

# MSD

## Compact Cylinder

ø6, ø8, ø12, ø16

Space saving structure



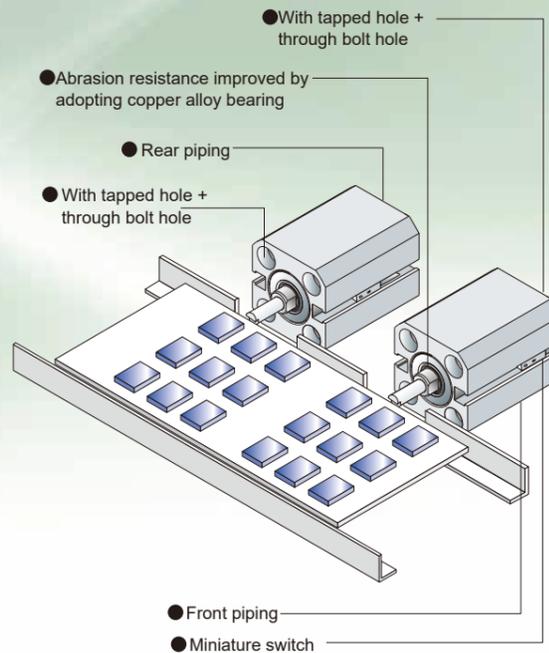
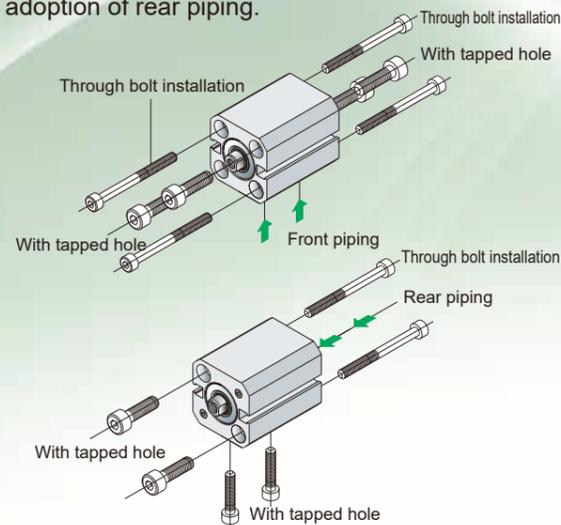
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## Axial space saving achieved

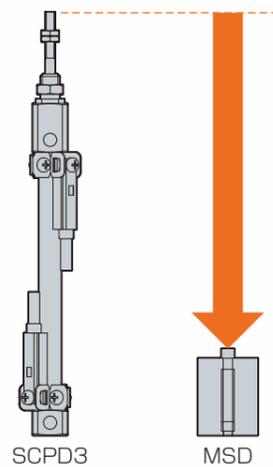
### Direct 3-sided mounting

Adoption of a square body allows direct mounting from each direction. Mounting to the body top surface and bottom surface can be done with through bolt and tapped hole. In addition, body side surface mounting is now also possible through the adoption of rear piping.



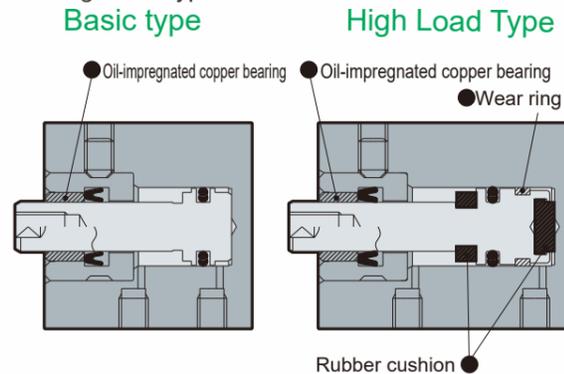
### Axial direction space saving

Axial length and mounting space can be reduced.



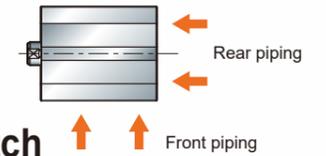
### Long life design (Approx. 4 times longer than conventional products)

Oil-impregnated copper alloy bearing is adopted for rod bearing section to increase abrasion resistance and high load type is also available.



### Piping direction selectable

Piping can be selected from two directions: front piping or rear piping.



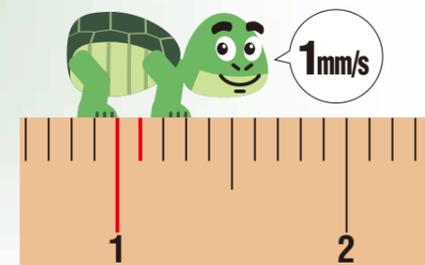
### Equipped with ultra-compact F series with switch

Achieved switch inclusion in compact sizes of ø6 and ø8.

### Ultra low speed operation from 1 mm/s is possible (MSD-F, LF, KF, KLF)

Ultra-low speed drive up to 1 mm/s possible

No stick-slip, stable operation even at fine speeds. Ideal for conveying and positioning delicate products.

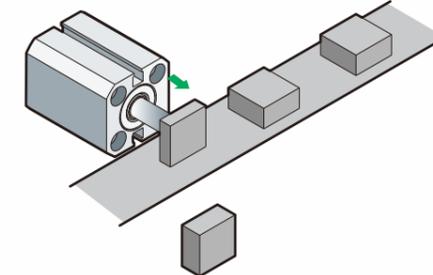


Our company's original sliding mechanism

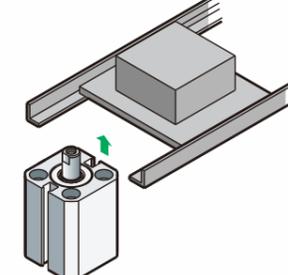
- Special treatment of the inner surface of the tube.
- Special treatment of the packing surface and optimization of hardness.
- Optimal grease selection.

### Application Example

Sorting good and defective products



Positioning of pallet/stopper



### MSD Series variation

| Model variations                                 |                   | Tube I.D. (mm)       | Standard stroke (mm) |    |    |    |    |    |
|--|-------------------|----------------------|----------------------|----|----|----|----|----|
|  |                   |                      | 5                    | 10 | 15 | 20 | 25 | 30 |
| Double acting/single rod With Switch             | MSD<br>MSD-L      | ø6 / ø8              | ●                    | ●  | ●  | ●  | ●  | ●  |
| Single acting/push With Switch                   | MSD-X<br>MSD-XL   | ø6 / ø8              | ●                    | ●  |    |    |    |    |
| Single acting/pull With Switch                   | MSD-Y<br>MSD-YL   | ø6 / ø8              | ●                    | ●  |    |    |    |    |
| Double acting/high load With Switch              | MSD-K<br>MSD-KL   | ø6 / ø8<br>ø12 / ø16 | ●                    | ●  | ●  | ●  | ●  | ●  |
| Double acting/single rod/ fine speed With Switch | MSD-F<br>MSD-LF   | ø6 / ø8              | ●                    | ●  | ●  | ●  | ●  | ●  |
| Double acting/high load/ fine speed With Switch  | MSD-KF<br>MSD-KLF | ø6 / ø8<br>ø12 / ø16 | ●                    | ●  | ●  | ●  | ●  | ●  |

●: Standard, ○: Option, ■: Not manufacturable

| Space-Saving Type | Variation  | Model No.         | Bore Size (mm)      | Standard Stroke (mm) |    |    |    |    |    | Min. Stroke (mm) | Max. Stroke (mm) | Option           | Switch | Page | Space-Saving Type |
|-------------------|--|-------------------|---------------------|----------------------|----|----|----|----|----|------------------|------------------|------------------|--------|------|-------------------|
|                   |  |                   |                     | 5                    | 10 | 15 | 20 | 25 | 30 |                  |                  | Rear piping type |        |      |                   |
|                   |  |                   |                     |                      |    |    |    |    |    |                  |                  | R                |        |      |                   |
| SSD2              | Double Acting, Single Rod Type with Switch       | MSD<br>MSD-L      | ø6 / ø8             | ●                    | ●  | ●  | ●  | ●  | ●  | 5                | 30               | ○                | ○      | 792  | SSD2              |
| SSG               |  |                   |                     |                      |    |    |    |    |    |                  |                  |                  |        |      | SSG               |
| SSD               | Single Acting, Push Type with Switch             | MSD-X<br>MSD-XL   | ø6 / ø8             | ●                    | ●  | ■  | ■  | ■  | ■  | 5                | 10               | ○                | ○      | 800  | SSD               |
| CAT               |  |                   |                     |                      |    |    |    |    |    |                  |                  |                  |        |      | CAT               |
| MDC2              | Single Acting, Retracting Type with Switch       | MSD-Y<br>MSD-YL   | ø6 / ø8             | ●                    | ●  | ■  | ■  | ■  | ■  | 5                | 10               | ○                | ○      | 800  | MDC2              |
| SMG               |  |                   |                     |                      |    |    |    |    |    |                  |                  |                  |        |      | SMG               |
| MSD               | Double Acting, High Load Type with Switch        | MSD-K<br>MSD-KL   | ø6 / ø8<br>ø12, ø16 | ●                    | ●  | ●  | ●  | ●  | ●  | 5                | 30               | ○                | ○      | 808  | MSD               |
| FC□               | Double acting/ single rod fine speed with switch | MSD-F<br>MSD-LF   | ø6 / ø8             | ●                    | ●  | ●  | ●  | ●  | ●  | 5                | 30               | ■                | ○      | 816  | FC□               |
|                   | High load/fine speed with switch                 | MSD-KF<br>MSD-KLF | ø6 / ø8<br>ø12, ø16 | ●                    | ●  | ●  | ●  | ●  | ●  | 5                | 30               | ■                | ○      | 816  |                   |

## Combination Availability Table for Variations and Option Items

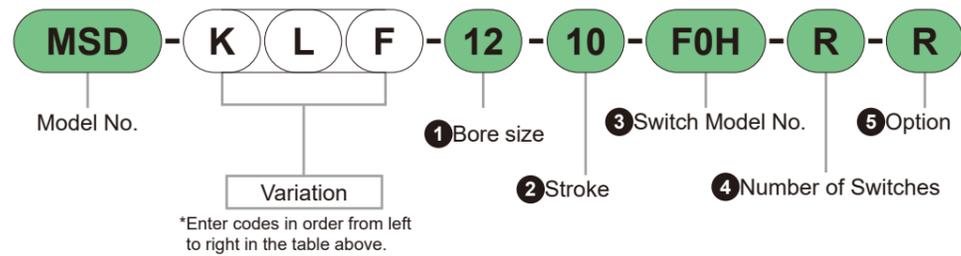
● MSD Series

○Mark: Option  
 ○Mark: Custom Products  
 XMark: Not manufacturable

| Space-Saving Type | Category | Category                       | Variation        |   |   |   |   |   |   | Option |   |
|-------------------|----------|--------------------------------|------------------|---|---|---|---|---|---|--------|---|
|                   |          | Code                           | None             | K | X | Y | L | F | R |        |   |
| SSD2              | SSG      | Double Acting/Single Rod Type  | Blank            |   |   |   |   |   |   |        | ○ |
|                   | SSG      | High Load Type                 | K                |   | X | X | ○ | ○ | ○ |        |   |
|                   | SSD      | Single Acting, Push Type       | X                |   |   | X | ○ | X | ○ |        |   |
|                   | SSD      | Single Acting, Retracting Type | Y                |   |   |   | ○ | X | ○ |        |   |
|                   | CAT      | With Cylinder Switch           | L                |   |   |   |   |   | ○ | ○      |   |
|                   | CAT      | Low speed type                 | F                |   |   |   |   |   |   | Note   |   |
|                   | MDC2     | Rear piping type               | R                |   |   |   |   |   |   |        |   |
|                   | SMG      | Cylinder Switch                | Separately Shown | ○ | ○ | ○ | ○ | ○ | ○ | ○      |   |
|                   | MSD      |                                |                  |   |   |   |   |   |   |        |   |

Note: ø6, ø8 cannot be selected.

### [Model Number Notation Example]



Model No.: Compact Cylinder

- Variation High load/with switch/fine speed
- ① Bore size: ø12 mm
- ② Stroke: 10 mm
- ③ Switch Model No. Reed FOH, lead wire 1 m
- ④ Number of Switches: With 1 pc. on rod side
- ⑤ Option: Rear piping type

MEMO

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Cylinder Switch

Ending



Compact Cylinder/Double Acting, Single Rod Type

# MSD Series

● Bore size:  $\phi 6/\phi 8$

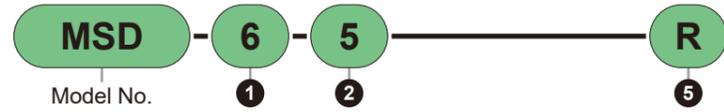


## MSD Series

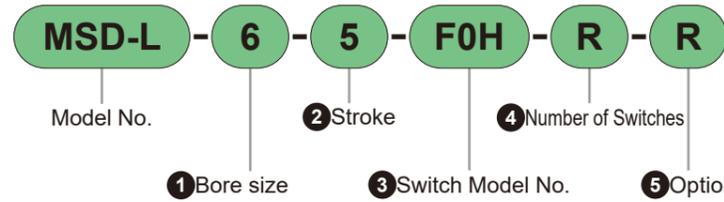
Model No. Notation Method

### Model No. Notation Method

Without Switch  
(Without magnet for switch)



With Switch  
(Built-in magnet for switch)



#### 1 Bore Size (mm)

| Code | Content  |
|------|----------|
| 6    | $\phi 6$ |
| 8    | $\phi 8$ |

#### 2 Stroke (mm)

| Code | Content |
|------|---------|
| 5    | 5       |
| 10   | 10      |
| 15   | 15      |
| 20   | 20      |
| 25   | 25      |
| 30   | 30      |

#### 3 Switch Model No.

For switch details, please refer to P. 869. Switches are included to the product and shipped.

| Contact     | Indicator LED Special Function | Wiring (Output) | Load Voltage (V) |            | Load Current (mA) |            | Lead Wire *1 |         | Image |
|-------------|--------------------------------|-----------------|------------------|------------|-------------------|------------|--------------|---------|-------|
|             |                                |                 | AC               | DC         | AC                | DC         | Straight     | L-shape |       |
| Solid State | 1-Color                        | 2-wire          | -                | 10 to 30   | -                 | 5 to 20    | -            | F2S□    |       |
|             |                                | 3-wire (NPN)    | -                | 30 or less | -                 | 50 or less | -            | F3S□    |       |
|             |                                | 2-wire          | -                | 10 to 30   | -                 | 5 to 20 *2 | F2H□         | F2V□    |       |
|             |                                | 3-wire (NPN)    | -                | 30 or less | -                 | 50 or less | F3H□         | F3V□    |       |
|             |                                | 3-wire (PNP)    | -                | 30 or less | -                 | 50 or less | F3PH□        | F3PV□   |       |
|             |                                | 2-wire          | -                | 24±10%     | -                 | 5 to 20    | F2YH□        | F2YV□   |       |
| 2-Color     | 3-wire (NPN)                   | -               | 30 or less       | -          | 50 or less        | F3YH□      | F3YV□        |         |       |
|             | Reed                           | 1-Color         | 2-wire           | —          | 24 ± 10%          | —          | 5 to 20      |         | F0H□  |

\*1: For "□" in the switch model number, enter the code selected from the "Lead wire length" table.

\*2: The maximum load current value above, 20 mA, is at 25°C. If the switch operating ambient temperature is higher than 25°C, it will be lower than 20 mA. (At 60°C, it will be 5 to 10 mA.)

\*3: When using with switch, use the non-magnetic (stainless steel, etc.) mounting bolt.

\*4: Switches other than the model numbers listed above are also available. (Custom products) For details, refer to P. 869.

\*5: Depending on the relationship between cylinder mounting and stroke, it may not be possible to mount the switch. Refer to P. 794 for availability.

#### 4 Number of Switches

| Code | Content                |
|------|------------------------|
| R    | With 1 pc on rod side  |
| H    | With 1 pc on head side |
| D    | With 2 pcs             |

#### 5 Option

| Code  | Content           | Image |
|-------|-------------------|-------|
| Blank | Front piping type |       |
| R     | Rear piping type  |       |

\*1: In the case of the rear piping type, mounting on the side of the main body is possible. Also, please note that two bolts are used for mounting on the rod side and head side.

