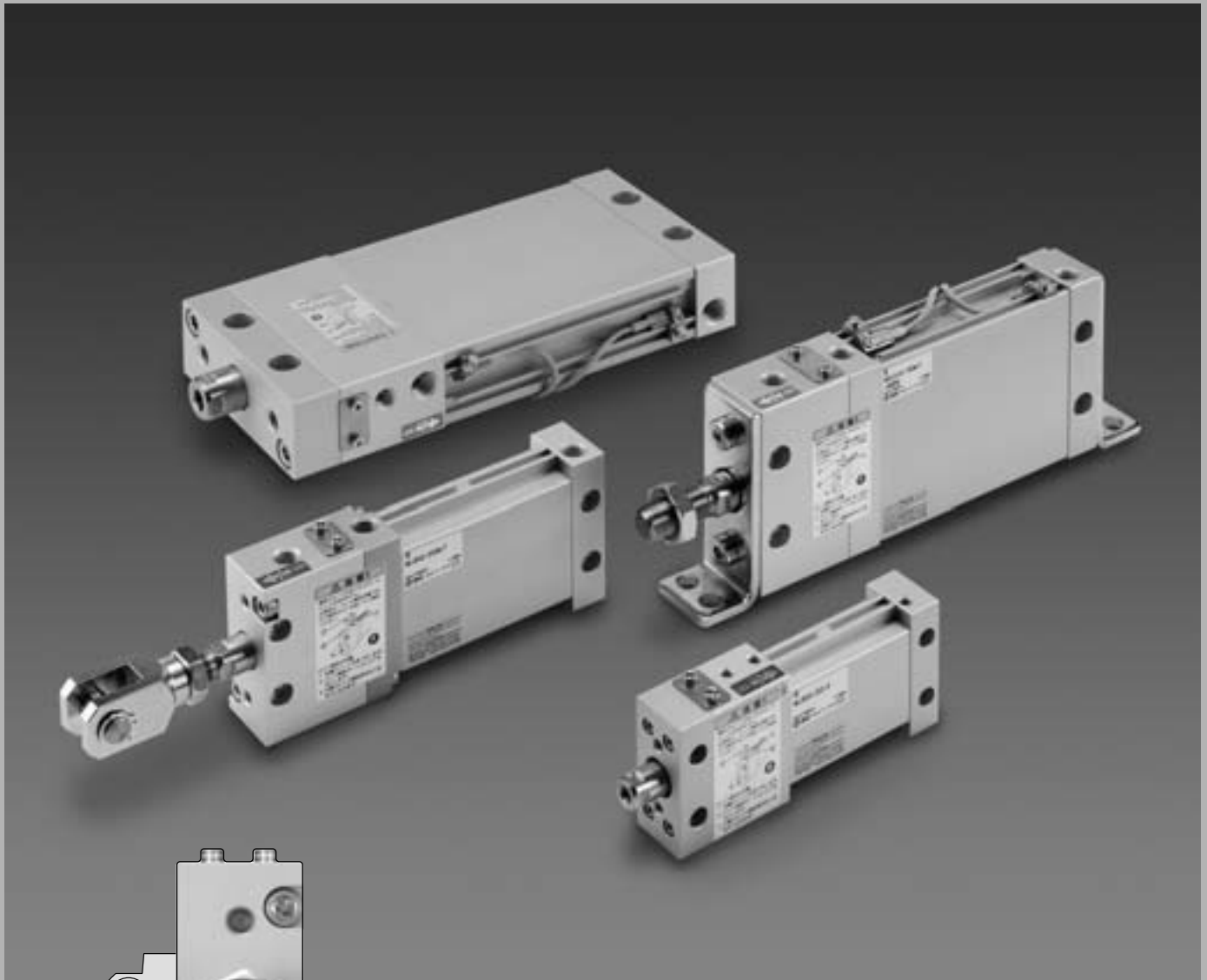


# Plate Cylinder with Lock

**Series *MLU***

**ø25, ø32, ø40, ø50**



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

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

**MLU**

MLGP

ML1C

D-□

-X□

Individual  
-X□

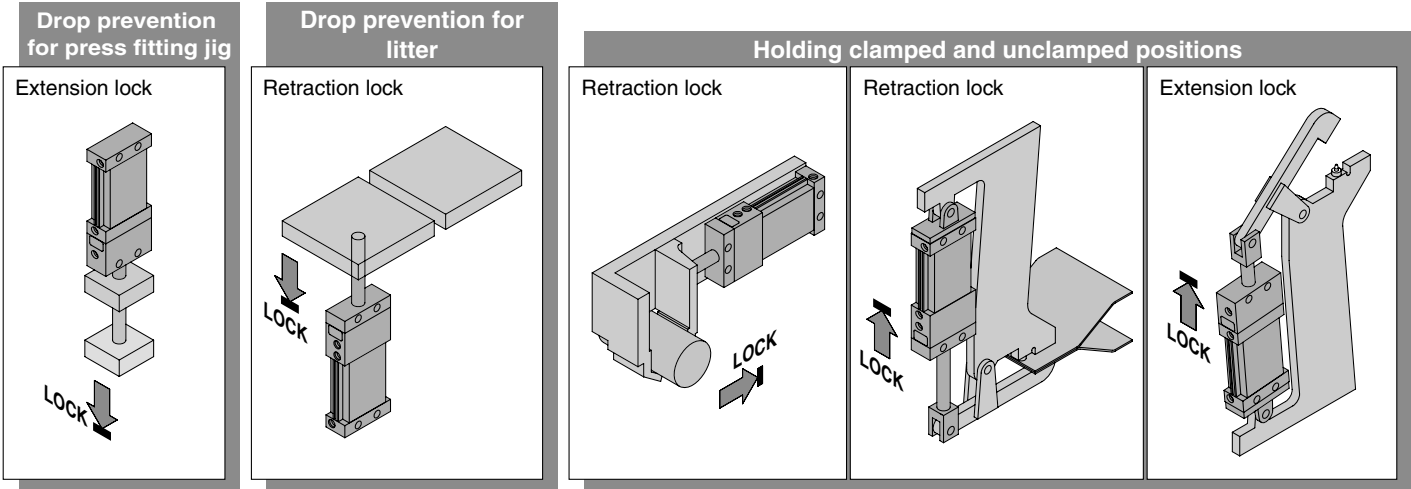
# Plate Cylinder with Lock

## Series MLU

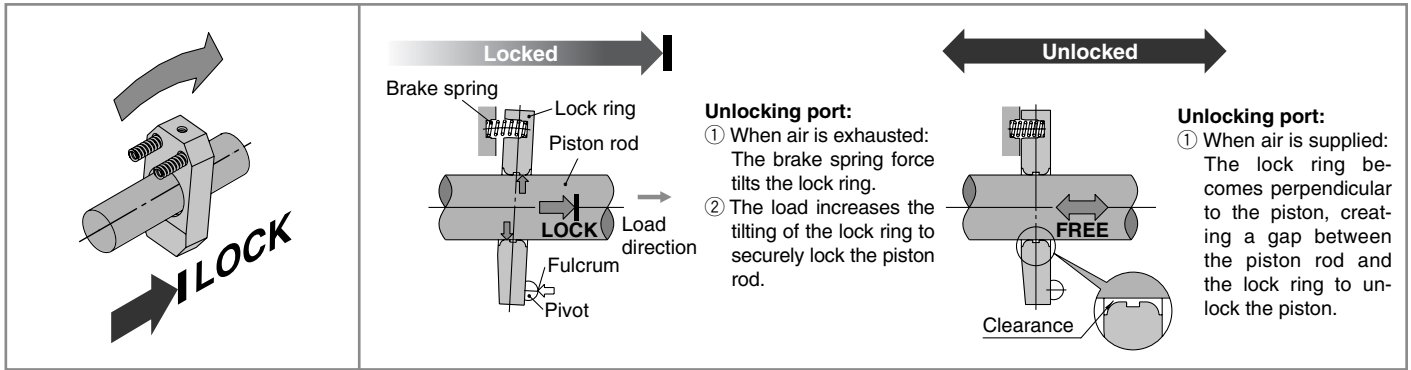
ø25, ø32, ø40, ø50

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.



Simple construction: Simple and reliable locking system

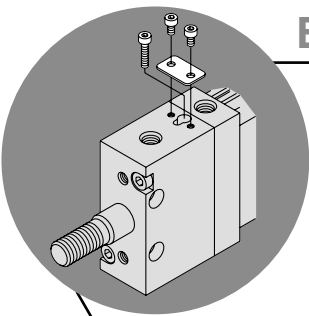
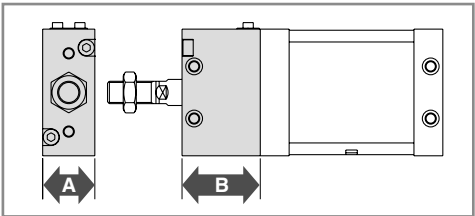


### Slim and compact lock unit

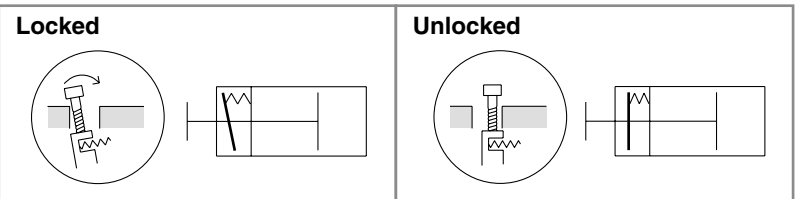
- Lock unit length  
**35 mm to 50.5 mm**
- Lock unit width  
**24 mm to 39 mm**

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

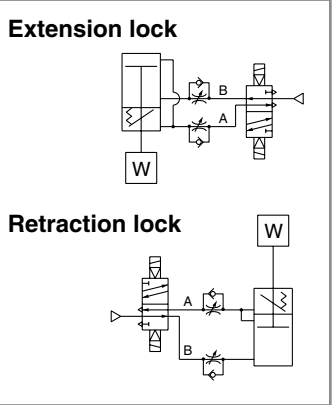
| Bore size (mm) | Lock unit thickness (mm) |      |
|----------------|--------------------------|------|
|                | A                        | B    |
| 25             | 24                       | 35   |
| 32             | 28                       | 42   |
| 40             | 32                       | 44   |
| 50             | 39                       | 50.5 |



