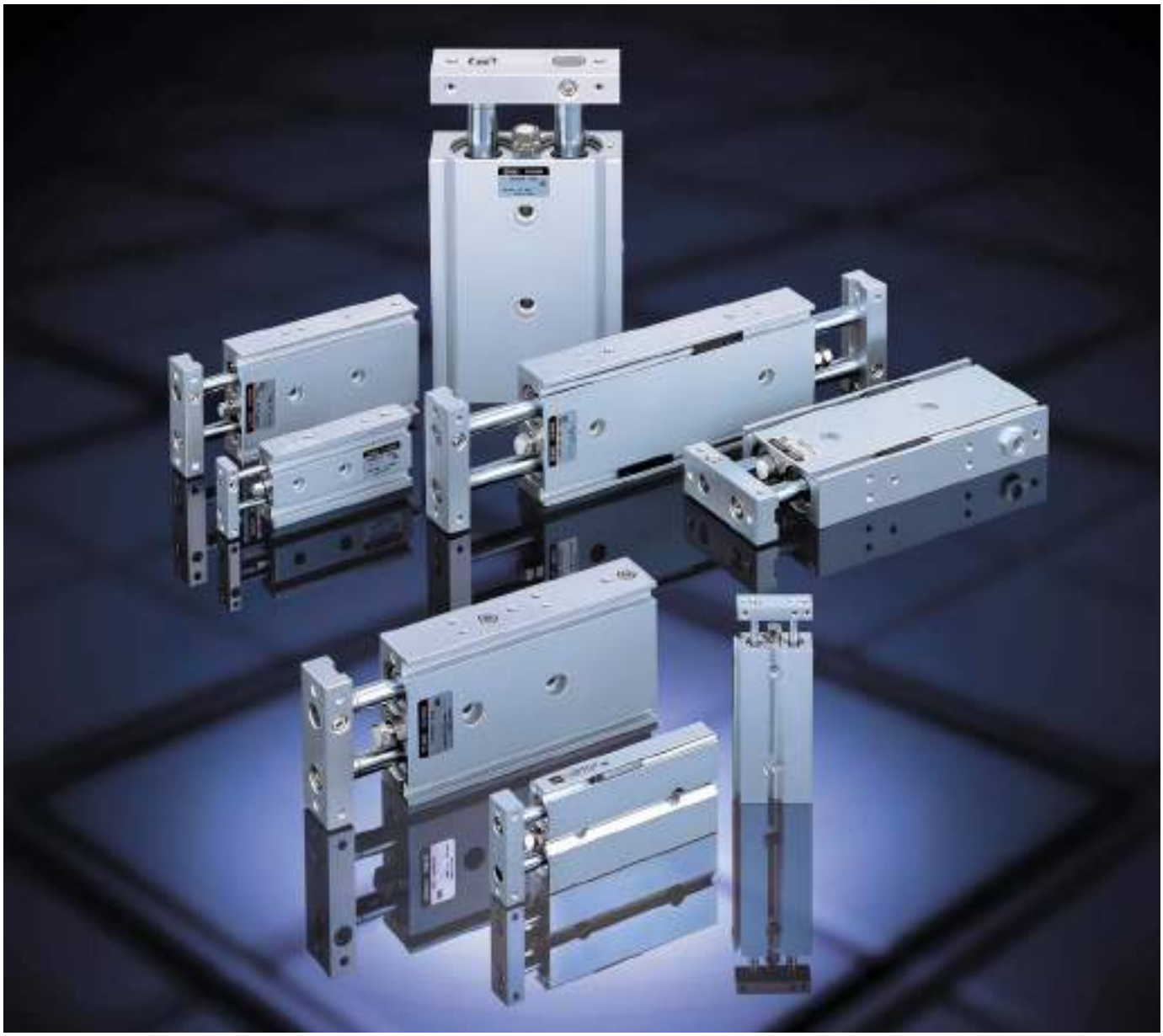
CAT.ES20-53 E-UK

SMC

## Dual-Rod Cylinder

# Series CXS

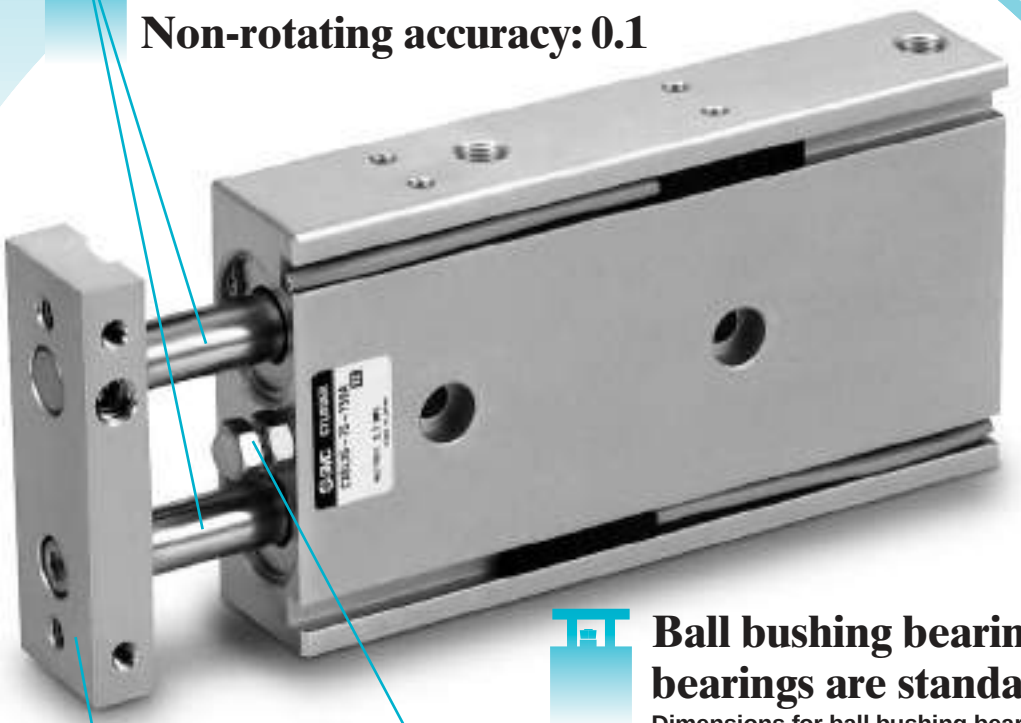


New:
- CXS Dual-Rod Cylinder with Air Cushion
- Compact Type Series CXSJ

# Dual-Rod Cylinder with guide functio for pick-and-place applications

## *Series CXS!*

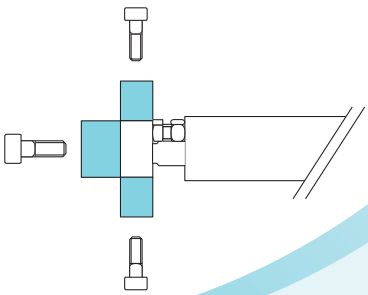
**Twice the thrust**
**Non-rotating accuracy: 0.1**



**Ball bushing bearings and slide bearings are standard for all series.**
Dimensions for ball bushing bearings and slide bearings are the same.

**Adjustable stroke range: 0 to –5mm**

**3-side work piece mounting is a reality.**



### Variations

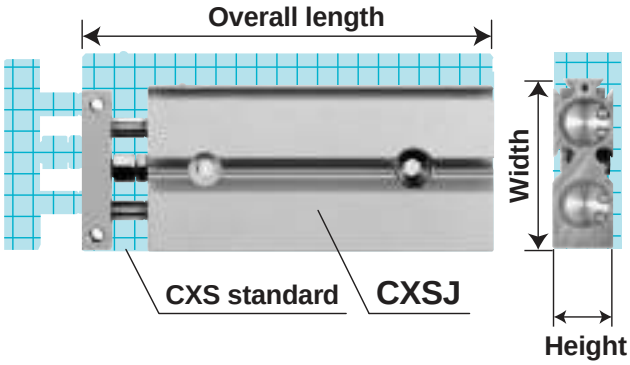
| Series | | Bore sizes (mm) 6 10 15 20 25 32 | Axial piping | Clean room series 11- 12- | Cylinder with Stable Lubrication Function (Lube-retainer) |
|---|---|---|---|---|---|
| New Compact type | CXSJ | ● ● ● ● ● ● | ● | ● ● (Ball bushing only) | ● |
| Standard type | CXS | ● ● ● ● ● ● | ● (ø6 only) | ● ● (Ball bushing only) | ● |
| New With air cushion | CXS | ● ● ● ● ● ● | | | |
| With end lock | CXS | ● ● ● ● ● ● | | | |
| Dual-double-rod type | CXSW | ● ● ● ● ● ● | | | |

# Two new additions: Compact type / Air cushion type cylinders.

New

## Compact type Series CXSJ: ø6, ø10

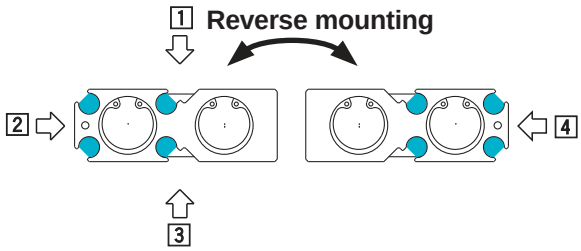
### Smaller and lightweight



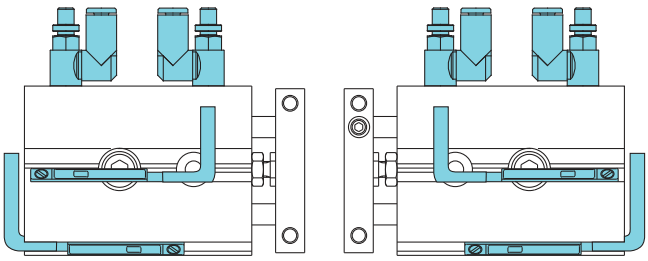

| Bore size (mm) | Series | Dimensions (mm) | | | Weight (g) |
|---|---|---|---|---|---|
| | | Height | Width | Overall length | |
| ø6 | **CXSJ□6** | **13.4** | **32** | **42 + Stroke** | **57** |
| | CXS□6 | 16 | 37 | 58.5 + Stroke | 95 |
| ø10 | **CXSJ□10** | **15** | **42** | **56 + Stroke** | **114** |
| | CXS□10 | 17 | 46 | 72 + Stroke | 170 |

### Superior mounting options

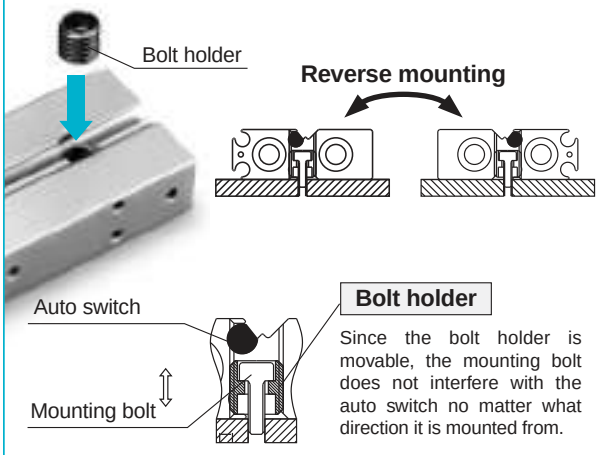
**1 Auto switches can be verified from 4 directions.**




**2 Symmetric mounting**



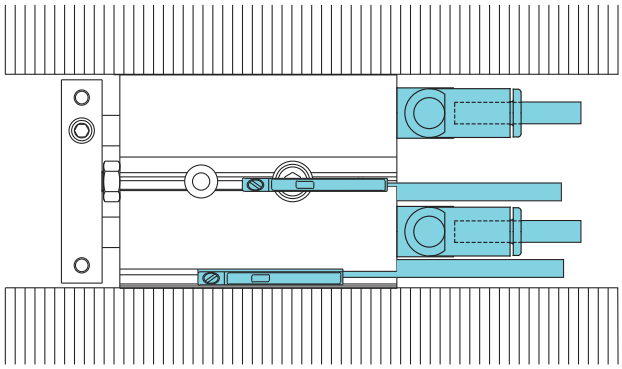
**Reverse mounting mechanism**




**Bolt holder**

Since the bolt holder is movable, the mounting bolt does not interfere with the auto switch no matter what direction it is mounted from.

**3 Axial piping**



■ **Allowable kinetic energy, allowable load, and non-rotating accuracy are equivalent to those of standard type CXS.**

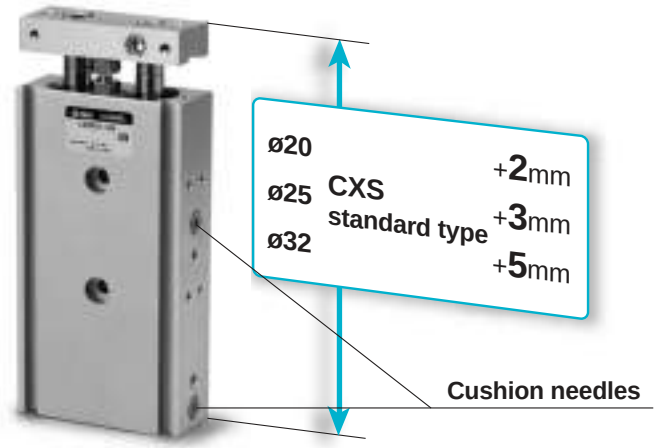
# Dual-rod cylinder range is better than ever.

New

## Air cushion type

### Series CXS: ø20, ø25, ø32

**Air cushion only minimally adds to overall length, compared with the standard type cylinder.**

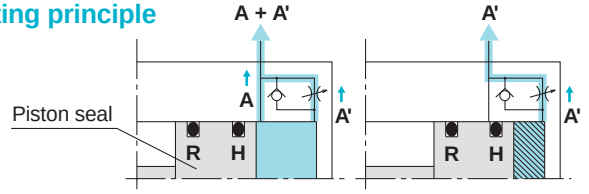



1. **Improved allowable kinetic energy: Two to three times that of the standard type**
2. **Improved noise reduction: Reduction of more than 6dB is possible.**

### Unique air cushion mechanism with no cushion ring

**Elimination of the cushion ring used in conventional type air cushions has made it possible to reduce the overall length of the cylinder while retaining all the advantages of a compact profile.**

#### Operating principle




① When the piston is retracting, air is exhausted through both A and A' until piston seal H passes air passage A.

② After piston seal H has passed air passage A, air is exhausted only through A'. The section marked with slanted lines becomes a cushion chamber, and an air cushion effect is achieved.

③ When air is supplied for the piston extension, the check seal opens and the piston extends with no delay.


## Clean room series

### Series 11-12- CXSJ: ø6, ø10

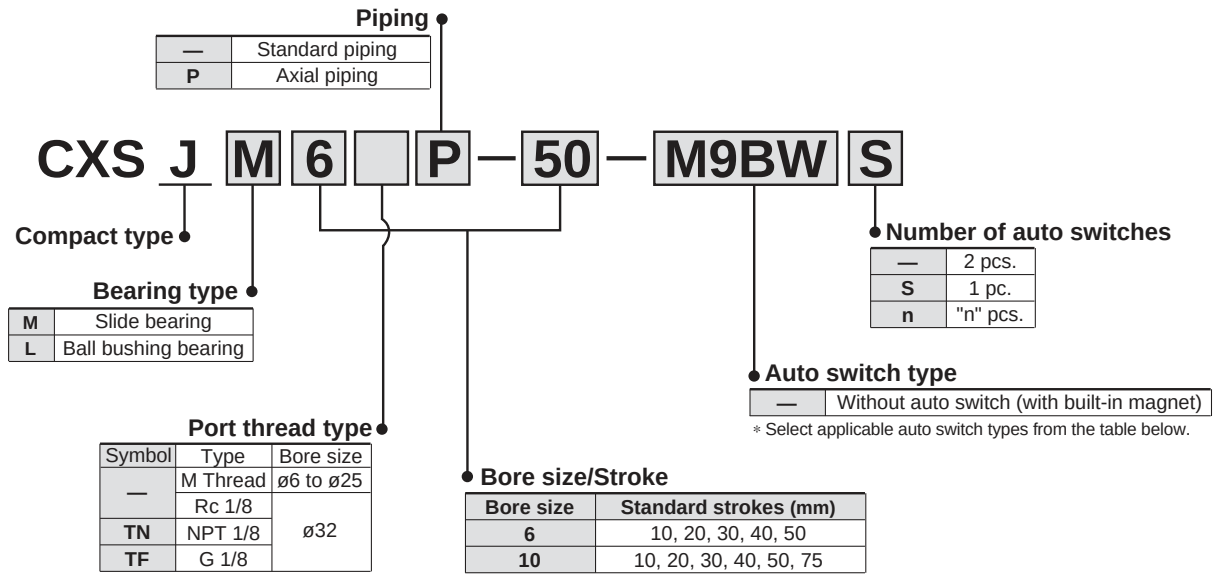
| Series | Type | Bearing type |
|---|---|---|
| 11-CXSJ | Vacuum specification | Slide bearing<br>Ball bushing bearing |
| 12-CXSJ | Relieving type<br>Special treatment | Ball bushing bearing |

# Compact Type Dual-Rod Cylinder

# *Series CXSJ*

## ø6, ø10

## How to Order




**Applicable auto switches:** Refer to pages 40 through 48 for detailed auto switch specifications.

| Type | Special function | Electrical entry | Indicator light | Wiring (output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length (m)∗2 0.5 (Nil) | 1 (M) | 3 (L) | 5 (Z) | Pre-wired connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solid state auto switch | — | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | M9BV | M9B | ● | ● | ● | ○ | ○ | — | |
| | Diagnostic indication (2-color display) | | | 3-wire (NPN) | | 5 V, 12 V | | M9NWV | M9NW | ● | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | M9PWV | M9PW | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | M9BWV | M9BW | ● | ● | ● | ○ | ○ | — | |
| | Water resistant (2-color display) | | | 3-wire (NPN) | | 5 V, 12 V | | M9NAV∗1 | M9NA∗1 | ○ | ○ | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | M9PAV∗1 | M9PA∗1 | ○ | ○ | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | M9BAV∗1 | M9BA∗1 | ○ | ○ | ● | ○ | ○ | — | |
| Reed auto switch | — | Grommet | Yes | 3-wire (NPN equiv.) | — | 5 V | — | A96V | A96 | ● | — | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V∗2 | A93 | ● | ● | ● | ● | — | — | Relay, PLC |
| | | | None | | | 5 V, 12 V | 100 V or less | A90V | A90 | ● | — | ● | — | — | IC circuit | |

∗ 1) Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

∗ 2) 1 m type lead wire is only applicable to D-A93.

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M M9NWM
3 m ····· L M9NWL
5 m ····· Z M9NWZ

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

• Since there are applicable auto switches other than listed.
• For details about switch with pre-wired connector, refer to the Auto Switch Guide.
∗ Auto switches are shipped together (not assembled).

# Series CXSJ

## Specifications

| Bore size (mm) | 6 | 10 |
|---|---|---|
| **Fluid** | Air (non-lube) | |
| **Proof pressure** | 1.05MPa | |
| **Maximum operating pressure** | 0.7MPa | |
| **Minimum operating pressure** | 0.15MPa | 0.1MPa |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | |
| **Piston speed** Note) | 30 to 800mm/s | |
| **Cushion** | Rubber bumper | |
| **Stroke adjustable range** | 0 to –5mm compared to the standard stroke | |
| **Port size** | M3 | M5 |

Note) The maximum piston speed shown in the table above is for extension.
The maximum piston speed for retraction is approximately 70% that of extension.

## Standard Strokes

(mm)

| Model | Standard strokes | Manufacturable stroke range |
|---|---|---|
| **CXSJ□6** | 10, 20, 30, 40, 50 | 60 to 100 |
| **CXSJ□10** | 10, 20, 30, 40, 50, 75 | 80 to 150 |

∗ Refer to "Made to Order" on page 50 for long strokes (i.e., strokes beyond the standard stroke range).
Non-standard strokes for a size ø6 cylinder are available as a special order.

## Theoretical Output

(N)

| Bore size (mm) | Rod size (mm) | Operating direction | Piston area (mm²) | Operating pressure (MPa) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1 | 0.15 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| **CXSJ□6** | **4** | OUT | 56 | — | 8.4 | 11.2 | 16.8 | 22.4 | 28.0 | 33.6 | 39.2 |
| | | IN | 31 | — | 4.6 | 6.2 | 9.3 | 12.4 | 15.5 | 18.6 | 21.7 |
| **CXSJ□10** | **6** | OUT | 157 | 15.7 | — | 31.4 | 47.1 | 62.8 | 78.5 | 94.2 | 110 |
| | | IN | 100 | 10.0 | — | 20.0 | 30.0 | 40.0 | 50.0 | 60.0 | 70.0 |

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

## Weights

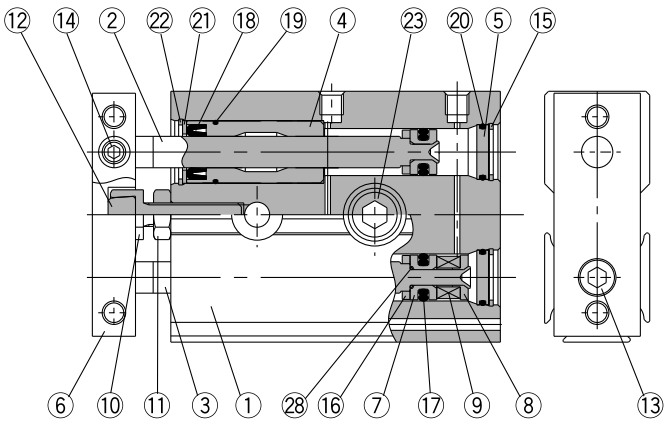
(g)

| Model | Standard stroke (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 |
| **CXSJM6** | 47 | 57 | 67 | 77 | 87 | — |
| **CXSJL6** | 48 | 58 | 68 | 78 | 88 | — |
| **CXSJM10** | 99 | 114 | 129 | 144 | 159 | 198 |
| **CXSJL10** | 106 | 121 | 136 | 151 | 166 | 205 |

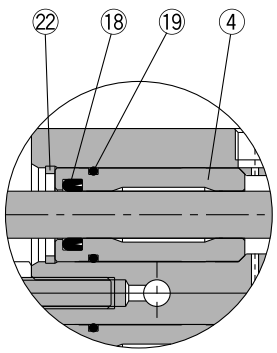
## Construction: Standard Piping

### CXSJM (Slide bearing)

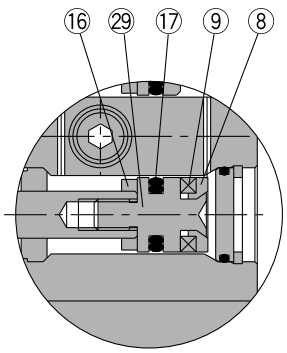
CXSJM6




CXSJM10



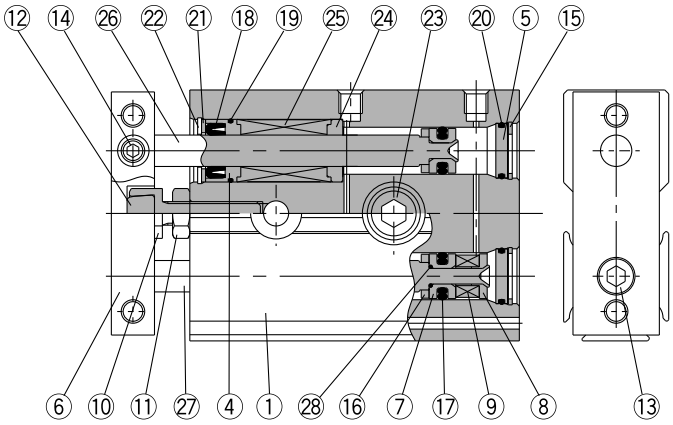

Rod cover



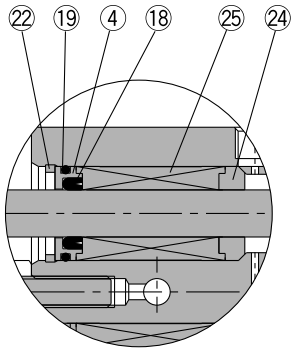

Piston rod B-side piston

### CXSJL (Ball bushing bearing)

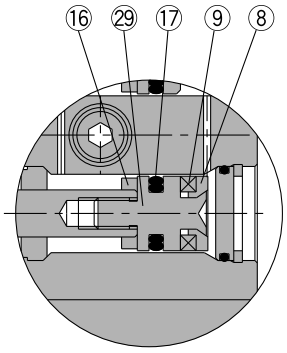
CXSJL6




CXSJL10




Rod cover




Piston rod B-side piston

### Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Housing** | Aluminum alloy | Hard anodized |
| 2 | **Piston rod A** | Carbon steel Note) | Hard chrome plated |
| 3 | **Piston rod B** | Carbon steel Note) | Hard chrome plated |
| 4 | **Rod cover/Bearing** | Aluminum alloy | |
| 5 | **Head cover** | Aluminum alloy | Anodized |
| 6 | **Plate** | Aluminum alloy | Glossy, self-coloring hard anodized |
| 7 | **Piston A** | Aluminum alloy | Chromated |
| 8 | **Piston B** | Aluminum alloy | Chromated |
| 9 | **Magnet** | Magnetic material | |
| 10 | **Bumper bolt** | Carbon steel | Nickel plated |
| 11 | **Hexagon nut** | Carbon steel | Nickel plated |
| 12 | **Bumper** | Polyurethane | |
| 13 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 14 | **Hexagon socket head set screw** | Chromium steel | Nickel plated |
| 15 | **Snap ring** | Special steel | Nickel plated |

Note) Stainless steel for CXSJM6.

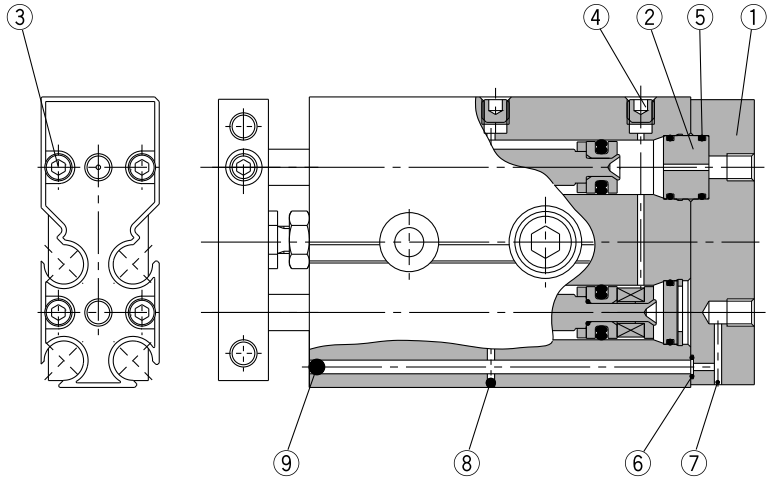
| No. | Description | Material | Note |
|---|---|---|---|
| 16 | **Bumper B** | Polyurethane | |
| 17 | **Piston seal** | NBR | |
| 18 | **Rod seal** | NBR | |
| 19 | **O-ring** | NBR | |
| 20 | **O-ring** | NBR | |
| 21 | **Seal retainer** | Stainless steel | |
| 22 | **Snap ring B** | Special steel | Nickel plated |
| 23 | **Bolt holder** | Stainless steel | |
| 24 | **Bearing spacer** | Aluminum alloy | |
| 25 | **Ball bushing** | — | |
| 26 | **Piston rod A** | Special steel | Hard chrome plated |
| 27 | **Piston rod B** | Special steel | Hard chrome plated |
| 28 | **O-ring** | NBR | |
| 29 | **Piston C** | Stainless steel | |

### Replacement parts: Seal kits

| Model | Seal kit no. | Kit components |
|---|---|---|
| **CXSJ□6** | CXSJ6-PS | Items 17, 18, and 20 from the chart above |
| **CXSJ□10** | CXSJ10-PS | |

## Construction: Axial Piping

**CXSJ□6P, CXSJ□10P**




**Parts list: Axial piping**

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Cover** | Aluminum alloy | Hard anodized |
| 2 | **Adapter** | Aluminum alloy | Anodized |
| 3 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 4 | **Hexagon socket head plug** | Chromium steel | Nickel plated |
| 5 | **O-ring** | NBR | |
| 6 | **O-ring** | NBR | |
| 7 | **Steel ball** | Special steel | Hard chrome plated |
| 8 | **Steel ball** | Special steel | Hard chrome plated |
| 9 | **Steel ball** | Special steel | Hard chrome plated |

∗ Parts other than those listed above are the same as those for CXSJ standard type.