Rechargeable Battery Compatible Specification (Catalog No. CC-1226AA)

● Structure usable in secondary battery manufacturing processes

MSD-.....P4\*

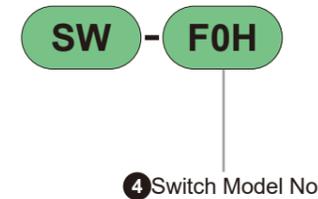
\*Please contact us for details.

High Durability Components HP Series (Catalog No. CC-1421AA)

● Long-life actuator that can contribute to productivity improvement with stable operation

MSD-.....HP□

### Switch Single Unit Model No. Display Method



#### \*Lead wire length

| Code  | Content        |
|-------|----------------|
| Blank | 1 m (Standard) |
| 3     | 3 m (Option)   |

Example) Lead wire length  
1 m F2S  
3 m F2S□

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Cylinder Switch

Ending

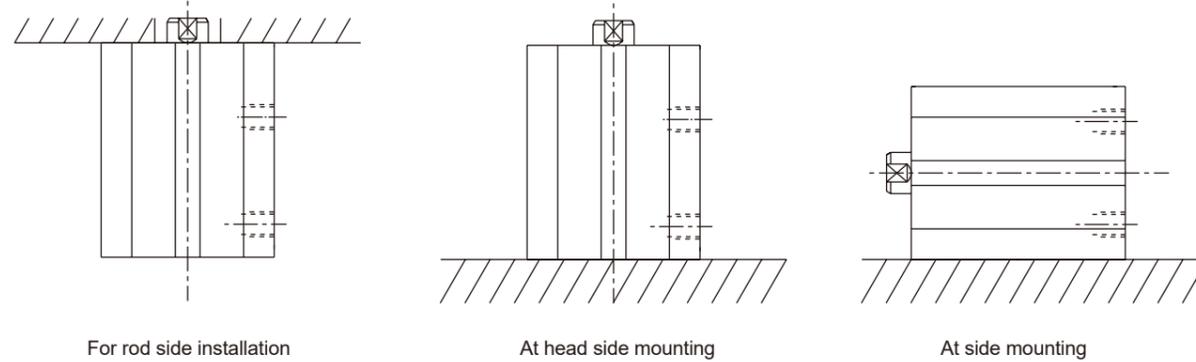
Cylinder Switch

Ending

Switch usability selection table

Depending on the cylinder mounting and stroke relationship, it may not be possible to mount the switch. Select the switch after confirming the table below. In addition, for side mounting, it cannot be used in the following combinations.

- Combinations in which F2YH/V, F3YH/V or F3PH/V is mounted at the switch mounting position H with stroke length 5 mm
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke length 10 mm (Refer to P. 796 for the min. stroke with switch.)



● For rod side installation

| Bore Size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|---|
|                |             | F2S/F3S                  |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |   |
| ø6             | 5           | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | × | ○                        | × | ○                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø8             | 5           | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | × | ○                        | × | ○                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |

● At head side mounting

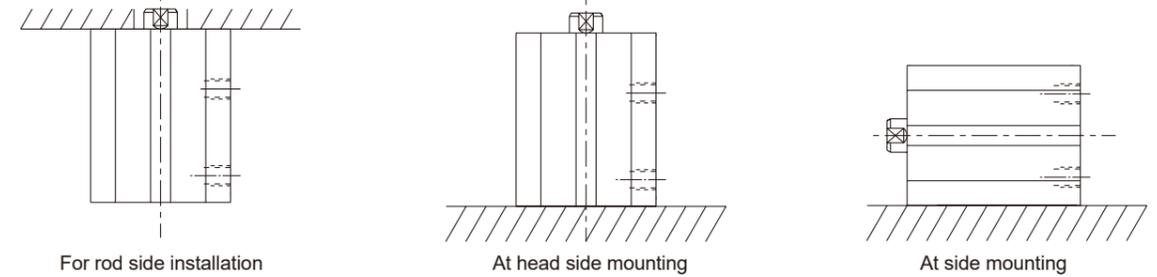
| Bore Size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
|                |             | F2S/F3S                  |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |
| ø6             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ○                        | × | ×                        | × | ○                        | ○ |
|                | 10          | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |
|                | 15          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |
|                | 20 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |
| ø8             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ○                        | × | ×                        | × | ○                        | ○ |
|                | 10          | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |
|                | 15          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |
|                | 20 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |

Note: (R) 1 rod side switch, H: With 1 head side switch

Switch usability selection table

Depending on the cylinder mounting and stroke relationship, it may not be possible to mount the switch. Select the switch after confirming the table below. In addition, for side mounting, it cannot be used in the following combinations.

- Combinations in which F2YH/V, F3YH/V or F3PH/V is mounted at the switch mounting position H with X type or Y type stroke length 5 mm
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with X type stroke length 10 mm (Refer to P. 802 for the min. stroke with switch.)



● For MSD-XL rod side installation

| Bore size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
|                |             | F2S, F3S                 |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |
| ø6             | 5           | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ |
| ø8             | 5           | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ |

● For MSD-XL head side mounting

| Bore size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
|                |             | F2S, F3S                 |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |
| ø6             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ×                        | ○ | ×                        | × | ○                        | ○ |
|                | 10          | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |
| ø8             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ×                        | ○ | ×                        | × | ○                        | ○ |
|                | 10          | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ |

● For MSD-YL rod side installation

| Bore size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
|                |             | F2S, F3S                 |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |
| ø6             | 5           | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ |
| ø8             | 5           | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ |

● For MSD-YL head side mounting

| Bore size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|
|                |             | F2S, F3S                 |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |
| ø6             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ |
| ø8             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ○                        | × | ○                        | ○ | ○                        | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ |

Note: (R) 1 rod side switch, H: With 1 head side switch

## Specifications

| Item                           | MSD<br>MSD-L (with switch)   |
|--------------------------------|--|
| Bore size mm                   | ø6, ø8   |
| Actuation method               | Double Acting Type   |
| Operating Fluid                | Compressed Air   |
| Maximum operating pressure MPa | 1.0  |
| Min. Operating Pressure MPa    | 0.15   |
| Proof pressure MPa             | 1.6  |
| Ambient Temperature °C         | -10 to 60 (No freezing)  |
| Port Size                      | M3   |
| Stroke tolerance mm            | +0.5<br>0  |
| Operating Piston Speed mm/s    | 50 to 500  |
| Cushion                        | None   |
| Lubrication                    | Not Required (When lubricating, use Turbine Oil ISO VG32)  |
| Allowable absorbed energy J    | This product cannot absorb the energy generated by an external load included to the cylinder.<br>Use without load or provide a separate shock absorber externally. |

## Stroke

| Bore size (mm) | Standard Stroke (mm)       | Minimum stroke with 2 switches (mm) |                    | Minimum stroke with 1 switch (mm) |                    |
|----------------|----------------------------|-------------------------------------|--------------------|-----------------------------------|--------------------|
|                |                            | Reed switch                         | Solid state switch | Reed switch                       | Solid state switch |
| ø6             | 5 / 10 / 15 / 20 / 25 / 30 | 10                                  | 5 (10)             | 5                                 | 5                  |
| ø8             | 5 / 10 / 15 / 20 / 25 / 30 | 10                                  | 5 (10)             | 5                                 | 5                  |

\*1: Only standard strokes can be manufactured.

\*2: In the case of F2Y, F3Y, F3P, the minimum stroke is the dimension in parentheses.

## Cylinder Weight Table

(Unit: g)

| Stroke (mm) | 5              |             | 10             |             | 15             |             | 20             |             | 25             |             | 30             |             | 1 switch<br>Weight per   |
|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|--|
|             | Without Switch | With Switch |  |
| ø6          | 22             | 24          | 25             | 27          | 27             | 29          | 30             | 32          | 33             | 35          | 36             | 38          | Refer to the weight stated in the switch specifications on P. 869. |
| ø8          | 23             | 26          | 28             | 31          | 33             | 36          | 38             | 41          | 42             | 45          | 47             | 50          |  |

## Theoretical Thrust Table

(Unit: N)

| Bore Size (mm) | Operating Direction | Operating Pressure MPa |      |      |      |      |      |      |      |      |      |
|----------------|---------------------|------------------------|------|------|------|------|------|------|------|------|------|
|                |                     | 0.15                   | 0.2  | 0.3  | 0.4  | 0.5  | 0.6  | 0.7  | 0.8  | 0.9  | 1.0  |
| ø6             | Push                | 4.24                   | 5.65 | 8.48 | 11.3 | 14.1 | 17.0 | 19.8 | 22.6 | 25.4 | 28.3 |
|                | Pull                | 2.36                   | 3.14 | 4.71 | 6.28 | 7.85 | 9.42 | 11.0 | 12.6 | 14.1 | 15.7 |
| ø8             | Push                | 7.54                   | 10.1 | 15.1 | 20.1 | 25.1 | 30.2 | 35.2 | 40.2 | 45.2 | 50.3 |
|                | Pull                | 4.59                   | 6.13 | 9.19 | 12.3 | 15.3 | 18.4 | 21.4 | 24.5 | 27.6 | 30.6 |

MEMO

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Cylinder Switch

Ending

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

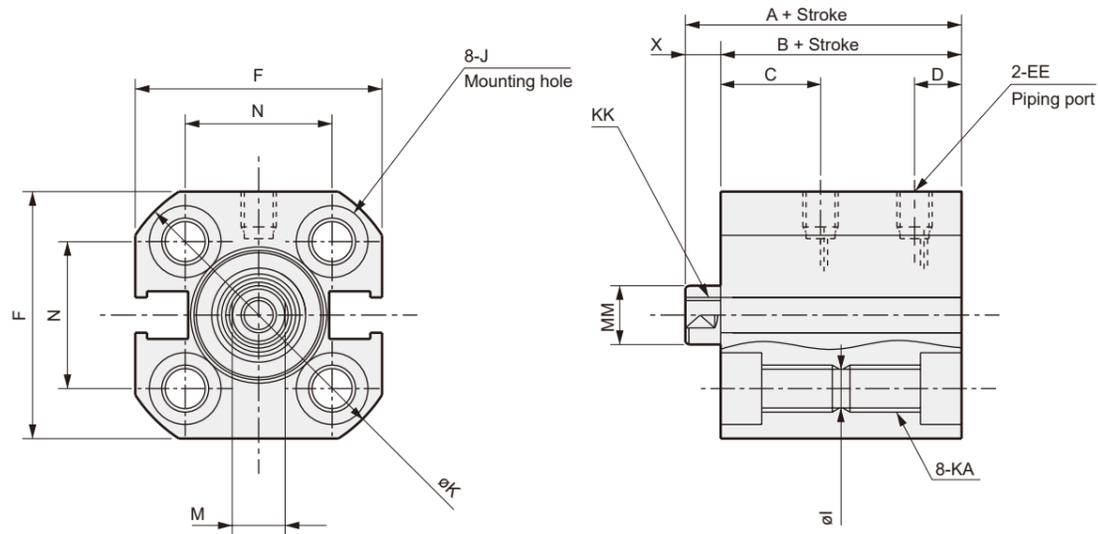
FC□

Cylinder Switch

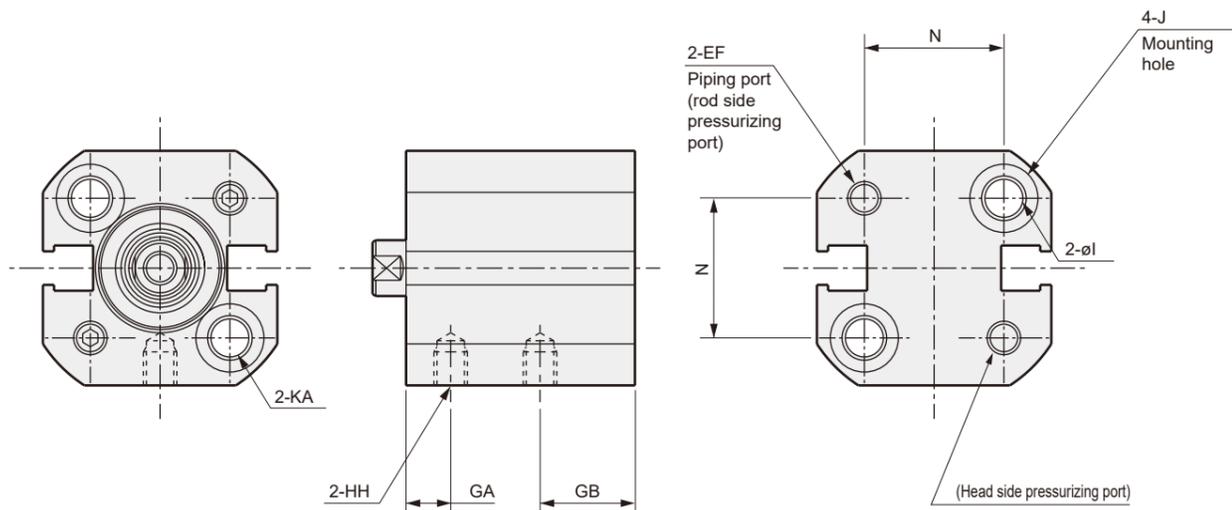
Ending

Outline Dimension Drawing

●MSD-(L)-6/8



●MSD-(L)-6/8-□R (rear piping)



| Bore Size (mm) | Without Switch |      | With Switch |      | Common dimension |   |    |    |     |                            |      |            |              |     |    |      |   |  |
|----------------|----------------|------|-------------|------|------------------|---|----|----|-----|----------------------------|------|------------|--------------|-----|----|------|---|--|
|                | A              | B    | A           | B    | C                | D | EE | F  | I   | J                          | K    | KA         | KK           | M   | MM | N    | X |  |
| ø6             | 17.5           | 14.5 | 22.5        | 19.5 | 7.5              | 4 | M3 | 19 | 3.2 | Counterbore ø6.1 Depth 3.5 | 22.5 | M4 Depth 6 | M2.5 depth 4 | 3.5 | 4  | 11   | 3 |  |
| ø8             | 19             | 16   | 24          | 21   | 9                | 4 | M3 | 21 | 3.2 | Counterbore ø6.1 Depth 3.5 | 25   | M4 Depth 6 | M3 Depth 5   | 4.5 | 5  | 12.5 | 3 |  |

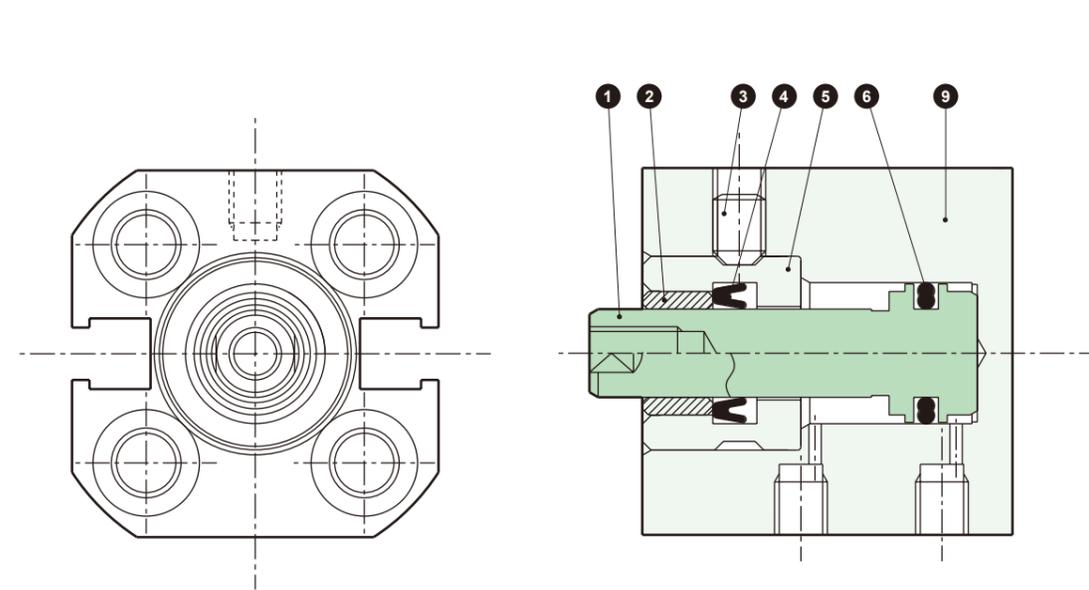
| Bore Size (mm) | Rear piping dimensions |     |     |            |
|----------------|------------------------|-----|-----|------------|
|                | EF                     | GA  | GB  | HH         |
| ø6             | M3                     | 3   | 8.5 | M3 Depth 3 |
| ø8             | M3                     | 4.5 | 8.5 | M3 Depth 3 |

Note: Refer to P. 820 to 824 for dimensions with switch.