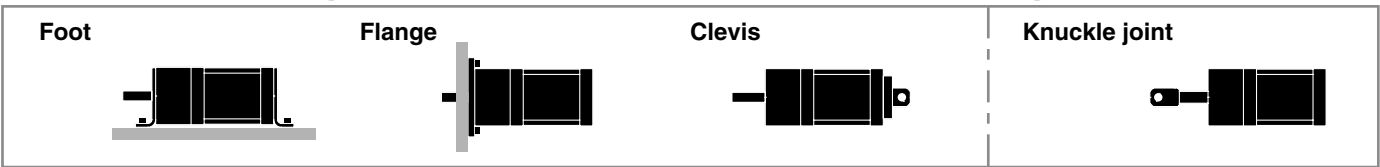
### Easy manual unlocking



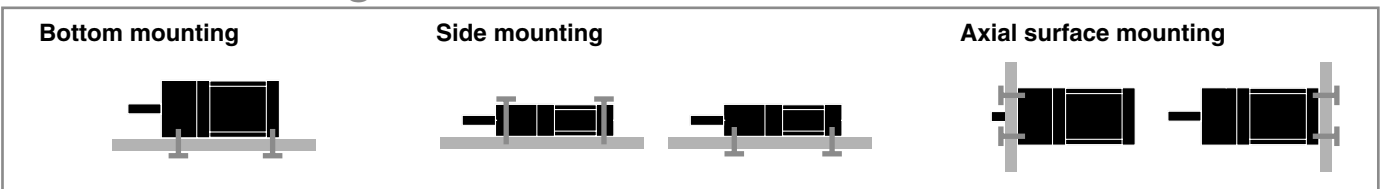
Locking direction can be selected.



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 |
| MLU    | Extension lock    | 25             | ●                    | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●   |
|        |                   | 32             | ●                    | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●   |
|        | Retraction lock   | 40             | ●                    | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●   |
|        |                   | 50             | ●                    | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●  | ●   | ●   | ●   |

CLJ2  
CLM2  
CLG1  
CL1  
MLGC  
CNG  
MNB  
CNA  
CNS  
CLS  
CLQ  
RLQ  
MLU  
MLGP  
ML1C

D-□  
-X□  
Individual  
-X□



## 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.

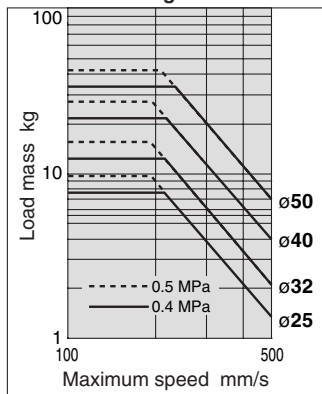
This may damage the locking mechanism, shorten the service life or cause unlocking malfunction.

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

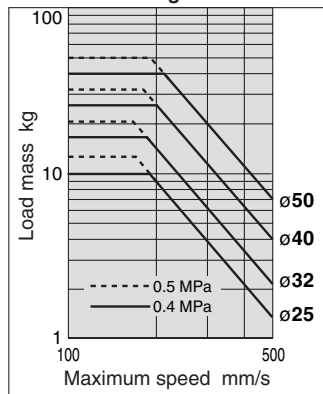
Operation beyond the limiting range will lead to cylinder damage and reduced service life, etc.