## Clean Room Series

There are two types of cylinders, relieving type and vacuum type, available for a clean room environment. The relieving type specification with the double-seal construction of the rod section allows the cylinder to channel exhaust through the relief port directly to the outside of a clean room environment. The vacuum type specification allows for the application of a vacuum on the rod section while forced exhaust of air takes place through the vacuum port to the outside of a clean room environment.

### How to Order

**11** – **CXSJ** **M** **Bore size** – **Stroke** – **Auto switch**

**Bore size/Stroke**

| Bore size | Standard strokes (mm) |
|---|---|
| **6** | 10, 20, 30, 40, 50 |
| **10** | 10, 20, 30, 40, 50 |

**Bearing type**

| | |
|---|---|
| **M** | Slide bearing |
| **L**∗ | Ball bushing bearing |

∗ Only ball bushing bearing is available for "Clean room specification 12-".

**Clean room specification**

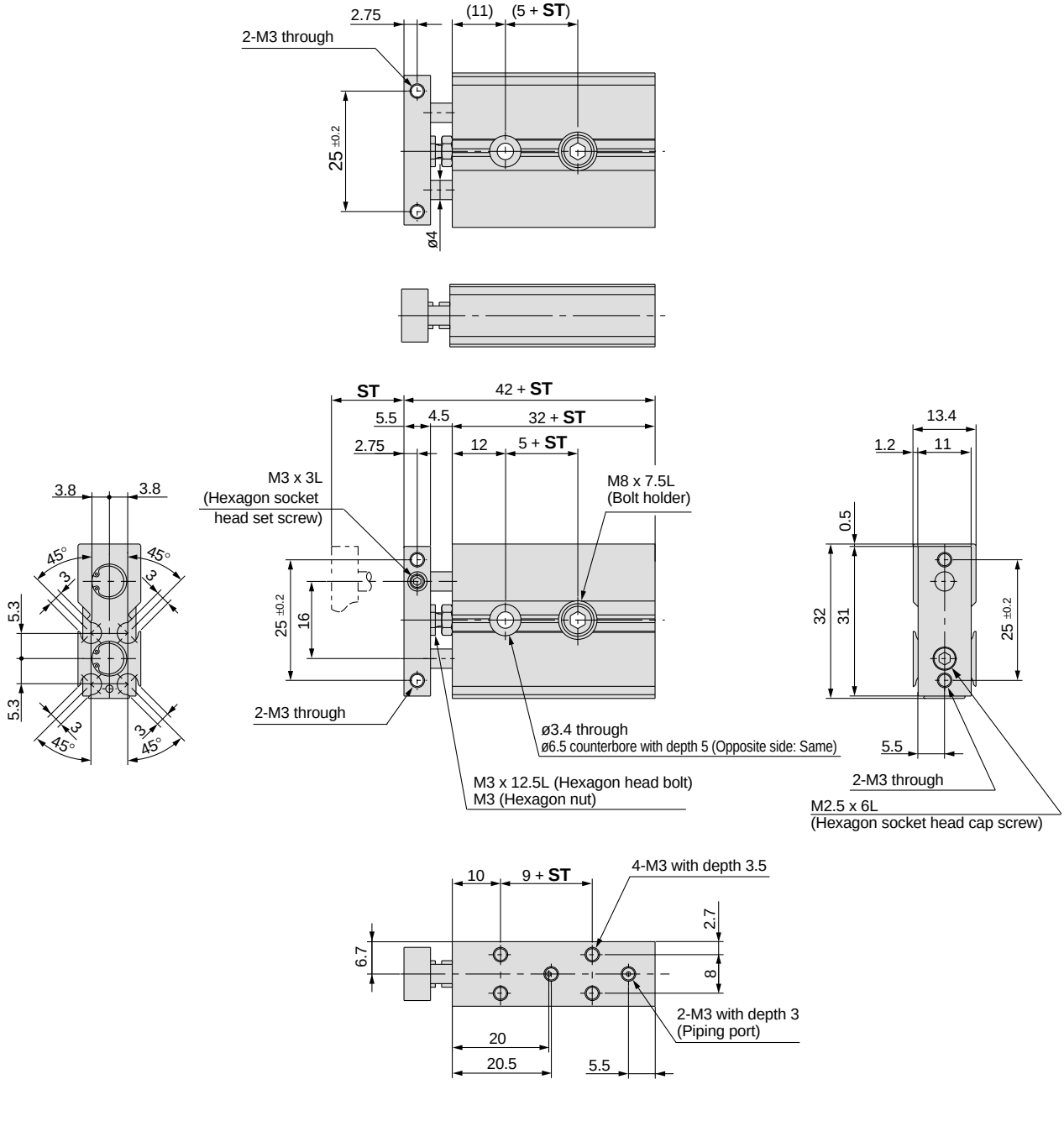
| | |
|---|---|
| **11** | Vacuum type |
| **12** | Relieving type (with specially treated sliding parts) |

### Specifications

| Bore size (mm) | **6** | **10** |
|---|---|---|
| **Proof pressure** | 1.05MPa | |
| **Maximum operating pressure** | 0.7MPa | |
| **Minimum operating pressure** | 0.15MPa | 0.1MPa |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | |
| **Piston speed** | 30 to 400mm/s | |
| **Stroke adjustable range** | 0 to –5mm compared to the standard stroke | |
| **Bearing type** | Slide bearing, Ball bushing bearing | |

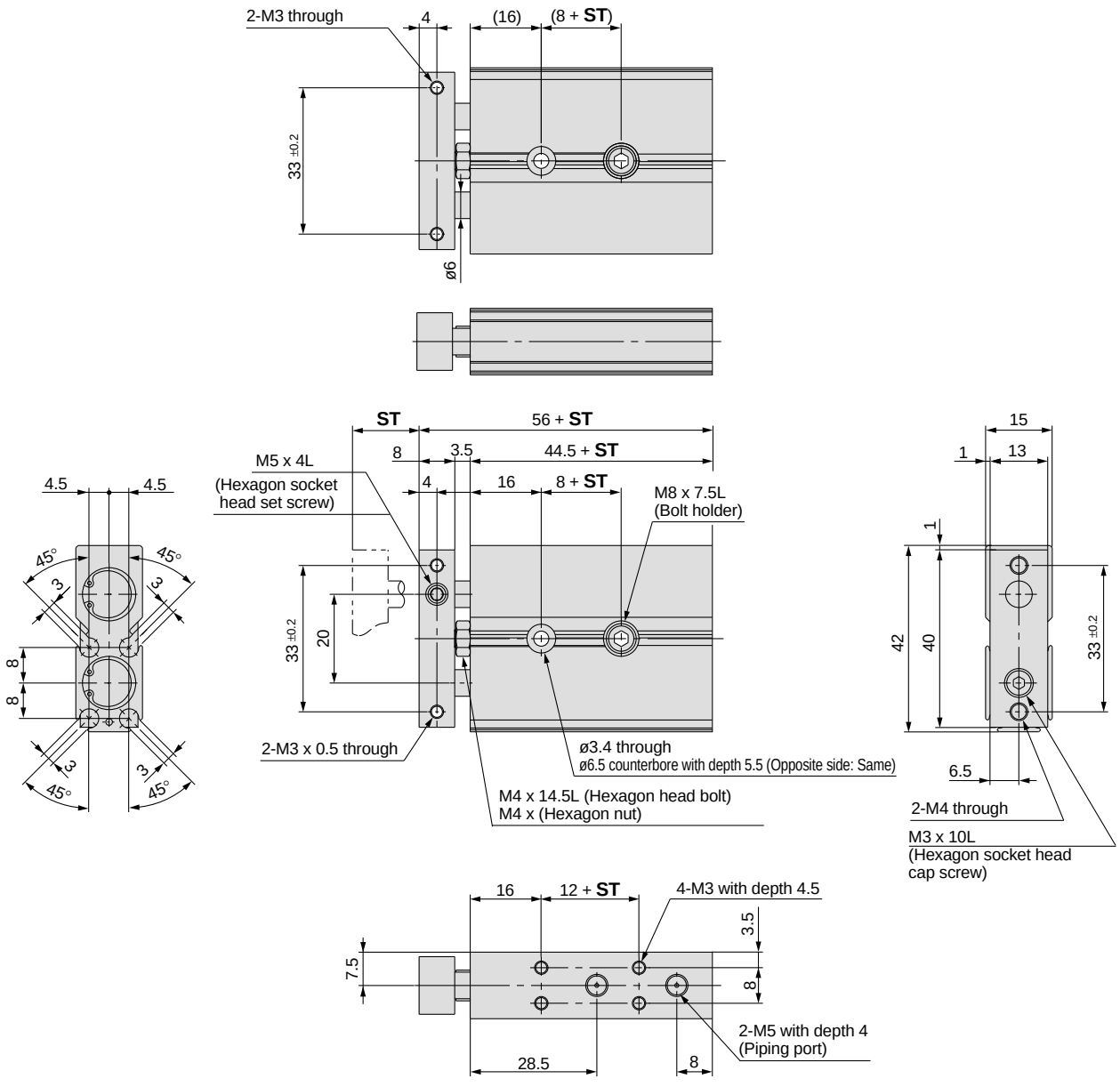
∗ Refer to the separate clean room series catalog for dimensions.

## Dimensions: ø6 Standard Piping




| Part no. | ST | 5 + ST | 9 + ST | 32 + ST | 42 + ST |
|---|---|---|---|---|---|
| **CXSJ□6-10** | 10 | 15 | 19 | 42 | 52 |
| **CXSJ□6-20** | 20 | 25 | 29 | 52 | 62 |
| **CXSJ□6-30** | 30 | 35 | 39 | 62 | 72 |
| **CXSJ□6-40** | 40 | 45 | 49 | 72 | 82 |
| **CXSJ□6-50** | 50 | 55 | 59 | 82 | 92 |

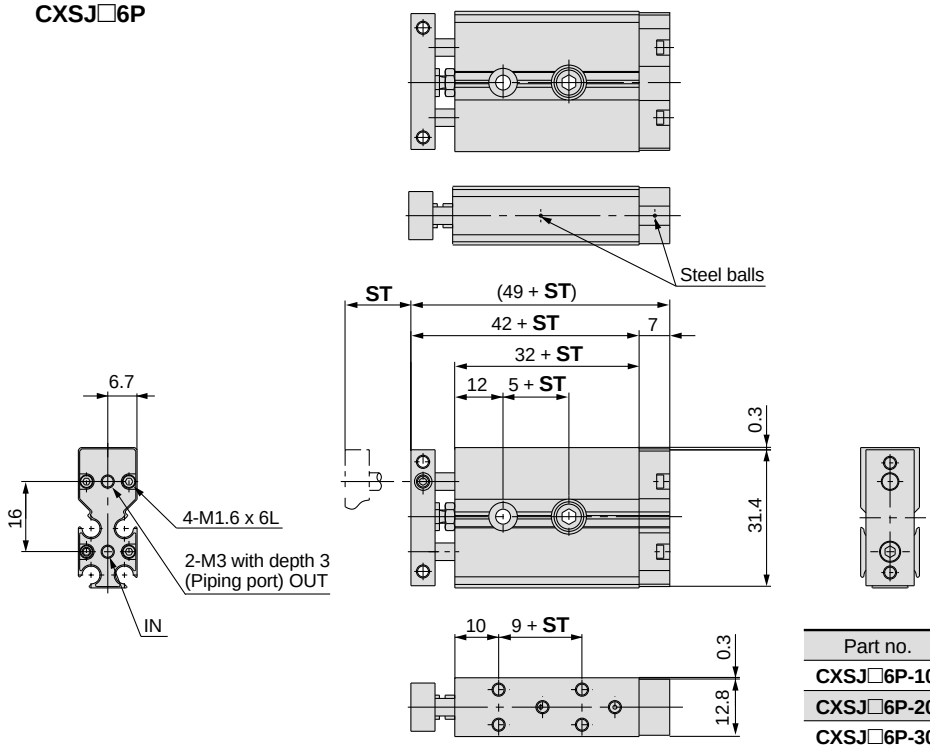
## Dimensions: ø10 Standard Piping




| Part no. | **ST** | 8 + **ST** | 12 + **ST** | 44.5 + **ST** | 56 + **ST** |
|---|---|---|---|---|---|
| **CXSJ□10-10** | 10 | 18 | 22 | 54.5 | 66 |
| **CXSJ□10-20** | 20 | 28 | 32 | 64.5 | 76 |
| **CXSJ□10-30** | 30 | 38 | 42 | 74.5 | 86 |
| **CXSJ□10-40** | 40 | 48 | 52 | 84.5 | 96 |
| **CXSJ□10-50** | 50 | 58 | 62 | 94.5 | 106 |
| **CXSJ□10-75** | 75 | 83 | 87 | 119.5 | 131 |

## Dimensions: ø6, ø10 Axial Piping

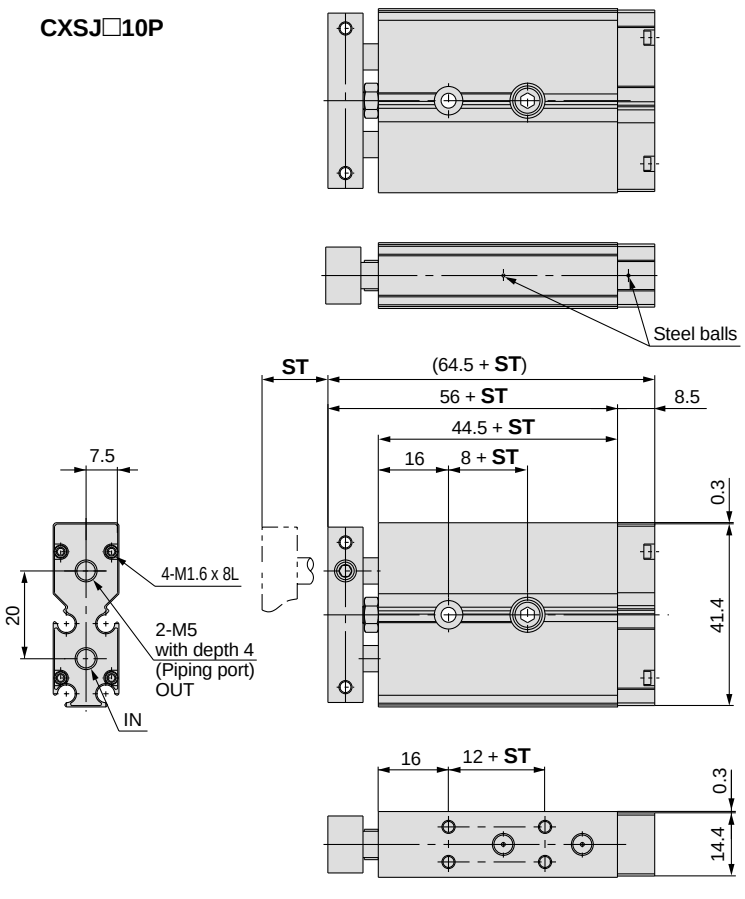
**CXSJ□6P**




| Part no. | ST | 5 + ST | 9 + ST | 32 + ST | 42 + ST | (49 + ST) |
|---|---|---|---|---|---|---|
| **CXSJ□6P-10** | 10 | 15 | 19 | 42 | 52 | 59 |
| **CXSJ□6P-20** | 20 | 25 | 29 | 52 | 62 | 69 |
| **CXSJ□6P-30** | 30 | 35 | 39 | 62 | 72 | 79 |
| **CXSJ□6P-40** | 40 | 45 | 49 | 72 | 82 | 89 |
| **CXSJ□6P-50** | 50 | 55 | 59 | 82 | 92 | 99 |

∗ Dimensions other than those listed above are the same as for standard products.

**CXSJ□10P**



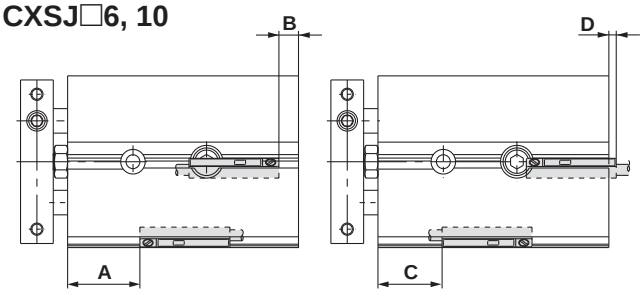

| Part no. | ST | 8 + ST | 12 + ST | 44.5 + ST | 56 + ST | (64.5 + ST) |
|---|---|---|---|---|---|---|
| **CXSJ□10P-10** | 10 | 18 | 22 | 54.5 | 66 | 74.5 |
| **CXSJ□10P-20** | 20 | 28 | 32 | 64.5 | 76 | 84.5 |
| **CXSJ□10P-30** | 30 | 38 | 42 | 74.5 | 86 | 94.5 |
| **CXSJ□10P-40** | 40 | 48 | 52 | 84.5 | 96 | 104.5 |
| **CXSJ□10P-50** | 50 | 58 | 62 | 94.5 | 106 | 114.5 |
| **CXSJ□10P-75** | 75 | 83 | 87 | 119.5 | 131 | 139.5 |

∗ Dimensions other than those listed above are the same as for standard products.

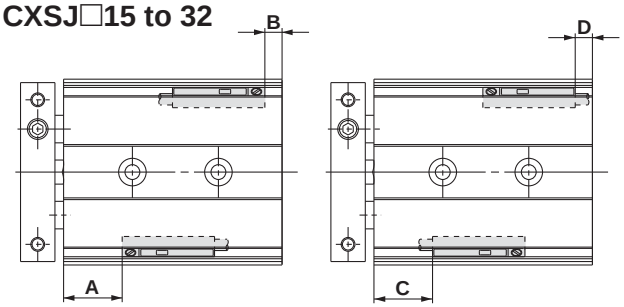
# Series CXSJ
# Auto Switch Mounting

## Auto Switch Proper Mounting Position for Stroke End Detection

### CXSJ□6, 10




### CXSJ□15 to 32




**Electrical entry direction: Inward**

**Electrical entry direction: Outward**

### Operating Range

(mm)

| Auto switch model | Bore size | | | | | |
|---|---|---|---|---|---|---|
| | 6 | 10 | 15 | 20 | 25 | 32 |
| D-A9□, D-A9□V | 5 | 6 | 6 | 7.5 | 8 | 9 |
| D-M9□, D-M9□V<br>D-M9□A, D-M9□AV<br>D-M9□W, D-M9□WV | 2.5 | 3 | 3.5 | 4.5 | 4.5 | 5 |

∗ The operating ranges are provided as guidelines including hystereses and are not guaranteed values (assuming approximately ±30% variations).
They may vary significantly with ambient environments.

### Auto Switch Proper Mounting Position

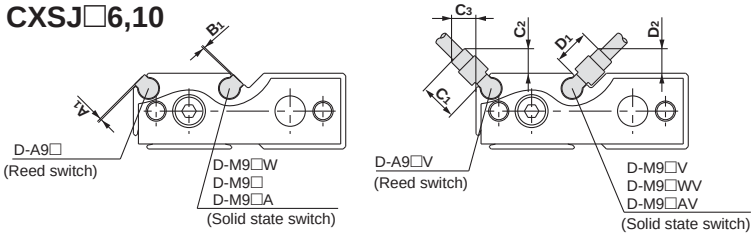
| Bore size (mm) | D-A90, D-A96 | | | | D-A93 | | | | D-M9□, D-M9□W<br>D-M9□AV | | | | D-M9□V, D-M9□WV | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | A | B | C | D | A | B | C | D | A | B | C | D |
| 6 | 15.5 | — | 13.5 | 5.5 | 15.5 | — | 11 | 8 | 19.5 | 0.5 | 9.5 | 9.5 | 19.5 | 0.5 | 11.5 | 7.5 |
| 10 | 25.5 | — | 23.5 | 3 | 25.5 | — | 21 | 5.5 | 29.5 | 3 | 19.5 | 7 | 29.5 | 3 | 21.5 | 5 |
| 15 | 31.5 | 6 | 29.5 | 4 | 31.5 | 6 | 27 | 1.5 | 35.5 | 10 | 25.5 | 0 | 35.5 | 10 | 27.5 | 2 |
| 20 | 39 | 9 | 37 | 7 | 39 | 9 | 34.5 | 4.5 | 43 | 13 | 33 | 3 | 43 | 13 | 35 | 5 |
| 25 | 40 | 11 | 38 | 9 | 40 | 11 | 35.5 | 6.5 | 44 | 15 | 34 | 5 | 44 | 15 | 36 | 7 |
| 32 | 49 | 11.5 | 47 | 9.5 | 49 | 11.5 | 44.5 | 7 | 53 | 15.5 | 43 | 5.5 | 53 | 15.5 | 45 | 7.5 |

| Bore size (mm) | D-M9□A | | | |
|---|---|---|---|---|
| | A | B | C | D |
| 6 | 19.5 | 0.5 | 7.5 | 11.5 |
| 10 | 29.5 | 3 | 17.5 | 9 |
| 15 | 35.5 | 10 | 23.5 | 2 |
| 20 | 43 | 13 | 31 | 5 |
| 25 | 44 | 15 | 32 | 7 |
| 32 | 53 | 15.5 | 41 | 7.5 |

Note 1) ø6: D-A90, A96, A93, F9BA
ø10: D-A90, A96, A93
Only outward electrical entry (D dimension) is available.
Note 2) Minus value in D column (ø15, ø20, ø25, ø32) means that the auto switches are to be mounted beyond the cylinder body edges.
Note 3) When setting an auto switch, confirm the operation and adjust its mounting position.

### Auto switch mounting dimensions

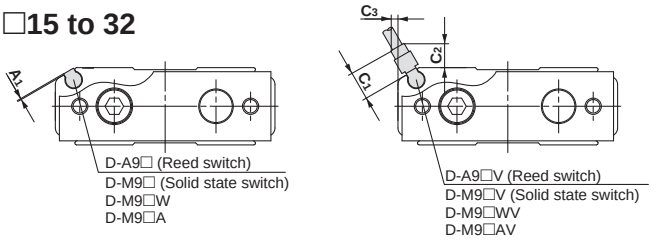
#### CXSJ□6,10




(mm)

| Auto switch model | Symbol | Bore size | |
|---|---|---|---|
| | | 6 | 10 |
| D-A9□ | $A_1$ | 1 | 1 |
| D-M9□, D-M9□W | $B_1$ | 1 | 1 |
| D-M9□A | $B_1$ | 2 | 2 |
| D-A9□V | $C_1$, $D_1$ | 5.5 | 5.5 |
| | $C_2$, $C_3$, $D_2$ | 4 | 4 |
| D-M9□V, D-M9□WV | $C_1$, $D_1$ | 8 | 8 |
| D-M9□AV | $C_2$, $C_3$, $D_2$ | 6 | 6 |

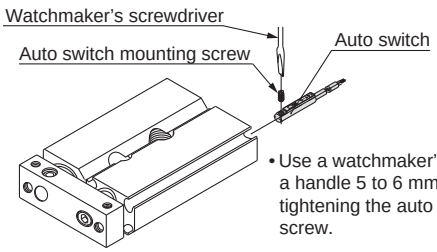
#### CXSJ□15 to 32




(mm)

| Auto switch model | Symbol | Bore size | | | |
|---|---|---|---|---|---|
| | | 15 | 20 | 25 | 32 |
| D-M9□, D-M9□W | $A_1$ | 1 | 1 | 1 | 1 |
| D-M9□A | $A_1$ | 2 | 2 | 2 | 2 |
| D-A9□V | $C_1$ | 5.5 | 5.5 | 5.5 | 5.5 |
| D-M9□WV | $C_2$ | 4.5 | 4.5 | 4.5 | 4.5 |
| D-M9□AV | $C_3$ | 1 | — | — | — |

## Auto Switch Mounting



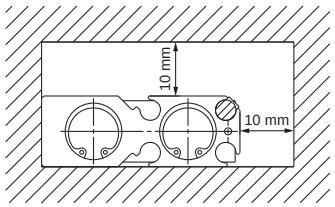

• Use a watchmaker's screwdriver with a handle 5 to 6 mm in diameter when tightening the auto switch mounting screw.

**Tightening Torque of Auto Switch Mounting Screw** (N·m)

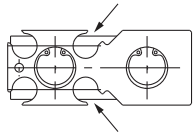
| Auto switch model | Tightening torque |
|---|---|
| D-A9□(V) | 0.10 to 0.20 |
| D-M9□(V)<br>D-M9□W(V) | 0.05 to 0.15 |

### ⚠Caution

① **Avoid proximity to magnetic objects.**
When magnetic substances such as iron (including flange brackets) are in close proximity to an auto switch cylinder (auto switch mounting side), be sure to provide a clearance between the magnetic substance and the cylinder body as shown in the drawing below. If the clearance is less than 10 mm, the auto switch may not function properly.




② **For CXSJ□6/10, the switch cannot be attached or detached from the plate side if the middle groove (indicated by arrows in the figure on the right) is used. (It will interfere with the bumper bolt at the end of the groove.)**



Other than the applicable auto switches listed in "How to Order," the following auto switches can be mounted.
∗ Normally closed (NC = b contact), solid state auto switches (D-F9G and D-F9H type) are also available.

# Standard Type Dual-Rod Cylinder

# *Series CXS*

## ø6, ø10, ø15, ø20, ø25, ø32

## How to Order

**Thread type**

| Symbol | Type | Bore size |
|---|---|---|
| — | M Thread | ø6 to ø20 |
| | Rc 1/8 | ø25, ø32 |
| **TN** | NPT 1/8 | |
| **TF** | G 1/8 | |

**CXS M 20 □ — 100 — Y7BW S**

**Bearing type**

| | |
|---|---|
| **M** | Slide bearing |
| **L** | Ball bushing bearing |

**Number of auto switches**

| | |
|---|---|
| — | 2 pcs. |
| **S** | 1 pc. |
| **n** | "n" pcs. |

**Bore size/Standard stroke**

| Bore sizes | Standard strokes (mm) |
|---|---|
| **6** | 10, 20, 30, 40, 50 |
| **10** | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 75 |
| **15, 20 25, 32** | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100 |

**Auto switch type**

| | |
|---|---|
| — | Without auto switch (with built-in magnet) |

∗ Select applicable auto switch types from the table below.

**Applicable auto switches:** Refer to pages 40 through 48 for detailed auto switch specifications.

| Type | Special function | Electrical entry | Indicator light | Wiring (output) | Load voltage | | | Auto switch type | | Lead wire length (m)∗ | | | Applicable loads | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DC | | AC | Electrical entry direction | | 0.5 (–) | 3 (L) | 5 (Z) | | |
| | | | | | | | | Perpendicular | In-line | | | | | |
| Reed switch | — | Grommet | Yes | 3-wire | — | 5V | — | — | **Z76** | ● | ● | — | IC circuit | — |
| | | | | 2-wire | 24V | 12V | 100V | — | **Z73** | ● | ● | ● | — | Relay PLC |
| | | | No | | | 5V, 12V | 100V or less | — | **Z80** | ● | ● | — | IC circuit | |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 24V | 5V, 12V | — | **Y69A** | **Y59A** | ● | ● | ○ | IC circuit | Relay PLC |
| | | | | 3-wire (PNP) | | | | **Y7PV** | **Y7P** | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | **Y69B** | **Y59B** | ● | ● | ○ | — | |
| | Diagnostic indication (2-colour display) | | | 3-wire (NPN) | | 5V, 12V | | **Y7NWV** | **Y7NW** | ● | ● | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **Y7PWV** | **Y7PW** | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | **Y7BWV** | **Y7BW** | ● | ● | ○ | — | |
| | Water-resistant (2-colour display) | | | | | | | — | **Y7BA** | — | ● | ○ | | |

∗ Lead wire length symbols: 0.5m ..... – (Example) Y59A
3m ..... L Y59AL
5m ..... Z Y59AZ

Note) Solid state switches marked "○" are produced upon receipt of order.

# Series CXS

## Specifications

| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| **Fluid** | Air (non-lube) | | | | | |
| **Proof pressure** | 1.05MPa | | | | | |
| **Maximum operating pressure** | 0.7MPa | | | | | |
| **Minimum operating pressure** | 0.15MPa | 0.1MPa | | 0.05MPa | | |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | | | | | |
| **Piston speed** Note) | 30 to 300mm/s | 30 to 800mm/s | 30 to 700mm/s | | 30 to 600mm/s | |
| **Cushion** | Rubber bumper | | | | | |
| **Stroke adjustable range** | 0 to –5mm compared to the standard stroke | | | | | |
| **Port size** | M5 | | | | 1/8 | |
| **Bearing type** | Slide bearing, Ball bushing bearing (Same dimensions for both) | | | | | |

Note) The maximum piston speed shown in the table above is for extension.
The maximum piston speed for retraction is approximately 70% that of extension.