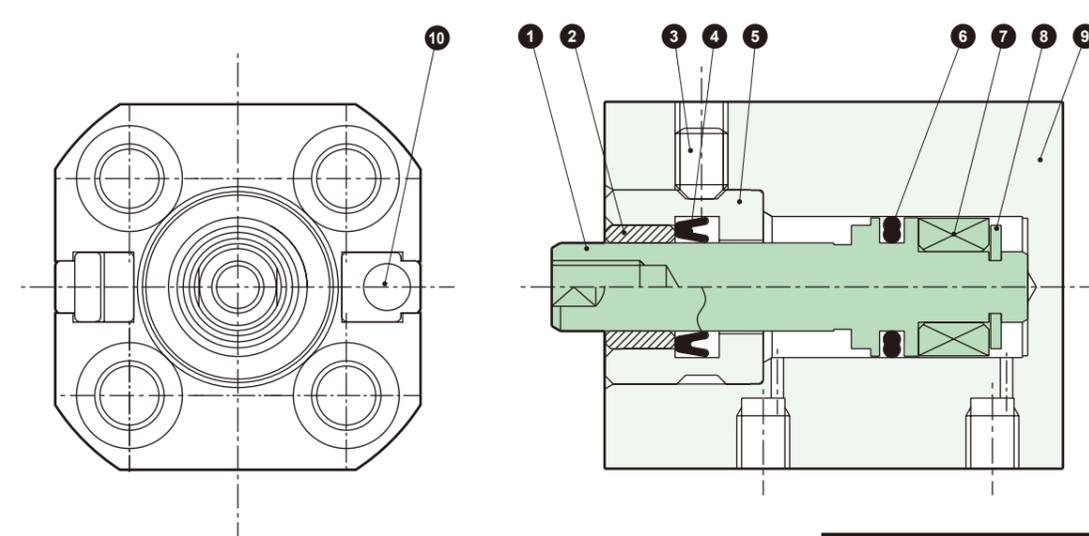
Internal Structure Diagram/Material

Internal Structure Diagram/Material

●MSD-6/8



●MSD-L-6/8



**Do not disassemble**

| Part No. | Part Name                     | Material                      | Remarks | Part No.    | Part Name             | Material        | Remarks       |
|----------|-------------------------------|-------------------------------|---------|-------------|-----------------------|-----------------|---------------|
| 1        | Piston                        | Stainless Steel               |         | 7           | Magnet                | Plastic         |               |
| 2        | Bushing                       | Oil-Impregnated Bearing Alloy |         | 8           | E-type retaining ring | Stainless Steel |               |
| 3        | Hexagon socket head set screw | Stainless Steel               |         | 9           | Cylinder Body         | Aluminum Alloy  | Hard Anodized |
| 4        | Rod Packing                   | Nitrile Rubber                |         | With Switch |                       |                 |               |
| 5        | Rod Metal                     | Stainless Steel               |         | 10          | Switch                |                 |               |
| 6        | Piston Packing                | Nitrile Rubber                |         |             |                       |                 |               |

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Cylinder Switch

Ending

Cylinder Switch

Ending



Small compact cylinder Single acting/push  
Single Acting, Retracting Type

# MSD-X<sup>X</sup> Series

● Bore size: ø6, ø8

Circuit Diagram  
Symbol

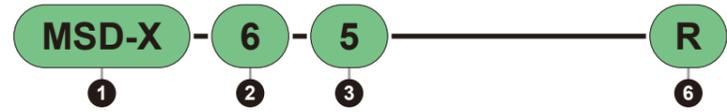


Single Acting, Push Type    Single Acting, Retracting Type

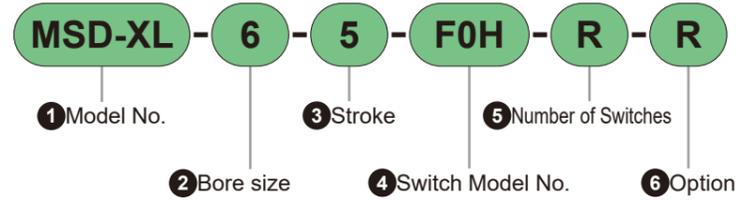


## Model No. Notation Method

Without Switch  
(Without magnet for switch)



With Switch  
(Built-in magnet for switch)



### 1 Model No.

| Code   | Content                         |
|--------|---------------------------------|
| MSD-X  | Single Acting, Push Type        |
| MSD-Y  | Single Acting, Retracting Type  |
| MSD-XL | Single acting/push, with switch |
| MSD-YL | Single acting/pull, with switch |

### 2 Bore Size (mm)

| Code | Content |
|------|---------|
| 6    | ø6      |
| 8    | ø8      |

### 3 Stroke (mm)

| Code | Content |
|------|---------|
| 5    | 5       |
| 10   | 10      |

### 4 Switch Model No.

For switch details, please refer to P. 869. Switches are included to the product and shipped.

| Contact     | Indicator LED<br>Special Function | Wiring<br>(Output) | Load Voltage (V) |            | Load Current (mA) |            | Lead Wire *1 |         | Image |
|-------------|-----------------------------------|--------------------|------------------|------------|-------------------|------------|--------------|---------|-------|
|             |                                   |                    | AC               | DC         | AC                | DC         | Straight     | L-shape |       |
| Solid State | 1-Color                           | 2-wire             | -                | 10 to 30   | -                 | 5 to 20    | -            | F2S□    |       |
|             |                                   | 3-wire (NPN)       | -                | 30 or less | -                 | 50 or less | -            | F3S□    |       |
|             |                                   | 2-wire             | -                | 10 to 30   | -                 | 5 to 20 *2 | F2H□         | F2V□    |       |
|             |                                   | 3-wire (NPN)       | -                | 30 or less | -                 | 50 or less | F3H□         | F3V□    |       |
|             | 2-Color                           | 3-wire (PNP)       | -                | 30 or less | -                 | 50 or less | F3PH□        | F3PV□   |       |
|             |                                   | 2-wire             | -                | 24±10%     | -                 | 5 to 20    | F2YH□        | F2YV□   |       |
| Reed        | 1-Color                           | 2-wire             | -                | 24 ± 10%   | -                 | 5 to 20    | F0H□         | F0V□    |       |
|             |                                   |                    | -                | 30 or less | -                 | 50 or less | F3YH□        | F3YV□   |       |

### \*Lead wire length

| Code  | Content        |
|-------|----------------|
| Blank | 1 m (Standard) |
| 3     | 3 m (Option)   |

Example) Lead wire length  
1 m F2S  
3 m F2S3

### 5 Number of Switches

| Code | Content                |
|------|------------------------|
| R    | With 1 pc on rod side  |
| H    | With 1 pc on head side |
| D    | With 2 pcs             |

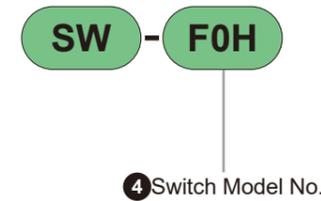
### 6 Option

| Code  | Content           |  |
|-------|-------------------|--|
| Blank | Front piping type |  |
| R     | Rear piping type  |  |

\*1

\*1: In the case of the rear piping type, mounting on the side of the main body is possible. Also, please note that two bolts are used for mounting on the rod side and head side.

## Switch Single Unit Model No. Display Method



\*1: For "□" in the switch model number, enter the code selected from the "Lead wire length" table.

\*2: The maximum load current value above, 20 mA, is at 25°C. If the switch operating ambient temperature is higher than 25°C, it will be lower than 20 mA. (At 60°C, it will be 5 to 10 mA.)

\*3: For models with switches, use non-magnetic (stainless steel, etc.) mounting bolts for ø6 and ø8.

\*4: Switches other than the model numbers listed above are also available. (Custom products) For details, refer to P. 869.

\*5: Depending on the relationship between cylinder mounting and stroke, it may not be possible to mount the switch. Refer to P. 795 for availability.

## Specifications

| Item                             | MSD-X  |    | MSD-Y                          |     |
|----------------------------------|--|----|--------------------------------|-----|
|                                  | MSD-XL (with switch)   |    | MSD-YL (with switch)           |     |
| Bore size mm                     | ø6   | ø8 | ø6                             | ø8  |
| Actuation method                 | Single Acting, Push Type   |    | Single Acting, Retracting Type |     |
| Operating Fluid                  | Compressed Air   |    |                                |     |
| Maximum operating pressure MPa   | 1.0  |    |                                |     |
| Min. Operating Pressure MPa      | 0.3  |    | 0.4                            | 0.3 |
| Proof pressure MPa               | 1.6  |    |                                |     |
| Ambient Temperature °C           | -10 to 60 (No freezing)  |    |                                |     |
| Port Size                        | M3   |    |                                |     |
| Stroke tolerance mm              | +0.5   |    |                                |     |
|                                  | 0  |    |                                |     |
| Operating Piston Speed mm/s      | 50 to 500  |    |                                |     |
| Cushion                          | None   |    |                                |     |
| Lubrication                      | Not Required (When lubricating, use Turbine Oil ISO VG32)  |    |                                |     |
| SSD2 Allowable absorbed energy J | This product cannot absorb the energy generated by an external load included to the cylinder.<br>Use without load or provide a separate shock absorber externally. |    |                                |     |

## Stroke

| Bore Size (mm) | Standard Stroke (mm) | Minimum stroke with 2 switches (mm) |             | Minimum stroke with 1 switch (mm) |             |
|----------------|----------------------|-------------------------------------|-------------|-----------------------------------|-------------|
|                |                      | Solid state switch                  | Reed switch | Solid state switch                | Reed switch |
| ø6             | 5, 10                | 5 (10)                              | 10          | 5                                 | 5           |
| ø8             | 5, 10                | 5 (10)                              | 10          | 5                                 | 5           |

\*1: Only standard strokes can be manufactured.

\*2: In the case of F2Y, F3Y, F3P, the minimum stroke is the dimension in parentheses.

## Cylinder Weight Table

| ●MSD-X / MSD-XL (Unit: g) |                |             |                |             |  | ●MSD-Y / MSD-YL (Unit: g) |                |             |                |             |  |
|---------------------------|----------------|-------------|----------------|-------------|--|---------------------------|----------------|-------------|----------------|-------------|--|
| Stroke (mm)               | 5              |             | 10             |             | 1 switch Weight per  | Stroke (mm)               | 5              |             | 10             |             | 1 switch Weight per  |
|                           | Without Switch | With Switch | Without Switch | With Switch |  |                           | Without Switch | With Switch | Without Switch | With Switch |  |
| ø6                        | 23             | 25          | 28             | 30          | Refer to the weight stated in the switch specifications on P. 869. | ø6                        | 25             | 27          | 31             | 33          | Refer to the weight stated in the switch specifications on P. 869. |
| ø8                        | 24             | 27          | 33             | 36          |  | ø8                        | 28             | 31          | 38             | 41          |  |

## Spring Load

| Bore size (mm) | Stroke (mm) | Spring Load |                  |
|----------------|-------------|-------------|------------------|
|                |             | At set      | During operation |
| ø6             | 5           | 1.59        | 4.90             |
|                | 10          |             |                  |
| ø8             | 5           | 3.19        | 6.86             |
|                | 10          |             |                  |

## Theoretical Thrust Table

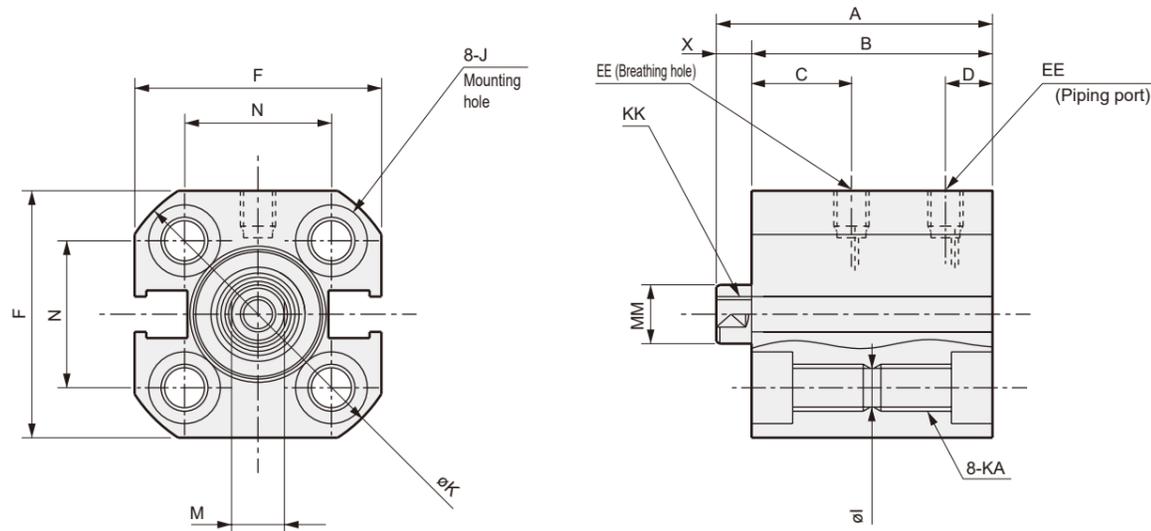
| Bore size (mm) | Operating Pressure MPa |      |      |      |      |      |      |      |
|----------------|------------------------|------|------|------|------|------|------|------|
|                | 0.3                    | 0.4  | 0.5  | 0.6  | 0.7  | 0.8  | 0.9  | 1.0  |
| ø6             | 3.58                   | 6.41 | 9.24 | 12.1 | 14.9 | 17.7 | 20.5 | 23.4 |
| ø8             | 8.22                   | 13.2 | 18.3 | 23.3 | 28.3 | 33.4 | 38.4 | 43.4 |

| Bore size (mm) | Operating Pressure MPa |      |      |      |      |      |      |      |
|----------------|------------------------|------|------|------|------|------|------|------|
|                | 0.3                    | 0.4  | 0.5  | 0.6  | 0.7  | 0.8  | 0.9  | 1.0  |
| ø6             | -                      | 1.38 | 2.95 | 4.52 | 6.10 | 7.67 | 9.24 | 10.8 |
| ø8             | 2.33                   | 5.39 | 8.46 | 11.5 | 14.6 | 17.6 | 20.7 | 23.8 |

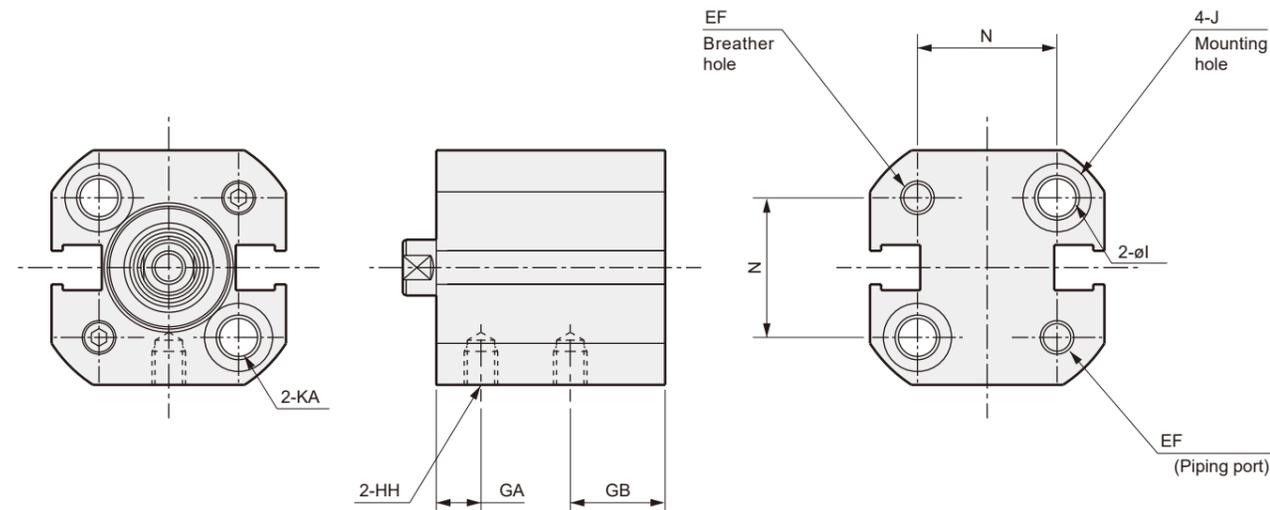
MEMO

Outline Dimension Drawing

●MSD-X(L)-6/8



●MSD-X(L)-6/8-□-R (rear piping)