### Allowable Kinetic Energy (Energy absorbable at the cylinder end)

Extension locking direction

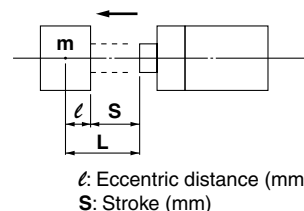
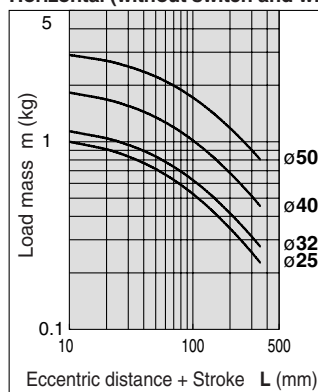


Retraction locking direction



### Allowable Load Mass

Horizontal (without switch and with switch)



## 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.

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.



## Series MLU

# 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

#### • 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)

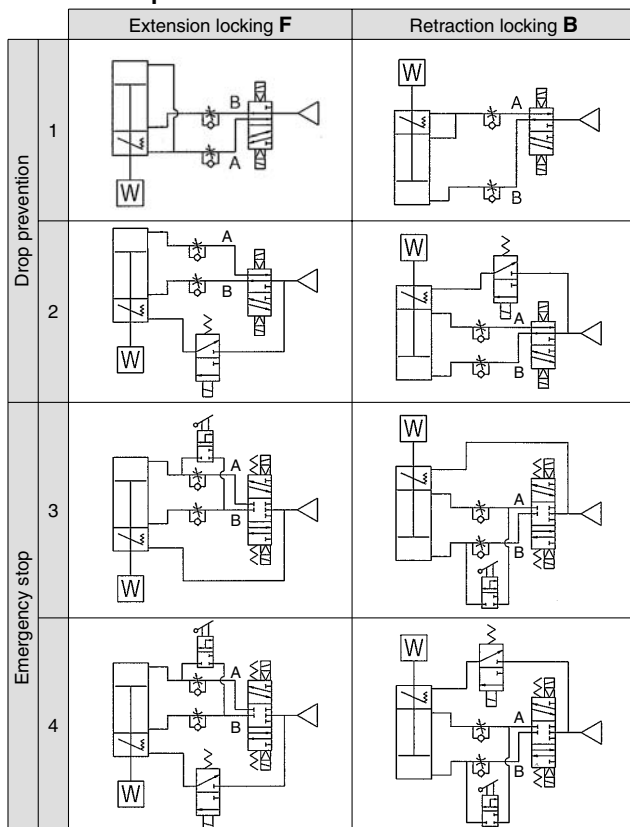
When the lock release delays, the cylinder may eject at high speed, which is extremely dangerous. It may also damage the cylinder, greatly shorten the service life or cause the locking malfunction. Even when the cylinder moves freely, be sure to release the lock and operate the cylinder.

#### • Drop prevention circuit, Emergency stop circuit

##### 1. If installing a solenoid valve for a lock unit, be aware that repeated supply and exhaustion of air may cause condensation. (Circuit examples 2 and 4)

The lock unit operating stroke is very small and so the pipe is long. If supplying and exhausting air repeatedly, condensation, which occurs by adiabatic expansion, accumulates in the lock unit. This may then cause air leakage and an unlocking malfunction due to corrosion of internal parts.

#### Circuit example



### 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

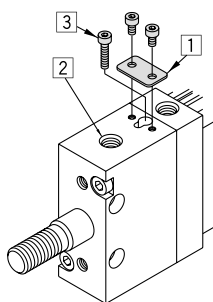
## Warning

##### 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.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual  
-X□



## 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

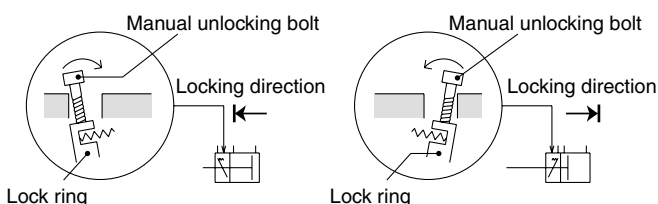
1. Do not perform unlocking when an external force such as a load or spring force is being applied.

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  $\phi 25$ ,  $\phi 32$ : M3 x 0.5 x 25  $\ell$  or more,  $\phi 40$ ,  $\phi 50$ : M4 x 0.7 x 35  $\ell$  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  $\phi 25$ ,  $\phi 32$ : M3 x 0.5 x 25  $\ell$  or more,  $\phi 40$ ,  $\phi 50$ : M4 x 0.7 x 35  $\ell$  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.

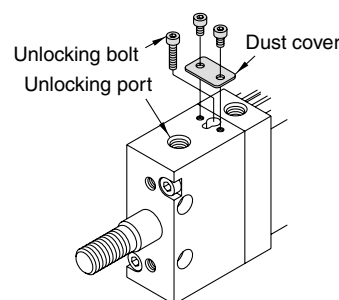
### Holding the Unlocked State

#### 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  $\phi 25$ ,  $\phi 32$ : M3 x 12  $\ell$ ,  $\phi 40$ ,  $\phi 50$ : M4 x 16  $\ell$ ) 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".

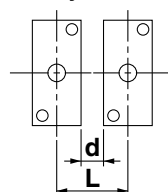
### Auto Switch Handling Precautions

#### 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.

|      |
|------|
| CLJ2 |
|------|

|      |
|------|
| CLM2 |
|------|

|      |
|------|
| CLG1 |
|------|

|     |
|-----|
| CL1 |
|-----|

|      |
|------|
| MLGC |
|------|

|     |
|-----|
| CNG |
|-----|

|     |
|-----|
| MNB |
|-----|

|     |
|-----|
| CNA |
|-----|

|     |
|-----|
| CNS |
|-----|

|     |
|-----|
| CLS |
|-----|

|     |
|-----|
| CLQ |
|-----|

|     |
|-----|
| RLQ |
|-----|

|            |
|------------|
| <b>MLU</b> |
|------------|

|      |
|------|
| MLGP |
|------|

|      |
|------|
| ML1C |
|------|

|     |
|-----|
| D-□ |
|-----|

|     |
|-----|
| -X□ |
|-----|

|                   |
|-------------------|
| Individual<br>-X□ |
|-------------------|

# 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           |
| TN  | Rc       | ø32, ø40, ø50 |
| TF  | NPT      |               |
| TF  | G        |               |

**Cylinder stroke (mm)**

Refer to "Standard Stroke" on page 871.

**Locking direction**

|   |                    |
|---|--------------------|
| F | Extension locking  |
| B | Retraction locking |

**Rod end shape**

|     |                       |
|-----|-----------------------|
| Nil | Rod end female thread |
| M   | Rod end male thread   |

**Action**

|   |               |
|---|---------------|
| D | Double acting |
|---|---------------|

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

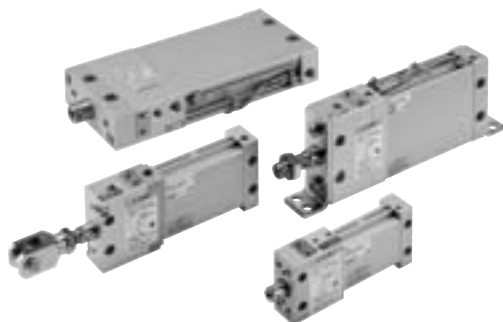
\*\* Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.  
Consult with SMC regarding water resistant types with the above model numbers.