## Standard Strokes

(mm)

| Model | Standard strokes | Manufacturable stroke range |
|---|---|---|
| **CXS□6** | 10, 20, 30, 40, 50 | 60 to 100 |
| **CXS□10** | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 75 | 80 to 150 |
| **CXS□15** | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100 | 110 to 150 |
| **CXS□20** | | 110 to 200 |
| **CXS□25** | | |
| **CXS□32** | | |

∗ Refer to "Made to Order" on page 50 for long strokes (i.e., strokes beyond the standard stroke range).
Non-standard strokes for a size ø6 cylinder are available as a special order.

## Made to Order Specifications

Refer to pages 49 through 52 for Series CXS Made to Order specifications.

## Theoretical Output

(N)

| Bore size (mm) | Rod size (mm) | Operating direction | Piston area (mm²) | Operating pressure (MPa) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1 | 0.15 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| **CXS□6** | **4** | OUT | 56 | — | 8.4 | 11.2 | 16.8 | 22.4 | 28.0 | 33.6 | 39.2 |
| | | IN | 31 | — | 4.6 | 6.2 | 9.3 | 12.4 | 15.5 | 18.6 | 21.7 |
| **CXS□10** | **6** | OUT | 157 | 15.7 | — | 31.4 | 47.1 | 62.8 | 78.5 | 94.2 | 110 |
| | | IN | 100 | 10.0 | — | 20.0 | 30.0 | 40.0 | 50.0 | 60.0 | 70.0 |
| **CXS□15** | **8** | OUT | 353 | 35.3 | — | 70.6 | 106 | 141 | 177 | 212 | 247 |
| | | IN | 252 | 25.2 | — | 50.4 | 75.6 | 101 | 126 | 151 | 176 |
| **CXS□20** | **10** | OUT | 628 | 62.8 | — | 126 | 188 | 251 | 314 | 377 | 440 |
| | | IN | 471 | 47.1 | — | 94.2 | 141 | 188 | 236 | 283 | 330 |
| **CXS□25** | **12** | OUT | 982 | 98.2 | — | 196 | 295 | 393 | 491 | 589 | 687 |
| | | IN | 756 | 75.6 | — | 151 | 227 | 302 | 378 | 454 | 529 |
| **CXS□32** | **16** | OUT | 1608 | 161 | — | 322 | 482 | 643 | 804 | 965 | 1126 |
| | | IN | 1206 | 121 | — | 241 | 362 | 482 | 603 | 724 | 844 |

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

## Weights

(kg)

| Model | Standard stroke (mm) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
| **CXSM 6** | 0.081 | — | 0.095 | — | 0.108 | — | 0.122 | — | 0.135 | — | — | — | — | — | — |
| **CXSL 6** | 0.081 | — | 0.095 | — | 0.108 | — | 0.122 | — | 0.135 | — | — | — | — | — | — |
| **CXSM10** | 0.15 | 0.16 | 0.17 | 0.18 | 0.19 | 0.20 | 0.21 | 0.22 | 0.23 | 0.25 | 0.27 | 0.28 | — | — | — |
| **CXSL 10** | 0.15 | 0.16 | 0.17 | 0.18 | 0.19 | 0.20 | 0.21 | 0.22 | 0.23 | 0.25 | 0.27 | 0.28 | — | — | — |
| **CXSM15** | 0.25 | 0.265 | 0.28 | 0.29 | 0.30 | 0.315 | 0.33 | 0.345 | 0.36 | 0.39 | 0.42 | 0.435 | 0.45 | 0.48 | 0.51 |
| **CXSL 15** | 0.27 | 0.285 | 0.30 | 0.31 | 0.32 | 0.335 | 0.35 | 0.365 | 0.38 | 0.41 | 0.44 | 0.455 | 0.47 | 0.50 | 0.53 |
| **CXSM20** | 0.40 | 0.42 | 0.44 | 0.46 | 0.48 | 0.495 | 0.51 | 0.53 | 0.55 | 0.585 | 0.62 | 0.64 | 0.66 | 0.70 | 0.74 |
| **CXSL 20** | 0.43 | 0.445 | 0.46 | 0.48 | 0.50 | 0.515 | 0.53 | 0.55 | 0.57 | 0.605 | 0.64 | 0.66 | 0.68 | 0.715 | 0.75 |
| **CXSM25** | 0.61 | 0.635 | 0.66 | 0.69 | 0.72 | 0.745 | 0.77 | 0.80 | 0.83 | 0.89 | 0.95 | 0.97 | 0.995 | 1.06 | 1.10 |
| **CXSL 25** | 0.62 | 0.645 | 0.67 | 0.70 | 0.73 | 0.755 | 0.78 | 0.81 | 0.84 | 0.895 | 0.955 | 0.98 | 1.005 | 1.065 | 1.11 |
| **CXSM32** | 1.15 | 1.19 | 1.23 | 1.275 | 1.32 | 1.36 | 1.40 | 1.45 | 1.49 | 1.58 | 1.665 | 1.71 | 1.755 | 1.84 | 1.93 |
| **CXSL 32** | 1.16 | 1.205 | 1.25 | 1.295 | 1.34 | 1.38 | 1.42 | 1.465 | 1.51 | 1.595 | 1.68 | 1.72 | 1.765 | 1.855 | 1.94 |

## Clean Room Series

There are two types of cylinders, relieving type and vacuum type, available for a clean room environment. The relieving type specification with the double-seal construction of the rod section allows the cylinder to channel exhaust through the relief port directly to the outside of a clean room environment. The vacuum type specification allows for the application of a vacuum on the rod section while forced exhaust of air takes place through the vacuum port to the outside of a clean room environment.

### How to Order

**12 – CXS L** [Bore size] – [Stroke] – [Auto switch]

- **L**: Ball bushing bearing
- **12**: Clean room specification

| | |
|---|---|
| 11 | Vacuum type |
| 12 | Relieving type (with specially treated sliding parts) |

### Specifications

| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| **Proof pressure** | 1.05MPa | | | | | |
| **Maximum operating pressure** | 0.7MPa | | | | | |
| **Minimum operating pressure** | 0.15MPa | 0.1MPa | | 0.05MPa | | |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | | | | | |
| **Piston speed** | 30 to 400mm/s | | | | | |
| **Stroke adjustable range** | 0 to –5mm compared to the standard stroke | | | | | |
| **Bearing type** | Ball bushing bearing | | | | | |

∗ Refer to the separate clean room series catalog for dimensions.

## Copper-Free Air Cylinder Series (for cathode ray tube manufacturing process)

Copper and fluorine-free air cylinders help prevent the adverse effects of copper ions and halogen ions produced during CRT manufacturing.

Note) Standard cylinders are essentially copper and fluorine-free. However, to emphasize and ensure proper ordering (i.e., copper and fluorine-free specification) when combining with other specifications, add the code 20- in front of the the series as shown below.

### How to Order

**20 – CXS L** [Bore size] – [Stroke] – [Auto switch]

- **L**: Ball bushing bearing
- **20**: Copper-free series

∗ Specifications and dimensions are the same as for standard products.

## Cylinder with Stable Lubrication Function (Lube-retainer)

### How to Order

**CXS** [Bearing type] [Bore size] **M** – [Stroke] – [Auto switch]

- **M**: Cylinder with Stable Lubrication Function (Lube-retainer)

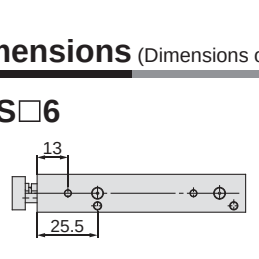
### Specifications

| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| **Action** | Double acting | | | | | |
| **Minimum operating pressure** | 0.2 MPa | 0.15 MPa | | 0.1 MPa | | |
| **Piston speed** | 50 to 300 mm/s | 50 to 800 mm/s | 50 to 700 mm/s | | 50 to 600 mm/s | |
| **Cushion** | Rubber bumper | | | | | |

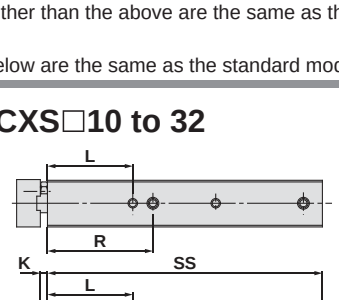
∗ Specifications other than the above are the same as the standard model.

## Dimensions (Dimensions other than those shown below are the same as the standard model.)

### CXS□6




### CXS□10 to 32




(mm)

| Model | K | L | R |
|---|---|---|---|
| **CXS □10** | 4 | 25 | 35 |
| **CXS □15** | 3 | 36 | 44.5 |
| **CXS □20** | 6 | 36 | 50.5 |
| **CXS □25** | 6 | 36 | 52 |
| **CXS □32** | 4 | 40 | 66 |

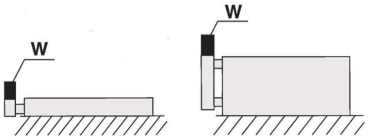
(mm)

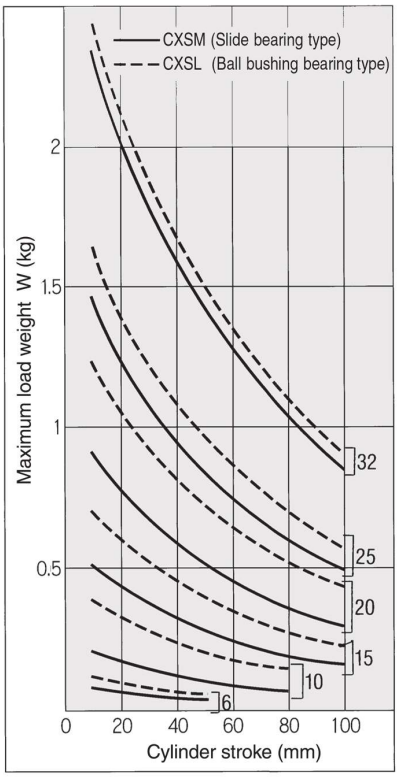
| Model \ Symbol / Stroke | SS | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
| **CXS □10** | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 120 | 130 | 135 | — | — | — |
| **CXS □15** | 76 | 81 | 86 | 91 | 96 | 101 | 106 | 111 | 116 | 126 | 136 | 141 | 146 | 156 | 166 |
| **CXS □20** | 86 | 91 | 96 | 101 | 106 | 111 | 116 | 121 | 126 | 136 | 146 | 151 | 156 | 166 | 176 |
| **CXS □25** | 88 | 93 | 98 | 103 | 108 | 113 | 118 | 123 | 128 | 138 | 148 | 153 | 158 | 168 | 178 |
| **CXS □32** | 102 | 107 | 112 | 117 | 122 | 127 | 132 | 137 | 142 | 152 | 162 | 167 | 172 | 182 | 192 |

## Operating Conditions

### Maximum load weight

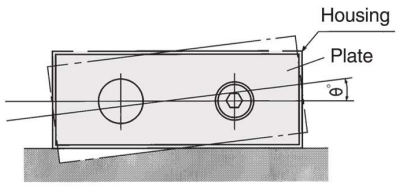
When the cylinder is mounted as shown in the diagrams below, the maximum load weight W should not exceed the values illustrated in the graph immediately following the diagrams.




### Non-rotating accuracy

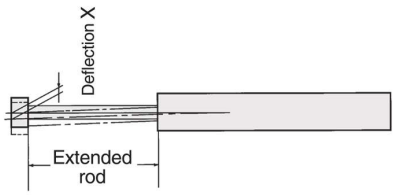
Non-rotating accuracy θ without a load should be less than or equal to the value provided in the table below as a guide.

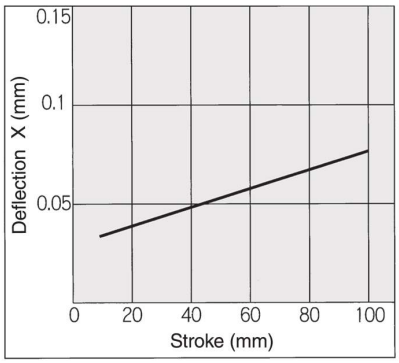



| Bore size (mm) | ø6 to ø32 |
|---|---|
| **CXSM (Slide bearing)** | 0.1 |
| **CXSL (Ball bushing bearing)** | |

### Deflection at the plate end

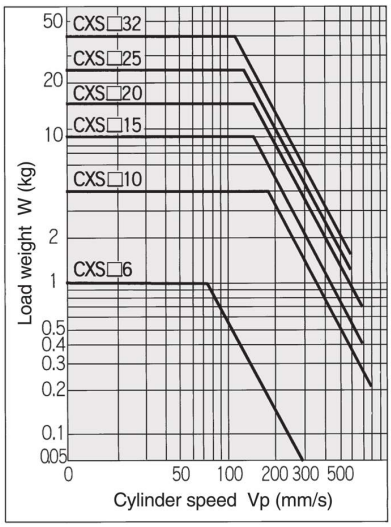
An approximate plate-end deflection X without a load is shown in the graph below.



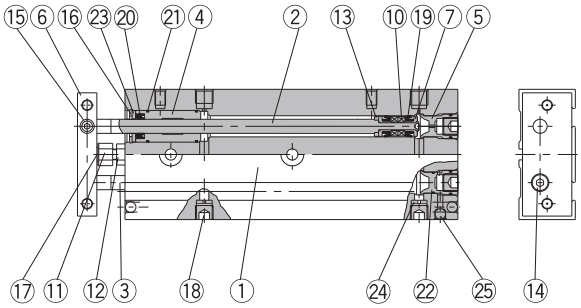

### Allowable kinetic energy

Operate a vertically mounted cylinder with a load weight and cylinder speed not exceeding the ranges shown in the graph below. A horizontally mounted cylinder should also be operated with a load weight less than the ranges given in the graph at left.
Cylinder speed should be adjusted using a speed controller.

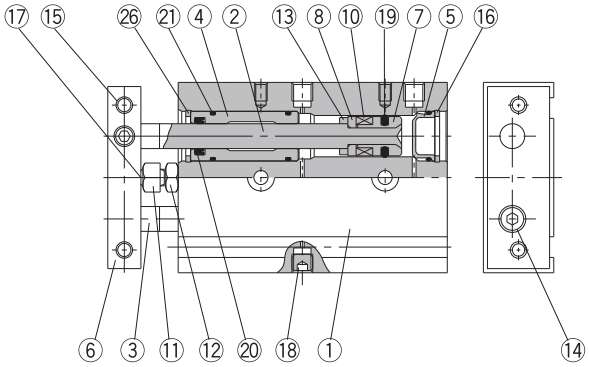


## Construction: Slide Bearing

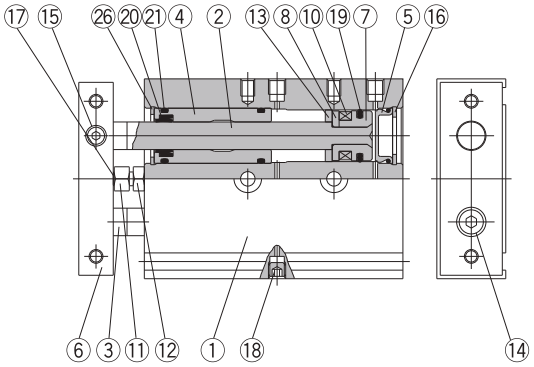
**CXSM6**



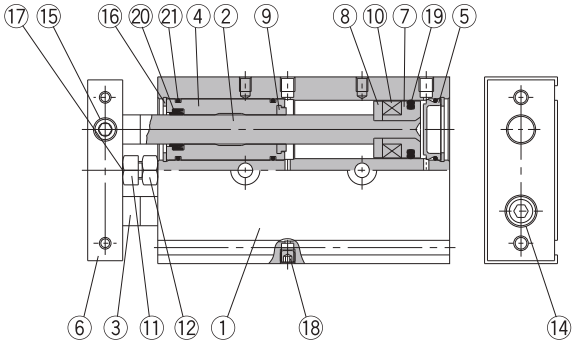

**CXSM10**




**CXSM15**




**CXSM20 to 32**




### Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Housing** | Aluminum alloy | Hard anodized |
| 2 | **Piston rod A** | Carbon steel Note 1) | Hard chrome plated |
| 3 | **Piston rod B** | Carbon steel Note 1) | Hard chrome plated |
| 4 | **Rod cover/Bearing** | Aluminum alloy | |
| 5 | **Head cover** | Special steel Note 2) | |
| 6 | **Plate** | Aluminum alloy | Hard anodized |
| 7 | **Piston A** | Aluminum alloy | Chromated |
| 8 | **Piston B** | Aluminum alloy | Chromated |
| 9 | **Bumper A** | Polyurethane | |
| 10 | **Magnet** | Magnetic material | |
| 11 | **Bumper bolt** | Carbon steel | Nickel plated |
| 12 | **Hexagon nut** | Carbon steel | Nickel plated |
| 13 | **Bumper B** | Polyurethane | |
| 14 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 15 | **Hexagon socket head set screw** | Chromium steel | Nickel plated |
| 16 | **Snap ring** | Special steel | Nickel plated |
| 17 | **Bumper** | Polyurethane | |
| 18 | **Plug** | Chromium steel | Nickel plated |
| 19 | **Piston seal** | NBR | |
| 20 | **Rod seal** | NBR | |
| 21 | **O-ring** | NBR | |
| 22 | **Head cover B** | Aluminum alloy | Nickel plated |
| 23 | **Seal retainer** | Aluminum alloy | |
| 24 | **Port spacer** | Aluminum alloy | |
| 25 | **Steel ball** | Special steel | Hard chrome plated |
| 26 | **Snap ring B** | Special steel | Nickel plated |

Note 1) Stainless steel for CXSM6.
Note 2) Anodized aluminum alloy for CXSM6.

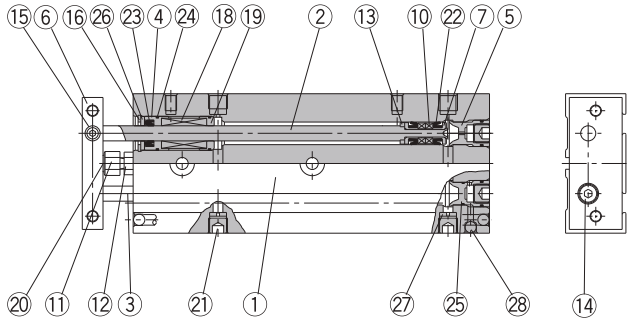
### Replacement parts: Seal Kits

| Bore size (mm) | Seal kit no. | Kit components |
|---|---|---|
| 6 | CXSM6-PS | Items 19 through 21 from the above chart |
| 10 | CXSM10APS | |
| 15 | CXSM15-PS | |
| 20 | CXSM20-PS | |
| 25 | CXSM25-PS | |
| 32 | CXSM32-PS | |

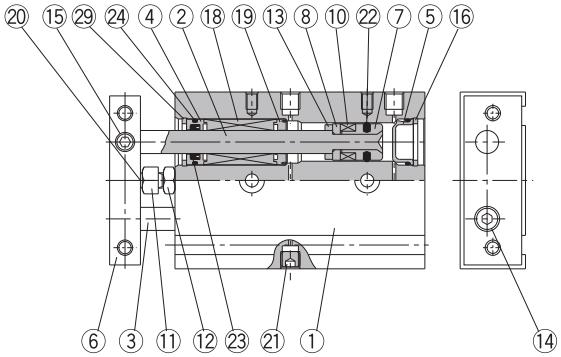
∗ Seal kits consist of items 19 through 21, and can be ordered by using the seal kit number corresponding to each bore size.

## Construction: Ball Bushing Bearing

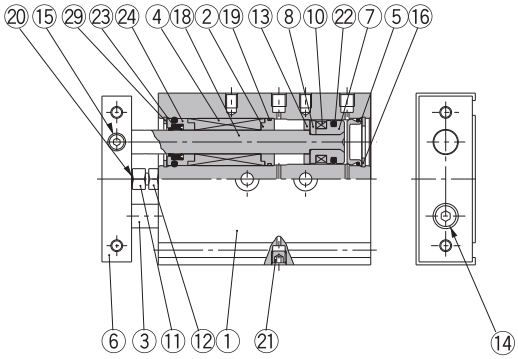
**CXSL6**



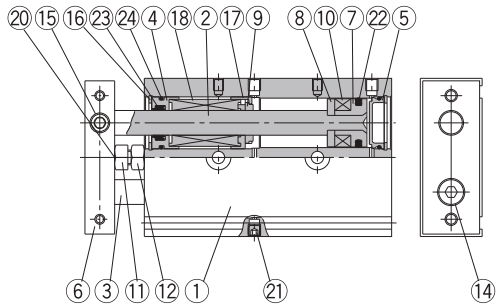

**CXSL10**




**CXSL15**




**CXSL20 to 32**




### Parts list: Standard piping

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Housing** | Aluminum alloy | Hard anodized |
| 2 | **Piston rod A** | Special steel | Hard chrome plated |
| 3 | **Piston rod B** | Special steel | Hard chrome plated |
| 4 | **Rod cover/Bearing** | Aluminum alloy | |
| 5 | **Head cover** | Special steel Note 1) | |
| 6 | **Plate** | Aluminum alloy | Hard anodized |
| 7 | **Piston A** | Aluminum alloy | Chromated |
| 8 | **Piston B** | Aluminum alloy | Chromated |
| 9 | **Bumper A** | Polyurethane | |
| 10 | **Magnet** | Magnetic material | |
| 11 | **Bumper bolt** | Carbon steel | Nickel plated |
| 12 | **Hexagon nut** | Carbon steel | Nickel plated |
| 13 | **Bumper B** | Polyurethane | |
| 14 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 15 | **Hexagon socket head set screw** | Chromium steel | Nickel plated |
| 16 | **Snap ring** | Special steel | Nickel plated |
| 17 | **Bumper holder** | Synthetic resin | |

Note 1) Anodized aluminum alloy for CXSL6.

### Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| 18 | **Ball bushing** | — | |
| 19 | **Bearing spacer** | Synthetic resin Note 2) | |
| 20 | **Bumper** | Polyurethane | |
| 21 | **Plug** | Chromium steel | Nickel plated |
| 22 | **Piston seal** | NBR | |
| 23 | **Rod seal** | NBR | |
| 24 | **O-ring** | NBR | |
| 25 | **Head cover B** | Aluminum alloy | Nickel plated |
| 26 | **Seal retainer** | Aluminum alloy | |
| 27 | **Port spacer** | Aluminum alloy | |
| 28 | **Steel ball** | Special steel | Hard chrome plated |
| 29 | **Snap ring B** | Special steel | Nickel plated |

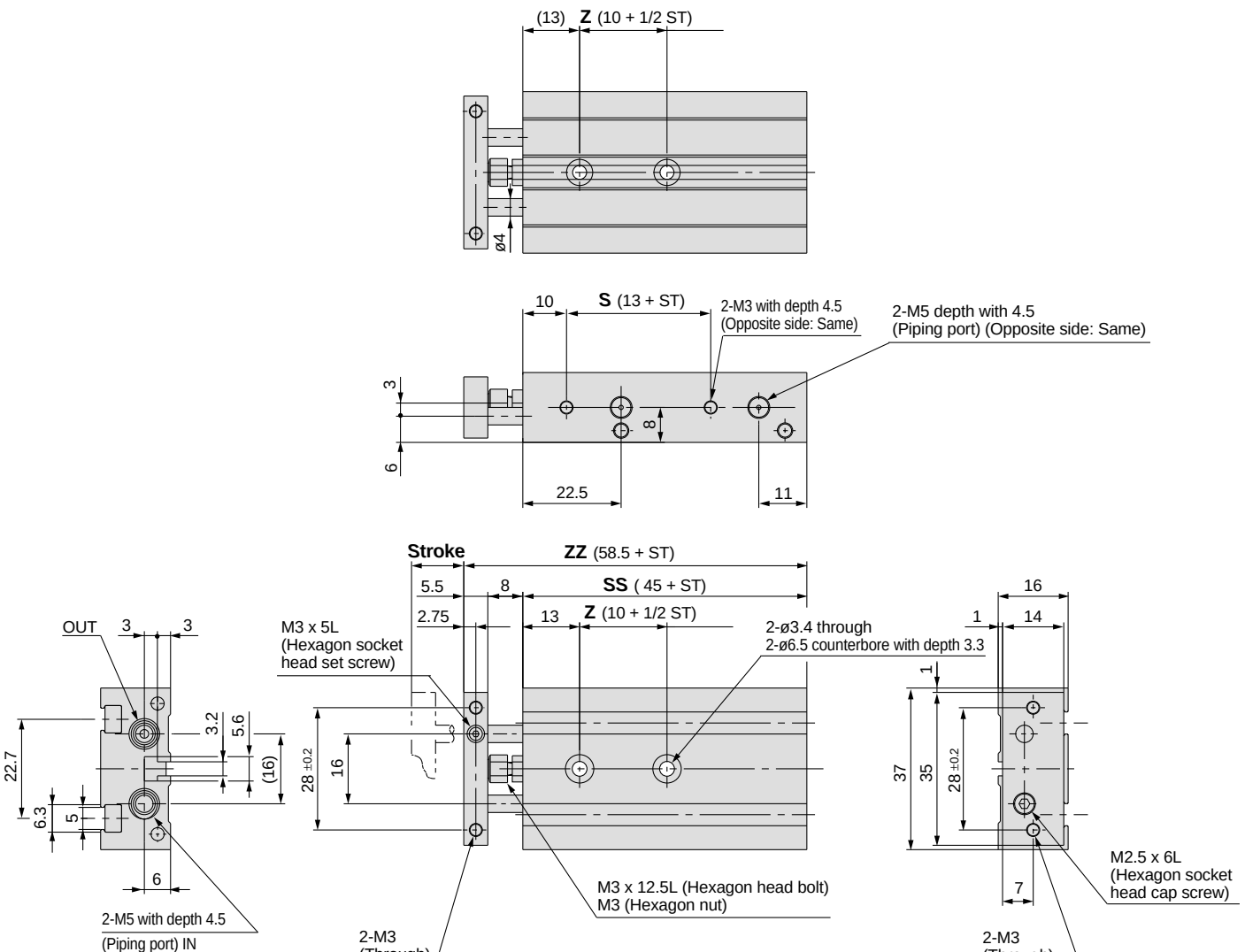
Note 2) Aluminum alloy for CXSL6.

### Replacement parts: Seal kits

| Bore size (mm) | Seal kit no. | Kit components |
|---|---|---|
| 6 | CXSL6–PS | Items 22 through 24 from the chart above |
| 10 | CXSL10BPS | |
| 15 | CXSL15APS | |
| 20 | CXSL20APS | |
| 25 | CXSL25APS | |
| 32 | CXSL32APS | |

∗ Seal kits consist of items 22 through 24, and can be ordered by using the seal kit number corresponding to each bore size.