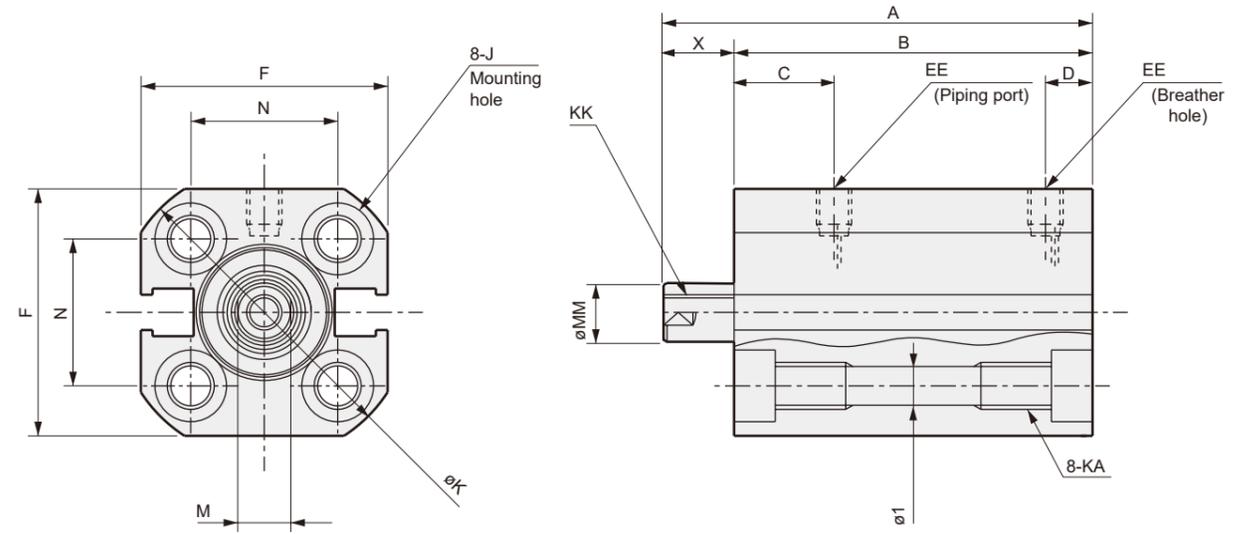
| Code            | Without Switch |           | With Switch |      | Common dimension |      |     |   |    |    |     |                          |      |            |              |     |    |      | Rear piping dimensions |    |     |     |            |
|-----------------|----------------|-----------|-------------|------|------------------|------|-----|---|----|----|-----|--------------------------|------|------------|--------------|-----|----|------|------------------------|----|-----|-----|------------|
|                 | Bore Size (mm) |           | A           | B    | A                | B    | C   | D | EE | F  | I   | J                        | K    | KA         | KK           | M   | MM | N    | X                      | EF | GA  | GB  | HH         |
| Cylinder Switch | ø6             | Stroke 5  | 22.5        | 19.5 | 27.5             | 24.5 | 7.5 | 4 | M3 | 19 | 3.2 | Spot face ø6.1 Depth 3.5 | 22.5 | M4 Depth 6 | M2.5 depth 4 | 3.5 | 4  | 11   | 3                      | M3 | 3   | 8.5 | M3 Depth 3 |
|                 |                | Stroke 10 | 32.5        | 29.5 | 37.5             | 34.5 |     |   |    |    |     |                          |      |            |              |     |    |      |                        |    |     |     |            |
| Ending          | ø8             | Stroke 5  | 24          | 21   | 29               | 26   | 9   | 4 | M3 | 21 | 3.2 | Spot face ø6.1 Depth 3.5 | 25   | M4 Depth 6 | M3 Depth 5   | 4.5 | 5  | 12.5 | 3                      | M3 | 4.5 | 8.5 | M3 Depth 3 |
|                 |                | Stroke 10 | 34          | 31   | 39               | 36   |     |   |    |    |     |                          |      |            |              |     |    |      |                        |    |     |     |            |

Note: Refer to P. 820 to 824 for dimensions with switch.

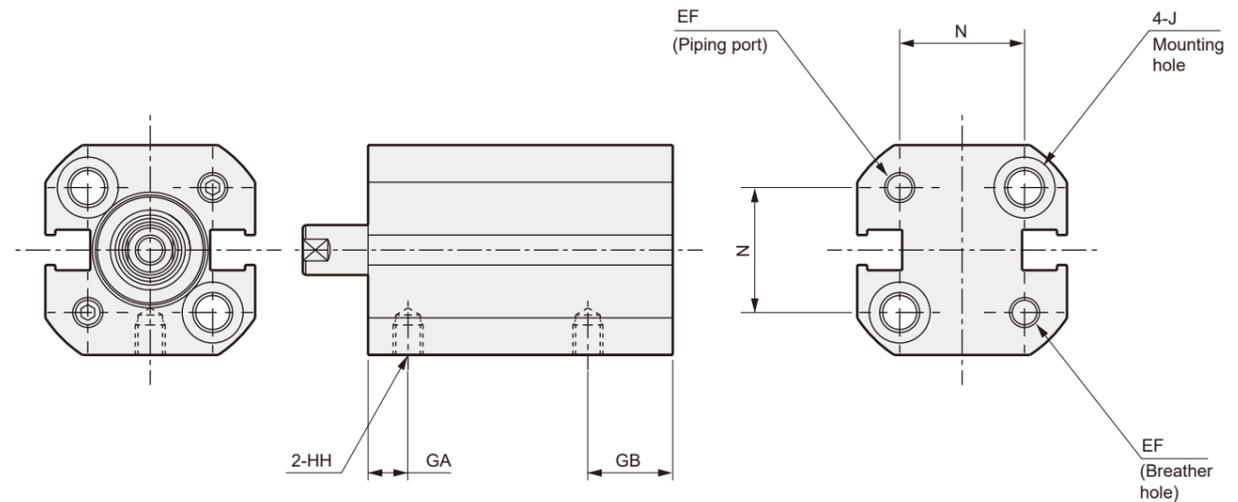
Outline Dimension Drawing

Outline Dimension Drawing

●MSD-Y(L)-6/8



●MSD-Y(L)-6/8-□-R (rear piping)

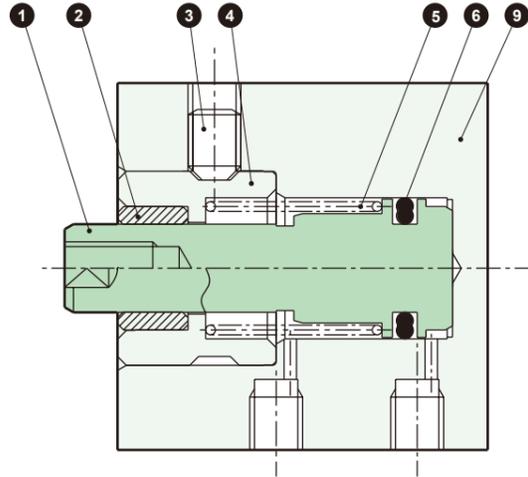


| Code            | Without Switch |           | With Switch |      | Common dimension |      |     |   |    |    |     |                            |      |            |              |     |    |      | Rear piping dimensions |    |     |     |            |
|-----------------|----------------|-----------|-------------|------|------------------|------|-----|---|----|----|-----|----------------------------|------|------------|--------------|-----|----|------|------------------------|----|-----|-----|------------|
|                 | Bore Size (mm) |           | A           | B    | A                | B    | C   | D | EE | F  | I   | J                          | K    | KA         | KK           | M   | MM | N    | X                      | EF | GA  | GB  | HH         |
| Cylinder Switch | ø6             | Stroke 5  | 32.5        | 24.5 | 37.5             | 29.5 | 7.5 | 4 | M3 | 19 | 3.2 | Counterbore ø6.1 Depth 3.5 | 22.5 | M4 Depth 6 | M2.5 depth 4 | 3.5 | 4  | 11   | 8                      | M3 | 3   | 8.5 | M3 Depth 3 |
|                 |                | Stroke 10 | 47.5        | 34.5 | 52.5             | 39.5 |     |   |    |    |     |                            |      |            |              |     |    |      |                        |    |     |     |            |
| Ending          | ø8             | Stroke 5  | 34          | 26   | 39               | 31   | 9   | 4 | M3 | 21 | 3.2 | Counterbore ø6.1 Depth 3.5 | 25   | M4 Depth 6 | M3 Depth 5   | 4.5 | 5  | 12.5 | 8                      | M3 | 4.5 | 8.5 | M3 Depth 3 |
|                 |                | Stroke 10 | 49          | 36   | 54               | 41   |     |   |    |    |     |                            |      |            |              |     |    |      |                        |    |     |     |            |

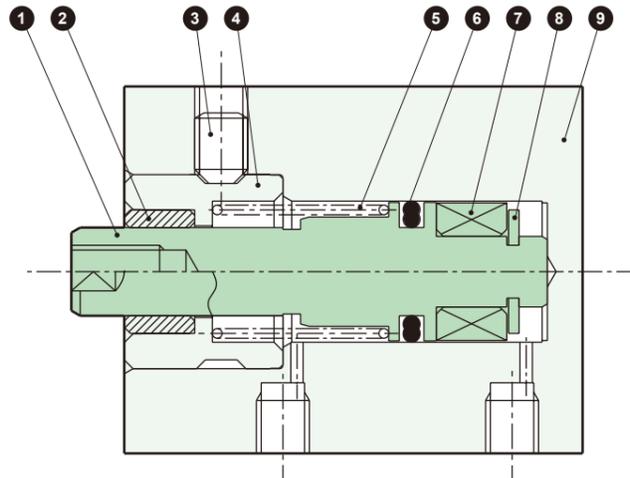
Note: Refer to P. 820 to 824 for dimensions with switch.

Internal Structure Diagram/Material

●MSD-X-6/8



●MSD-XL-6/8

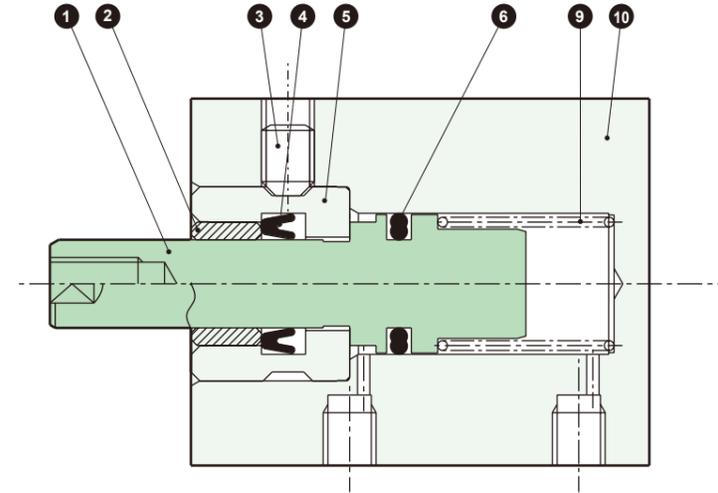


**Do not disassemble**

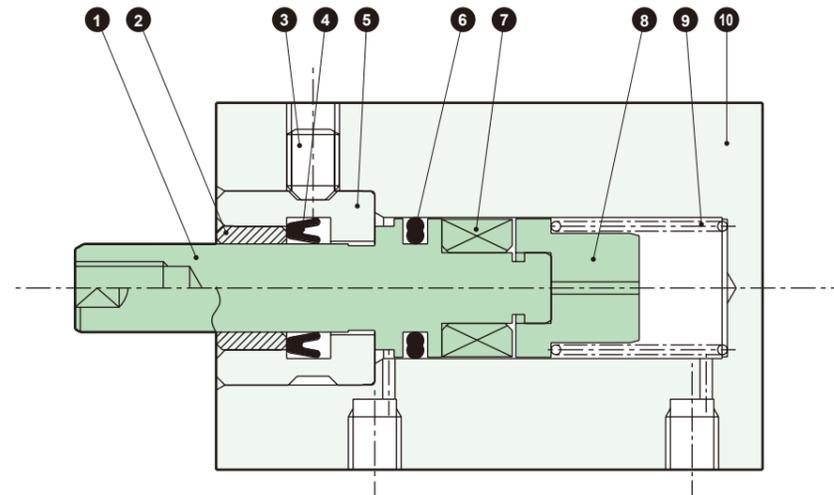
| Part No. | Part Name                     | Material                      | Remarks                   | Part No. | Part Name             | Material        | Remarks       |
|----------|-------------------------------|-------------------------------|---------------------------|----------|-----------------------|-----------------|---------------|
| 1        | Piston                        | Stainless Steel               |                           | 6        | Piston Packing        | Nitrile Rubber  |               |
| 2        | Bushing                       | Oil-Impregnated Bearing Alloy |                           | 7        | Magnet                | Plastic         |               |
| 3        | Hexagon socket head set screw | Stainless Steel               |                           | 8        | E-type retaining ring | Stainless Steel |               |
| 4        | Rod Metal                     | Stainless Steel               |                           | 9        | Cylinder Body         | Aluminum Alloy  | Hard Anodized |
| 5        | Coil Spring                   | Piano Wire                    | Electrodeposition Coating |          |                       |                 |               |

Internal Structure Diagram/Material

●MSD-Y-6/8



●MSD-YL-6/8



**Do not disassemble**

| Part No. | Part Name                     | Material                      | Remarks | Part No. | Part Name       | Material        | Remarks                   |
|----------|-------------------------------|-------------------------------|---------|----------|-----------------|-----------------|---------------------------|
| 1        | Piston                        | Stainless Steel               |         | 6        | Piston Packing  | Nitrile Rubber  |                           |
| 2        | Bushing                       | Oil-Impregnated Bearing Alloy |         | 7        | Magnet          | Plastic         |                           |
| 3        | Hexagon socket head set screw | Stainless Steel               |         | 8        | Spring Retainer | Stainless Steel |                           |
| 4        | Rod Packing                   | Nitrile Rubber                |         | 9        | Coil Spring     | Piano Wire      | Electrodeposition Coating |
| 5        | Rod Metal                     | Stainless Steel               |         | 10       | Cylinder Body   | Aluminum Alloy  | Hard Anodized             |



Small compact cylinder Double acting/high load

# MSD-K Series

● Bore size:  $\phi 6$ ,  $\phi 8$ ,  $\phi 12$ ,  $\phi 16$

Circuit Diagram Symbol

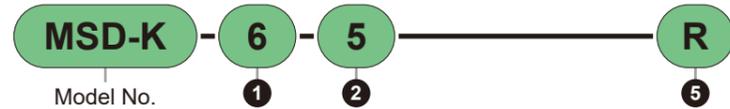


Double Acting Type

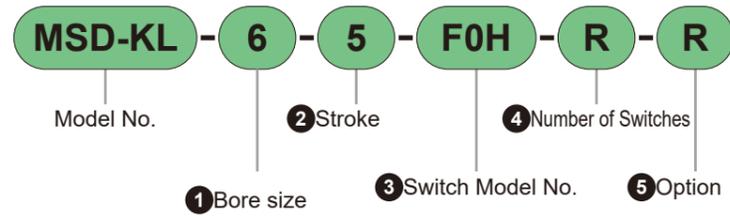


## Model No. Notation Method

Without Switch  
(Without magnet for switch)



With Switch  
(Built-in magnet for switch)



### 1 Bore size (mm)

| Code | Content   |
|------|-----------|
| 6    | $\phi 6$  |
| 8    | $\phi 8$  |
| 12   | $\phi 12$ |
| 16   | $\phi 16$ |

### 2 Stroke (mm)

| Code | Content |
|------|---------|
| 5    | 5       |
| 10   | 10      |
| 15   | 15      |
| 20   | 20      |
| 25   | 25      |
| 30   | 30      |

### 3 Switch Model No.

For switch details, please refer to P. 869. Switches are included to the product and shipped.

| Contact      | Indicator LED Special Function | Wiring (Output) | Load Voltage (V) |            | Load Current (mA) |            | Lead Wire *1 |         | Image |
|--------------|--------------------------------|-----------------|------------------|------------|-------------------|------------|--------------|---------|-------|
|              |                                |                 | AC               | DC         | AC                | DC         | Straight     | L-shape |       |
| Solid State  | 1-Color                        | 2-wire          | -                | 10 to 30   | -                 | 5 to 20    | -            | F2S□    |       |
|              |                                | 3-wire (NPN)    | -                | 30 or less | -                 | 50 or less | -            | F3S□    |       |
|              |                                | 2-wire          | -                | 10 to 30   | -                 | 5 to 20 *2 | F2H□         | F2V□    |       |
|              |                                | 3-wire (NPN)    | -                | 30 or less | -                 | 50 or less | F3H□         | F3V□    |       |
|              |                                | 3-wire (PNP)    | -                | 30 or less | -                 | 50 or less | F3PH□        | F3PV□   |       |
|              |                                | 2-Color         | 2-wire           | -          | 24±10%            | -          | 5 to 20      | F2YH□   | F2YV□ |
| 3-wire (NPN) | -                              |                 | 30 or less       | -          | 50 or less        | F3YH□      | F3YV□        |         |       |
| Reed         | 1-Color                        | 2-wire          | -                | 24 ± 10%   | -                 | 5 to 20    | F0H□         | F0V□    |       |

\*1: For "□" in the switch model number, enter the code selected from the "Lead wire length" table.