\* 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 <small>Note)</small>    |     |     |    |
| Ambient and fluid temperature   | - 10 to 60°C (with no freezing) |     |     |    |
| Lubrication                     | Non-lube                        |     |     |    |
| Cushion                         | Rubber bumper (Standard)        |     |     |    |
| Stroke length tolerance         | $+1.4$<br>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) <small>Note)</small> | 245                                                            | 403 | 629 | 982 |

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

## Non-rotating Rod Accuracy

| Size                      | 25            | 32              | 40              | 50 |
|---------------------------|---------------|-----------------|-----------------|----|
| Non-rotating rod accuracy | $\pm 1^\circ$ | $\pm 0.8^\circ$ | $\pm 0.5^\circ$ |    |

## Standard Stroke

| Size           | Standard stroke (mm)                                                           | Max. manufacturable stroke |
|----------------|--------------------------------------------------------------------------------|----------------------------|
| 25, 32, 40, 50 | 5, 10, 15, 20, 25, 30, 35, 40, 45, 50<br>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 |

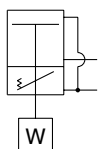
Note) The mass of the attached metal single clevis and double clevis include the mass of two pieces of mounting bolts.

Calculation method—Example: MDLUL32-100D-F

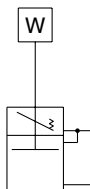
● Basic mass: ..... 0.72 (axial foot type · size 32)  
● Additional mass: ..... 0.16/50 stroke  
● Stroke: ..... 100 stroke  
 $0.72 + 100/50 \times 0.16 = 1.04$  kg

### JIS Symbol

Extension locking



Retraction locking



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.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

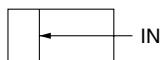
ML1C

D-□

-X□

Individual  
-X□

## Theoretical Output



Unit: N

| Size | Rod size (mm) | Operating direction | Piston area (mm <sup>2</sup> ) | 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<sup>2</sup>)

## Mounting Bracket Part No.

| Bracket \ Size                   | 25     | 32     | 40     | 50     |
|----------------------------------|--------|--------|--------|--------|
| Foot <sup>Note 1)</sup>          | 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 <sup>Note 3)</sup> | MU-D02 | MU-D03 | MU-D04 | MU-D05 |



Note 1) When ordering foot brackets, order 2 pieces for each cylinder.

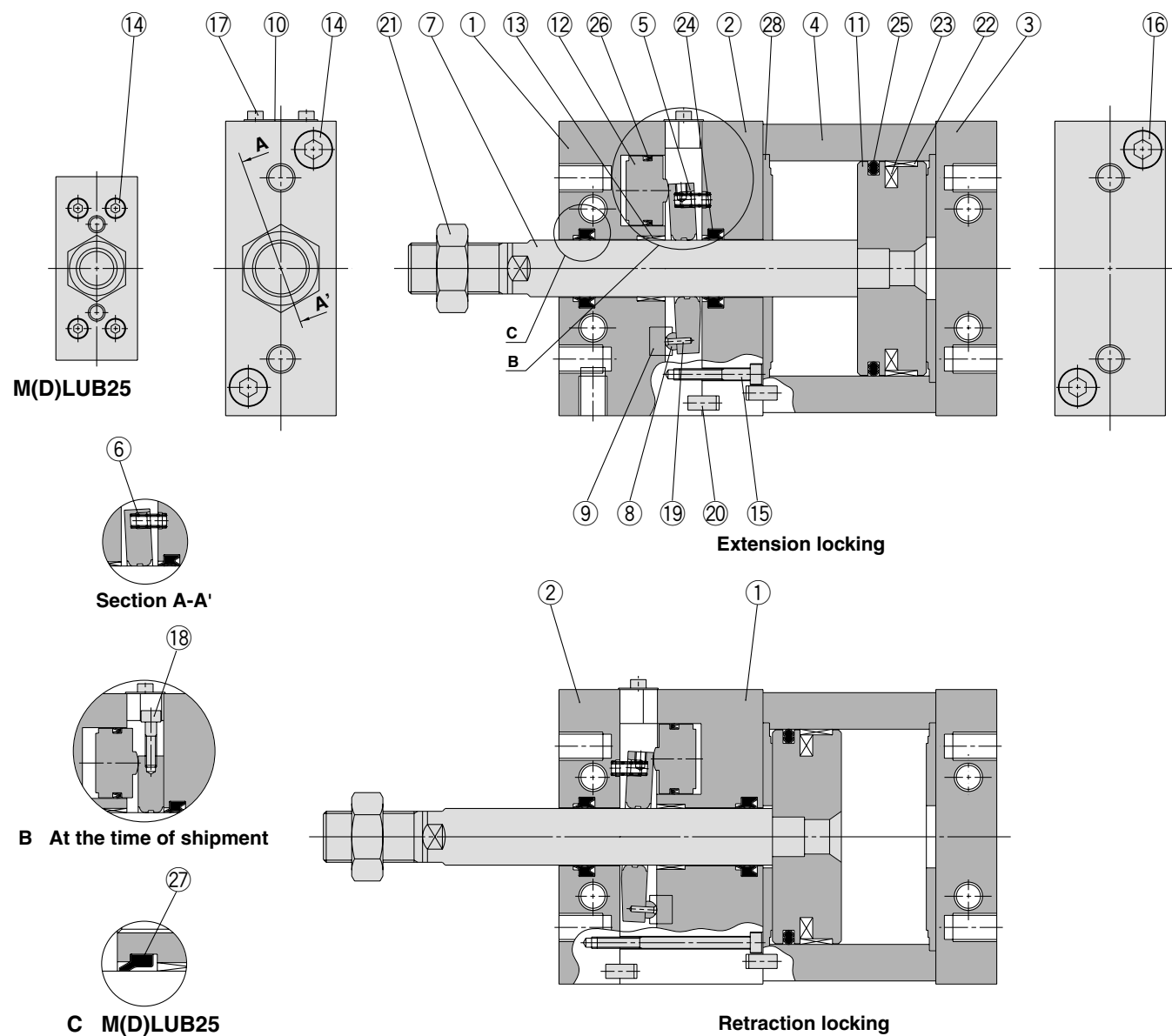
Note 2) The parts included with each bracket are shown below.