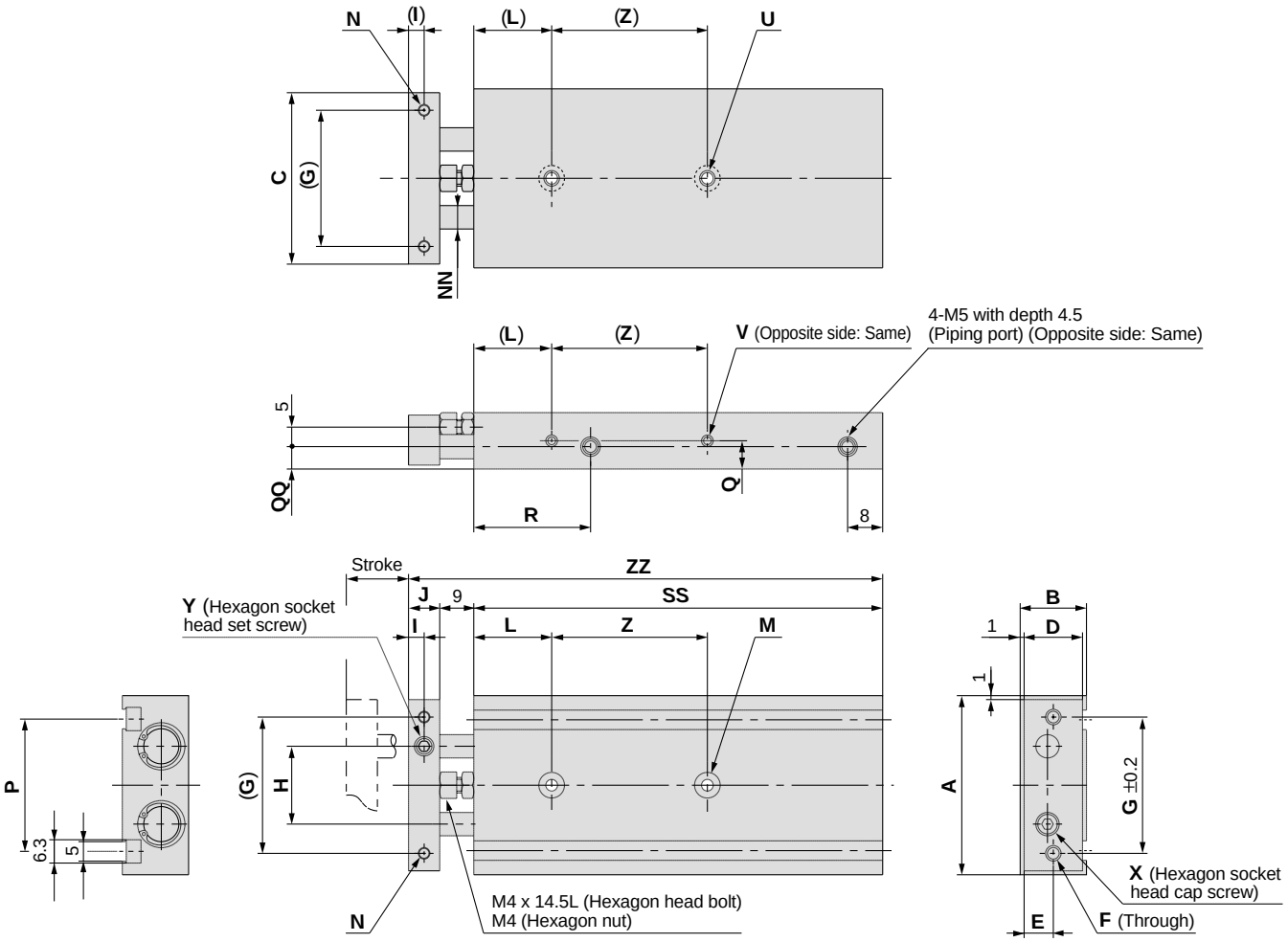
## Dimensions: ø6




(mm)

| Model | Stroke | Z | S | SS | ZZ |
|---|---|---|---|---|---|
| **CXS□6-10** | 10 | 15 | 23 | 55 | 68.5 |
| **CXS□6-20** | 20 | 20 | 33 | 65 | 78.5 |
| **CXS□6-30** | 30 | 25 | 43 | 75 | 88.5 |
| **CXS□6-40** | 40 | 30 | 53 | 85 | 98.5 |
| **CXS□6-50** | 50 | 35 | 63 | 95 | 108.5 |

## Dimensions: ø10, ø15



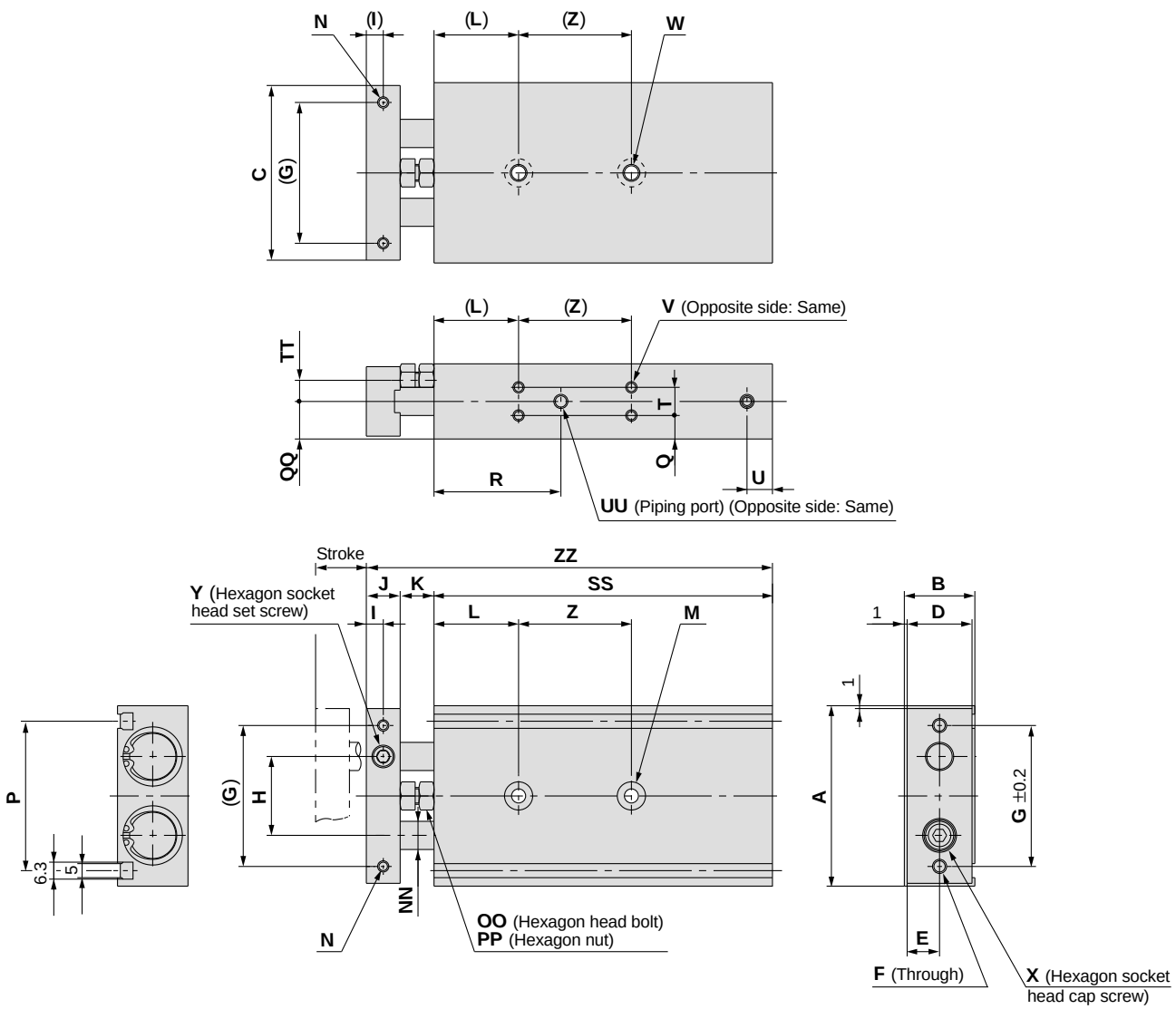

(mm)

| Model | A | B | C | D | E | F | G | H | I | J | L | M | N | NN | P | Q | QQ | R | U | V | X | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CXS□10** | 46 | 17 | 44 | 15 | 7.5 | 2-M4 | 35 | 20 | 4 | 8 | 20 | 2-ø3.4 through<br>2-ø6.5 counterbore<br>with depth 3.3 | 2-M3<br>with depth 5 | ø6 | 33.6 | 8.5 | 7 | 30 | 2-M4<br>with depth 7 | 4-M3<br>with depth 4.5 | M3<br>x 10 | M5 x 5L |
| **CXS□15** | 58 | 20 | 56 | 18 | 9 | 2-M5 | 45 | 25 | 5 | 10 | 30 | 2-ø4.3 through<br>2-ø8 counterbore<br>with depth 4.4 | 2-M4<br>with depth 6 | ø8 | 48 | 10 | 10 | 38.5 | 2-M5<br>with depth 8 | 4-M4<br>with depth 5 | M5<br>x 10 | M6 x 5L |

**Strokes**

| Model \ Symbol / Stroke | SS | | | | | | | | | | | | | | | | Z | | | | | ZZ | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 | | 10, 15<br>20, 25 | 30, 35,<br>40, 45, 50 | 60, 70, 75 | 80 | 90, 100 | | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 | | | |
| **CXS□10** | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 115 | 125 | 130 | — | — | — | | 30 | 40 | 50 | — | — | | 82 | 87 | 92 | 97 | 102 | 107 | 112 | 117 | 122 | 132 | 142 | 147 | — | — | — | | | |
| **CXS□15** | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 120 | 130 | 135 | 140 | 150 | 160 | | 25 | 35 | 45 | 45 | 55 | | 89 | 94 | 99 | 104 | 109 | 114 | 119 | 124 | 129 | 139 | 149 | 154 | 159 | 169 | 179 | | | |

## Dimensions: ø20, ø25, ø32




(mm)

| Model | A | B | C | D | E | F | G | H | I | J | K | L | M | N | NN | OO | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CXS□20** | 64 | 25 | 62 | 23 | 11.5 | 2-M5 | 50 | 28 | 6 | 12 | 12 | 30 | 2-ø5.5 through<br>2-ø9.5 counterbore<br>with depth 5.3 | 2-M4<br>with depth 6 | ø10 | M6 x 18.5L | 53 |
| **CXS□25** | 80 | 30 | 78 | 28 | 14 | 2-M6 | 60 | 35 | 6 | 12 | 12 | 30 | 2-ø6.9 through<br>2-ø11 counterbore<br>with depth 6.3 | 2-M5<br>with depth 7.5 | ø12 | M6 x 18.5L | 64 |
| **CXS□32** | 98 | 38 | 96 | 36 | 18 | 2-M6 | 75 | 44 | 8 | 16 | 14 | 30 | 2-ø6.9 through<br>2-ø11 counterbore<br>with depth 6.3 | 2-M5<br>with depth 8 | ø16 | M8 x 23L | 76 |

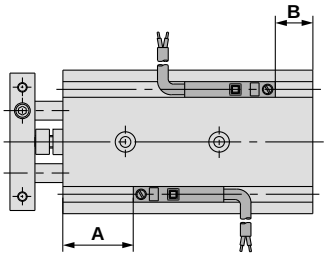
| Model | PP | Q | QQ | R | T | TT | U | UU | V | W | X | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CXS□20** | M6 | 7.75 | 12.5 | 45 | 9.5 | 6.5 | 8 | 4-M5<br>with depth 4.5 | 8-M4<br>with depth 5.5 | 2-M6<br>with depth 10 | M6 x 12 | M8 x 6L |
| **CXS□25** | M6 | 8.5 | 15 | 46 | 13 | 9 | 9 | 4- 1/8<br>with depth 6.5 | 8-M5<br>with depth 7.5 | 2-M8<br>with depth 12 | M6 x 14 | M8 x 6L |
| **CXS□32** | M8 | 9 | 19 | 56 | 20 | 11.5 | 10 | 4- 1/8<br>with depth 6.5 | 8-M5<br>with depth 7.5 | 2-M8<br>with depth 12 | M8 x 16 | M10 x 8L |

**Strokes**

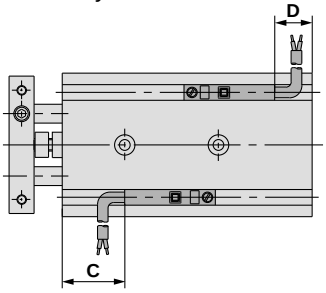
| Symbol / Stroke / Model | SS | | | | | | | | | | | | | | | Z | | | ZZ | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 | 10, 15, 20, 25 | 30, 35, 40, 45, 50 | 60, 70, 75, 80, 90, 100 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
| **CXS□20** | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 130 | 140 | 145 | 150 | 160 | 170 | 30 | 40 | 60 | 104 | 109 | 114 | 119 | 124 | 129 | 134 | 139 | 144 | 154 | 164 | 169 | 174 | 184 | 194 | | | |
| **CXS□25** | 82 | 87 | 92 | 97 | 102 | 107 | 112 | 117 | 122 | 132 | 142 | 147 | 152 | 162 | 172 | 30 | 40 | 60 | 106 | 111 | 116 | 121 | 126 | 131 | 136 | 141 | 146 | 156 | 166 | 171 | 176 | 186 | 196 | | | |
| **CXS□32** | 92 | 97 | 102 | 107 | 112 | 117 | 122 | 127 | 132 | 142 | 152 | 157 | 162 | 172 | 182 | 40 | 50 | 70 | 122 | 127 | 132 | 137 | 142 | 147 | 152 | 157 | 162 | 172 | 182 | 187 | 192 | 202 | 212 | | | |

## Auto Switch Proper Mounting Positions for Stroke End Detection

Electrical entry direction: Inward




Electrical entry direction: Outward



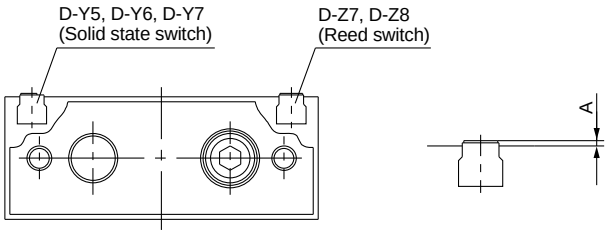

| Bore size (mm) | A | B | D-Z7, D-Z8, D-Y7□W D-Y5□, D-Y7□ | | D-Y6□, D-Y7□V D-Y7□WV | | D-Y7BAL | |
|---|---|---|---|---|---|---|---|---|
| | | | C | D | C | D | C | D |
| **6** | 15.5 | 4.5 | 11.5 (10) | 0.5 (–1) | 13 | 2 | 5.5 | –5.5 |
| **10** | 22.5 | 7.5 | 18.5 (17) | 3.5 (2) | 20 | 5 | 12.5 | –2.5 |
| **15** | 30.5 | 4.5 | 26.5 (25) | 0.5 (–1) | 28 | 2 | 20.5 | –5.5 |
| **20** | 38 | 7 | 34 (32.5) | 3 (1.5) | 36 | 4.5 | 28 | –3 |
| **25** | 38 | 9 | 34 (32.5) | 5 (3.5) | 36 | 6.5 | 28 | –1 |
| **32** | 48 | 9 | 44 (42.5) | 5 (3.5) | 46 | 6.5 | 38 | –1 |

Lead wire entry is inward prior to shipment.

Notes) • Negative values for dimension D indicate how much the lead wires protrude from the cylinder body.

• Dimensions inside ( ) are for D-Z73.

## Auto Switch Mounting Dimensions



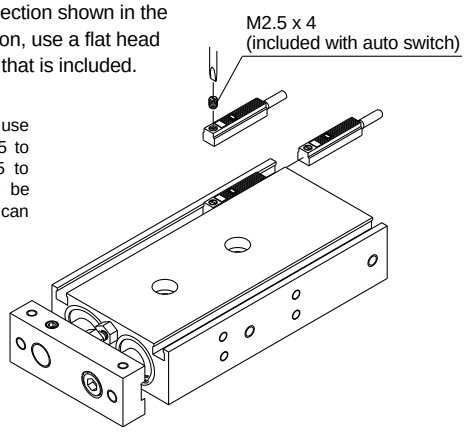

**Dimension A**

| Switch types | Bore size | | | | | |
|---|---|---|---|---|---|---|
| | 6 | 10 | 15 | 20 | 25 | 32 |
| **D-Y59A, D-Y7P, D-Y59B** | 0.7 | | 0.2 | | | |
| **D-Y69A, D-Y7PV, D-Y69B** | | | | | | |
| **D-Y7NWV, D-Y7PWV, D-Y7BWV** | | | | | | |
| **D-Y7NW, D-Y7PW, D-Y7BW** | | | | | | |
| **D-Y7BAL** | 6.5 | | 6.0 | | | |
| **D-Z7, D-Z8** | 1.2 | | 0.7 | | | |

## Auto Switch Mounting

When mounting and securing auto switches, they should be inserted into the cylinder's switch mounting rail from the direction shown in the drawing below. After setting in the mounting position, use a flat head watchmakers screwdriver to tighten the set screw that is included.

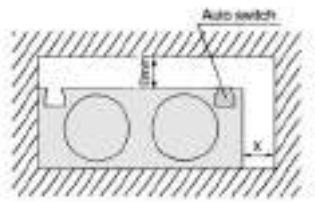
Note) When tightening the auto switch mounting screw, use a watchmakers screwdriver with a handle about 5 to 6mm in diameter. Tighten with a torque of 0.05 to 0.1N·m. As a rule, the mounting screw should be turned about 90° past the point at which tightening can first be felt.




### ⚠Caution

**1. Take precautions when magnetic substances come in close proximity of the cylinder with auto switches.**

When magnetic substances such as iron (including flanges) are in close proximity of an auto switch cylinder, be sure to provide a clearance between the magnetic substance and the cylinder body as shown in the drawing below. If the clearance is less than the values noted in the table below, the auto switch may not function properly.




| Bore size | X (mm) |
|---|---|
| **ø6** | 0 |
| **ø10** | 0 |
| **ø15** | 10 |
| **ø20** | 10 |
| **ø25** | 0 |
| **ø32** | 0 |

# Dual-Rod Cylinder with Air Cushion

# *Series CXS*

## ø20, ø25, ø32

## How to Order

**Port thread type**

| Symbol | Type | Bore sizes |
|---|---|---|
| Nil | M | ø20 |
| | Rc | ø25, ø32 |
| TN | NPT | |
| TF | G | |

**CXS M 20 ☐ — 100 A — Y7BW S**

**Dual-rod cylinder**

**Bearing type**

| | |
|---|---|
| M | Slide bearing |
| L | Ball bushing bearing |

**Bore size/Stroke**

| Bore sizes | Strokes (mm) |
|---|---|
| 20 | 20, 25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100 |
| 25, 32 | 25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100 |

**Air cushion**

**Auto switch type**

| | |
|---|---|
| Nil | Without auto switch (with built-in magnet) |

∗ Select applicable auto switch types from the table below.

**Number of auto switches**

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

**Applicable auto switches:** Refer to pages 40 through 48 for detailed auto switch specifications.

| Type | Special function | Electrical entry | Indicator light | Wiring (output) | Load voltage | | | Auto switch type | | Lead wire length (m)∗ | | | Applicable loads | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DC | | AC | Electrical entry direction | | 0.5 (Nil) | 3 (L) | 5 (Z) | | |
| | | | | | | | | Perpendicular | In-line | | | | | |
| Reed switch | — | Grommet | Yes | 3-wire | — | 5V | — | — | Z76 | ● | ● | — | IC circuit | — |
| | | | | 2-wire | 24V | 12V | 100V | — | Z73 | ● | ● | ● | — | Relay PLC |
| | | | No | | | 5V, 12V | 100V or less | — | Z80 | ● | ● | — | IC circuit | |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 24V | 5V, 12V | — | Y69A | Y59A | ● | ● | ○ | IC circuit | Relay PLC |
| | | | | 3-wire (PNP) | | | | Y7PV | Y7P | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | Y69B | Y59B | ● | ● | ○ | — | |
| | Diagnostic indication (2-colour display) | | | 3-wire (NPN) | | 5V, 12V | | Y7NWV | Y7NW | ● | ● | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | Y7PWV | Y7PW | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | Y7BWV | Y7BW | ● | ● | ○ | — | |
| | Water-resistant (2-colour display) | | | | | | | — | Y7BA | — | ● | ○ | | |

∗ Lead wire length symbols: 0.5m ..... Nil (Example) Y59A
3m ..... L Y59AL
5m ..... Z Y59AZ

Note) Solid state switches marked "○" are produced upon receipt of order.

## ⚠ Specific Product Precautions

**Be sure to read before handling.**
**Refer to pages 64 through 70 for Safety Instructions, Actuator Precautions, and Auto Switch Precautions.**

### Selection

## ⚠Caution

**1. Operate the cylinder until the stroke end.**

If the stroke is restricted by the external stopper and clamp work piece, effective cushioning and noise reduction will not be achieved.

**2. Adjust the cushion needles to absorb the kinetic energy during the cushion stroke so that excessive kinetic energy does not remain when the piston reaches the stroke end.**

If the piston reaches the stroke end with excessive kinetic energy remaining (more than the values given in table 1 below) due to an improper adjustment, excessive impact will occur, causing damage to machinery.

**Table 1. Allowable kinetic energy at piston impact**

| Bore size (mm) | 20 | 25 | 32 |
|---|---|---|---|
| Piston speed (mm/s) | 50 to 700 | 50 to 600 | 50 to 600 |
| Allowable kinetic energy (J) | 0.17 | 0.271 | 0.32 |

### Cushion Needle Adjustment

## ⚠Caution

**1. Keep the adjustment range for the cushion needles between the fully closed position and the rotations shown below.**

| Bore size (mm) | 20 | 25 | 32 |
|---|---|---|---|
| Rotations | 2.5 rotations or less | | 3 rotations or less |

Use a 3mm flat head watchmakers screwdriver to adjust the cushion needles. Never set the cushion needles to the fully closed position, as this will cause damage to the seals. The adjustment range for the cushion needles must be between the fully closed position and the open position ranges indicated in the table above. A retaining mechanism prevents the cushion needles from slipping out; however, they may spring out during operation if they are rotated beyond the ranges shown above.

Precautions for selection standard, mounting, piping, and operating environment are same as for the standard series.

## Specifications

| Bore size (mm) | 20 | 25 | 32 |
|---|---|---|---|
| **Fluid** | Air (non-lube) | | |
| **Proof pressure** | 1.05MPa | | |
| **Maximum operating pressure** | 0.7MPa | | |
| **Minimum operating pressure** | 0.1MPa | | |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | | |
| **Piston speed** Note) | 50 to 1000mm/s | | |
| **Port size** | M5 | Rc 1/8 (NPT 1/8, G 1/8) | |
| **Bearing type** | Slide bearing, Ball bushing bearing (Same dimensions for both) | | |
| **Cushion** | Air cushion (both sides) | | |

Note) The maximum piston speed shown in the table above is for extension.
The maximum piston speed for retraction is approximately 70% that of extension.

## Cushion Mechanism

| Bore size (mm) | Effective cushion length (mm) | Absorbable kinetic energy (J) |
|---|---|---|
| **20** | 5.9 | 0.40 |
| **25** | 5.7 | 0.75 |
| **32** | 5.6 | 1.0 |

## Standard Strokes

(mm)

| Model | Standard strokes |
|---|---|
| **CXS□20** | 20, 25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100 |
| **CXS□25**<br>**CXS□32** | 25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 90, 100 |

∗ Refer to "Made to Order" on page 51 for long strokes (i.e., strokes beyond the standard stroke range).

## Theoretical Output

(N)

| Model | Rod size (mm) | Operating direction | Piston area (mm²) | Operating pressure (MPa) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| **CXS□20** | **10** | OUT | 628 | 62.8 | 126 | 188 | 251 | 314 | 377 | 440 |
| | | IN | 471 | 47.1 | 94.2 | 141 | 188 | 236 | 283 | 330 |
| **CXS□25** | **12** | OUT | 982 | 98.2 | 196 | 295 | 393 | 491 | 589 | 687 |
| | | IN | 756 | 75.6 | 151 | 227 | 302 | 378 | 454 | 529 |
| **CXS□32** | **16** | OUT | 1608 | 161 | 322 | 482 | 643 | 804 | 965 | 1126 |
| | | IN | 1206 | 121 | 241 | 362 | 482 | 603 | 724 | 844 |

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

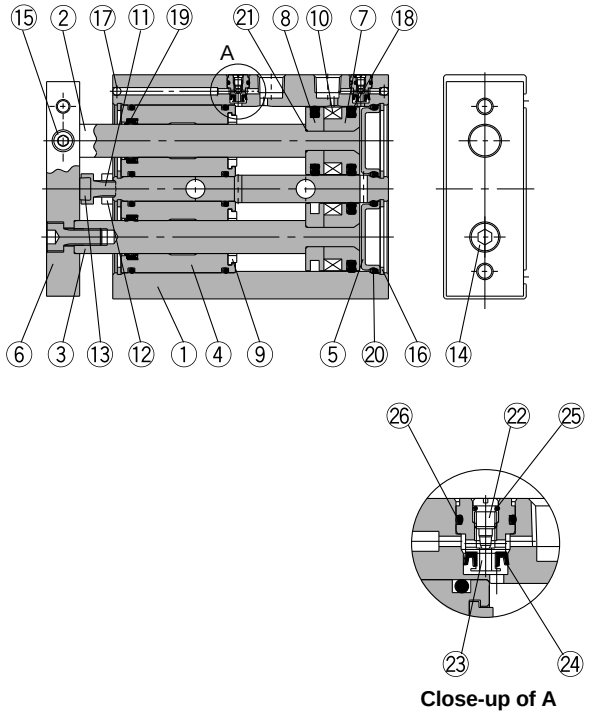
## Weights

(kg)

| Model | Standard stroke (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 75 | 80 | 90 | 100 |
| **CXSM20-□A** | 0.50 | 0.52 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.66 | 0.70 | 0.715 | 0.735 | 0.755 | 0.815 |
| **CXSL20-□A** | 0.52 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.68 | 0.72 | 0.735 | 0.755 | 0.775 | 0.835 |
| **CXSM25-□A** | — | 0.78 | 0.80 | 0.82 | 0.84 | 0.86 | 0.88 | 0.92 | 0.96 | 0.98 | 1.00 | 1.04 | 1.08 |
| **CXSL25-□A** | — | 0.79 | 0.81 | 0.83 | 0.85 | 0.87 | 0.89 | 0.93 | 0.97 | 0.99 | 1.01 | 1.05 | 1.09 |
| **CXSM32-□A** | — | 1.48 | 1.53 | 1.575 | 1.62 | 1.67 | 1.72 | 1.82 | 1.92 | 1.96 | 2.06 | 2.14 | 2.20 |
| **CXSL32-□A** | — | 1.51 | 1.55 | 1.60 | 1.64 | 1.69 | 1.74 | 1.84 | 1.94 | 1.98 | 2.08 | 2.16 | 2.22 |

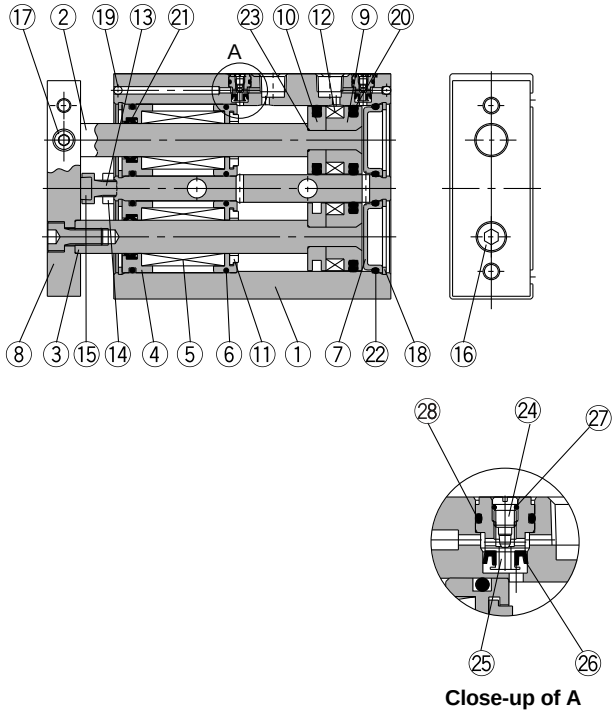
## Construction

### CXSM with air cushion




Close-up of A

### CXSL with air cushion




Close-up of A

### CXSM: Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Housing** | Aluminum alloy | Hard anodized |
| 2 | **Piston rod A** | Carbon steel | Hard chrome plated |
| 3 | **Piston rod B** | Carbon steel | Hard chrome plated |
| 4 | **Rod cover/Bearing** | Aluminum alloy | |
| 5 | **Head cover** | Special steel | Electroless nickel plated |
| 6 | **Plate** | Aluminum alloy | Glossy, self-coloring hard anodized |
| 7 | **Piston A** | Aluminum alloy | Chromated |
| 8 | **Piston B** | Aluminum alloy | Chromated |
| 9 | **Bumper B** | Polyurethane | |
| 10 | **Magnet** | Magnetic material | |
| 11 | **Bumper bolt** | Carbon steel | Nickel plated |
| 12 | **Hexagon nut** | Carbon steel | Nickel plated |
| 13 | **Bumper** | Polyurethane | |
| 14 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 15 | **Hexagon socket head set screw** | Chromium steel | Nickel plated |
| 16 | **Snap ring** | Special steel | Nickel plated |
| 17 | **Steel ball** | Special steel | Nickel plated |
| 18 | **Piston seal** | NBR | |
| 19 | **Rod seal** | NBR | |
| 20 | **O-ring** | NBR | |
| 21 | **O-ring** | NBR | |
| 22 | **Cushion needle** | Stainless steel | |
| 23 | **Check seal retainer** | Copper alloy | |
| 24 | **Check seal** | NBR | |
| 25 | **Needle gasket** | NBR | |
| 26 | **Check gasket** | NBR | |