\*2: The maximum load current value above, 20 mA, is at 25°C. If the switch operating ambient temperature is higher than 25°C, it will be lower than 20 mA. (At 60°C, it will be 5 to 10 mA.)

\*3: For models with switches, use non-magnetic (stainless steel, etc.) mounting bolts for  $\phi 6$  and  $\phi 8$ .

\*4: When using a non-contact switch with  $\phi 12$  or  $\phi 16$ , use non-magnetic (stainless steel, etc.) through bolts.

\*5: Switches other than the model numbers listed above are also available. (Custom products) For details, refer to P. 869.

\*6: Depending on the relationship between cylinder mounting and stroke, it may not be possible to mount the switch. Refer to P. 810 for availability.

### \*Lead wire length

| Code  | Content        |
|-------|----------------|
| Blank | 1 m (Standard) |
| 3     | 3 m (Option)   |

Example) Lead wire length  
1 m F2S  
3 m F2S<sup>3</sup>

### 4 Number of Switches

| Code | Content                |
|------|------------------------|
| R    | With 1 pc on rod side  |
| H    | With 1 pc on head side |
| D    | With 2 pcs             |

### 5 Option

| Code  | Content           | Image |
|-------|-------------------|-------|
| Blank | Front piping type |       |
| R     | Rear piping type  |       |

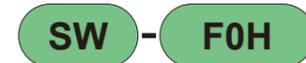
\*1: In the case of the rear piping type, mounting on the side of the main body is possible. Also, please note that two bolts are used for mounting on the rod side and head side.

Rechargeable Battery Compatible Specification (Catalog No. CC-1226AA)

● Structure usable in secondary battery manufacturing processes

MSD-K - . . . . . P4□

## Switch Single Unit Model No. Display Method

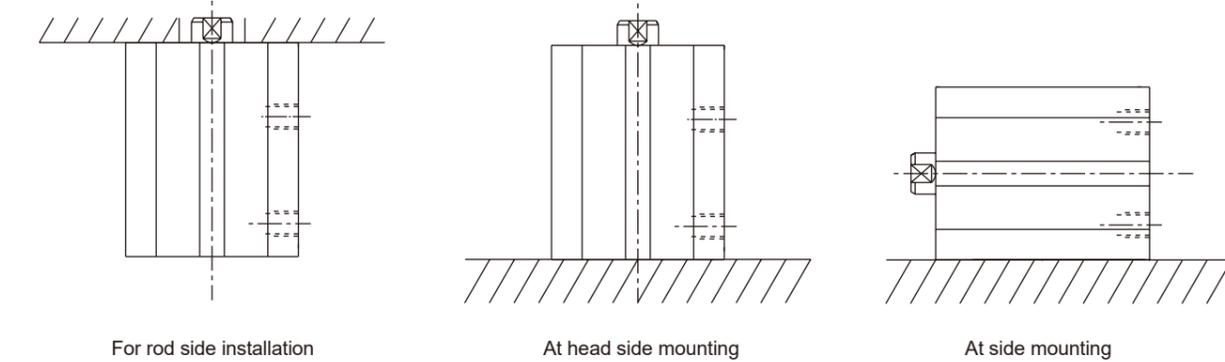


4 Switch Model No.

Switch usability selection table

Depending on the cylinder mounting and stroke relationship, it may not be possible to mount the switch. Select the switch after confirming the table below. Switches cannot be used for side mounting in the following combinations.

- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke length 5 mm for ø6
- Combinations in which F2YH, F3YH or F3PH is mounted at the switch mounting position H with stroke length 5 mm for ø8 (Refer to P. 811 for the min. stroke with switch.)



● For rod side installation

| Bore Size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|---|
|                |             | F2S/F3S                  |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |   |
| ø6             | 5           | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø8             | 5           | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø12            | 5           | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø16            | 5           | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | × | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |

● At head side mounting

| Bore Size (mm) | Stroke (mm) | Solid state switch       |   |                          |   |                          |   |                          |   |                          |   | Reed switch              |   |                          |   |   |
|----------------|-------------|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|--------------------------|---|---|
|                |             | F2S/F3S                  |   | F2H/F3H                  |   | F2V/F3V                  |   | F2YH/F3YH/F3PH           |   | F2YV/F3YV/F3PV           |   | F0H                      |   | F0V                      |   |   |
|                |             | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   | Switch mounting position |   |   |
|                |             | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H | R                        | H |   |
| ø6             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | × | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø8             | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø12            | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
| ø16            | 5           | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ×                        | ○ | ○                        | ○ | ○ |
|                | 10          | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |
|                | 15 to       | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○                        | ○ | ○ |

Note: (R) 1 rod side switch, H: With 1 head side switch

Specifications

| Item                           | MSD-K<br>MSD-KL (with switch)                             |       |       |       |
|--------------------------------|---|-------|-------|-------|
|                                | ø6  | ø8    | ø12   | ø16   |
| Bore size mm                   | ø6  | ø8    | ø12   | ø16   |
| Actuation method               | Double Acting Type  |       |       |       |
| Operating Fluid                | Compressed Air  |       |       |       |
| Maximum operating pressure MPa | 1.0   |       |       |       |
| Min. Operating Pressure MPa    | 0.15  |       | 0.1   |       |
| Proof pressure MPa             | 1.6   |       |       |       |
| Ambient Temperature °C         | -10 to 60 (No freezing)                                   |       |       |       |
| Connection                     | Front piping type   | M3    |       | M5    |
|                                | Rear piping type  | M3    |       | M3    |
| Stroke tolerance mm            | +2.0<br>0   |       |       |       |
| Operating Piston Speed mm/s    | 50 to 500   |       |       |       |
| Cushion                        | With Rubber Cushion                                       |       |       |       |
| Lubrication                    | Not Required (When lubricating, use Turbine Oil ISO VG32) |       |       |       |
| Allowable absorbed energy J    | 0.004   | 0.014 | 0.044 | 0.110 |

Stroke

| Bore Size (mm) | Standard Stroke (mm)       | Minimum stroke with 2 switches (mm) |             | Minimum stroke with 1 switch (mm) |             |
|----------------|----------------------------|-------------------------------------|-------------|-----------------------------------|-------------|
|                |                            | Solid state switch                  | Reed switch | Solid state switch                | Reed switch |
| ø6             | 5 / 10 / 15 / 20 / 25 / 30 | 5 (10)                              | 10          | 5                                 | 5           |
| ø8             | 5 / 10 / 15 / 20 / 25 / 30 | 5                                   | 10          | 5                                 | 5           |
| ø12            | 5 / 10 / 15 / 20 / 25 / 30 | 5                                   | 10          | 5                                 | 5           |
| ø16            | 5 / 10 / 15 / 20 / 25 / 30 | 5                                   | 10          | 5                                 | 5           |

\*1: Only standard strokes can be manufactured.

\*2: In the case of F2Y, F3Y, F3P, the minimum stroke is the dimension in parentheses.

Cylinder Weight Table

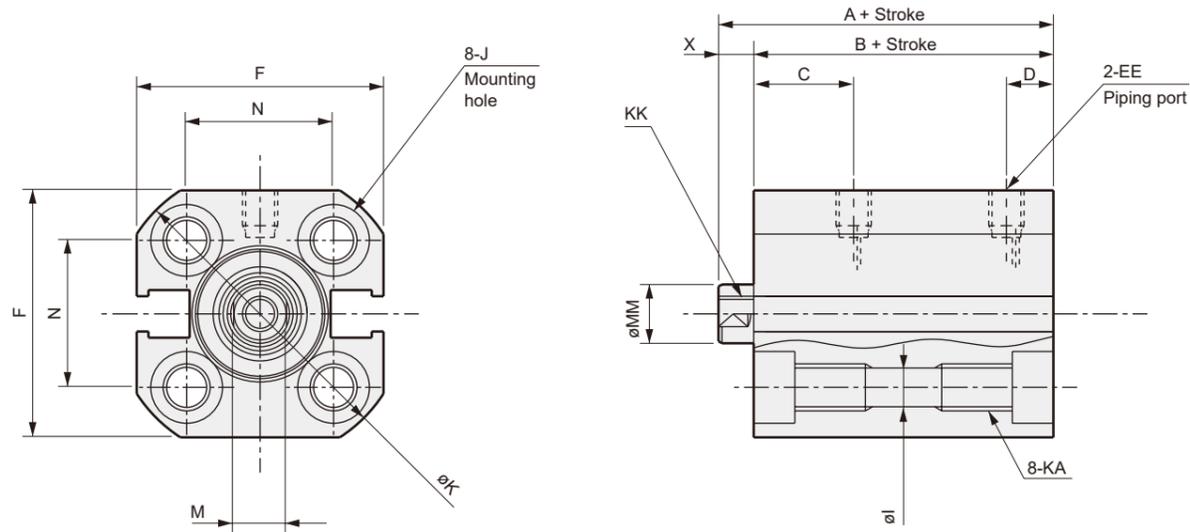
| Stroke (mm)    | (Unit: g)      |             |                |             |                |             |                |             |                |             |                |             | Weight per Switch  |
|----------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|----------------|-------------|--|
|                | 5              |             | 10             |             | 15             |             | 20             |             | 25             |             | 30             |             |  |
| Bore Size (mm) | Without Switch | With Switch | Refer to the weight stated in the switch specifications on P. 869. |
| ø6             | 27             | 29          | 30             | 32          | 32             | 34          | 35             | 37          | 38             | 40          | 41             | 43          |  |
| ø8             | 29             | 32          | 34             | 37          | 39             | 42          | 44             | 47          | 48             | 51          | 53             | 56          |  |
| ø12            | 35             | 45          | 43             | 53          | 52             | 62          | 61             | 71          | 70             | 80          | 79             | 89          |  |
| ø16            | 54             | 70          | 66             | 82          | 79             | 95          | 92             | 108         | 104            | 120         | 117            | 133         |  |

Theoretical Thrust Table

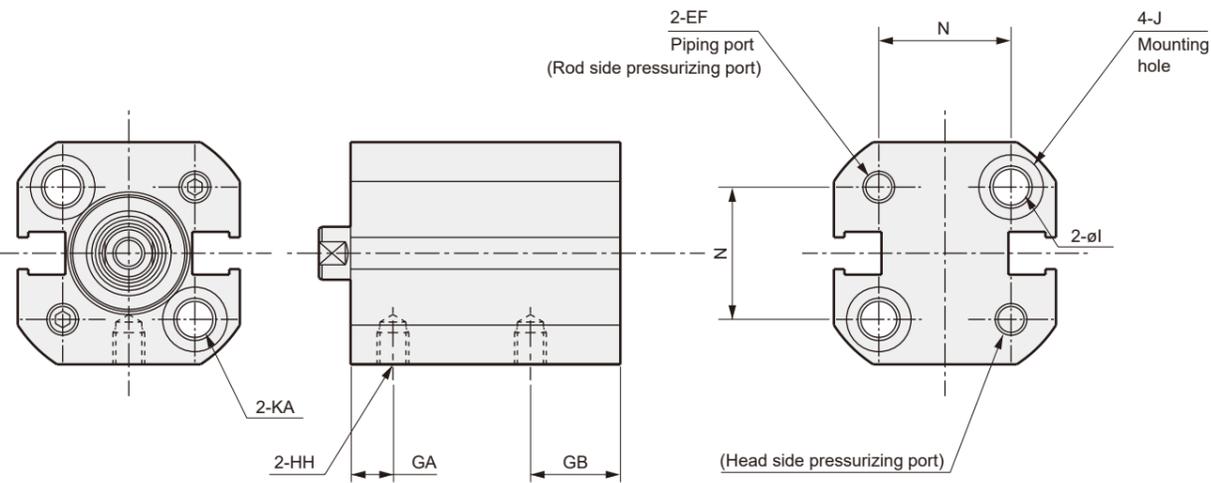
| Bore Size (mm) | Operating Direction | Operating Pressure MPa |      |      |      |      |                      |                      |                      |                      |                      |                      |
|----------------|---------------------|------------------------|------|------|------|------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                |                     | 0.1                    | 0.15 | 0.2  | 0.3  | 0.4  | 0.5                  | 0.6                  | 0.7                  | 0.8                  | 0.9                  | 1.0                  |
| ø6             | Push                | -                      | 4.24 | 5.65 | 8.48 | 11.3 | 14.1                 | 17.0                 | 19.8                 | 22.6                 | 25.4                 | 28.3                 |
|                | Pull                | -                      | 2.36 | 3.14 | 4.71 | 6.28 | 7.85                 | 9.42                 | 11.0                 | 12.6                 | 14.1                 | 15.7                 |
| ø8             | Push                | -                      | 7.54 | 10.1 | 15.1 | 20.1 | 25.1                 | 30.2                 | 35.2                 | 40.2                 | 45.2                 | 50.3                 |
|                | Pull                | -                      | 4.59 | 6.13 | 9.19 | 12.3 | 15.3                 | 18.4                 | 21.4                 | 24.5                 | 27.6                 | 30.6                 |
| ø12            | Push                | 11.3                   | 17.0 | 22.6 | 33.9 | 45.2 | 56.5                 | 67.9                 | 79.2                 | 90.5                 | 1.02×10 <sup>2</sup> | 1.13×10 <sup>2</sup> |
|                | Pull                | 8.48                   | 12.7 | 17.0 | 25.4 | 33.9 | 42.4                 | 50.9                 | 59.4                 | 67.9                 | 76.3                 | 84.8                 |
| ø16            | Push                | 20.1                   | 30.2 | 40.2 | 60.3 | 80.4 | 1.01×10 <sup>2</sup> | 1.21×10 <sup>2</sup> | 1.41×10 <sup>2</sup> | 1.61×10 <sup>2</sup> | 1.81×10 <sup>2</sup> | 2.01×10 <sup>2</sup> |
|                | Pull                | 15.1                   | 22.6 | 30.2 | 45.2 | 60.3 | 75.4                 | 90.5                 | 1.06×10 <sup>2</sup> | 1.21×10 <sup>2</sup> | 1.36×10 <sup>2</sup> | 1.51×10 <sup>2</sup> |

Outline Dimension Drawing

●MSD-K(L)-6/8/12



●MSD-K(L)-6/8/12-□-R (rear piping)