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



CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

**MLU**

MLGP

ML1C

## 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                        | Sintering oil 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<br>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         |                                                                   |

D-☐

-X☐

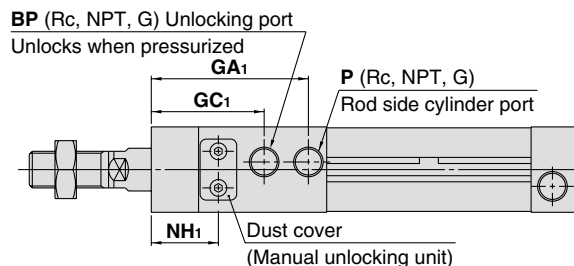
Individual  
-X☐

## Dimensions

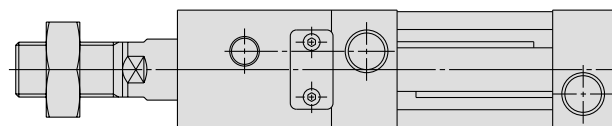
### Basic style

M(D)LUB25, 32

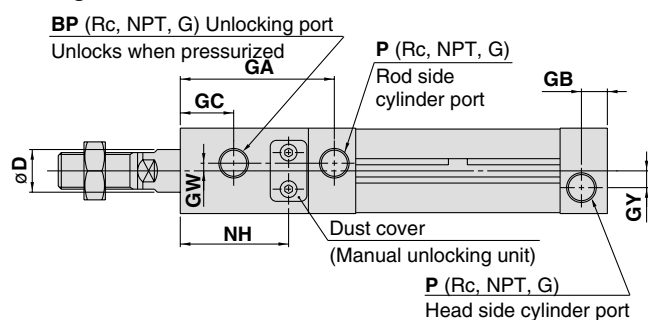
Retraction locking



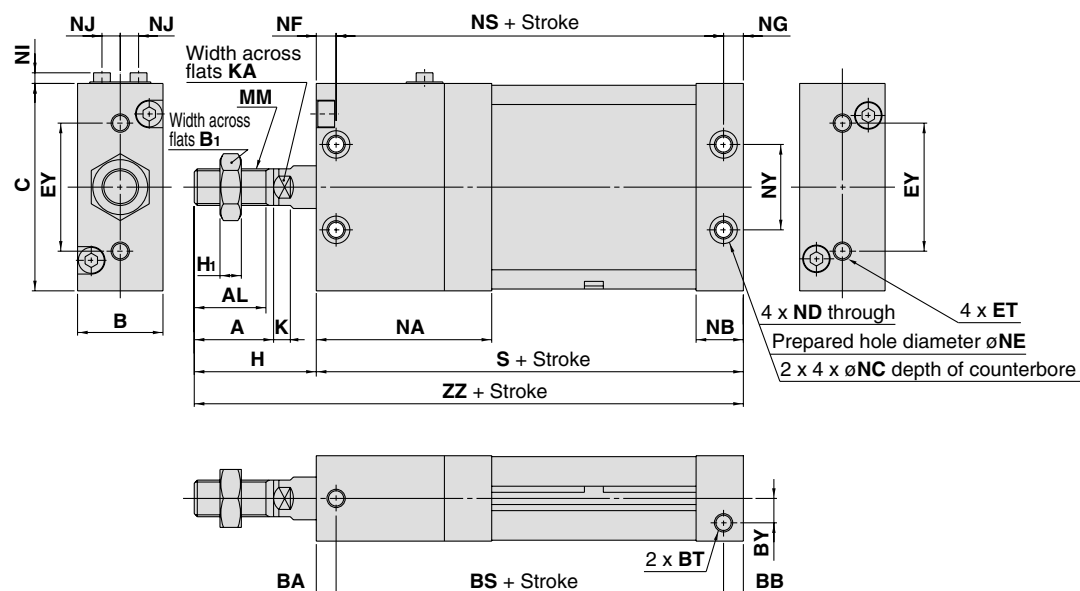
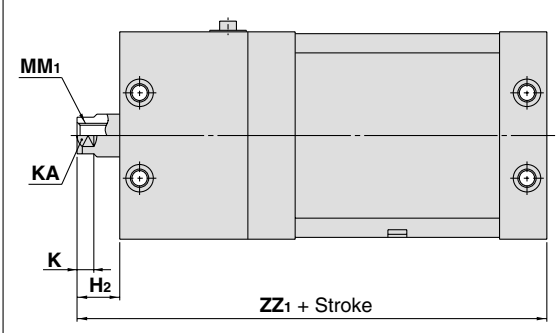
M(D)LUB40, 50



### Extension locking



### Rod end female thread



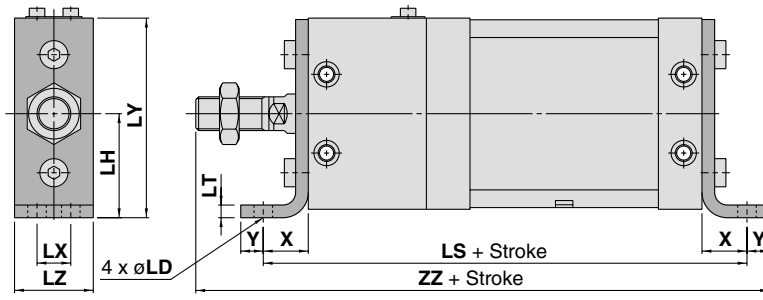
(mm)

| 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

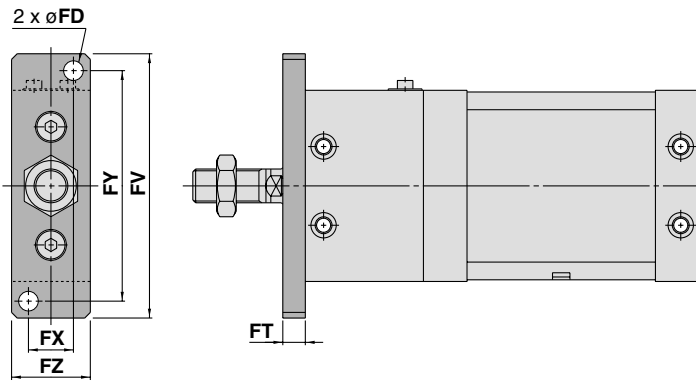
### Axial foot style



| 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 |

(mm)

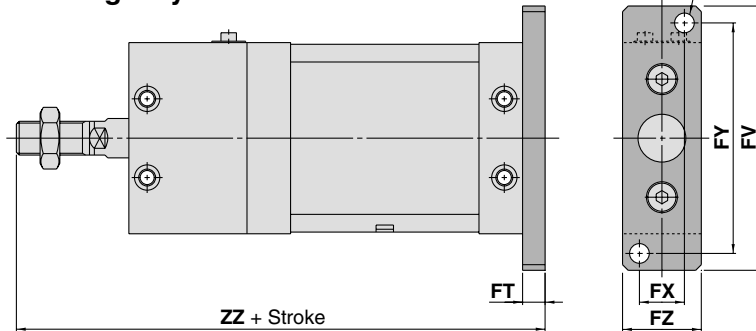
### Rod flange style



| 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 |

(mm)