### CXSL: Parts list

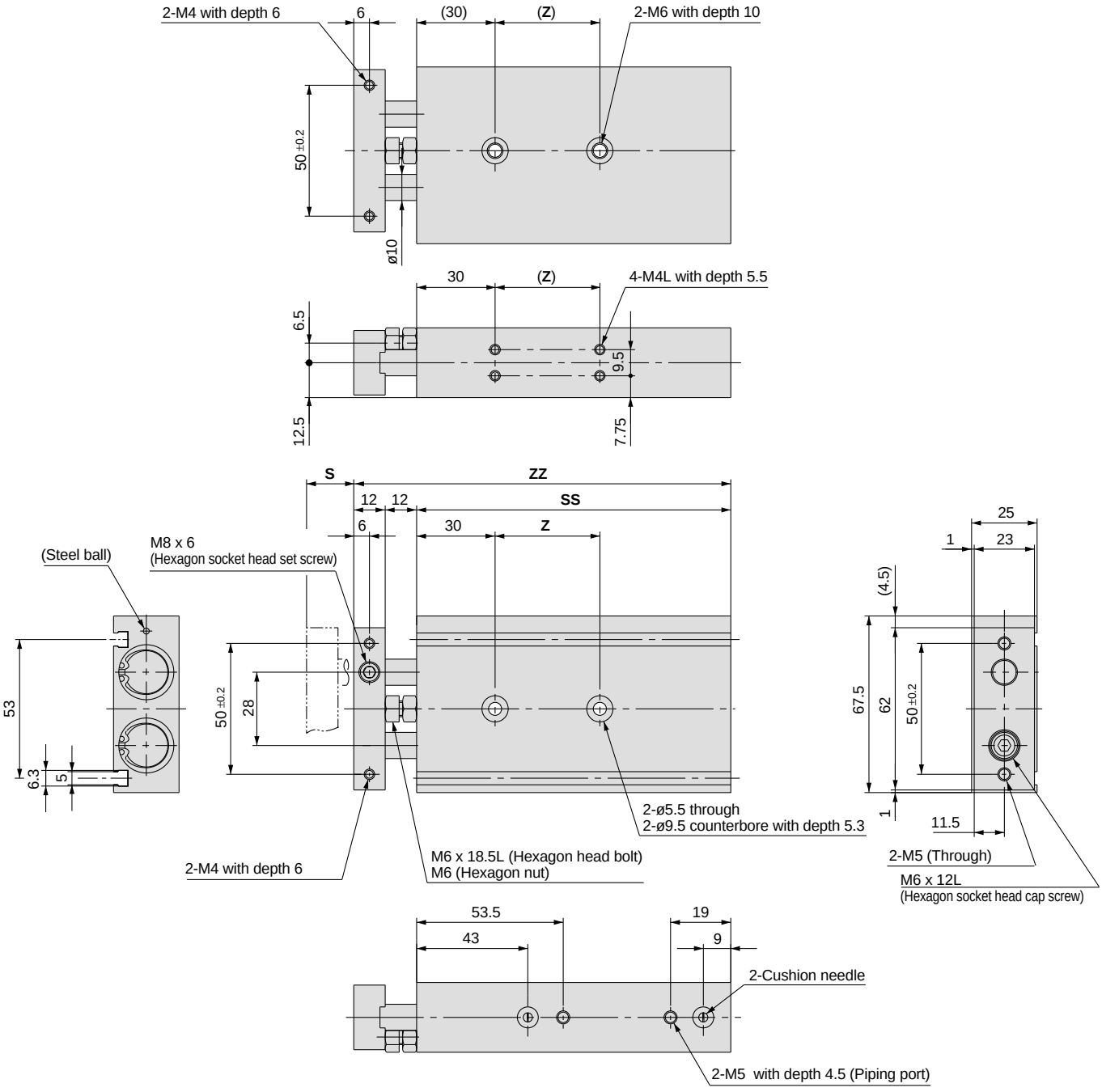
| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Housing** | Aluminum alloy | Hard anodized |
| 2 | **Piston rod A** | Special steel | Hard chrome plated |
| 3 | **Piston rod B** | Special steel | Hard chrome plated |
| 4 | **Rod cover/Bearing** | Aluminum alloy | |
| 5 | **Ball bushing** | — | |
| 6 | **Bumper holder** | Synthetic resin | |
| 7 | **Head cover** | Special steel | Electroless nickel plated |
| 8 | **Plate** | Aluminum alloy | Glossy, self-coloring hard anodized |
| 9 | **Piston A** | Aluminum alloy | Chromated |
| 10 | **Piston B** | Aluminum alloy | Chromated |
| 11 | **Bumper B** | Polyurethane | |
| 12 | **Magnet** | Magnetic material | |
| 13 | **Bumper bolt** | Carbon steel | Nickel plated |
| 14 | **Hexagon nut** | Carbon steel | Nickel plated |
| 15 | **Bumper** | Polyurethane | |
| 16 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 17 | **Hexagon socket head set screw** | Chromium steel | Nickel plated |
| 18 | **Snap ring** | Stainless steel | Nickel plated |
| 19 | **Steel ball** | Stainless steel | Nickel plated |
| 20 | **Piston seal** | NBR | |
| 21 | **Rod seal** | NBR | |
| 22 | **O-ring** | NBR | |
| 23 | **O-ring** | NBR | |
| 24 | **Cushion needle** | Stainless steel | |
| 25 | **Check seal retainer** | Copper alloy | |
| 26 | **Check seal** | NBR | |
| 27 | **Needle gasket** | NBR | |
| 28 | **Check gasket** | NBR | |

### Replacement parts: Seal kits

| Bore size (mm) | Seal kit no. | Kit components |
|---|---|---|
| **20** | CXS□20A-PS | Items 18 through 20 from the chart above |
| **25** | CXS□25A-PS | |
| **32** | CXS□32A-PS | |

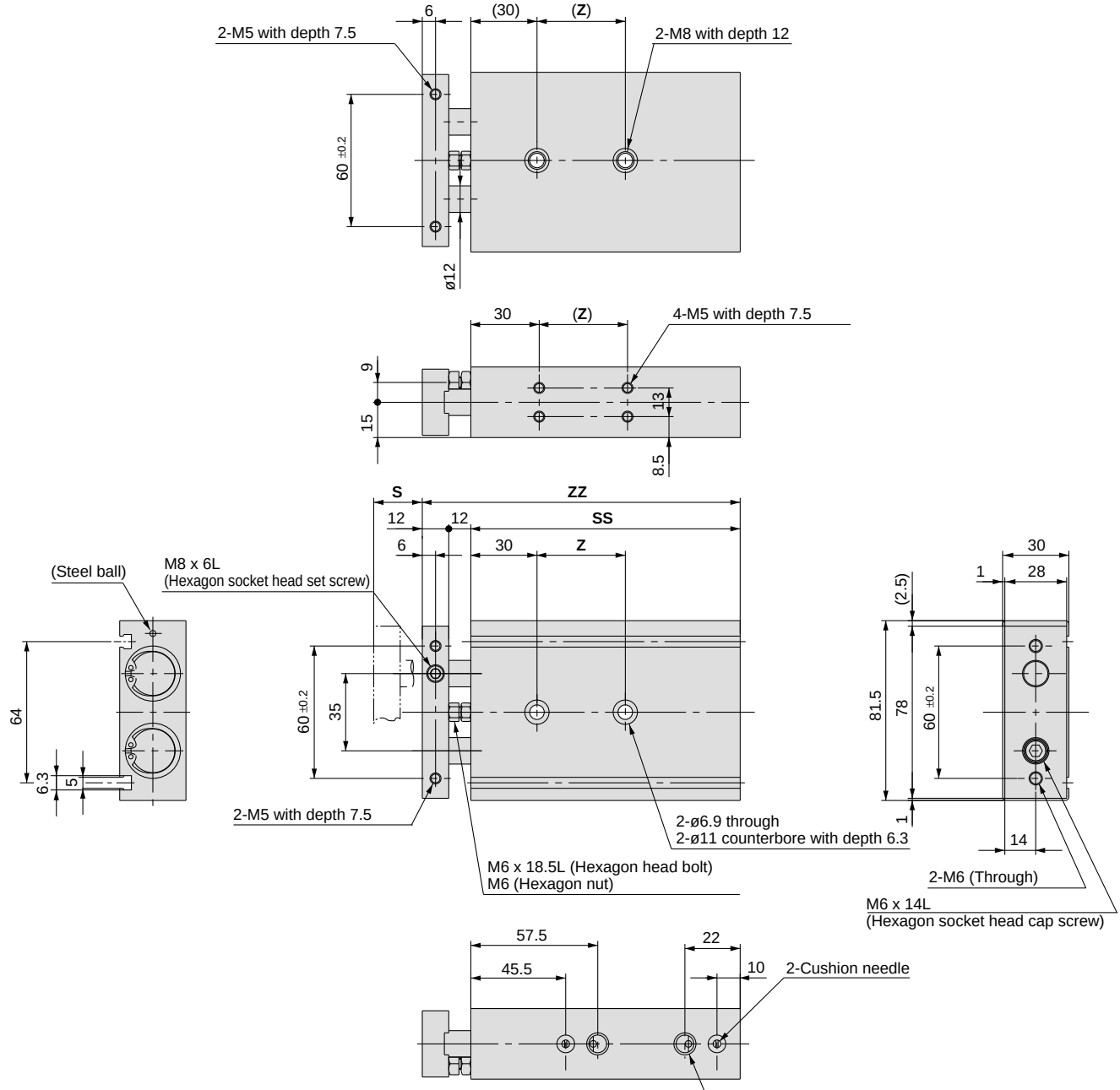
∗ Seal kits consist of items 18 through 20, and can be ordered by using the seal kit number corresponding to each bore size.

## Dimensions: ø20




| Part no. | S | SS | ZZ | Z |
|---|---|---|---|---|
| **CXS□20- 20A** | 20 | 92 | 116 | 30 |
| **CXS□20- 25A** | 25 | 97 | 121 | |
| **CXS□20- 30A** | 30 | 102 | 126 | 40 |
| **CXS□20- 35A** | 35 | 107 | 131 | |
| **CXS□20- 40A** | 40 | 112 | 136 | |
| **CXS□20- 45A** | 45 | 117 | 141 | |
| **CXS□20- 50A** | 50 | 122 | 146 | |
| **CXS□20- 60A** | 60 | 132 | 156 | 60 |
| **CXS□20- 70A** | 70 | 142 | 166 | |
| **CXS□20- 75A** | 75 | 147 | 171 | |
| **CXS□20- 80A** | 80 | 152 | 176 | |
| **CXS□20- 90A** | 90 | 162 | 186 | |
| **CXS□20-100A** | 100 | 172 | 196 | |

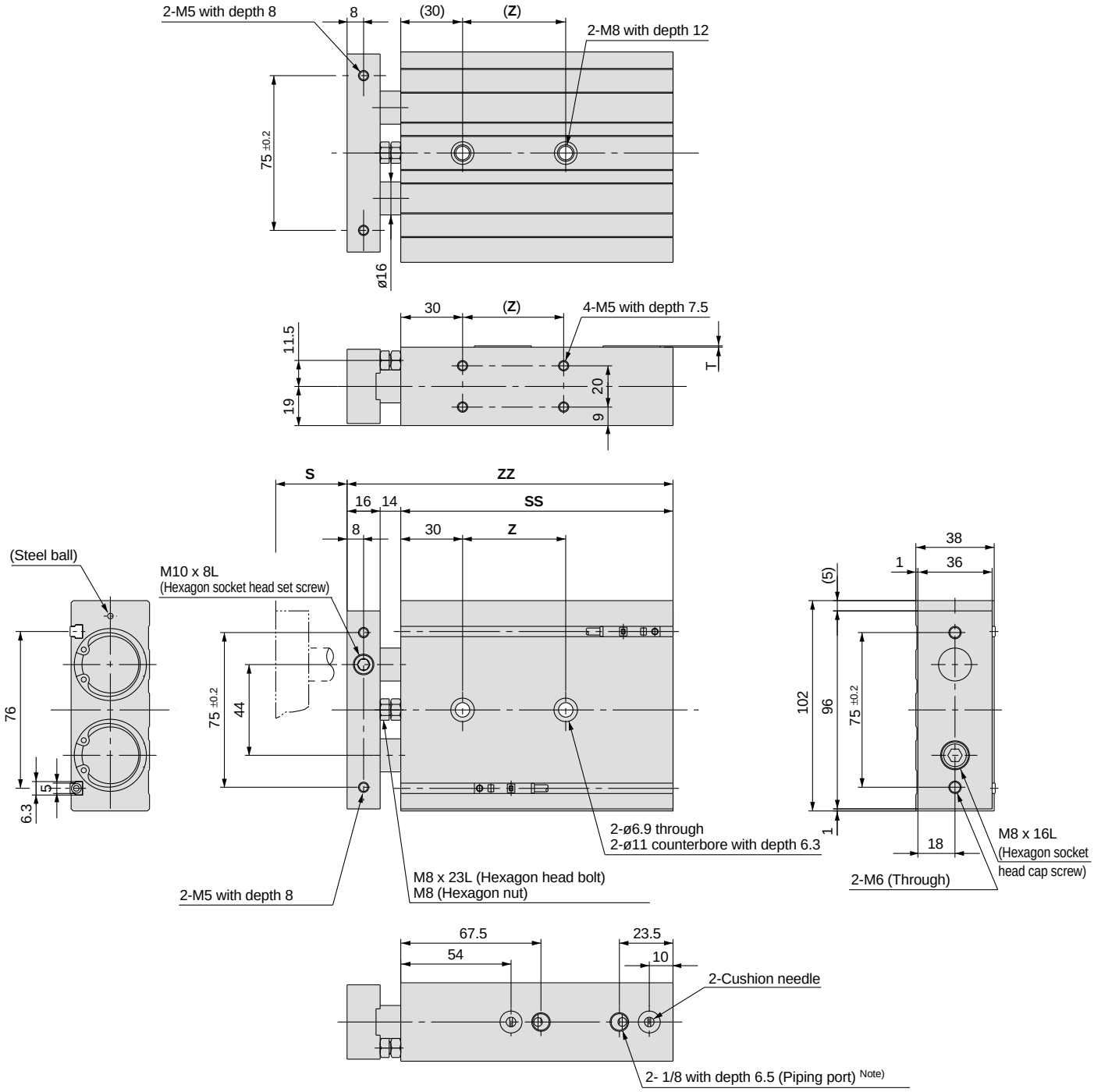
## Dimensions: ø25




| Part no. | S | SS | ZZ | Z |
|---|---|---|---|---|
| **CXS□25- 25A** | 25 | 100 | 124 | 30 |
| **CXS□25- 30A** | 30 | 105 | 129 | 40 |
| **CXS□25- 35A** | 35 | 110 | 134 | |
| **CXS□25- 40A** | 40 | 115 | 139 | |
| **CXS□25- 45A** | 45 | 120 | 144 | |
| **CXS□25- 50A** | 50 | 125 | 149 | |
| **CXS□25- 60A** | 60 | 135 | 159 | |
| **CXS□25- 70A** | 70 | 145 | 169 | 60 |
| **CXS□25- 75A** | 75 | 150 | 174 | |
| **CXS□25- 80A** | 80 | 155 | 179 | |
| **CXS□25- 90A** | 90 | 165 | 189 | |
| **CXS□25-100A** | 100 | 175 | 199 | |

Note) For port threads TN and TF, only the piping port type varies.

## Dimensions: ø32

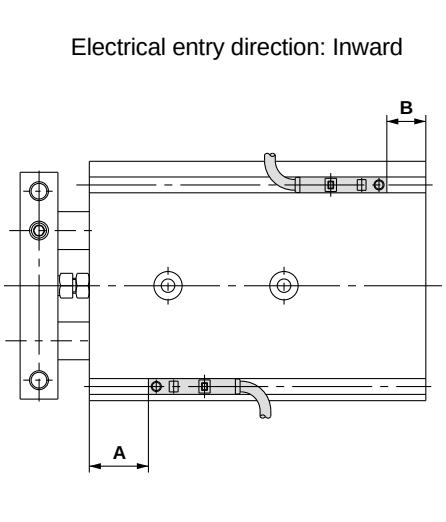



| Part no. | S | SS | ZZ | Z |
|---|---|---|---|---|
| **CXS□32- 25A** | 25 | 112 | 142 | 40 |
| **CXS□32- 30A** | 30 | 117 | 147 | 50 |
| **CXS□32- 35A** | 35 | 122 | 152 | |
| **CXS□32- 40A** | 40 | 127 | 157 | |
| **CXS□32- 45A** | 45 | 132 | 162 | |
| **CXS□32- 50A** | 50 | 137 | 167 | |
| **CXS□32- 60A** | 60 | 147 | 177 | 70 |
| **CXS□32- 70A** | 70 | 157 | 187 | |
| **CXS□32- 75A** | 75 | 162 | 192 | |
| **CXS□32- 80A** | 80 | 167 | 197 | |
| **CXS□32- 90A** | 90 | 177 | 207 | |
| **CXS□32-100A** | 100 | 187 | 217 | |

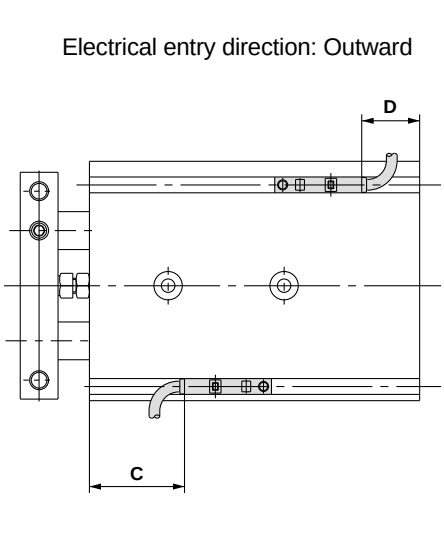
Note) For port threads TN and TF, only the piping port type varies.

## Auto Switch Proper Mounting Positions for Stroke End Detection

Electrical entry direction: Inward




Electrical entry direction: Outward




| Bore size (mm) | A | B | D-Z7, D-Z8, D-Y7□W D-Y5□, D-Y7□ | | D-Y6□, D-Y7□V D-Y7□WV | | D-Y7BAL | |
|---|---|---|---|---|---|---|---|---|
| | | | C | D | C | D | C | D |
| **20** | 40.5 | 6.5 | 36.5 (35) | 2.5 (1) | 38.5 | 4 | 30.5 | –3.5 |
| **25** | 42 | 8 | 38 (36.5) | 4 (2.5) | 40 | 5.5 | 32 | –2 |
| **32** | 52.5 | 9.5 | 48.5 (47) | 5.5 (4) | 50.5 | 7 | 42.5 | –0.5 |

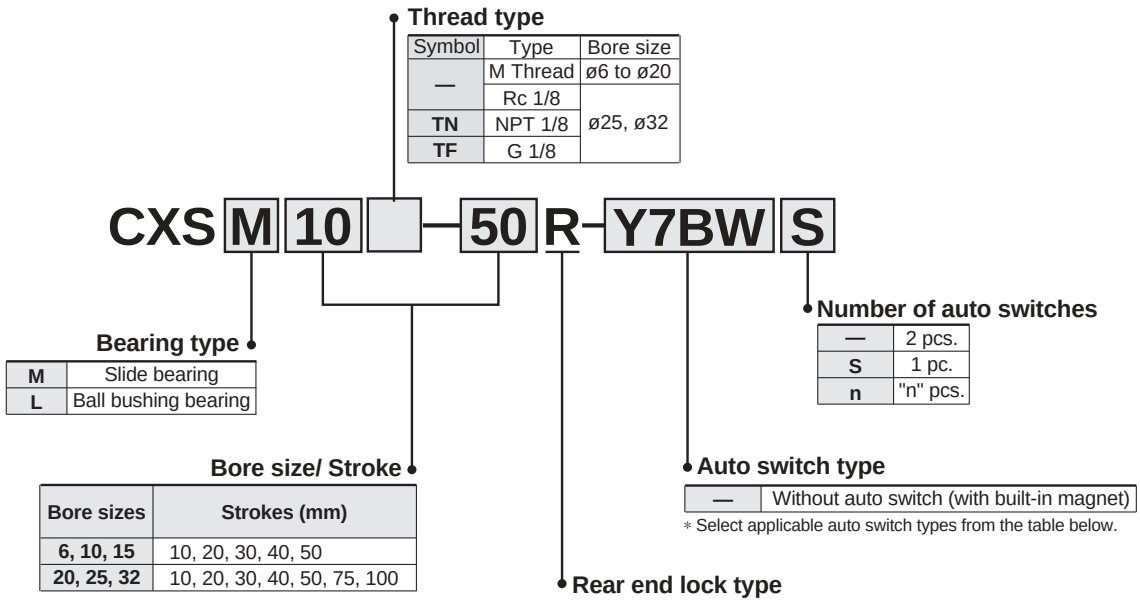
**Auto switch mounting and mounting dimensions are same as those for the standard type. Refer to page 18.**

# Dual-Rod Cylinder with Rear End Lock

# *Series CXS*

## ø6, ø10, ø15, ø20, ø25, ø32

## How to Order




**Applicable auto switches:** Refer to pages 40 through 48 for detailed auto switch specifications.

| Type | Special function | Electrical entry | Indicator light | Wiring (output) | Load voltage | | | Auto switch type | | Lead wire length (m)∗ | | | Applicable loads | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DC | | AC | Electrical entry direction | | 0.5 (–) | 3 (L) | 5 (Z) | | |
| | | | | | | | | Perpendicular | In-line | | | | | |
| Reed switch | — | Grommet | Yes | 3-wire | — | 5V | — | — | Z76 | ● | ● | — | IC circuit | — |
| | | | | 2-wire | 24V | 12V | 100V | — | Z73 | ● | ● | ● | — | Relay PLC |
| | | | No | | | 5V, 12V | 100V or less | — | Z80 | ● | ● | — | IC circuit | |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 24V | 5V, 12V | —— | Y69A | Y59A | ● | ● | ○ | IC circuit | Relay PLC |
| | | | | 3-wire (PNP) | | | | Y7PV | Y7P | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | Y69B | Y59B | ● | ● | ○ | — | |
| | Diagnostic indication (2-colour display) | | | 3-wire (NPN) | | 5V, 12V | | Y7NWV | Y7NW | ● | ● | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | Y7PWV | Y7PW | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | Y7BWV | Y7BW | ● | ● | ○ | — | |
| | Water-resistant (2-colour display) | | | | | | | — | Y7BA | — | ● | ○ | | |

∗ Lead wire length symbols: 0.5m ..... – (Example) Y59A
3m ..... L Y59AL
5m ..... Z Y59AZ

Note) Solid state switches marked "○" are produced upon receipt of order.

## ⚠ Specific Product Precautions

**Be sure to read before handling.**
**Refer to pages 64 through 70 for Safety Instructions, Actuator Precautions, and Auto Switch Precautions.**

### Mounting

## ⚠ Caution

**Mounting and adjusting**

1. **Release the lock when mounting and adjusting the cylinder. An attempt to mount or adjust a cylinder while it is locked can damage the lock.**
2. **Never adjust the retracting stroke using a bumper bolt or external stopper. The lock will not function.**

**Releasing the lock**

1. **Do not release the lock while a load is applied to the lock. This will cause a sudden, erratic movement of the cylinder, and create a dangerous condition.**

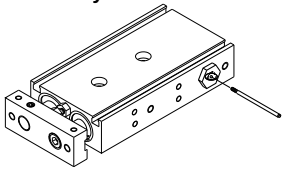
**Control circuit**

1. **To control the end lock cylinder, use a 2-position 4-/5-port solenoid valve. Avoid using these valves along with a 3-position solenoid valve (especially a closed-centre metal seal type).**
2. **Be sure to supply air and apply back pressure to the retracted end before operation. If air is supplied to the extended end while there is no air inside of the cylinder, it will cause a sudden, erratic movement of the cylinder, and create a dangerous condition.**

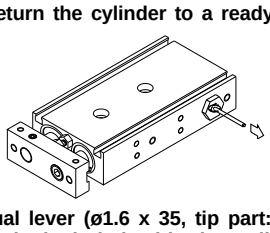
### Manual Release

**Manual release (Non-locking type)**

1. **Insert the manual lever and screw it into the lock holder assembly.**



2. **To unlock, pull the manual lever in the direction of the arrow. Release the manual lever to return the cylinder to a ready-to-lock state.**



3. **The manual lever (ø1.6 x 35, tip part: M1.6 x 0.35 x 3) is included with the cylinder. If additional manual levers are required, use the following part number to place an order: CXS06-48BK2777 (for all series)**

## Specifications

| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| **Fluid** | Air (Non-lube) | | | | | |
| **Proof pressure** | 1.05MPa | | | | | |
| **Maximum operating pressure** | 0.7MPa | | | | | |
| **Minimum operating pressure** | 0.3MPa | | | | | |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | | | | | |
| **Piston speed** Note) | 30 to 300mm/s | 30 to 800mm/s | 30 to 700mm/s | | 30 to 600mm/s | |
| **Cushion** | Bumper is standard on both sides | | | | | |
| **Port size** | M5 | | | | 1/8 | |
| **Bearing type** | Slide bearing, Ball bushing bearing (Same dimensions for both) | | | | | |

Note) The maximum piston speed shown in the table above is for extension.
The maximum piston speed for retraction is approximately 70% that of extension.

## Lock Specifications

| **Lock specification** | Rear End Lock | | | | | |
|---|---|---|---|---|---|---|
| **Bore size (mm)** | **6** | **10** | **15** | **20** | **25** | **32** |
| **Maximum holding force (N)** | 14.7 | 39.2 | 98.1 | 157 | 235 | 382 |
| **Manual release** | Non-locking type | | | | | |

## Standard Strokes

(mm)

| Model | Standard strokes |
|---|---|
| **CXS□ 6** | 10, 20, 30, 40, 50 |
| **CXS□10** | |
| **CXS□15** | |
| **CXS□20** | 10, 20, 30, 40, 50, 75, 100 |
| **CXS□25** | |
| **CXS□32** | |

∗ Long strokes (i.e., strokes beyond the standard stroke range) are available as a special order and processed accordingly.

## Theoretical Output

(N)

| Model | Rod size (mm) | Operating direction | Piston area (mm²) | Operating pressure (MPa) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.1 | 0.15 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| **CXS□ 6** | **4** | OUT | 56 | — | 8.4 | 11.2 | 16.8 | 22.4 | 28.0 | 33.6 | 39.2 |
| | | IN | 31 | — | 4.6 | 6.2 | 9.3 | 12.4 | 15.5 | 18.6 | 21.7 |
| **CXS□10** | **6** | OUT | 157 | 15.7 | — | 31.4 | 47.1 | 62.8 | 78.5 | 94.2 | 110 |
| | | IN | 100 | 10.0 | — | 20.0 | 30.0 | 40.0 | 50.0 | 60.0 | 70.0 |
| **CXS□15** | **8** | OUT | 353 | 35.3 | — | 70.6 | 106 | 141 | 177 | 212 | 247 |
| | | IN | 252 | 25.2 | — | 50.4 | 75.6 | 101 | 126 | 151 | 176 |
| **CXS□20** | **10** | OUT | 628 | 62.8 | — | 126 | 188 | 251 | 314 | 377 | 440 |
| | | IN | 471 | 47.1 | — | 94.2 | 141 | 188 | 236 | 283 | 330 |
| **CXS□25** | **12** | OUT | 982 | 98.2 | — | 196 | 295 | 393 | 491 | 589 | 687 |
| | | IN | 756 | 75.6 | — | 151 | 227 | 302 | 378 | 454 | 529 |
| **CXS□32** | **16** | OUT | 1608 | 161 | — | 322 | 482 | 643 | 804 | 965 | 1126 |
| | | IN | 1206 | 121 | — | 241 | 362 | 482 | 603 | 724 | 844 |

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

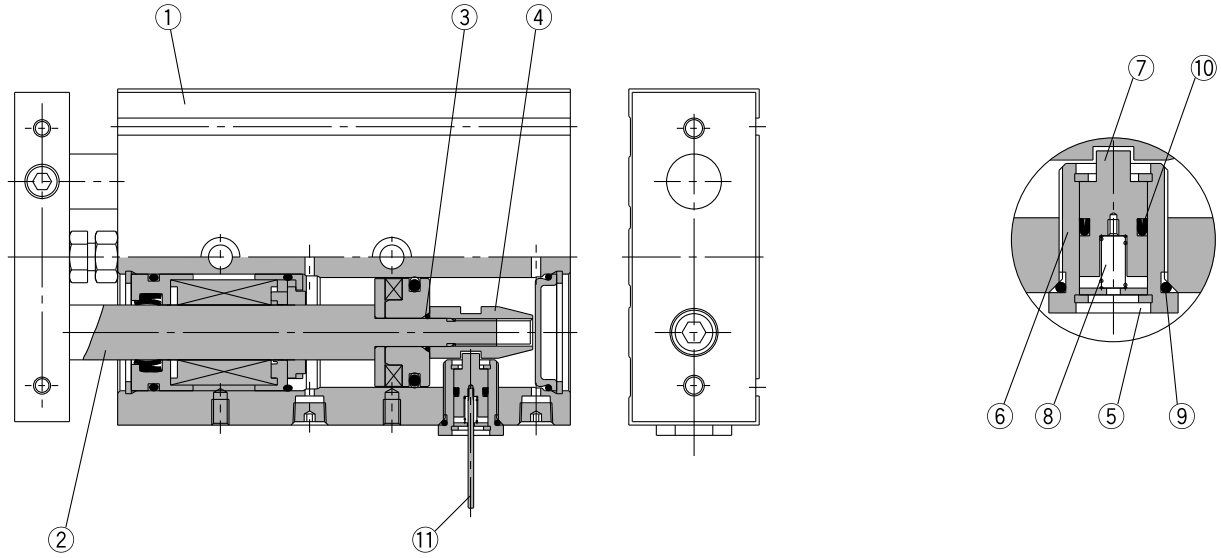
## Weights

(kg)

| Model | Standard strokes (mm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 | 100 |
| **CXSM6- □R** | 0.105 | 0.12 | 0.135 | 0.15 | 0.165 | — | — |
| **CXSL6- □R** | 0.105 | 0.12 | 0.135 | 0.15 | 0.165 | — | — |
| **CXSM10-□R** | 0.18 | 0.2 | 0.225 | 0.25 | 0.27 | — | — |
| **CXSL10- □R** | 0.18 | 0.2 | 0.225 | 0.25 | 0.27 | — | — |
| **CXSM15-□R** | 0.3 | 0.33 | 0.355 | 0.38 | 0.41 | — | — |
| **CXSL15- □R** | 0.32 | 0.35 | 0.375 | 0.4 | 0.43 | — | — |
| **CXSM20-□R** | 0.465 | 0.5 | 0.54 | 0.58 | 0.62 | 0.715 | 0.815 |
| **CXSL20- □R** | 0.485 | 0.52 | 0.56 | 0.60 | 0.64 | 0.735 | 0.835 |
| **CXSM25-□R** | 0.72 | 0.76 | 0.8 | 0.84 | 0.88 | 0.98 | 1.08 |
| **CXSL25- □R** | 0.73 | 0.77 | 0.81 | 0.85 | 0.89 | 0.99 | 1.09 |
| **CXSM32-□R** | 1.33 | 1.43 | 1.53 | 1.62 | 1.72 | 1.96 | 2.2 |
| **CXSL32- □R** | 1.35 | 1.45 | 1.55 | 1.64 | 1.74 | 1.98 | 2.22 |

## Construction: Slide Bearing

**CXSM6**




### Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| **1** | **Housing** | Aluminum alloy | Hard anodized |
| **2** | **Piston rod B** | Carbon steel | Hard chrome plated |
| **3** | **O-ring** | NBR | |
| **4** | **Lock rod** | Special steel | |
| **5** | **Snap ring** | Special steel | |
| **6** | **Lock holder** | Aluminum alloy | |
| **7** | **Lock pin** | Special steel | |
| **8** | **Lock spring** | Piano wire | |
| **9** | **O-ring** | NBR | |
| **10** | **Lock seal** | NBR | |
| **11** | **Manual lever** | Special steel | |

∗ Parts other than those listed above are same as the standard type.