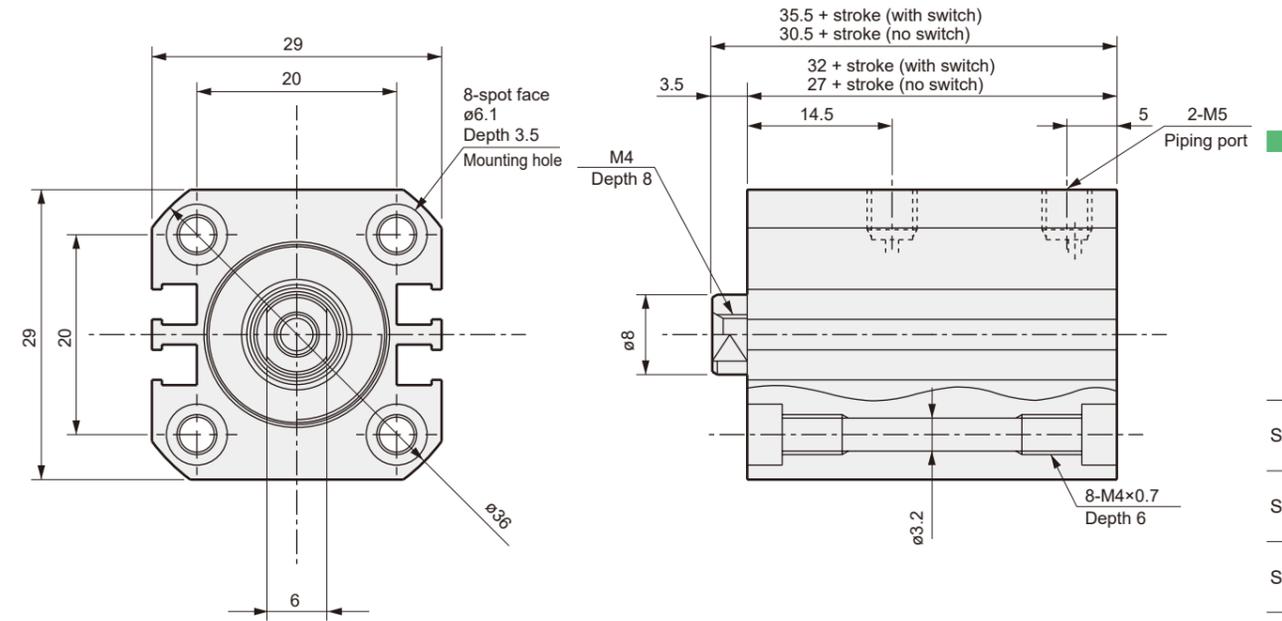
| Bore size (mm) | Without Switch |      | With Switch |      | Common dimension |   |    |    |     |                             |      |            |              |     |    |      |     |
|----------------|----------------|------|-------------|------|------------------|---|----|----|-----|-----------------------------|------|------------|--------------|-----|----|------|-----|
|                | A              | B    | A           | B    | C                | D | EE | F  | I   | J                           | K    | KA         | KK           | M   | MM | N    | X   |
| ø6             | 22.5           | 19.5 | 27.5        | 24.5 | 7.5              | 4 | M3 | 19 | 3.2 | Spot face ø6.1<br>Depth 3.5 | 22.5 | M4 Depth 6 | M2.5 depth 4 | 3.5 | 4  | 11   | 3   |
| ø8             | 24             | 21   | 29          | 26   | 9                | 4 | M3 | 21 | 3.2 | Spot face ø6.1<br>Depth 3.5 | 25   | M4 Depth 6 | M3 Depth 5   | 4.5 | 5  | 12.5 | 3   |
| ø12            | 25.5           | 22   | 30.5        | 27   | 11.5             | 5 | M5 | 25 | 3.2 | Spot face ø6.1<br>Depth 3.5 | 31   | M4 Depth 6 | M3 depth 6   | 5   | 6  | 15.5 | 3.5 |

| Bore size (mm) | Rear piping dimensions |     |      |            |
|----------------|------------------------|-----|------|------------|
|                | EF                     | GA  | GB   | HH         |
| ø6             | M3                     | 3   | 8.5  | M3 Depth 3 |
| ø8             | M3                     | 4.5 | 8.5  | M3 Depth 3 |
| ø12            | M3                     | 4   | 10.5 | M3 Depth 3 |

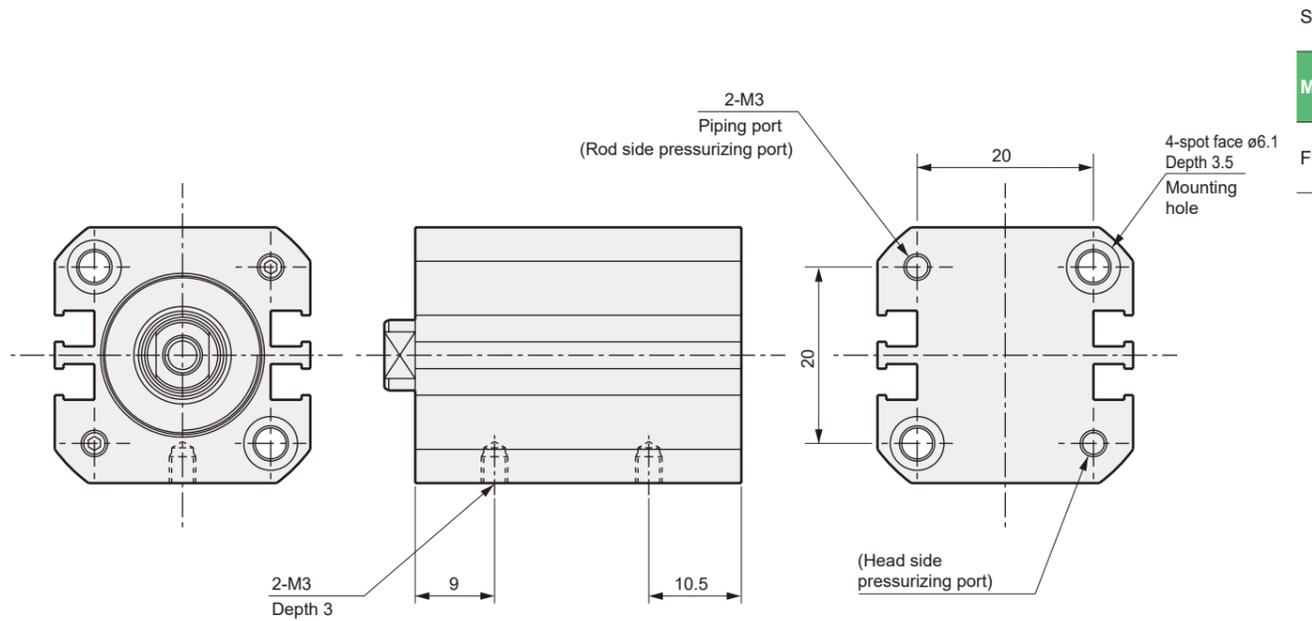
Note: Refer to P. 820 to 824 for dimensions with switch.

Outline Dimension Drawing

●MSD-K(L)-16

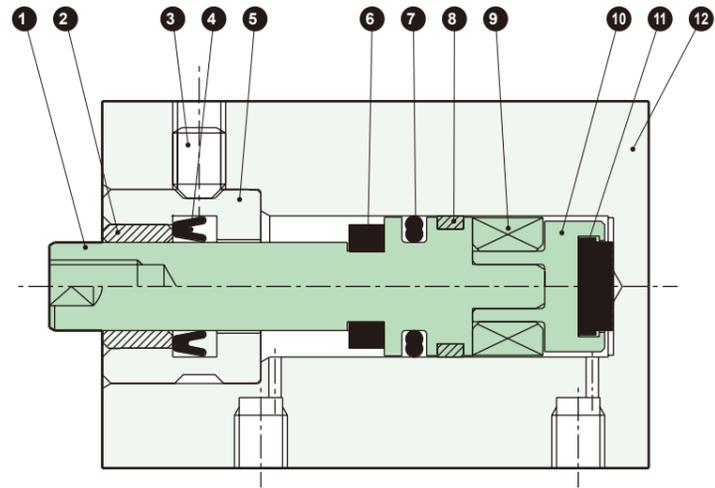
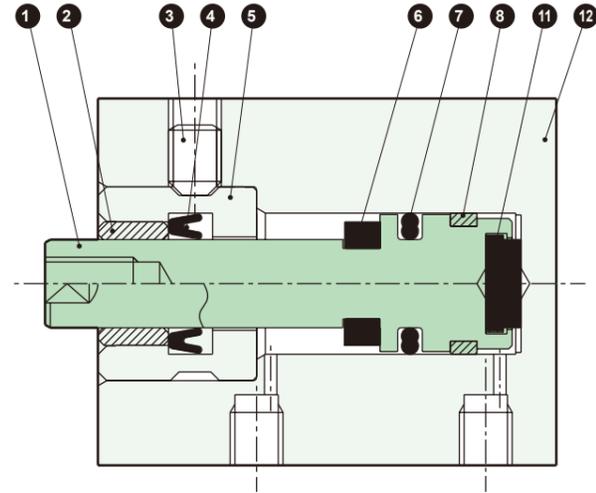


●MSD-K(L)-16-□-R (rear piping)



Internal Structure Diagram/Material

●MSD-K-6/8/12



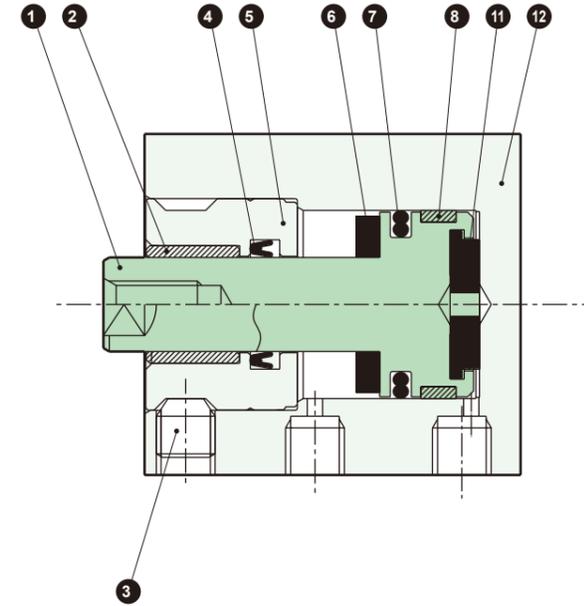
**Do not disassemble**

| Part No. | Part Name                     | Material                      | Remarks | Part No. | Part Name        | Material         | Remarks       |
|----------|-------------------------------|-------------------------------|---------|----------|------------------|------------------|---------------|
| 1        | Piston                        | Stainless Steel               |         | 7        | Piston Packing   | Nitrile Rubber   |               |
| 2        | Bushing                       | Oil-Impregnated Bearing Alloy |         | 8        | Wear Ring        | Polyacetal Resin |               |
| 3        | Hexagon socket head set screw | Stainless Steel               |         | 9        | Magnet           | Plastic          |               |
| 4        | Rod Packing                   | Nitrile Rubber                |         | 10       | Adapter          | Aluminum Alloy   |               |
| 5        | Rod Metal                     | Stainless Steel               |         | 11       | Cushion rubber H | Urethane Rubber  |               |
| 6        | Cushion rubber R              | Urethane Rubber               |         | 12       | Cylinder Body    | Aluminum Alloy   | Hard Anodized |

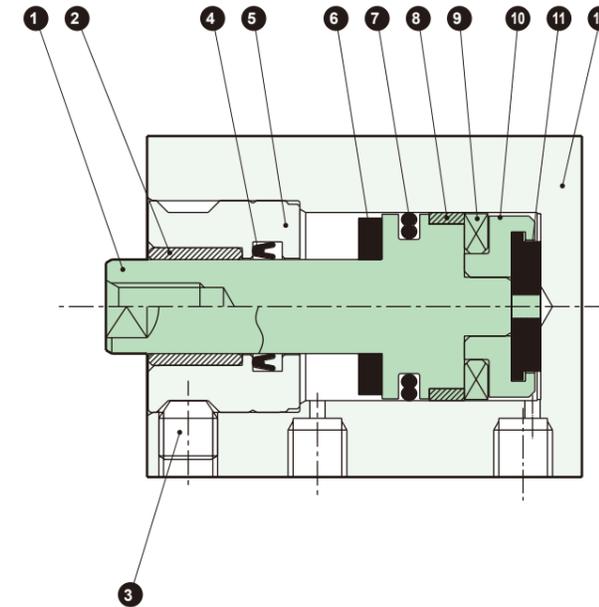
Internal Structure Diagram/Material

Internal Structure Diagram/Material

●MSD-K-16



●MSD-KL-16



**Do not disassemble**

| Part No. | Part Name                     | Material                      | Remarks | Part No. | Part Name        | Material         | Remarks       |
|----------|-------------------------------|-------------------------------|---------|----------|------------------|------------------|---------------|
| 1        | Piston                        | Stainless Steel               |         | 7        | Piston Packing   | Nitrile Rubber   |               |
| 2        | Bushing                       | Oil-Impregnated Bearing Alloy |         | 8        | Wear Ring        | Polyacetal Resin |               |
| 3        | Hexagon socket head set screw | Stainless Steel               |         | 9        | Magnet           | Plastic          |               |
| 4        | Rod Packing                   | Nitrile Rubber                |         | 10       | Adapter          | Aluminum Alloy   |               |
| 5        | Rod Metal                     | Stainless Steel               |         | 11       | Cushion rubber H | Urethane Rubber  |               |
| 6        | Cushion rubber R              | Urethane Rubber               |         | 12       | Cylinder Body    | Aluminum Alloy   | Hard Anodized |

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Cylinder Switch

Ending

Space-Saving Type

SSD2

SSG

SSD

CAT

MDC2

SMG

MSD

FC□

Cylinder Switch

Ending



Compact Cylinder Double Acting, Ultra Low Speed Type

## Single Rod Type MSD-F Series

● Tube bore ø6, ø8

## High Load Type MSD-KF Series

● Tube bore ø6, ø8, ø12, ø16

Circuit Diagram Symbol



Double Acting Type

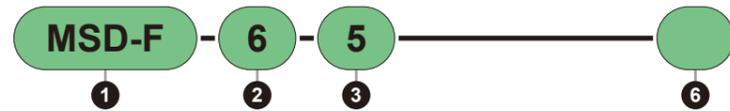


# MSD-F/MSD-KF Series

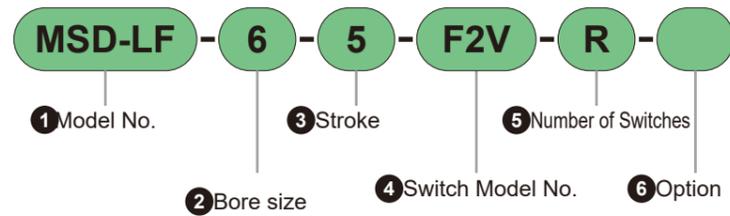
Model No. Notation Method

### Model No. Notation Method

Without Switch  
(Without magnet for switch)



With Switch  
(Built-in magnet for switch)



#### 1 Model No.

| Code    | Content  |
|---------|--|
| MSD-F   | Double Acting/Ultra Low Speed Type                         |
| MSD-KF  | Double acting, High load ultra low speed type              |
| MSD-LF  | Double acting, Ultra low speed type, With switch           |
| MSD-KLF | Double acting, High load Ultra low speed type, With switch |

#### 2 Bore size (mm)

| Code | Content | Model No.       |                   |
|------|---------|-----------------|-------------------|
|      |         | MSD-F<br>MSD-LF | MSD-KF<br>MSD-KLF |
| 6    | ø6      | ●               | ●                 |
| 8    | ø8      | ●               | ●                 |
| 12   | ø12     |                 | ●                 |
| 16   | ø16     |                 | ●                 |

#### 3 Stroke (mm)

| Code | Content |
|------|---------|
| 5    | 5       |
| 10   | 10      |
| 15   | 15      |
| 20   | 20      |
| 25   | 25      |
| 30   | 30      |

#### 4 Switch Model No.

For switch details, please refer to P. 869. Switches are included to the product and shipped.

| Contact      | Indicator LED<br>Special Function | Wiring<br>(Output) | Load Voltage (V) |            | Load Current (mA) |            | Lead Wire *1 |         | Image |
|--------------|-----------------------------------|--------------------|------------------|------------|-------------------|------------|--------------|---------|-------|
|              |                                   |                    | AC               | DC         | AC                | DC         | Straight     | L-shape |       |
| Solid State  | 1-Color                           | 2-wire             | -                | 10 to 30   | -                 | 5 to 20    | -            | F2S□    |       |
|              |                                   | 3-wire (NPN)       | -                | 30 or less | -                 | 50 or less | -            | F3S□    |       |
|              |                                   | 2-wire             | -                | 10 to 30   | -                 | 5 to 20 *2 | F2H□         | F2V□    |       |
|              |                                   | 3-wire (NPN)       | -                | 30 or less | -                 | 50 or less | F3H□         | F3V□    |       |
|              |                                   | 3-wire (PNP)       | -                | 30 or less | -                 | 50 or less | F3PH□        | F3PV□   |       |
|              |                                   | 2-Color            | 2-wire           | -          | 24±10%            | -          | 5 to 20      | F2YH□   | F2YV□ |
| 3-wire (NPN) | -                                 |                    | 30 or less       | -          | 50 or less        | F3YH□      | F3YV□        |         |       |
| Reed         | 1-Color                           | 2-wire             | —                | 24 ± 10%   | —                 | 5 to 20    | F0H□         | F0V□    |       |

#### \*Lead wire length

| Code  | Content        |
|-------|----------------|
| Blank | 1 m (Standard) |
| 3     | 3 m (Option)   |

Example) Lead wire length  
1 m F2S  
3 m F2S[3]

\*1: For "□" in the switch model number, enter the code selected from the "\*Lead wire length" table.

\*2: The maximum load current value above, 20 mA, is at 25°C. If the switch operating ambient temperature is higher than 25°C, it will be lower than 20 mA. (At 60°C, it will be 5 to 10 mA.)