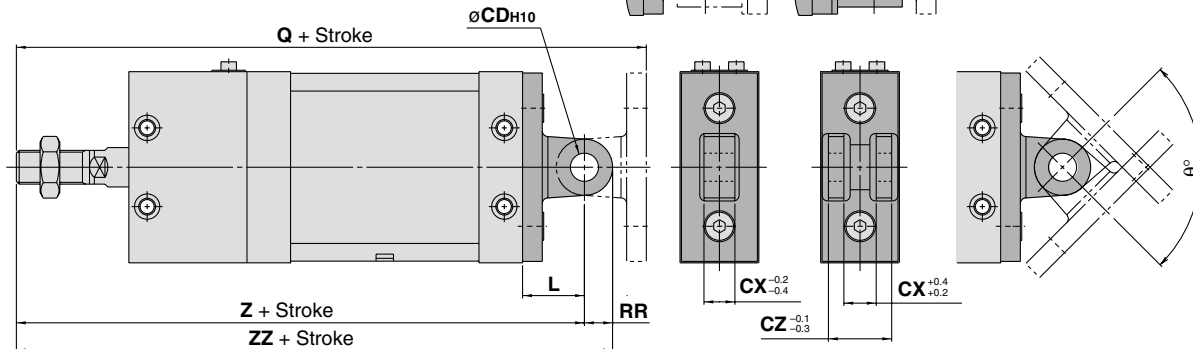
### Head flange style



### Single clevis style Double clevis style

#### Single clevis style

#### Double clevis style



| Model          | CDH10                             | CX | CZ | L  | Q     | RR | Z     | ZZ    | Rotation angle |
|----------------|-----------------------------------|----|----|----|-------|----|-------|-------|----------------|
| MLUC25, MLUD25 | 8 <sup>+0.058</sup> <sub>0</sub>  | 9  | 18 | 17 | 160   | 8  | 143   | 151   | 100            |
| MLUC32, MLUD32 | 10 <sup>+0.058</sup> <sub>0</sub> | 11 | 22 | 22 | 184   | 10 | 162   | 172   | 90             |
| MLUC40, MLUD40 | 10 <sup>+0.058</sup> <sub>0</sub> | 13 | 26 | 27 | 203   | 10 | 176   | 186   | 80             |
| MLUC50, MLUD50 | 14 <sup>+0.070</sup> <sub>0</sub> | 16 | 32 | 32 | 241.5 | 14 | 209.5 | 223.5 | 80             |

(mm)

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

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

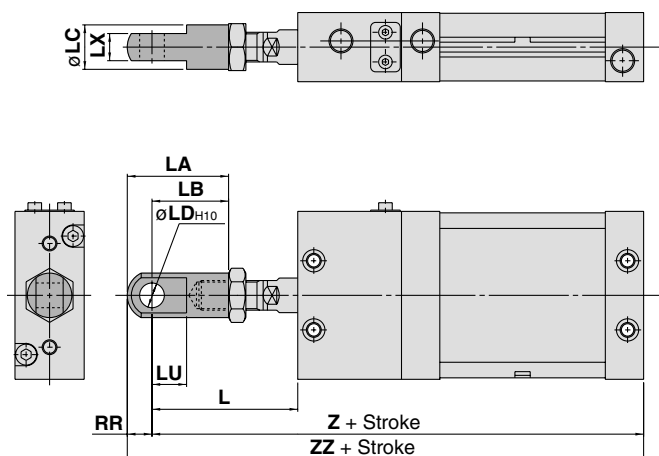
-X□

Individual

-X□

## Accessory Bracket Dimensions

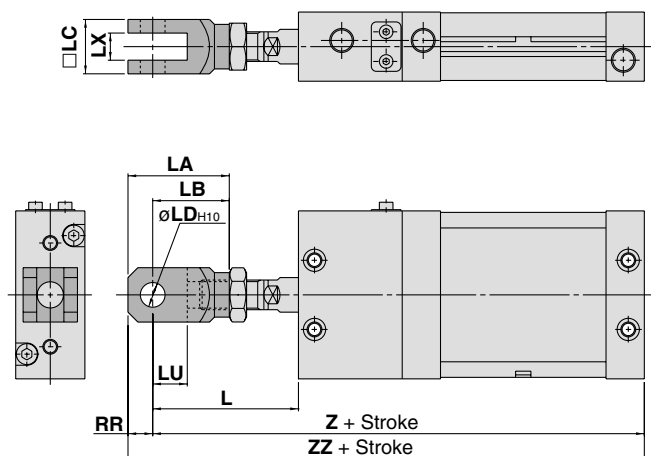
### Single knuckle joint



| Model  | L    | LA   | LB | LC | LD                                | LU | LX                                 | RR  | Z     | ZZ    |
|--------|------|------|----|----|-----------------------------------|----|------------------------------------|-----|-------|-------|
| MLU-25 | 52.5 | 35.5 | 27 | 16 | 8 <sup>+0.058</sup> <sub>0</sub>  | 11 | 9 <sup>-0.2</sup> <sub>-0.4</sub>  | 8.5 | 142.5 | 151   |
| MLU-32 | 59   | 41   | 31 | 18 | 10 <sup>+0.058</sup> <sub>0</sub> | 14 | 11 <sup>-0.2</sup> <sub>-0.4</sub> | 10  | 159   | 169   |
| MLU-40 | 67   | 47   | 36 | 20 | 10 <sup>+0.058</sup> <sub>0</sub> | 15 | 13 <sup>-0.2</sup> <sub>-0.4</sub> | 11  | 171   | 182   |
| MLU-50 | 81   | 62   | 46 | 28 | 14 <sup>+0.070</sup> <sub>0</sub> | 20 | 16 <sup>-0.2</sup> <sub>-0.4</sub> | 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.

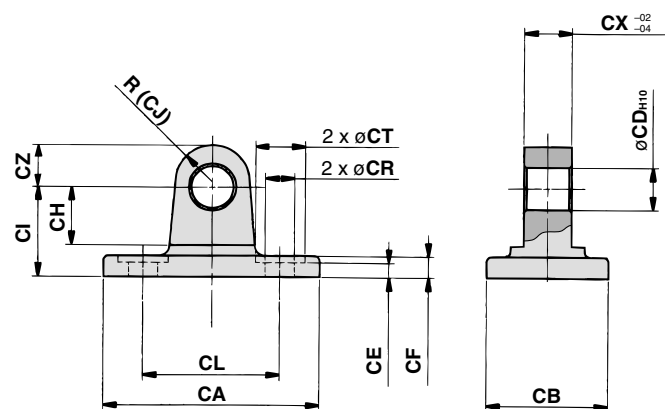
### Double knuckle joint



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

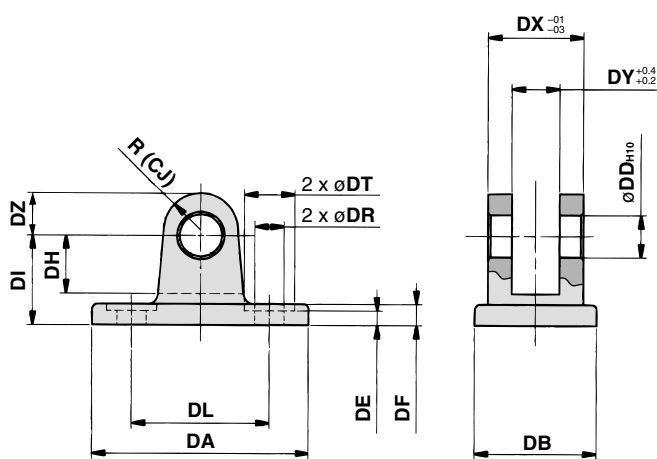
### Single clevis (Double clevis bracket)



| Model  | Size | CA  | CB | CD <sub>H10</sub>                 | CE  | CF | CH | CI | CJ |
|--------|------|-----|----|-----------------------------------|-----|----|----|----|----|
| MU-C02 | 25   | 53  | 23 | 8 <sup>+0.058</sup> <sub>0</sub>  | 3.5 | 4  | 11 | 17 | 7  |
| MU-C03 | 32   | 67  | 27 | 10 <sup>+0.058</sup> <sub>0</sub> | 3.5 | 7  | 13 | 22 | 10 |
| MU-C04 | 40   | 85  | 31 | 10 <sup>+0.058</sup> <sub>0</sub> | 3.5 | 10 | 13 | 27 | 10 |
| MU-C05 | 50   | 103 | 37 | 14 <sup>+0.070</sup> <sub>0</sub> | 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)