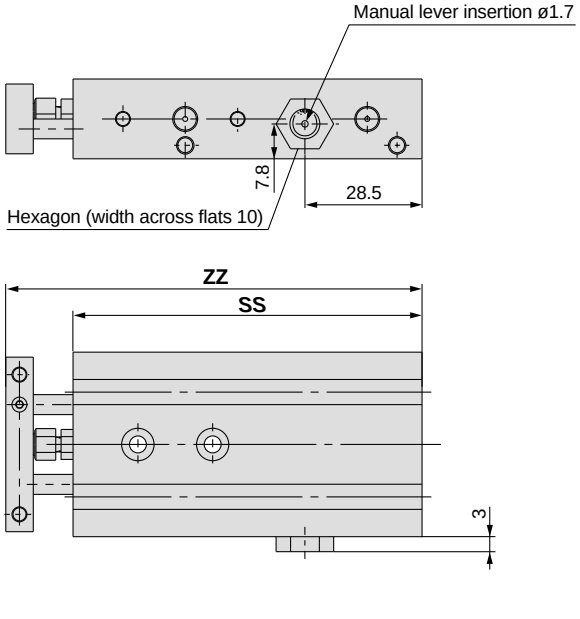
### Replacement parts: Seal kits

| Bore size (mm) | Seal kit no. | Kit components |
|---|---|---|
| 6 | CXSRM6-PS | Includes the kit components of the seal kit featured on page 14 plus items 9 and 10 from the parts list above. |
| | CXSRL6APS | |
| 10 | CXSRM10-PS | |
| | CXSRL10APS | |
| 15 | CXSRM15-PS | |
| | CXSRL15APS | |
| 20 | CXSRM20-PS | |
| | CXSRL20APS | |
| 25 | CXSRM25-PS | |
| | CXSRL25APS | |
| 32 | CXSRM32-PS | |
| | CXSRL32APS | |

∗ Seal kits consist of the seal kits featured on page 14 plus items 9 and 10 from the above parts list, and can be ordered by using the seal kit number corresponding to each bore size.

## Dimensions: ø6, ø10, ø15

**CXS□6-□R**

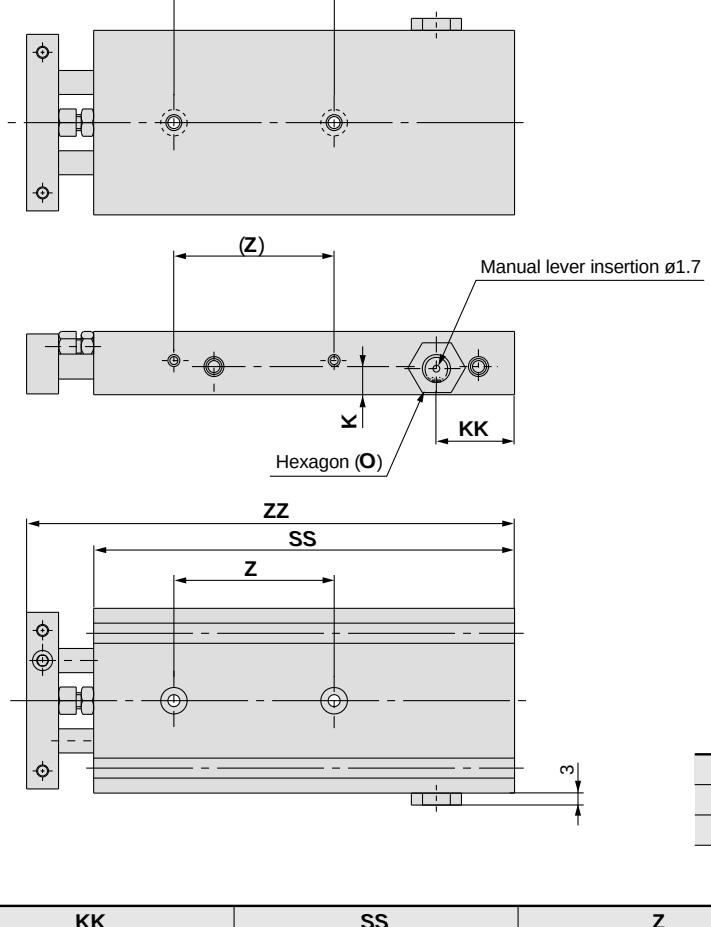



(mm)

| Model | SS | ZZ |
|---|---|---|
| **CXS□6-10R** | 75 | 88.5 |
| **CXS□6-20R** | 85 | 98.5 |
| **CXS□6-30R** | 95 | 108.5 |
| **CXS□6-40R** | 105 | 118.5 |
| **CXS□6-50R** | 115 | 128.5 |

∗ Dimensions other than those listed above are the same as for the standard type.

**CXS□$^{10}_{15}$-□R**




(mm)

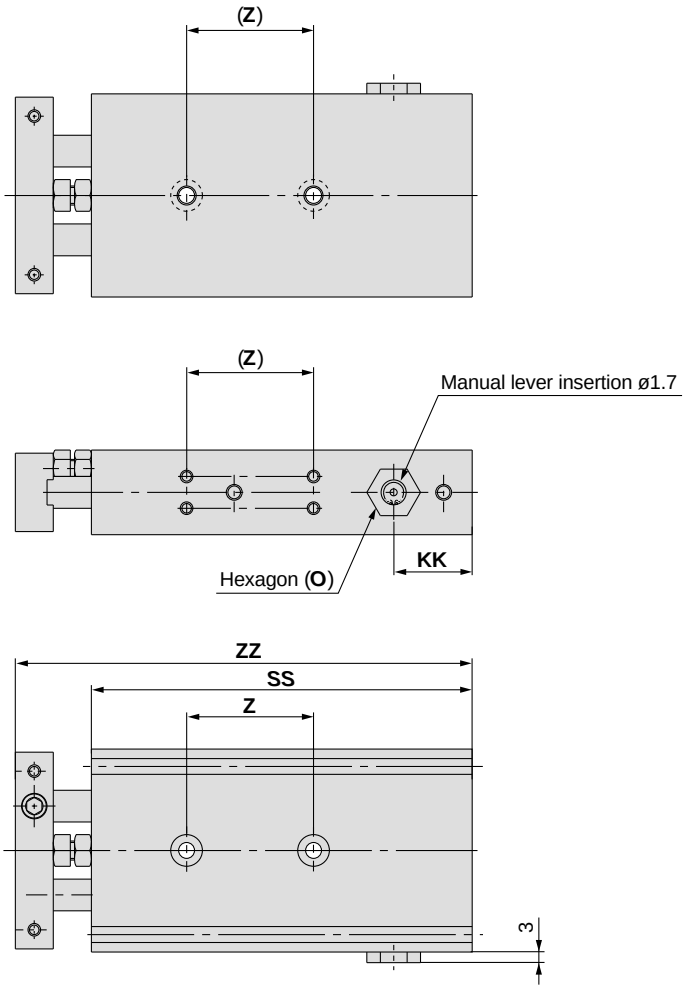
| Model | K | O |
|---|---|---|
| **CXS□10-□R** | 6.5 | Width across flats 12 |
| **CXS□15-□R** | 8.5 | Width across flats 13 |

(mm)

| Symbol / Stroke / Model | KK | | | | | SS | | | | | Z | | | | | ZZ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 10 | 20 | 30 | 40 | 50 | 10 | 20 | 30 | 40 | 50 | 10 | 20 | 30 | 40 | 50 |
| **CXS□10-□R** | 19.5 | | | 24.5 | | 80 | 90 | 100 | 115 | 125 | 30 | 40 | | 50 | | 97 | 107 | 117 | 132 | 142 |
| **CXS□15-□R** | 20.5 | | | | | 90 | 100 | 110 | 120 | 130 | 35 | | | 45 | | 109 | 119 | 129 | 139 | 149 |

∗ Dimensions other than those listed above are the same as for the standard type.

## Dimensions: ø20, ø25, ø32




(mm)

| Model | O |
|---|---|
| CXS□20-□R | Width across flats 13 |
| CXS□25-□R | Width across flats 16 |
| CXS□32-□R | Width across flats 19 |

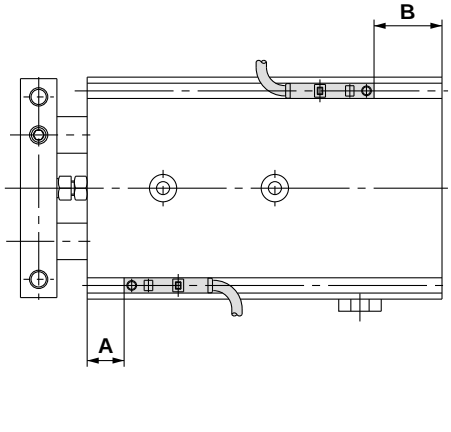
(mm)

| Symbol / Stroke / Model | KK | | | | | | | SS | | | | | | | Z | | | | | | | ZZ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 10 | 20 | 30 | 40 | 50 | 75 | 100 | 10 | 20 | 30 | 40 | 50 | 75 | 100 |
| CXS□20-□R | 22 | | | | | 27 | 22 | 100 | 110 | 120 | 130 | 140 | 170 | 190 | 40 | | | 60 | | | 80 | 124 | 134 | 144 | 154 | 164 | 194 | 214 |
| CXS□25-□R | 24.5 | | 29.5 | | 24.5 | | | 107 | 117 | 132 | 142 | 147 | 172 | 197 | 40 | | 60 | | | | 80 | 131 | 141 | 156 | 166 | 171 | 196 | 221 |
| CXS□32-□R | 29 | | | | | 34 | 49 | 122 | 132 | 142 | 152 | 162 | 192 | 232 | 50 | | 70 | | | 90 | | 152 | 162 | 172 | 182 | 192 | 222 | 262 |

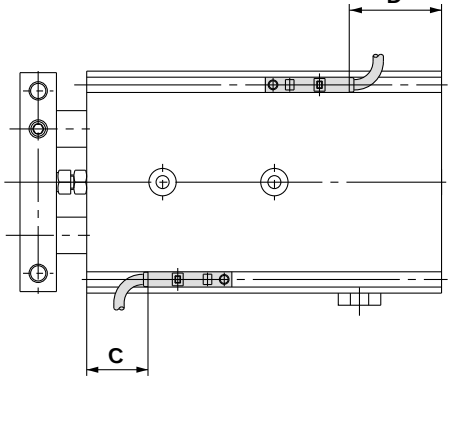
∗ Dimensions other than those listed above are the same as for the standard type.

## Auto Switch Proper Mounting Positions for Stroke End Detection

Electrical entry direction: Inward




Electrical entry direction: Outward




| Bore size (mm) | A | B | D-Z7, D-Z8, D-Y7□W D-Y5□, D-Y7□ | | D-Y6□, D-Y7□V D-Y7□WV | | D-Y7BAL | |
|---|---|---|---|---|---|---|---|---|
| | | | C | D | C | D | C | D |
| **6** | 15.5 | 24.5 | 11.5 (10) | 20.5 (19) | 13 | 22 | 5.5 | 14.5 |
| **10** | 22.5 | 22.5 | 18.5 (17) | 18.5 (17) | 20 | 20 | 12.5 | 12.5 |
| **15** | 30.5 | 24.5 | 26.5 (25) | 20.5 (19) | 28 | 22 | 20.5 | 14.5 |
| **20** | 38 | 27 | 34 (32.5) | 23 (21.5) | 36 | 24.5 | 28 | 17 |
| **25** | 38 | 34 | 34 (32.5) | 30 (28.5) | 36 | 31.5 | 28 | 24 |
| **32** | 48 | 39 | 44 (42.5) | 35 (33.5) | 46 | 6.5 | 38 | 29 |

**Auto switch mounting and mounting dimensions are same as those for the standard type. Refer to page 18.**

# Dual-Double-Rod Cylinder

# *Series CXSW*

## ø6, ø10, ø15, ø20, ø25, ø32

## How to Order

**Thread type**

| Symbol | Type | Bore size |
|---|---|---|
| — | M Thread | ø6 to ø20 |
| | Rc 1/8 | ø25, ø32 |
| TN | NPT 1/8 | |
| TF | G 1/8 | |

**CXS W L 20 □ — 100 — Y7BW S**

**Dual-double-rod type**

**Bearing type**

| | |
|---|---|
| M | Slide bearing |
| L | Ball bushing bearing |

**Bore size/Stroke**

| Bore sizes | Standard strokes (mm) |
|---|---|
| 6 | 10, 20, 30, 40, 50 |
| 10, 15 | 10, 20, 30, 40, 50 |
| 20, 25, 32 | 10, 20, 30, 40, 50, 75, 100 |

**Auto switch type**

| | |
|---|---|
| — | Without auto switch (with built-in magnet) |

∗ Select applicable auto switch types from the table below.

**Number of auto switches**

| | |
|---|---|
| — | 2 pcs. |
| S | 1 pc. |
| n | "n" pcs. |

**Applicable auto switches:** Refer to pages 40 through 48 for detailed auto switch specifications.

| Type | Special function | Electrical entry | Indicator light | Wiring (output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch type: Electrical entry direction: Perpendicular | Auto switch type: Electrical entry direction: In-line | Lead wire length (m)∗: 0.5 (—) | Lead wire length (m)∗: 3 (L) | Lead wire length (m)∗: 5 (Z) | Applicable loads | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire | — | 5V | — | — | Z76 | ● | ● | — | IC circuit | — |
| | | | | 2-wire | 24V | 12V | 100V | — | Z73 | ● | ● | ● | — | Relay, PLC |
| | | | No | | | 5V, 12V | 100V or less | — | Z80 | ● | ● | — | IC circuit | |
| Solid state switch | — | Grommet | Yes | 3-wire (NPN) | 24V | 5V, 12V | — | Y69A | Y59A | ● | ● | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | Y7PV | Y7P | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | Y69B | Y59B | ● | ● | ○ | — | |
| | Diagnostic indication (2-colour display) | | | 3-wire (NPN) | | 5V, 12V | | Y7NWV | Y7NW | ● | ● | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | Y7PWV | Y7PW | ● | ● | ○ | | |
| | | | | 2-wire | | 12V | | Y7BWV | Y7BW | ● | ● | ○ | — | |
| | Water-resistant (2-colour display) | | | | | | | — | Y7BA | — | ● | ○ | | |

∗ Lead wire length symbols: 0.5m ..... – (Example) Y59A
3m ..... L Y59AL
5m ..... Z Y59AZ

Note) Solid state switches marked "○" are produced upon receipt of order.
Y7BAL is not compatible with sizes ø10, ø15, and ø20. Please inquire separately.

## Specifications

| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| **Fluid** | Air (non-lube) | | | | | |
| **Proof pressure** | 1.05MPa | | | | | |
| **Maximum operating pressure** | 0.7MPa | | | | | |
| **Minimum operating pressure** | 0.15MPa | | | 0.1MPa | | |
| **Ambient and fluid temperature** | –10° to 60°C (with no freezing) | | | | | |
| **Piston speed** | 50 to 500mm/s | | | | | |
| **Cushion** | Bumper is standard on both sides | | | | | |
| **Stroke adjustable range** | 0 to –10mm compared to the standard stroke (Extended end: 5mm; Retracted end: 5mm) | | | | | |
| **Port size** | M5 | | | | 1/8 | |
| **Bearing type** | Slide bearing, Ball bushing bearing (Same dimensions for both) | | | | | |

## Standard Strokes

(mm)

| Model | Standard strokes | Long stroke |
|---|---|---|
| **CXSW□ 6** | 10, 20, 30, 40, 50 | — |
| **CXSW□10** | 10, 20, 30, 40, 50 | 75, 100, 125, 150 |
| **CXSW□15** | | |
| **CXSW□20** | 10, 20, 30, 40, 50, 75, 100 | 125, 150, 175, 200 |
| **CXSW□25** | | |
| **CXSW□32** | | |

∗ Refer to "Made to Order" on page 50 for long strokes (i.e., strokes beyond the standard stroke range).

## Made to Order Specifications

Refer to pages 49 through 52 for Series CXSW Made to Order specifications.

## Theoretical Output

(N)

| Model | Rod size (mm) | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| **CXSW□ 6** | **4** | 31 | 4.6 | 6.2 | 9.3 | 12.4 | 15.5 | 18.6 | 21.7 |
| **CXSW□10** | **6** | 100 | 10 | 20 | 30 | 40 | 50 | 60 | 70 |
| **CXSW□15** | **8** | 252 | 25.2 | 50.4 | 75.6 | 101 | 126 | 151 | 176 |
| **CXSW□20** | **10** | 471 | 47.1 | 94.2 | 141 | 188 | 236 | 283 | 330 |
| **CXSW□25** | **12** | 756 | 75.6 | 151 | 227 | 302 | 378 | 454 | 529 |
| **CXSW□32** | **16** | 1206 | 121 | 241 | 362 | 482 | 603 | 724 | 844 |

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

## Weights

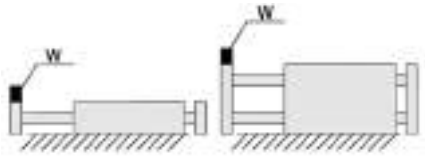
(kg)

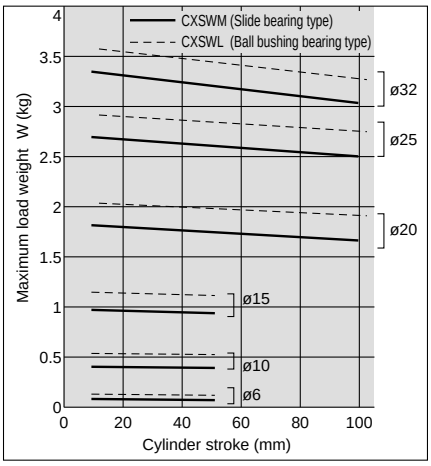
| Model | Standard stroke (mm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 75 | 100 |
| **CXSWM 6** | 0.11 | 0.13 | 0.14 | 0.16 | 0.17 | — | — |
| **CXSWL 6** | 0.12 | 0.13 | 0.15 | 0.16 | 0.18 | — | — |
| **CXSWM 10** | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 | 0.37 | 0.42 |
| **CXSWL 10** | 0.25 | 0.27 | 0.29 | 0.31 | 0.33 | 0.38 | 0.43 |
| **CXSWM 15** | 0.43 | 0.45 | 0.48 | 0.51 | 0.54 | 0.61 | 0.68 |
| **CXSWL 15** | 0.47 | 0.50 | 0.52 | 0.55 | 0.58 | 0.65 | 0.42 |
| **CXSWM 20** | 0.71 | 0.74 | 0.78 | 0.82 | 0.85 | 0.95 | 1.04 |
| **CXSWL 20** | 0.75 | 0.79 | 0.82 | 0.86 | 0.90 | 0.99 | 1.08 |
| **CXSWM 25** | 1.06 | 1.11 | 1.17 | 1.22 | 1.28 | 1.41 | 1.55 |
| **CXSWL 25** | 1.07 | 1.12 | 1.18 | 1.23 | 1.29 | 1.42 | 1.56 |
| **CXSWM 32** | 2.04 | 2.12 | 2.21 | 2.29 | 2.38 | 2.59 | 2.81 |
| **CXSWL 32** | 2.06 | 2.15 | 2.23 | 2.32 | 2.41 | 2.62 | 2.83 |

## Operating Conditions

### Maximum load weight

When the cylinder is mounted as shown in the diagrams below, the maximum load weight W should not exceed the values illustrated in the graph immediately following the diagrams.

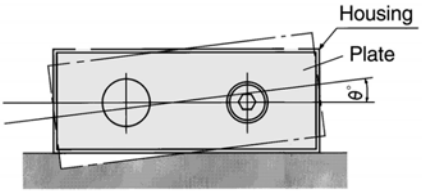



Note) Consult with SMC regarding the maximum load weight for long strokes depending on your sepecific usage conditions.

### Non-rotating accuracy

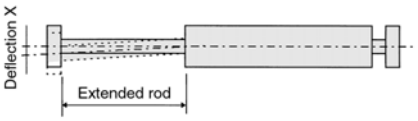
Non-rotating accuracy θ° without a load should be less than or equal to the value provided in the table below as a guide.




| Bore size (mm) | 6 to 32 |
|---|---|
| **CXSWM (Slide bearing)** | ±0.1° |
| **CXSWL (Ball bushing bearing)** | |

### Deflection at the plate end

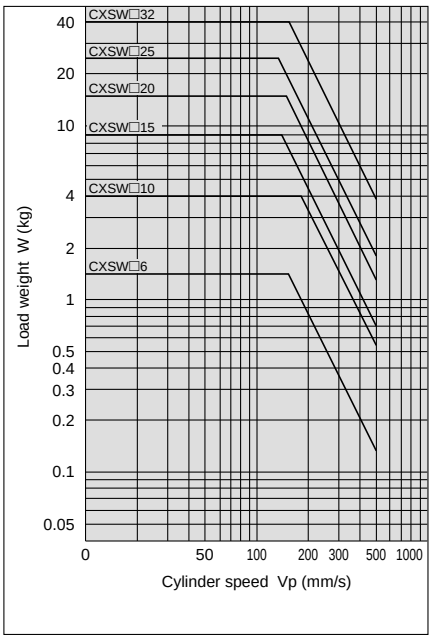
An approximate plate-end deflection X without a load is shown in the graph below.




| Bore size (mm) | 6 to 32 |
|---|---|
| **CXSWM (Slide bearing)** | ±0.03mm |
| **CXSWL (Ball bushing bearing)** | |

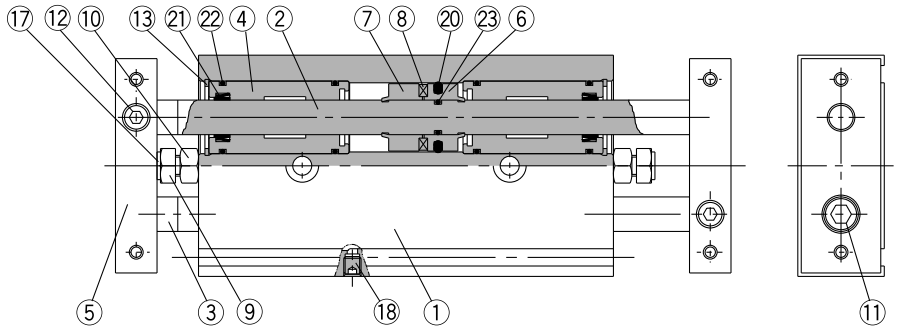
### Allowable kinetic energy

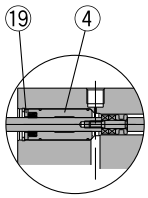
Operate a vertically mounted cylinder with a load weight and cylinder speed not exceeding the ranges shown in the graph below. A horizontally mounted cylinder should also be operated with a load weight less than the ranges given in the graph at left.
Cylinder speed should be adjusted using a speed controller.



## Construction

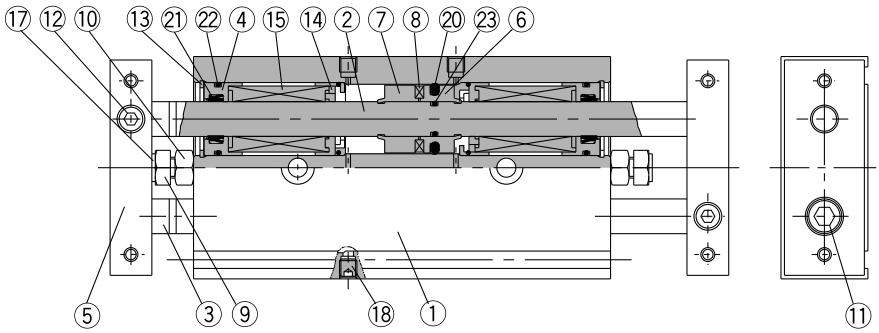
### CXSWM Slide bearing

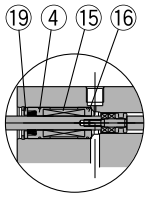


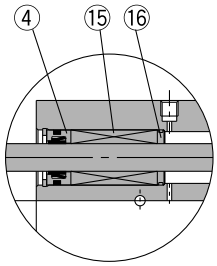

CXSWM6

### CXSWL Ball bushing bearing



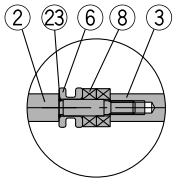




CXSWL6

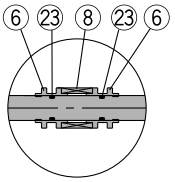



CXSWL10, 15

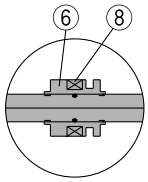
(Piston)




CXSW□6




CXSW□10




CXSW□25, 32

### Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Housing** | Aluminum alloy | Hard anodized |
| 2 | **Piston rod A** | Carbon steel | Hard chrome plated |
| 3 | **Piston rod B** | Carbon steel | Hard chrome plated |
| 4 | **Rod cover/Bearing** | Aluminum alloy | |
| 5 | **Plate** | Aluminum alloy | Hard anodized |
| 6 | **Piston A** | Aluminum alloy | Chromated |
| 7 | **Piston B** | Aluminum alloy | Chromated |
| 8 | **Magnet** | Magnetic material | |
| 9 | **Bumper bolt** | Carbon steel | Nickel plated |
| 10 | **Hexagon nut** | Carbon steel | Nickel plated |
| 11 | **Hexagon socket head cap screw** | Chromium steel | Nickel plated |
| 12 | **Hexagon socket head set screw** | Chromium steel | Nickel plated |

Note) Piston rod for CXSWL is quenched.