\*3: For models with switches, use non-magnetic (stainless steel, etc.) mounting bolts for ø6 and ø8.

\*4: When using a non-contact switch with ø12 or ø16, use non-magnetic (stainless steel, etc.) through bolts.

\*5: Switches other than the model numbers listed above are also available. (Custom products) For details, refer to P. 869.

\*6: Depending on the relationship between cylinder mounting and stroke, it may not be possible to mount the switch. Availability is MSD-(L) F: P. 794, MSD-K (L) F: See P. 810.

#### 5 Number of Switches

| Code | Content                |
|------|------------------------|
| R    | With 1 pc on rod side  |
| H    | With 1 pc on head side |
| D    | With 2 pcs             |

#### 6 Option

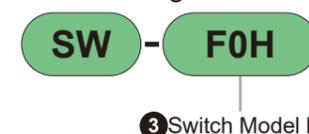
| Code  | Content           | Image |
|-------|-------------------|-------|
| Blank | Front piping type |       |
| R     | Rear piping type  |       |

\*1, \*2

\*1: In the case of the rear piping type, mounting on the side of the main body is possible. Also, please note that two bolts are used for mounting on the rod side and head side.

\*2: For the rear piping type, only double-acting, high-load types ø12 and ø16 can be selected.

#### Switch Single Unit Model No. Display Method



# MSD-F/MSD-KF Series

## Specifications

| Item                           | MSD-F / MSD-LF (with switch)  |    | MSD-KF / MSD-KLF (with switch) |                     |       |       |
|--------------------------------|---|----|--------------------------------|---------------------|-------|-------|
|                                | ø6  | ø8 | ø6                             | ø8                  | ø12   | ø16   |
| Bore size mm                   |   |    |                                |                     |       |       |
| Actuation method               | Double Acting/Single Rod Type   |    |                                |                     |       |       |
| Operating Fluid                | Compressed Air  |    |                                |                     |       |       |
| Maximum operating pressure MPa | 1.0   |    |                                |                     |       |       |
| Min. Operating Pressure MPa    | 0.15  |    | 0.15                           |                     | 0.1   |       |
| Proof pressure MPa             | 1.6   |    |                                |                     |       |       |
| Ambient Temperature °C         | 5 to 60   |    |                                |                     |       |       |
| Port Size                      | Front piping type   | M3 |                                | M3                  |       | M5    |
|                                | Rear piping type  | -  |                                | -                   |       | M3    |
| Stroke tolerance mm            | +0.5<br>0   |    | +2.0<br>0                      |                     |       |       |
| Operating Piston Speed mm/s    | 1 to 200  |    |                                |                     |       |       |
| Cushion                        | None  |    |                                | With Rubber Cushion |       |       |
| Lubrication                    | Lubrication Not Possible  |    |                                |                     |       |       |
| Allowable absorbed energy J    | This product cannot absorb the energy generated by an external load included to the cylinder. Use without load, select a high-load type, or provide a separate shock absorber externally. |    | 0.004                          | 0.014               | 0.044 | 0.110 |

MEMO

## Stroke

| Bore Size (mm) | Standard Stroke (mm) | Minimum stroke with 2 switches (mm) |             | Minimum stroke with 1 switch (mm) |             |
|----------------|----------------------|-------------------------------------|-------------|-----------------------------------|-------------|
|                |                      | Solid state switch                  | Reed switch | Solid state switch                | Reed switch |
| ø6             | 5/10/15/20/25/30     | 5                                   | 10          | 5                                 | 5           |
| ø8             | 5/10/15/20/25/30     | 5                                   | 10          | 5                                 | 5           |
| ø12            | 5/10/15/20/25/30     | 5                                   | 10          | 5                                 | 5           |
| ø16            | 5/10/15/20/25/30     | 5                                   | 10          | 5                                 | 5           |

Note: Strokes other than standard are not available.

## Cylinder Weight Table

Same as double acting, single rod MSD series and double acting, high load MSD-K series. See P. 796 and 811.

## Theoretical Thrust Table

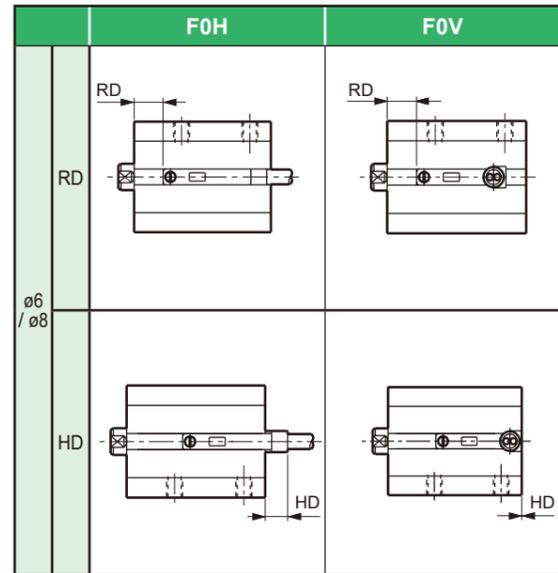
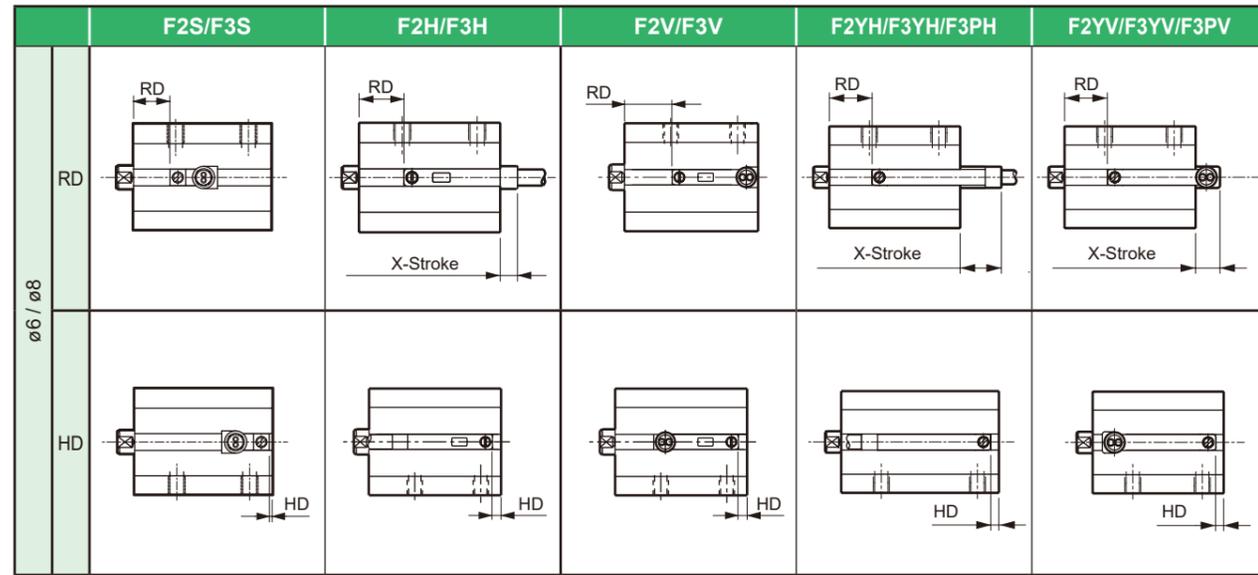
(Unit: N)

| Bore Size (mm) | Operating Direction | Operating Pressure MPa |      |      |      |      |                      |                      |                      |                      |                      |                      |
|----------------|---------------------|------------------------|------|------|------|------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                |                     | 0.1                    | 0.15 | 0.2  | 0.3  | 0.4  | 0.5                  | 0.6                  | 0.7                  | 0.8                  | 0.9                  | 1.0                  |
| ø6             | Push                | -                      | 4.24 | 5.65 | 8.48 | 11.3 | 14.1                 | 17.0                 | 19.8                 | 22.6                 | 25.4                 | 28.3                 |
|                | Pull                | -                      | 2.36 | 3.14 | 4.71 | 6.28 | 7.85                 | 9.42                 | 11.0                 | 12.6                 | 14.1                 | 15.7                 |
| ø8             | Push                | -                      | 7.54 | 10.1 | 15.1 | 20.1 | 25.1                 | 30.2                 | 35.2                 | 40.2                 | 45.2                 | 50.3                 |
|                | Pull                | -                      | 4.59 | 6.13 | 9.19 | 12.3 | 15.3                 | 18.4                 | 21.4                 | 24.5                 | 27.6                 | 30.6                 |
| ø12            | Push                | 11.3                   | 17.0 | 22.6 | 33.9 | 45.2 | 56.5                 | 67.9                 | 79.2                 | 90.5                 | 1.02×10 <sup>2</sup> | 1.13×10 <sup>2</sup> |
|                | Pull                | 8.48                   | 12.7 | 17.0 | 25.4 | 33.9 | 42.4                 | 50.9                 | 59.4                 | 67.9                 | 76.3                 | 84.8                 |
| ø16            | Push                | 20.1                   | 30.2 | 40.2 | 60.3 | 80.4 | 1.01×10 <sup>2</sup> | 1.21×10 <sup>2</sup> | 1.41×10 <sup>2</sup> | 1.61×10 <sup>2</sup> | 1.81×10 <sup>2</sup> | 2.01×10 <sup>2</sup> |
|                | Pull                | 15.1                   | 22.6 | 30.2 | 45.2 | 60.3 | 75.4                 | 90.5                 | 1.06×10 <sup>2</sup> | 1.21×10 <sup>2</sup> | 1.36×10 <sup>2</sup> | 1.51×10 <sup>2</sup> |

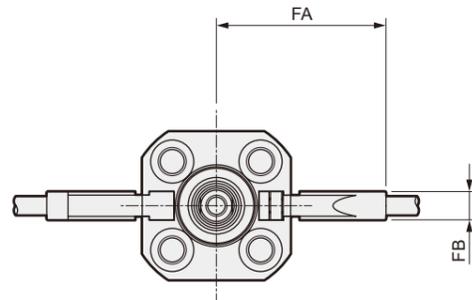
## Outline Dimension Drawing

MSD-(L)F: Double acting/single rod MSD Series, MSD-K(L)F: Same as MSD-K Series (double acting/high load). See P. 798, 812, and 813.

MSD-L Series Outline Dimension Drawing with Switch



● Protrusion dimension when mounting cylinder switch F2S, F3S



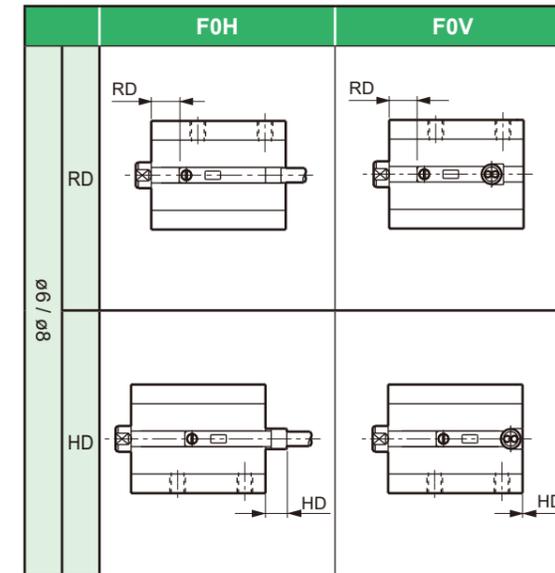
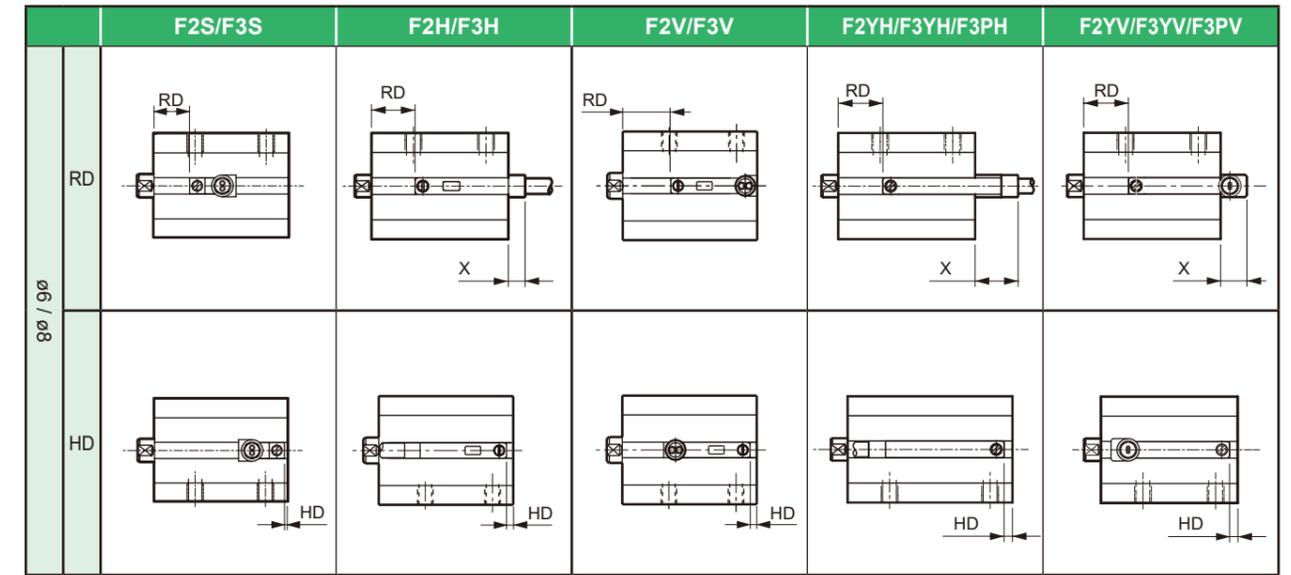
(Unit: mm)

| Model | Bore size (mm) | F2S/F3S |     | F2H/F3H |         |     | F2V/F3V |        | F2YH/F3YH/F3PH |     |     | F2YV/F3YV/F3PV |        |     | F0H |     | F0V |     |     |     |
|-------|----------------|---------|-----|---------|---------|-----|---------|--------|----------------|-----|-----|----------------|--------|-----|-----|-----|-----|-----|-----|-----|
|       |                | RD      | HD  | FA (*2) | FB (*2) | RD  | HD      | X (*1) | RD             | HD  | RD  | HD             | X (*1) | RD  | HD  | RD  | HD  | RD  | HD  |     |
| MSD-L | ø6             | 6.5     | 0.5 | 20.6    | 4       | 7.5 | 1.5     | 7.7    | 7.5            | 1.5 | 7.5 | 1.5            | 12.2   | 7.5 | 1.5 | 9.2 | 3.5 | 3.5 | 3.5 | 0.0 |
|       | ø8             | 8.5     | 0.0 | 21.6    | 4       | 9.5 | 1.0     | 8.2    | 9.5            | 1.0 | 9.5 | 1.0            | 12.7   | 9.5 | 1.0 | 9.7 | 5.5 | 4.0 | 5.5 | 0.0 |
|       |                |         |     |         |         |     |         |        |                |     |     |                |        |     |     |     |     |     |     |     |

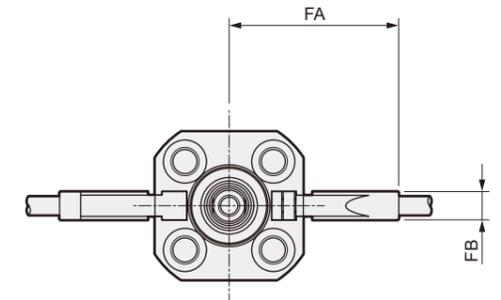
\*1: X dimension is the switch protrusion dimension from the main body end face. If X-stroke is negative, there is no switch protrusion from the main body end face.  
 \*2: For FA and FB dimensions, refer to "Protrusion Dimensions when Mounting Cylinder Switches F2S and F3S."  
 \*3: For switch mounting dimensions, refer to the model number notation method for each variation.