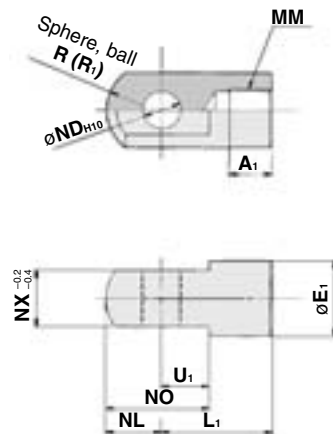


| Model  | Size | DA  | DB | DD <sub>H10</sub>                 | DE  | DF | DH | DI | DJ |
|--------|------|-----|----|-----------------------------------|-----|----|----|----|----|
| MU-D02 | 25   | 53  | 23 | 8 <sup>+0.058</sup> <sub>0</sub>  | 3.5 | 4  | 11 | 17 | 7  |
| MU-D03 | 32   | 67  | 27 | 10 <sup>+0.058</sup> <sub>0</sub> | 3.5 | 7  | 13 | 22 | 10 |
| MU-D04 | 40   | 85  | 31 | 10 <sup>+0.058</sup> <sub>0</sub> | 3.5 | 10 | 13 | 27 | 10 |
| MU-D05 | 50   | 103 | 37 | 14 <sup>+0.070</sup> <sub>0</sub> | 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

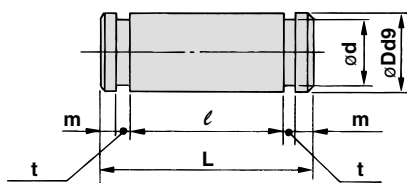


(mm)

| Part no. | Size | A <sub>1</sub> | E <sub>1</sub> | L <sub>1</sub> | 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 <sub>H10</sub>                 | NL  | NO   | NX | R <sub>1</sub> | U <sub>1</sub> |
|----------|-----------------------------------|-----|------|----|----------------|----------------|
| I-MU02   | 8 <sup>+0.058</sup> <sub>0</sub>  | 8.5 | 19.5 | 9  | 8.5            | 11             |
| I-MU03   | 10 <sup>+0.058</sup> <sub>0</sub> | 10  | 24   | 11 | 10             | 14             |
| I-MU04   | 10 <sup>+0.058</sup> <sub>0</sub> | 11  | 26   | 13 | 11             | 15             |
| I-MU05   | 14 <sup>+0.070</sup> <sub>0</sub> | 16  | 36   | 16 | 16             | 20             |

## Clevis pin and knuckle pin



(mm)

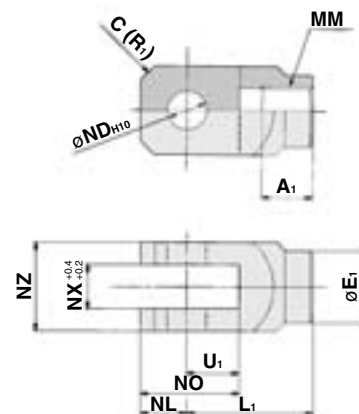
| Part no. | Size | Dd9                                    | L  | d    | l    |
|----------|------|----------------------------------------|----|------|------|
| CD-MU02  | 25   | 8 <sup>+0.040</sup> <sub>-0.076</sub>  | 23 | 7.6  | 18.2 |
| CD-MU03  | 32   | 10 <sup>+0.040</sup> <sub>-0.076</sub> | 27 | 9.6  | 22.2 |
| CD-MU04  | 40   | 10 <sup>+0.040</sup> <sub>-0.076</sub> | 31 | 9.6  | 26.2 |
| CD-MU05  | 50   | 14 <sup>+0.050</sup> <sub>-0.093</sub> | 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.

## Double knuckle joint



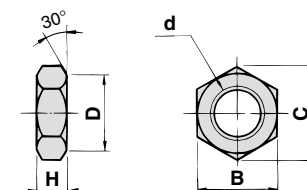
(mm)

| Part no. | Size | A <sub>1</sub> | E <sub>1</sub> | L <sub>1</sub> | MM         | ND <sub>H10</sub>                 |
|----------|------|----------------|----------------|----------------|------------|-----------------------------------|
| Y-MU02   | 25   | 10.5           | 14             | 27             | M10 x 1.25 | 8 <sup>+0.058</sup> <sub>0</sub>  |
| Y-MU03   | 32   | 12             | 18             | 31             | M12 x 1.25 | 10 <sup>+0.058</sup> <sub>0</sub> |
| Y-MU04   | 40   | 14             | 20             | 36             | M14 x 1.5  | 10 <sup>+0.058</sup> <sub>0</sub> |
| Y-MU05   | 50   | 18             | 28             | 46             | M18 x 1.5  | 14 <sup>+0.070</sup> <sub>0</sub> |

| Part no. | NL | NO | NX | NZ | R <sub>1</sub> | U <sub>1</sub> | 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.

## Rod end nut



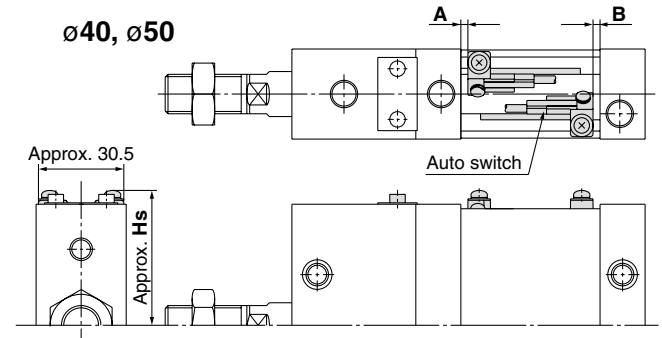
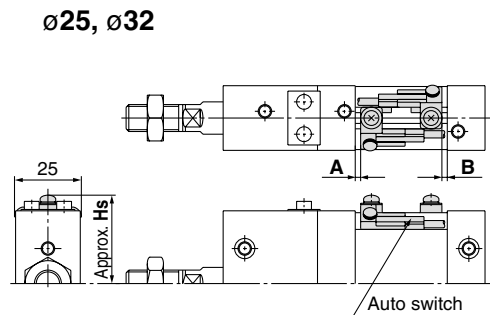
(mm)