### Replacement parts: Seal kits

| Bore size (mm) | Seal kit no. | Kit components |
|---|---|---|
| 6 | CXSWM6-PS | Items 20 through 22 from the chart above. |
| | CXSWL6-PS | |
| 10 | CXSWM10-PS | |
| | CXSWL10APS | |
| 15 | CXSWM15-PS | |
| | CXSWL15APS | |
| 20 | CXSWM20-PS | |
| | CXSWL20APS | |
| 25 | CXSWM25-PS | |
| | CXSWL25APS | |
| 32 | CXSWM32-PS | |
| | CXSWL32APS | |

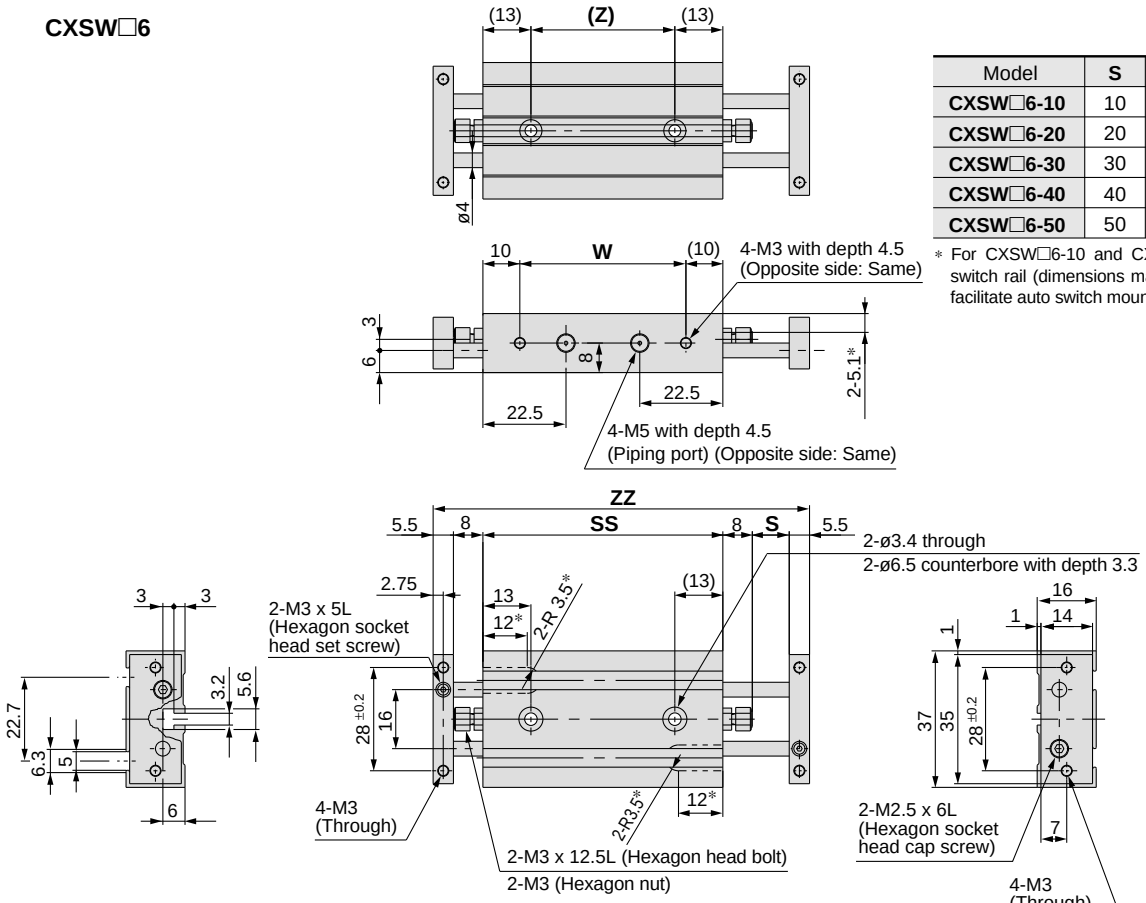
### Parts list

| No. | Description | Material | Note |
|---|---|---|---|
| 13 | **Snap ring** | Special steel | Nickel plated |
| 14 | **Bumper holder** | Synthetic resin | |
| 15 | **Ball bushing** | — | |
| 16 | **Bearing spacer** | Synthetic resin | |
| 17 | **Bumper** | Polyurethane | |
| 18 | **Plug** | Chromium steel | Nickel plated |
| 19 | **Seal retainer** | Aluminum alloy | |
| 20* | **Piston seal** | NBR | |
| 21* | **Rod seal** | NBR | |
| 22* | **O-ring** | NBR | |
| 23 | **O-ring** | NBR | |

* Seal kits consist of items 20 through 22, and can be ordered by using the seal kit number corresponding to each bore size. However for CXSWL15, there are two types of O-ring (22). For other sizes, one type of O-ring is available.
For CXSWL6, aluminum alloy is used for 16.

## Dimensions: ø6, ø10

### CXSW□6

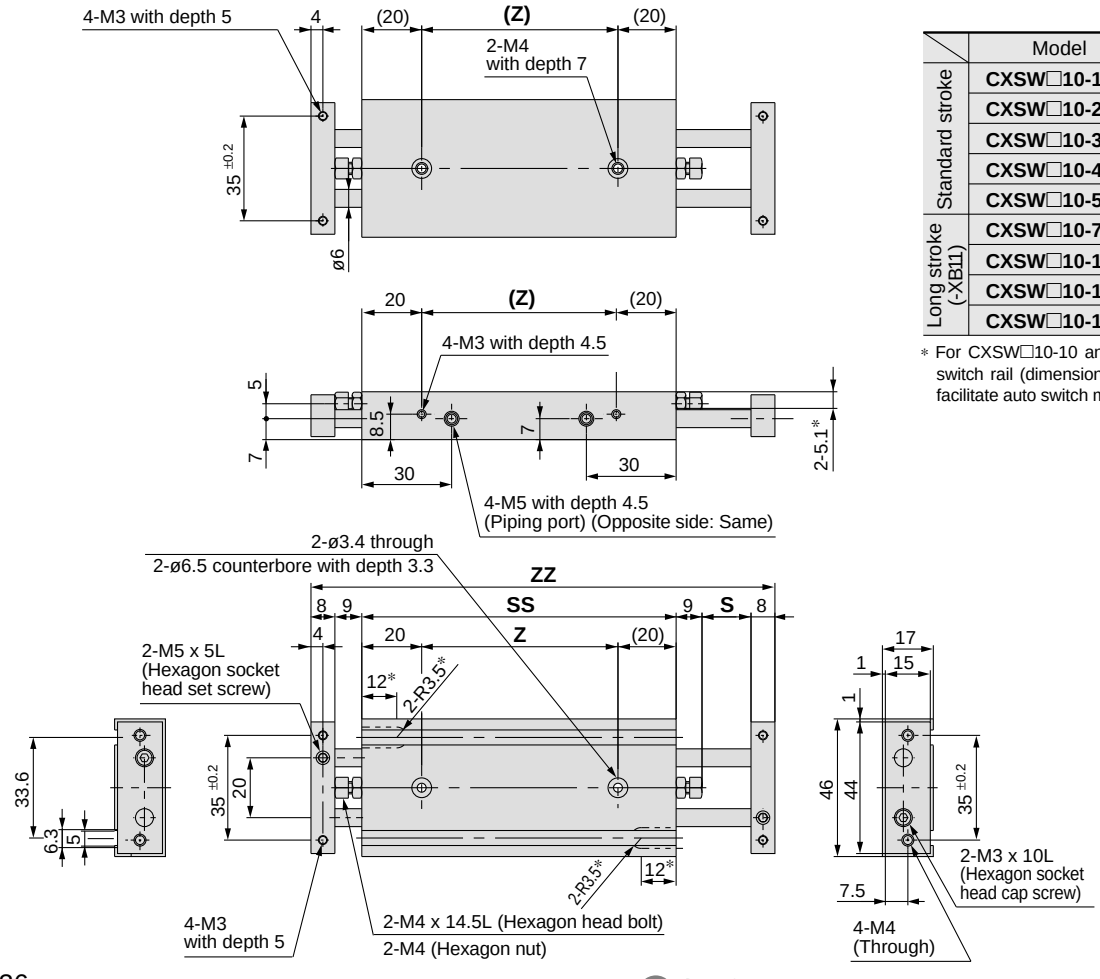



(mm)

| Model | S | SS | ZZ | Z | W |
|---|---|---|---|---|---|
| **CXSW□6-10** | 10 | 66 | 103 | 40 | 46 |
| **CXSW□6-20** | 20 | 76 | 123 | 50 | 56 |
| **CXSW□6-30** | 30 | 86 | 143 | 60 | 66 |
| **CXSW□6-40** | 40 | 96 | 163 | 70 | 76 |
| **CXSW□6-50** | 50 | 106 | 183 | 80 | 86 |

* For CXSW□6-10 and CXSW□6-20 only, a part of the switch rail (dimensions marked with an "*") is notched to facilitate auto switch mounting.

### CXSW□10



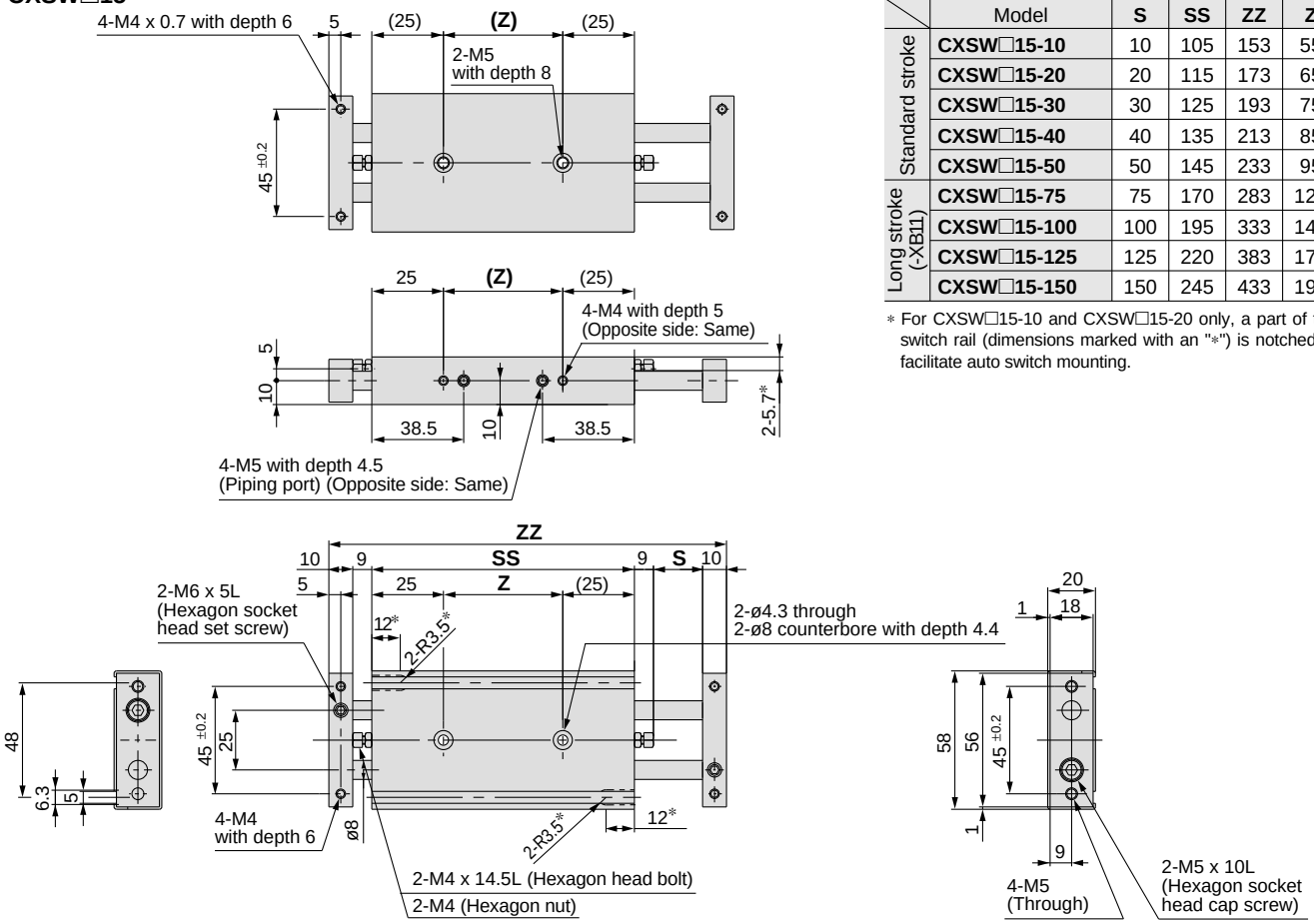

(mm)

| | Model | S | SS | ZZ | Z |
|---|---|---|---|---|---|
| Standard stroke | **CXSW□10-10** | 10 | 92 | 136 | 52 |
| | **CXSW□10-20** | 20 | 102 | 156 | 62 |
| | **CXSW□10-30** | 30 | 112 | 176 | 72 |
| | **CXSW□10-40** | 40 | 122 | 196 | 82 |
| | **CXSW□10-50** | 50 | 132 | 216 | 92 |
| Long stroke (-XB11) | **CXSW□10-75** | 75 | 157 | 266 | 117 |
| | **CXSW□10-100** | 100 | 182 | 316 | 142 |
| | **CXSW□10-125** | 125 | 207 | 366 | 167 |
| | **CXSW□10-150** | 150 | 232 | 416 | 192 |

* For CXSW□10-10 and CXSW□10-20 only, a part of the switch rail (dimensions marked with an "*") is notched to facilitate auto switch mounting.

## Dimensions: ø15, ø20

### CXSW□15

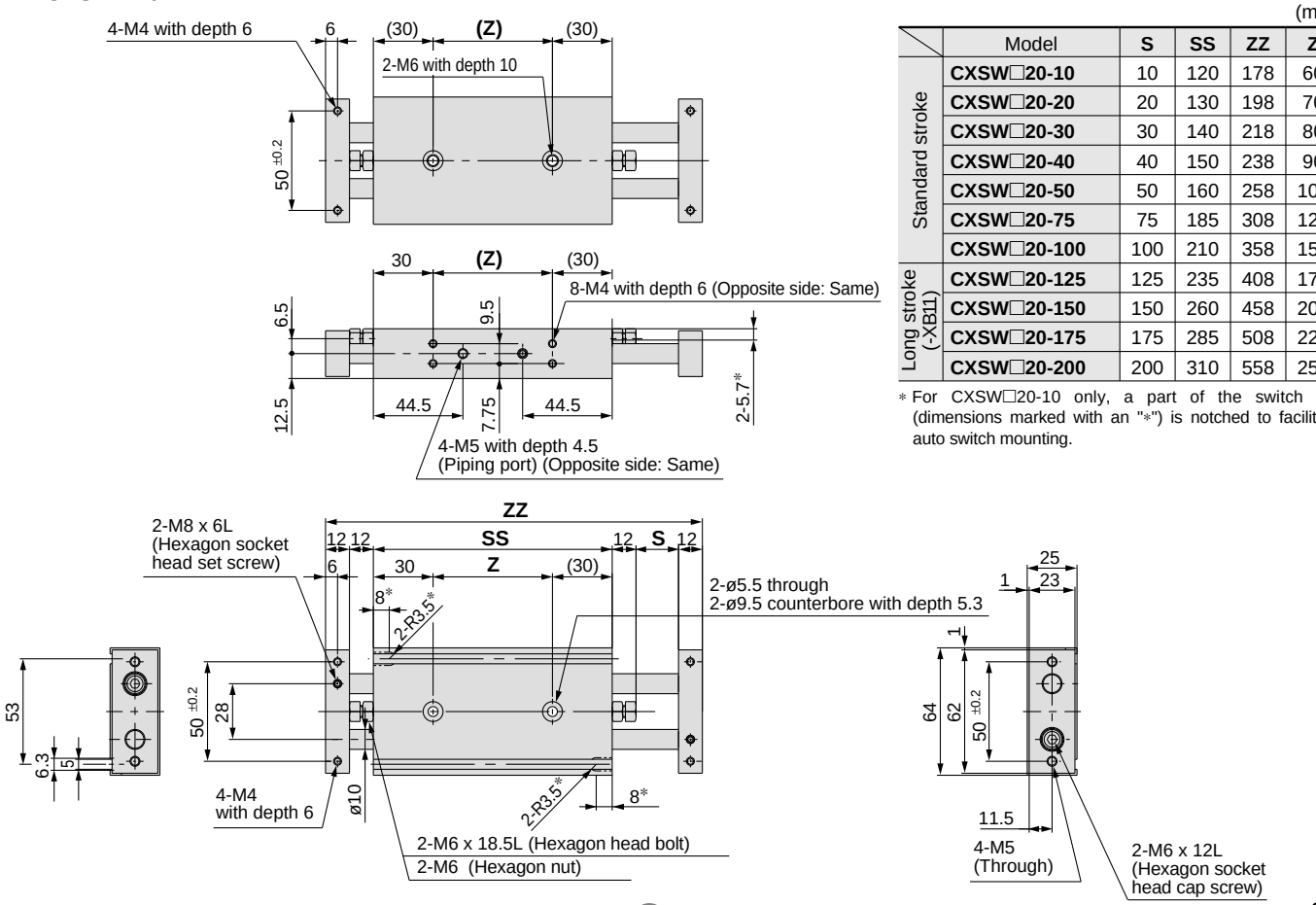



(mm)

| | Model | S | SS | ZZ | Z |
|---|---|---|---|---|---|
| Standard stroke | **CXSW□15-10** | 10 | 105 | 153 | 55 |
| | **CXSW□15-20** | 20 | 115 | 173 | 65 |
| | **CXSW□15-30** | 30 | 125 | 193 | 75 |
| | **CXSW□15-40** | 40 | 135 | 213 | 85 |
| | **CXSW□15-50** | 50 | 145 | 233 | 95 |
| Long stroke (-XB11) | **CXSW□15-75** | 75 | 170 | 283 | 120 |
| | **CXSW□15-100** | 100 | 195 | 333 | 145 |
| | **CXSW□15-125** | 125 | 220 | 383 | 170 |
| | **CXSW□15-150** | 150 | 245 | 433 | 195 |

* For CXSW□15-10 and CXSW□15-20 only, a part of the switch rail (dimensions marked with an "*") is notched to facilitate auto switch mounting.

### CXSW□20



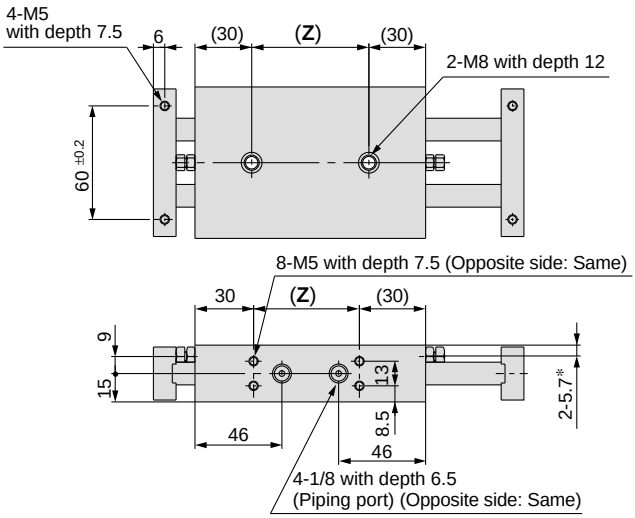

(mm)

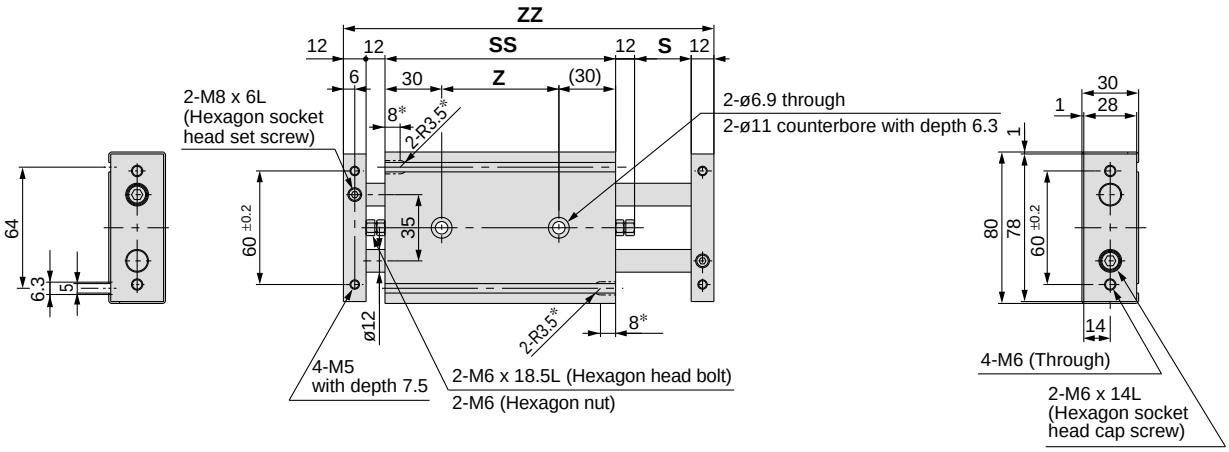
| | Model | S | SS | ZZ | Z |
|---|---|---|---|---|---|
| Standard stroke | **CXSW□20-10** | 10 | 120 | 178 | 60 |
| | **CXSW□20-20** | 20 | 130 | 198 | 70 |
| | **CXSW□20-30** | 30 | 140 | 218 | 80 |
| | **CXSW□20-40** | 40 | 150 | 238 | 90 |
| | **CXSW□20-50** | 50 | 160 | 258 | 100 |
| | **CXSW□20-75** | 75 | 185 | 308 | 125 |
| | **CXSW□20-100** | 100 | 210 | 358 | 150 |
| Long stroke (-XB11) | **CXSW□20-125** | 125 | 235 | 408 | 175 |
| | **CXSW□20-150** | 150 | 260 | 458 | 200 |
| | **CXSW□20-175** | 175 | 285 | 508 | 225 |
| | **CXSW□20-200** | 200 | 310 | 558 | 250 |

* For CXSW□20-10 only, a part of the switch rail (dimensions marked with an "*") is notched to facilitate auto switch mounting.

## Dimensions: ø25, ø32

### CXSW□25



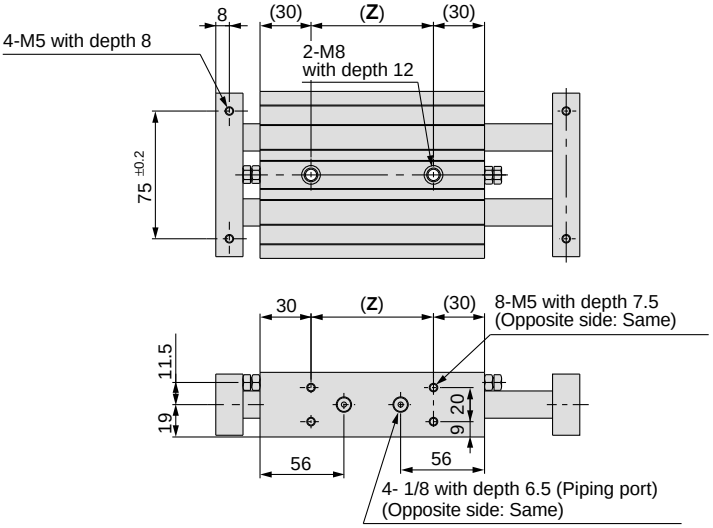



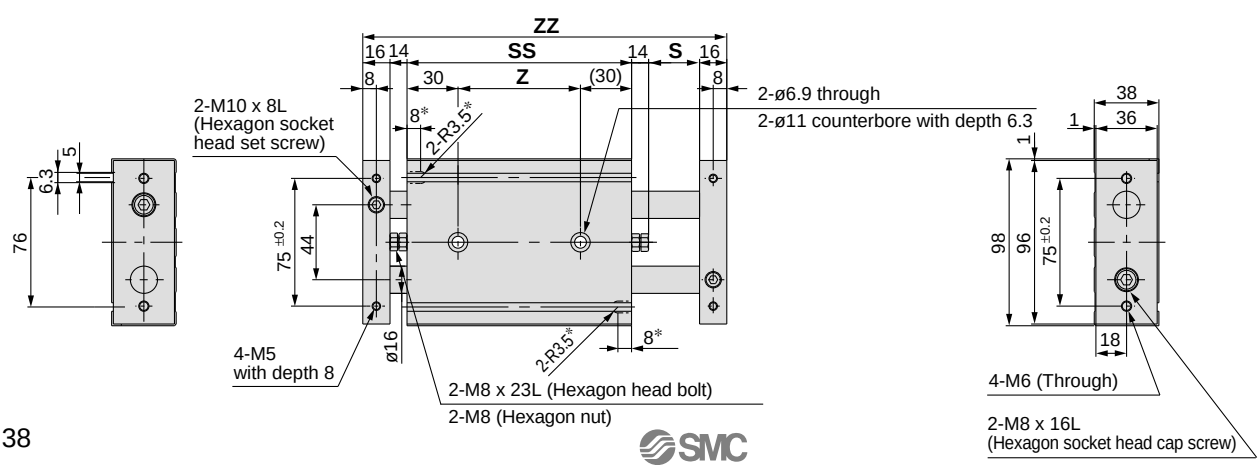

(mm)

| | Model | S | SS | ZZ | Z |
|---|---|---|---|---|---|
| Standard stroke | **CXSW□25-10** | 10 | 122 | 180 | 62 |
| | **CXSW□25-20** | 20 | 132 | 200 | 72 |
| | **CXSW□25-30** | 30 | 142 | 220 | 82 |
| | **CXSW□25-40** | 40 | 152 | 240 | 92 |
| | **CXSW□25-50** | 50 | 162 | 260 | 102 |
| | **CXSW□25-75** | 75 | 187 | 310 | 127 |
| | **CXSW□25-100** | 100 | 212 | 360 | 152 |
| Long stroke (-XB11) | **CXSW□25-125** | 125 | 237 | 410 | 177 |
| | **CXSW□25-150** | 150 | 262 | 460 | 202 |
| | **CXSW□25-175** | 175 | 287 | 510 | 227 |
| | **CXSW□25-200** | 200 | 312 | 560 | 252 |

* For CXSW□25-10 only, a part of the switch rail (dimensions marked with an "*") is notched to facilitate auto switch mounting.

### CXSW□32



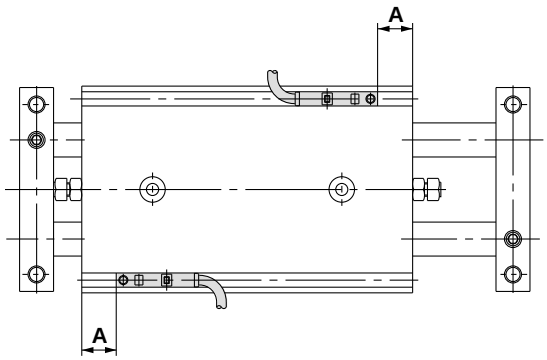

(mm)

| | Model | S | SS | ZZ | Z |
|---|---|---|---|---|---|
| Standard stroke | **CXSW□32-10** | 10 | 143 | 213 | 83 |
| | **CXSW□32-20** | 20 | 153 | 233 | 93 |
| | **CXSW□32-30** | 30 | 163 | 253 | 103 |
| | **CXSW□32-40** | 40 | 173 | 273 | 113 |
| | **CXSW□32-50** | 50 | 183 | 293 | 123 |
| | **CXSW□32-75** | 75 | 208 | 343 | 148 |
| | **CXSW□32-100** | 100 | 233 | 393 | 173 |
| Long stroke (-XB11) | **CXSW□32-125** | 125 | 258 | 443 | 198 |
| | **CXSW□32-150** | 150 | 283 | 493 | 223 |
| | **CXSW□32-175** | 175 | 308 | 543 | 248 |
| | **CXSW□32-200** | 200 | 333 | 593 | 273 |

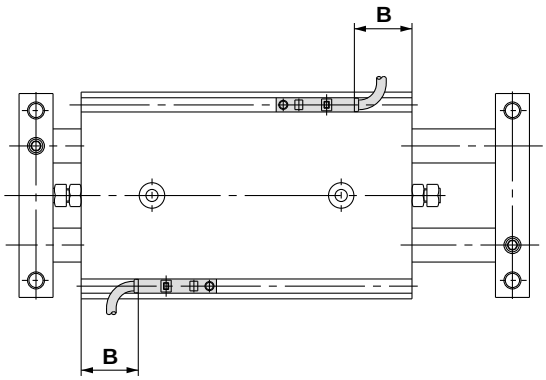
* For CXSW□32-10 only, a part of the switch rail (dimensions marked with an "*") is notched to facilitate auto switch mounting.