External Dimensions Diagram with Switch

MSD-XL Series Outline Dimension Drawing with Switch



● Protrusion dimension when mounting cylinder switch F2S, F3S



(Unit: mm)

| Switch Model No. | Bore size | F2S/F3S |      | F2H/F3H |         |    | F2V/F3V |        | F2YH/F3YH/F3PH |      |     | F2YV/F3YV/F3PV |        |     | F0H  |     | F0V |      |     |      |   |
|------------------|-----------|---------|------|---------|---------|----|---------|--------|----------------|------|-----|----------------|--------|-----|------|-----|-----|------|-----|------|---|
|                  |           | RD      | HD   | FA (*2) | FB (*2) | RD | HD      | X (*1) | RD             | HD   | RD  | HD             | X (*1) | RD  | HD   | RD  | HD  | RD   | HD  |      |   |
| MSD-XL           | ø6        | 5       | 6.5  | 0.5     | 20.6    | 4  | 7.5     | 1.5    | 3.0            | 7.5  | 1.5 | 7.5            | 1.5    | 7.5 | 1.5  | 4.5 | 4.0 | 4.0  | 4.0 | 0    |   |
|                  |           | 10      | 11.5 | 0.5     |         |    | 12.5    | 1.5    | -              | 12.5 | 1.5 | 12.5           | 1.5    | -   | 12.5 | 1.5 | -   | 9.0  | 4.0 | 9.0  | 0 |
|                  | ø8        | 5       | 8.0  | 0.5     | 21.6    | 4  | 9.0     | 1.5    | 3.0            | 9.0  | 1.5 | 9.0            | 1.5    | 7.5 | 9.0  | 1.5 | 4.5 | 5.5  | 4.0 | 5.5  | 0 |
|                  |           | 10      | 13.0 | 0.5     |         |    | 14.0    | 1.5    | -              | 14.0 | 1.5 | 14.0           | 1.5    | -   | 14.0 | 1.5 | -   | 10.5 | 4.0 | 10.5 | 0 |

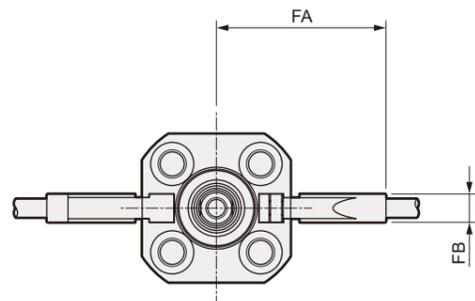
\*1: X dimension is the switch protrusion dimension from the main body end face. If X dimension is not specified, there is no switch protrusion from the main body end face.  
 \*2: For FA and FB dimensions, refer to "Protrusion Dimensions when Mounting Cylinder Switches F2S and F3S."  
 \*3: For switch mounting dimensions, refer to the model number notation method for each variation.

MSD-YL Series Outline Dimension Drawing with Switch

|                   |    | F2S/F3S | F2H/F3H | F2V/F3V | F2YH/F3YH/F3PH | F2YV/F3YV/F3PV |
|-------------------|----|---------|---------|---------|----------------|----------------|
| Space-Saving Type | RD |         |         |         |                |                |
|                   | HD |         |         |         |                |                |
| SSD2              |    |         |         |         |                |                |
| SSG               |    |         |         |         |                |                |
| SSD               |    |         |         |         |                |                |

|                   |    | F0H | F0V |
|-------------------|----|-----|-----|
| Space-Saving Type | RD |     |     |
|                   | HD |     |     |
| SSD2              |    |     |     |
| SSG               |    |     |     |
| SSD               |    |     |     |

● Protrusion dimension when mounting cylinder switch F2S, F3S



(Unit: mm)

| Model  | Bore size | Switch Model No. | F2S/F3S |      | F2H/F3H |      | F2V/F3V |      | F2YH/F3YH/F3PH |      | F2YV/F3YV/F3PV |      | F0H  |     | F0V |     |     |
|--------|-----------|------------------|---------|------|---------|------|---------|------|----------------|------|----------------|------|------|-----|-----|-----|-----|
|        |           |                  | RD      | HD   | RD      | HD   | RD      | HD   | RD             | HD   | RD             | HD   | RD   | HD  | RD  | HD  | RD  |
| MSD-YL | ø6        | 5                | 7.0     | 6.0  | 8.0     | 7.0  | 8.0     | 7.0  | 8.0            | 7.0  | 2.7            | 8.0  | 7.0  | 3.5 | 2.5 | 3.5 | 2.5 |
|        |           | 10               | 7.0     | 11.0 | 8.0     | 12.0 | 8.0     | 12.0 | 8.0            | 12.0 | -              | 8.0  | 12.0 | 3.5 | 7.5 | 3.5 | 7.5 |
|        | ø8        | 5                | 9.0     | 5.0  | 10.0    | 6.0  | 10.0    | 6.0  | 10.0           | 6.0  | 3.2            | 10.0 | 6.0  | 5.5 | 2.0 | 5.5 | 2.0 |
|        |           | 10               | 9.0     | 10.0 | 10.0    | 11.0 | 10.0    | 11.0 | 10.0           | 11.0 | -              | 10.0 | 11.0 | 5.5 | 7.0 | 5.5 | 7.0 |

\*1: X dimension is the switch protrusion dimension from the main body end face. If X dimension is not specified, there is no switch protrusion from the main body end face.

\*2: For FA and FB dimensions, refer to "Protrusion Dimensions when Mounting Cylinder Switches F2S and F3S."

\*3: For switch mounting dimensions, refer to the model number notation method for each variation.

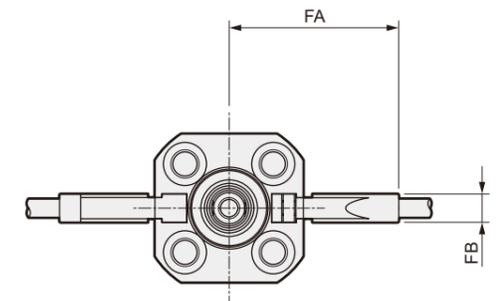
External Dimensions Diagram with Switch

MSD-KL Series (ø6 / ø8) Outline Dimension Drawing with Switch

|                   |    | F2S/F3S | F2H/F3H | F2V/F3V | F2YH/F3YH/F3PH | F2YV/F3YV/F3PV |
|-------------------|----|---------|---------|---------|----------------|----------------|
| Space-Saving Type | RD |         |         |         |                |                |
|                   | HD |         |         |         |                |                |
| SSD2              |    |         |         |         |                |                |
| SSG               |    |         |         |         |                |                |
| SSD               |    |         |         |         |                |                |

|                   |    | F0H | F0V |
|-------------------|----|-----|-----|
| Space-Saving Type | RD |     |     |
|                   | HD |     |     |
| SSD2              |    |     |     |
| SSG               |    |     |     |
| SSD               |    |     |     |

● Protrusion dimension when mounting cylinder switch F2S, F3S



(Unit: mm)

| Model  | Bore size (mm) | F2S/F3S |     | F2H/F3H |         | F2V/F3V |     | F2YH/F3YH/F3PH |      | F2YV/F3YV/F3PV |        | F0H  |     | F0V |     |     |     |   |     |   |
|--------|----------------|---------|-----|---------|---------|---------|-----|----------------|------|----------------|--------|------|-----|-----|-----|-----|-----|---|-----|---|
|        |                | RD      | HD  | FA (*2) | FB (*2) | RD      | HD  | X (*1)         | RD   | HD             | X (*1) | RD   | HD  | RD  | HD  |     |     |   |     |   |
| MSD-KL | ø6             | 9       | 2.5 | 20.6    | 4       | 10      | 3.5 | 5.2            | 10   | 3.5            | 10     | 3.5  | 9.7 | 10  | 3.5 | 6.7 | 6.0 | 0 | 6.0 | 0 |
|        | ø8             | 11.5    | 1.5 | 21.6    | 4       | 12.5    | 2.5 | 6.2            | 12.5 | 2.5            | 10.7   | 12.5 | 2.5 | 7.7 | 8.5 | 0   | 8.5 | 0 | 8.5 | 0 |

\*1: X dimension is the switch protrusion dimension from the main body end face. If X-stroke is negative, there is no switch protrusion from the main body end face.

\*2: For FA and FB dimensions, refer to "Protrusion Dimensions when Mounting Cylinder Switches F2S and F3S."

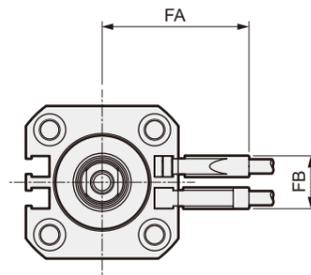
\*3: For switch mounting dimensions, refer to the model number notation method for each variation.

|                   |     | F2S/F3S | F2H/F3H | F2V/F3V | F2YH/F3YH/F3PH | F2YV/F3YV/F3PV |
|-------------------|-----|---------|---------|---------|----------------|----------------|
| Space-Saving Type | ø12 |         |         |         |                |                |
|                   | HD  |         |         |         |                |                |
| SSD2              | ø16 |         |         |         |                |                |
| SSG               |     |         |         |         |                |                |
| SSD               | ø16 |         |         |         |                |                |
| CAT               |     |         |         |         |                |                |

|                   |     | F0H | F0V |
|-------------------|-----|-----|-----|
| Space-Saving Type | ø12 |     |     |
|                   | HD  |     |     |
|                   | ø16 |     |     |
|                   | HD  |     |     |

● Protrusion dimension when mounting cylinder switch F2S, F3S

• ø12, ø16



(Unit: mm)

| Model  | Bore size (mm) | F2S/F3S |     |         |         | F2H/F3H |     |        | F2V/F3V |     | F2YH/F3YH/F3PH |     |        | F2YV/F3YV/F3PV |     |        | F0H  |    | F0V  |    |
|--------|----------------|---------|-----|---------|---------|---------|-----|--------|---------|-----|----------------|-----|--------|----------------|-----|--------|------|----|------|----|
|        |                | RD      | HD  | FA (*2) | FB (*2) | RD      | HD  | X (*1) | RD      | HD  | RD             | HD  | X (*1) | RD             | HD  | X (*1) | RD   | HD | RD   | HD |
| MSD-KL | ø12            | 12      | 2.5 | 23.6    | 4       | 13      | 3.5 | 5.7    | 13      | 3.5 | 13             | 3.5 | 10.2   | 13             | 3.5 | 7.2    | 9.0  | 0  | 9.0  | 0  |
|        | ø16            | 16.5    | 2.5 | 25.6    | 10      | 17.5    | 3.5 | 5.2    | 17.5    | 3.5 | 17.5           | 3.5 | 9.7    | 17.5           | 3.5 | 6.7    | 14.0 | 0  | 14.0 | 0  |

\*1: X dimension is the switch protrusion dimension from the main body end face. If X-stroke is negative, there is no switch protrusion from the main body end face.

\*2: For FA and FB dimensions, refer to "Protrusion Dimensions when Mounting Cylinder Switches F2S and F3S."

\*3: For switch mounting dimensions, refer to the model number notation method for each variation.



# To Use This Product Safely

Be sure to read this before use.

For general cylinder information, see Intro 41, and for cylinder switches, see P. 924.

## Individual Precautions: Small compact cylinder MSD Series

### During Design/Selection

#### 1. Common

##### Caution

■ Please consult us if you intend to use the cylinder as a stopper.

■ When selecting a cylinder switch, refer to the "Switch Usability Selection Table" on P. 794, 795, and 810.

#### 2. Single acting MSD-X/Y

##### Caution

■ Do not apply a load when the piston rod is retracting for the push type, or when the piston rod is extending for the retracting type.

The built-in cylindrical spring in the cylinder only has enough force to return the piston rod, so if a load is applied, it will not return to the stroke end.

■ Do not leave pressurized.

If left pressurized, the piston rod may not return by spring force when the pressure is released.

#### 3. Fine speed MSD-(K) F

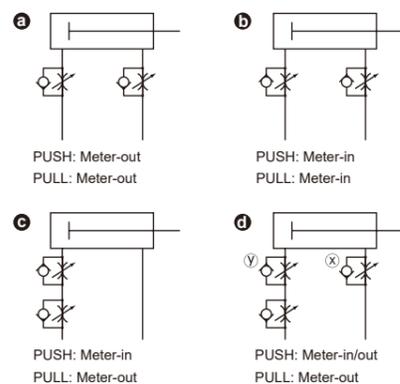
##### Caution

■ Use without lubrication.  
Lubrication may change characteristics.

■ Generally, the higher the air pressure and the lower the load factor, the more stable the speed.  
Use with a load factor of 50% or less.

■ Speed control is stable with a meter-out circuit.

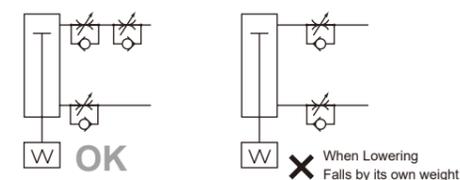
When driving a single-rod cylinder at creep speed in the PUSH direction, if the load resistance is small, a flying-out phenomenon may occur at the start of operation. As countermeasures, use circuits **b**, **c** or **d**. In addition, the **d** circuit is the most stable.



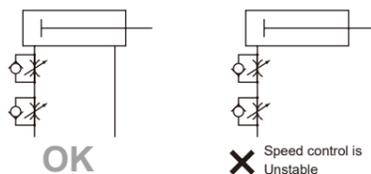
- ① Speed adjustment method for PUSH operation of the circuit:
1. Speed setting with x-speed controller
  2. Throttle with y-speed controller until lurching stops.
  3. Reconfirmation of speed

(\*1) When comparing **b**, **c**, **d**, operation is the most stable with the **d** circuit.

(\*2) For vertical mounting, it will fall by its own weight in a meter-in circuit, so combine it with a meter-out circuit.



(\*3) For series connection of speed controllers, use the circuit shown in the figure below.



(Guideline for lurching occurrence)  
Lurching occurs in the following cases:

• Thrust > Resistance

\*Resistance: Thrust due to residual pressure on exhaust side + due to load  
 (For creep speed type, intake pressure = residual pressure) + For vertical use: Dead weight of the load

■ Do not apply lateral load to the cylinder.

Operation becomes unstable when lateral load is applied.

■ Avoid use in locations with vibration.

Operation becomes unstable due to the influence of vibration.

### During Use

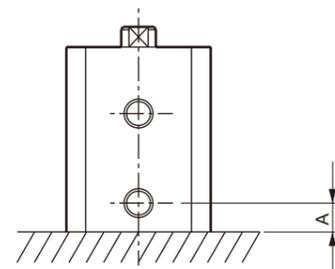
#### 1. Common

##### Caution

■ Mount the switch observing the tightening torque.  
If tightened beyond the tightening torque range, mounting screws, mounting brackets, switches, etc. may be damaged. Also, if tightened below the tightening torque range, the switch mounting position may shift.  
Tightening torque: 29.4 (N·m)

■ During piping

Precautions for piping speed controllers and fittings  
There are restrictions on usable piping fittings, so please refer to the table below.



#### Fitting Usability Table

| Code<br>Bore Size (mm) | Port Size | Port position<br>Dimension A | Usable speed<br>Controller/Fitting   | Fitting outer<br>diameter |
|------------------------|-----------|------------------------------|--|---------------------------|
| ø6<br>ø8               | M3        | 4                            | SC3W-M3-3<br>SC3W-M3-4<br>SC3U-M3-3<br>SC3U-M3-4                           | ø8 or less                |
|                        |           |                              | GWS3-M3-S<br>GWS4-M4-S<br>FTS4-M3  |                           |
| ø12<br>ø16             | M5        | 5                            | SC3W-M5-3<br>SC3W-M5-4<br>SC3W-M5-6<br>SC3U-M5-3<br>SC3U-M5-4<br>SC3U-M5-6 | ø10 or less               |
|                        |           |                              | GWS4-M5-S<br>GWS6-M5-S<br>FTS4-M5<br>FTS6-M5                               |                           |

■ During installation

Please do not make dents, scratches, etc. on the main body (tube) mounting surface and table surface that would impair flatness. The flatness of the mating side to be included to the table should be 0.05 mm or less.

#### 2. Single acting MSD-X/Y

##### Caution

■ A breather hole is provided on the main body, so be careful not to block it during installation.  
This will cause malfunction.

#### 3. Fine speed MSD-(K) F

##### Caution

■ Install the speed controller near the cylinder.

If installed far from the cylinder, the speed will become unstable. Use SC-M3/M5-F, SC3W, or SCD-M3/M5-F series speed controllers.

■ Adjust alignment etc. so that no lateral load is applied to the cylinder. Also, adjust and install so that there is no twisting with respect to the sliding guide.

Operation will become unstable if there are fluctuations in load or resistance. Guides with a large difference between static friction and dynamic friction will result in unstable operation.

For precautions regarding mounting, installation, adjustment, use, and maintenance, please see "Precautions for Use" in this catalog and the CKD Components Product website (<https://www.ckd.co.jp/kiki/en/>) -> "Model No." -> [Instruction Manual].