| 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   |

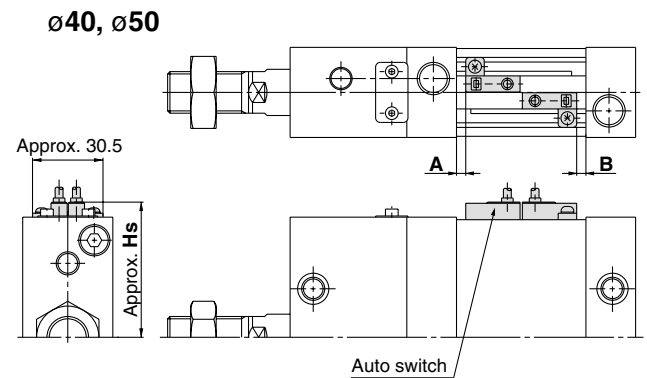
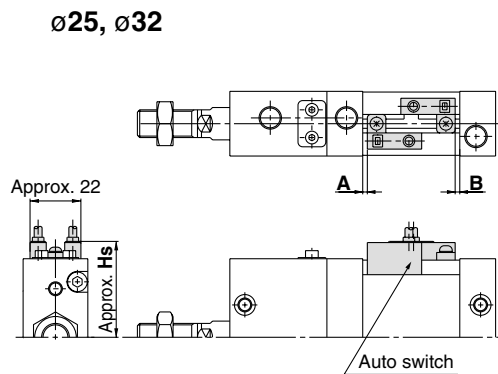
\* One piece is included with the rod end male thread as standard.

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

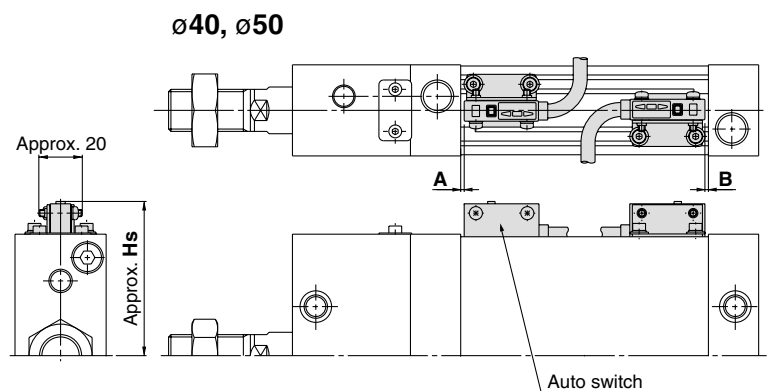
D-M9□  
D-M9□V  
D-M9□W  
D-M9□WV  
D-M9□AL  
D-M9□AVL



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



D-P4DW



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

### Auto Switch Proper Mounting Position

(mm)

| Auto switch model<br>Bore size (mm) | D-M9□<br>D-M9□V<br>D-M9□W<br>D-M9□WV<br>D-M9□AL<br>D-M9□AVL |     | D-A73<br>D-A80 |     | D-A72<br>D-A7□H<br>D-A80H<br>D-F7□<br>D-F7□V<br>D-J79<br>D-F7□W<br>D-F7□WV<br>D-J79W<br>D-F7BAL<br>D-F7BAVL<br>D-F79F |     | D-A73C<br>D-A80C<br>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 |

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

### Auto Switch Mounting Height

(mm)

| Auto switch model<br>Bore size (mm) | D-M9□<br>D-M9□V<br>D-M9□W<br>D-M9□WV<br>D-M9□AL<br>D-M9□AVL |    | D-A7□<br>D-A80 |    | D-A7□H<br>D-80H<br>D-F7□<br>D-J79<br>F-F7□W<br>D-79W<br>D-F7NTL<br>D-F79F<br>D-F7BAL |      | D-A73C<br>D-A80C |      | D-F7□V<br>D-F7□WV<br>D-F7BAVL |    | D-J79C |    | D-A79W |    | D-P4DWL |    |
|-------------------------------------|-------------------------------------------------------------|----|----------------|----|--------------------------------------------------------------------------------------|------|------------------|------|-------------------------------|----|--------|----|--------|----|---------|----|
|                                     | Hs                                                          | Hs | Hs             | Hs | Hs                                                                                   | Hs   | Hs               | Hs   | 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 | Bore size | D-M9□V            |           | D-M9□WV           |           | D-M9□AVL          |           | D-M9□<br>D-M9□W   |           | D-M9□AL           |           |
|-------------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|
|                         |           | Different side(s) | Same side | Different side(s) | Same side | Different side(s) | Same side | Different side(s) | Same side | Different side(s) | Same side |
| 1 pc.                   | 25 to 50  | 5                 |           | 10                |           | 10                |           | 15                |           | 15                |           |
| 2 pcs.                  | 25, 32    | 10                |           | 15                |           | 15                |           | 15                |           | 20                |           |
|                         | 40, 50    | 10                | 30        | 15                | 30        | 15                | 35        | 15                | 40        | 20                | 45        |

(mm)

| Number of auto switches | D-F7□V<br>D-J79C | D-A7□<br>D-A80<br>D-A73C<br>D-A80C | D-F7□WV<br>D-F7BAVL | D-A7□H/A80H<br>D-A79W<br>D-F7□/J79<br>D-F7□W/J79W<br>D-F7BAL/F7NTL<br>D-F79F | D-P4DWL *         |           |
|-------------------------|------------------|------------------------------------|---------------------|------------------------------------------------------------------------------|-------------------|-----------|
|                         |                  |                                    |                     |                                                                              | Different side(s) | Same side |
| 1 pc.                   | 5                | 5                                  | 10                  | 15                                                                           | 20                |           |
| 2 pcs.                  | 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<br>D-M9□W/M9□WV<br>D-M9□AL/M9□AVL | 4.5       | 5.5 | 7  | 7  |
| D-A7□/A80<br>D-A7□H/A80H<br>D-A73C/A80C      | 13        | 13  | 13 | 13 |
| D-A79W                                       | 13        | 13  | 14 | 14 |

(mm)

| Auto switch model                                                                    | Bore size |    |     |     |
|--------------------------------------------------------------------------------------|-----------|----|-----|-----|
|                                                                                      | 25        | 32 | 40  | 50  |
| D-F7□/J79<br>D-F7□V/J79C<br>D-F7□W/F7□WV<br>D-J79W/F7NTL<br>D-F7BAL/F7BAVL<br>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.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

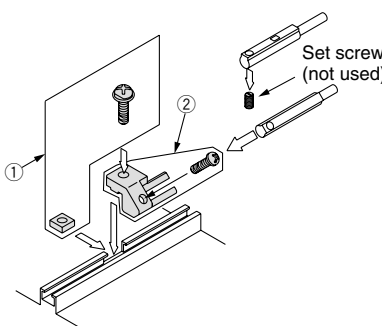
D-□

-X□

Individual

-X□

## Auto Switch Mounting Bracket Part No.

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