## Auto Switch Proper Mounting Positions for Stroke End Detection

Electric entry direction: Inward




Electric entry direction: Outward




| Bore size (mm) | A | D-Z7, D-Z8, D-Y7□W<br>D-Y5□, D-Y7□ | D-Y6□, D-Y7□V<br>D-Y7□WV | D-Y7BAL |
|---|---|---|---|---|
| | | B | B | B |
| **6** | 13.8 | 9.8 (8.3) | 11.3 | 3.8 |
| **10** | 28.5 | 24.5 (23) | 26 | — |
| **15** | 35 | 31 (29.5) | 32.5 | — |
| **20** | 42.5 | 38.5 (37) | 40.5 | — |
| **25** | 43.5 | 39.5 (38) | 41.5 | 33.5 |
| **32** | 54 | 50 (48.5) | 52 | 44 |

**Auto switch mounting and mounting dimensions are same as those for the standard type. Refer to page 18.**

# Reed Switches: Direct Mounting Type
# D-A90(V), D-A93(V), D-A96(V)

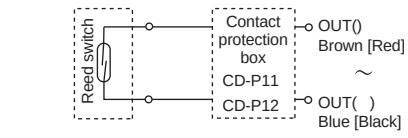
## Specifications

| D-A9□, D-A9□V | | | | | | |
|---|---|---|---|---|---|---|
| **Auto switch part no.** | **D-A90** | **D-A90V** | **D-A93** | **D-A93V** | **D-A96** | **D-A96V** |
| **Electrical entry direction** | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| **Wiring type** | 2-wire | | | | 3-wire | |
| **Applicable load** | IC circuit, Relay, PLC | | Relay, PLC | | IC circuit | |
| **Load voltage / Load current range and Max. load current** | 24V AC/DC or less/50mA<br>48V AC/DC or less/40mA<br>100V AC/DC or less/20mA | | 24VDC/5 to 40mA<br>100VAC/5 to 20mA | | 4 to 8VDC/20mA | |
| **Contact protection circuit** | Not available | | | | | |
| **Internal voltage drop** | 0 | | 2.4V or less (up to 20mA)<br>3V or less (up to 40mA) | | 0.8V or less | |
| **Indicator light** | None | | Red LED lights when ON | | | |

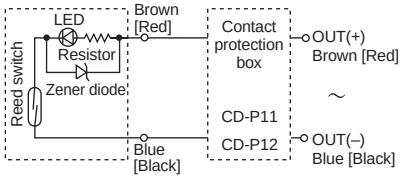
• Lead wire ..... Oilproof heavy-duty vinyl cord: ø2.7, 0.5m
D-A90 (V), D-A93 (V): 0.18mm² x 2 cores (Brown, Blue [Red, Black])
D-A96 (V): 0.15mm² x 3 cores (Brown, Black, Blue [Red, White, Black])

### Internal circuits

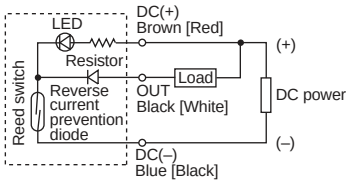
**D-A90(V)**




**D-A93(V)**




**D-A96(V)**




## Weights

(g)

| Auto switch part no. | D-A90 | D-A90V | D-A93 | D-A93V | D-A96 | D-A96V |
|---|---|---|---|---|---|---|
| Lead wire length: 0.5m | 6 | 6 | 6 | 6 | 8 | 8 |
| Lead wire length: 3m | 30 | 30 | 30 | 30 | 41 | 41 |

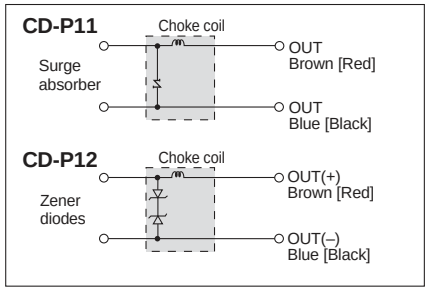
## Contact Protection Box

Type D-A9 switches do not have built-in contact protection circuits. Use a contact protection box with an induction load, when lead wires are 5 meters or longer, and with 100VAC.

| Part no. | Voltage | Lead wire length |
|---|---|---|
| **CD-P11** | 100VAC | Switch connection side: 0.5m<br>Load connection side: 0.5m |
| **CD-P12** | 24VDC | |

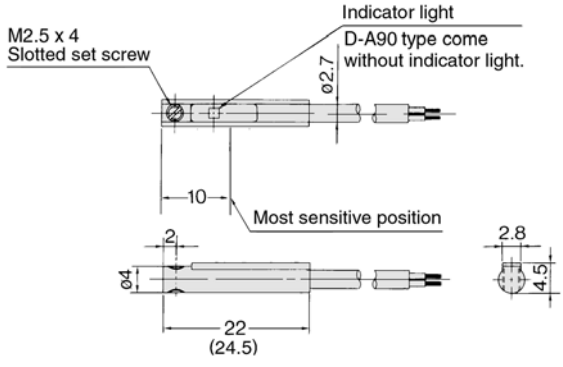
Since D-A90(V) type switches have no particular specified voltage below 100VAC, select a switch type based on the voltage being used.

### Internal circuits



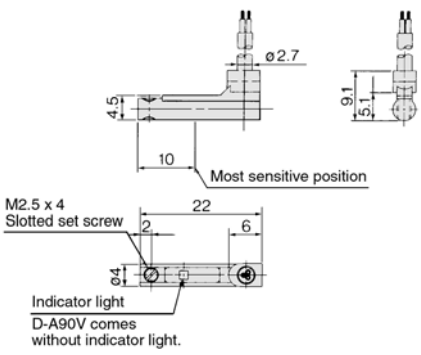

## Dimensions

**D-A90, D-A93, D-A96**




The dimension inside ( ) is for D-A93.

**D-A90V, D-A93V, D-A96V**



# Solid State Switches: Direct Mounting Type
# D-F9N(V), D-F9P(V), D-F9B(V)

## Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- Lead free
- UL certified (style 2844) lead cable is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.

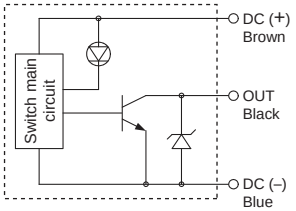
## ⚠Caution

### Operating Precautions

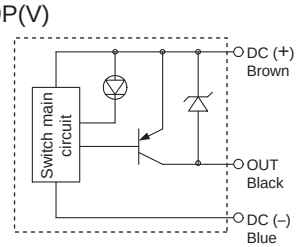
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied, is used.

### Auto Switch Internal Circuit

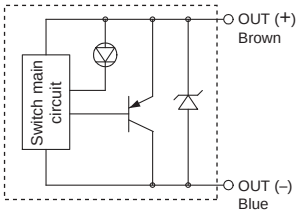
D-M9N(V)




D-M9P(V)




D-M9B(V)




## Auto Switch Specifications

PLC: Programmable Logic Controller

| D-M9□/D-M9□V (With indicator light) | | | | | | |
|---|---|---|---|---|---|---|
| Auto switch part no. | D-M9N | D-M9NV | D-M9P | D-M9PV | D-M9B | D-M9BV |
| Electrical entry direction | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| Wiring type | 3-wire | | | | 2-wire | |
| Output type | NPN | | PNP | | — | |
| Applicable load | IC circuit, Relay, PLC | | | | 24 VDC relay, PLC | |
| Power supply voltage | 5, 12, 24 VDC (4.5 to 28 V) | | | | — | |
| Current consumption | 10 mA or less | | | | — | |
| Load voltage | 28 VDC or less | | — | | 24 VDC (10 to 28 VDC) | |
| Load current | 40 mA or less | | | | 2.5 to 40 mA | |
| Internal voltage drop | 0.8 V or less | | | | 4 V or less | |
| Leakage current | 100 μA or less at 24 VDC | | | | 0.8 mA or less | |
| Indicator light | Red LED illuminates when ON. | | | | | |
| Standard | Conforming to CE Standards | | | | | |

- Lead wires
  Oilproof heavy-duty vinyl cable: ø2.7 x 3.2 ellipse
  D-M9B(V) 0.15 mm² x 2 cores
  D-M9N(V), D-M9P(V) 0.15 mm² x 3 cores

Note 1) Refer to catalogue for details of solid state switch with pre-wired connector.
Note 2) Refer to catalogue for solid state switch common specifications and for lead wire lengths.

## Weights

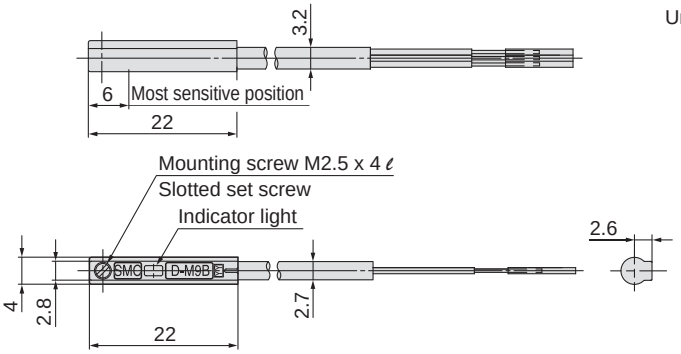
Unit: g

| Auto switch part no. | | D-M9N(V) | D-M9P(V) | D-M9B(V) |
|---|---|---|---|---|
| Lead wire length [m] | 0.5 | 8 | 8 | 7 |
| | 3 | 41 | 41 | 38 |
| | 5 | 68 | 68 | 63 |

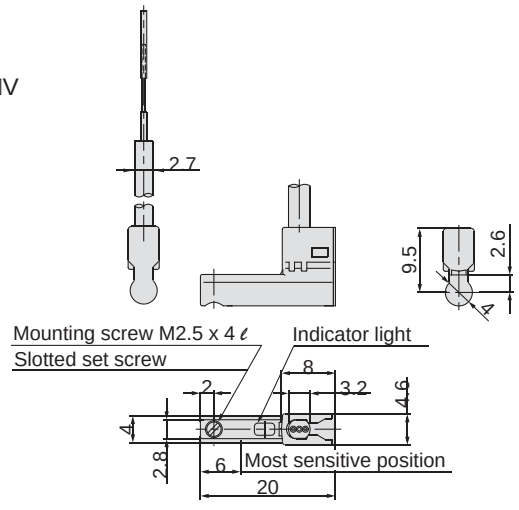
## Dimensions

D-M9□

Unit: mm




D-M9□V



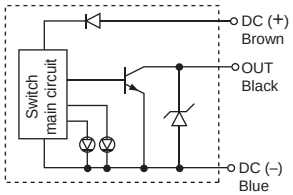
# 2-Colour Indication Solid State Switch:
## Direct Mounting Style
# D-F9NW(V), D-F9PW(V), D-F9BW(V)

**Grommet**

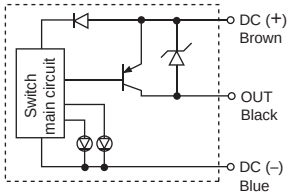
- 2-wire load current is reduced (2.5 to 40 mA).
- RoHS compliant
- UL certified (style 2844) lead cable is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.
- The optimum operating position can be determined by the colour of the light. (Red → Green → Red)

### Auto Switch Internal Circuit

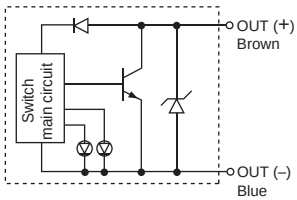
D-M9NW(V)



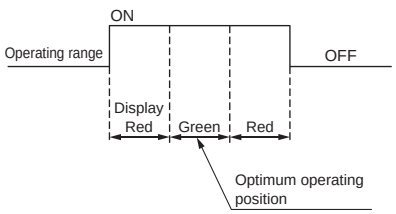

D-M9PW(V)




D-M9BW(V)




### Indicator light / Display method




## Auto Switch Specifications

PLC: Programmable Logic Controller

| D-M9□W/D-M9□WV (With indicator light) | | | | | | |
|---|---|---|---|---|---|---|
| Auto switch part no. | D-M9NW | D-M9NWV | D-M9PW | D-M9PWV | D-M9BW | D-M9BWV |
| Electrical entry direction | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| Wiring type | 3-wire | | | | 2-wire | |
| Output type | NPN | | PNP | | — | |
| Applicable load | IC circuit, Relay IC, PLC | | | | 24 VDC relay, PLC | |
| Power supply voltage | 5, 12, 24 VDC (4.5 to 28 VDC) | | | | — | |
| Current consumption | 10 mA or less | | | | — | |
| Load voltage | 28 VDC or less | | — | | 24 VDC (10 to 28 VDC) | |
| Load current | 40 mA or less | | | | 2.5 to 40 mA | |
| Internal voltage drop | 0.8 V or less at 10 mA (2 V or less at 40 mA) | | | | 4 V or less | |
| Leakage current | 100 µA or less at 24 VDC | | | | 0.8 mA or less | |
| Internal voltage drop | Operating position ····· Red LED illuminates.<br>Optimum operating position ····· Green LED illuminates. | | | | | |
| Standard | Conforming to CE Standards | | | | | |

- Lead wires
  Oilproof heavy-duty vinyl cable: ø2.7 x 3.2 ellipse
  D-M9BW(V) 0.15 mm² x 2 cores
  D-M9NW(V), D-M9PW(V) 0.15 mm² x 3 cores

Note 1) Refer to catalogue for details of solid state switch with pre-wired connector.
Note 2) Refer to catalogue for solid state switch common specifications and for lead wire lengths.

## Weights

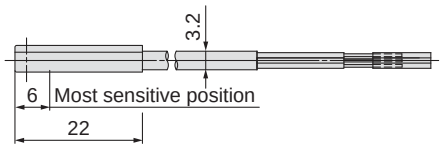
Unit: g

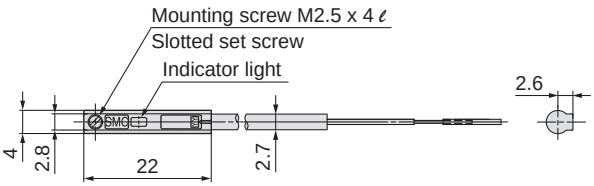
| Auto switch part no. | | D-M9NW(V) | D-M9PW(V) | D-M9BW(V) |
|---|---|---|---|---|
| Lead wire length [m] | 0.5 | 8 | 8 | 7 |
| | 1 | 14 | 14 | 13 |
| | 3 | 41 | 41 | 38 |
| | 5 | 68 | 68 | 63 |

## Dimensions

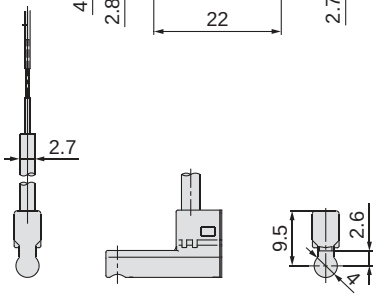
Unit: mm

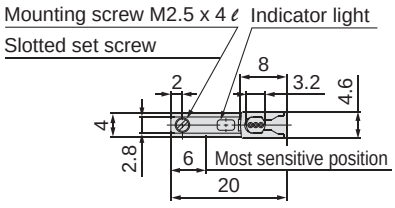
D-M9□W




D-M9□WV



# Water Resistant 2-Colour Indication Solid State Switch: Direct Mounting Type
# D-M9NA(V)/D-M9PA(V)/D-M9BA(V)

## Grommet

- Water (coolant) resistant type
- 2-wire load current is reduced (2.5 to 40 mA).
- The optimum operating position can be determined by the colour of the light. (Red → Green ← Red)
- Using flexible cable as standard specification

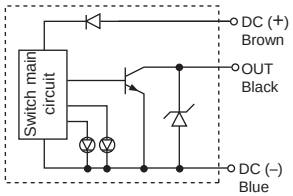
## ⚠Caution

### Precautions

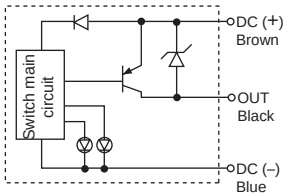
Fix the auto switch with the set screw attached to the auto switch body. The auto switch may be damaged if an unspecified screw is used.

### Auto Switch Internal Circuit

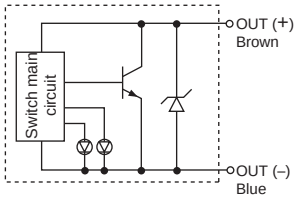
D-M9NA(V)



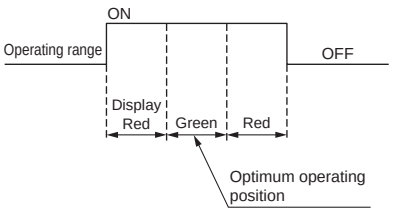

D-M9PA(V)




D-M9BA(V)




Indicator light / Display method




## Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□A(V) (With indicator light)

| Auto switch model | D-M9NA | D-M9NAV | D-M9PA | D-M9PAV | D-M9BA | D-M9BAV |
|---|---|---|---|---|---|---|
| Electrical entry direction | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| Wiring type | 3-wire | | | | 2-wire | |
| Output type | NPN | | PNP | | — | |
| Applicable load | IC circuit, Relay, PLC | | | | 24 VDC relay, PLC | |
| Power supply voltage | 5, 12, 24 VDC (4.5 to 28 V) | | | | — | |
| Current consumption | 10 mA or less | | | | — | |
| Load voltage | 28 VDC or less | | — | | 24 VDC (10 to 28 VDC) | |
| Load current | 40 mA or less | | | | 2.5 to 40 mA | |
| Internal voltage drop | 0.8 V or less at 10 mA (2 V or less at 40 mA) | | | | 4 V or less | |
| Leakage current | 100 μA or less at 24 VDC | | | | 0.8 mA or less | |
| Indicator light | Operating position ····· Red LED illuminates.<br>Optimum operating position ····· Green LED illuminates. | | | | | |
| Standard | CE marking | | | | | |

- Lead wires — Oilproof flexible heavy-duty vinyl cable: ø2.7 x 3.2 ellipse
  D-M9BA(V) 0.15 mm² x 2 cores
  D-M9NA(V), D-M9PA(V) 0.15 mm² x 3 cores

Note 1) Refer to catalogue for solid state switch common specifications.
Note 2) Refer to catalogue for lead wire lengths.

## Weight

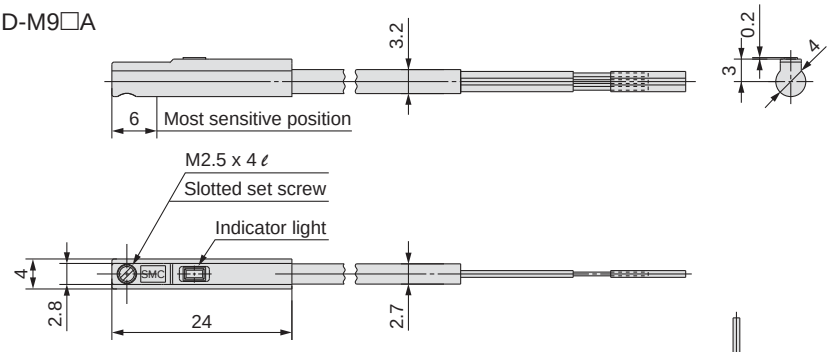
Unit: g

| Auto switch model | | D-M9NA(V) | D-M9PA(V) | D-M9BA(V) |
|---|---|---|---|---|
| Lead wire length [m] | 0.5 | 8 | 8 | 7 |
| | 1 | 14 | 14 | 13 |
| | 3 | 41 | 41 | 38 |
| | 5 | 68 | 68 | 63 |

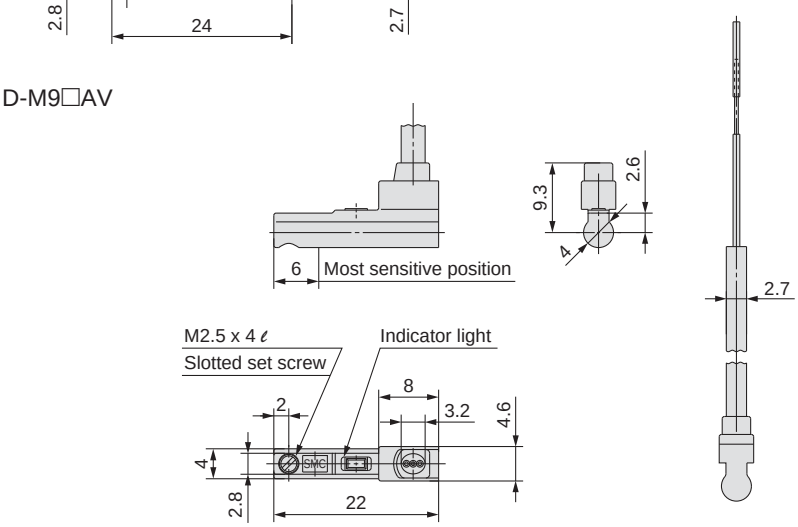
## Dimensions

Unit: mm

D-M9□A




D-M9□AV



# Reed Switches: Direct Mounting Type
# D-Z73, D-Z76, D-Z80

## Specifications

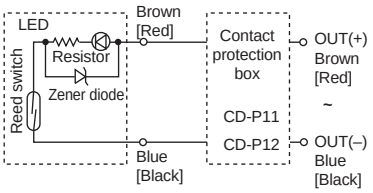
| D-Z73, D-Z76 (with indicator light) | | | |
|---|---|---|---|
| **Auto switch part no.** | **D-Z73** | | **D-Z76** |
| **Electrical entry direction** | In-line | | |
| **Applicable load** | Relay, PLC | | IC circuit |
| **Load voltage** | 24VDC | 100VAC | 4 to 8VDC |
| **Maximum load current and Load current range** | 5 to 40mA | 5 to 20mA | 20mA |
| **Contact protection circuit** | Not available | | |
| **Internal voltage drop** | 2.4V or less (up to 20mA), 3V or less (up to 40mA) | | 0.8V or less |
| **Indicator light** | Red LED lights when ON | | |

| D-Z80 (without indicator light) | | | |
|---|---|---|---|
| **Auto switch part no.** | **D-Z80** | | |
| **Electrical entry direction** | In-line | | |
| **Applicable load** | Relay, PLC, IC circuit | | |
| **Load voltage** | 24V AC/DC or less | 48V AC/DC or less | 100V AC/DC or less |
| **Maximum load current** | 50mA | 40mA | 20mA |
| **Contact protection circuit** | Not available | | |
| **Internal resistance** | 1 or less (includes 3m lead wire length) | | |

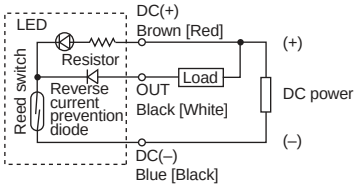
• Lead wire ..... Oilproof, heavy-duty vinyl cord: 0.5m
D-Z76: ø3.4, 0.2mm² x 2 cores (Brown, Blue [Red, Black])
D-Z80: ø3.4, 0.2mm² x 3 cores (Brown, Black, Blue [Red, White, Black])
D-Z73: ø2.7, 0.18mm² x 2 cores (Brown, Blue [Red, Black])

## Internal circuits

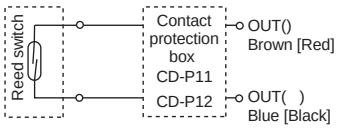
**D-Z73**




**D-Z76**




**D-Z80**




Note) A contact protection box should be used in any of the following conditions to prevent the shortening of the working life of the switch.
1. Operated load is an induction load.
2. The length of wiring to the load is 5m or more.
3. The load voltage is 100VAC.

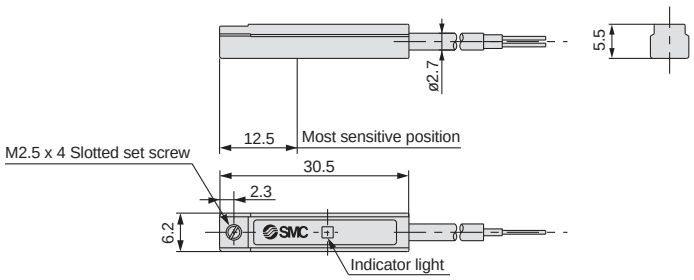
## Weights

(g)

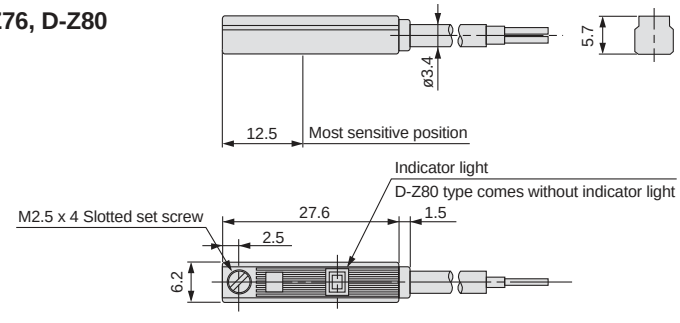
| Auto switch part no. | Lead wire length: 0.5m | Lead wire length: 3m |
|---|---|---|
| **D-Z73** | 6 | 31 |
| **D-Z76** | 10 | 55 |
| **D-Z80** | 9 | 49 |

## Dimensions

**D-Z73**




**D-Z76, D-Z80**



# Solid State Switches: Direct Mounting Type
# D-Y59 A/B, D-Y69 A/B, D-Y7P(V)

## Specifications

| D-Y5, D-Y6, D-Y7P, D-Y7PV (with indicator light) | | | | | | |
|---|---|---|---|---|---|---|
| **Auto switch part no.** | **D-Y59A** | **D-Y69A** | **D-Y7P** | **D-Y7PV** | **D-Y59B** | **D-Y69B** |
| **Electrical entry direction** | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| **Wiring type** | 3-wire | | | | 2-wire | |
| **Output type** | NPN | | PNP | | — | |
| **Applicable load** | IC circuit, Relay, PLC | | | | 24VDC relay, PLC | |
| **Power supply voltage** | 5, 12, 24VDC (4.5 to 28VDC) | | | | — | |
| **Current consumption** | 10mA or less | | | | — | |
| **Load voltage** | 28VDC or less | | — | | 24VDC (10 to 28VDC) | |
| **Load current** | 40mA or less | | 80mA or less | | 5 to 40mA | |
| **Internal voltage drop** | 1.5V or less (0.8V or less at 10mA load current) | | 0.8V or less | | 4V or less | |
| **Leakage current** | 100μA or less at 24VDC | | | | 0.8mA or less at 24VDC | |
| **Indicator light** | Red LED lights when ON | | | | | |

• Lead wire ..... Oilproof, heavy-duty, flexible vinyl cord: ø3.4, 0.5m
D-Y59A, D-Y69A, D-Y7P(V): 0.15mm² x 3 cores (Brown, Black, Blue [Red, White, Black])
D-Y59B, D-Y69B: 0.15mm² x 2 cores (Brown, Blue [Red, Black])

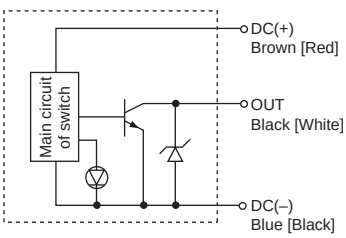
## Weights

(g)

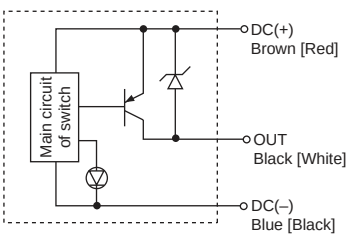
| Auto switch part no. | Lead wire length | |
|---|---|---|
| | 0.5m | 3m |
| **D-Y59A, D-Y69A, D-Y7P, D-Y7PV** | 10 | 53 |
| **D-Y59B, D-Y69B** | 9 | 50 |

## Internal circuits

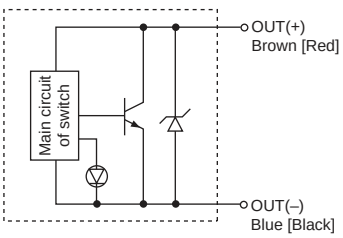
**D-Y59A, D-Y69A**




**D-Y7P(V)**

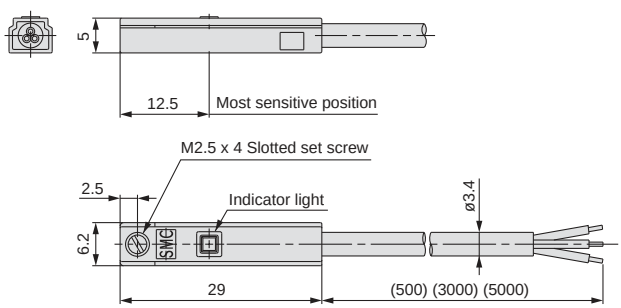



**D-Y59B, D-Y69B**

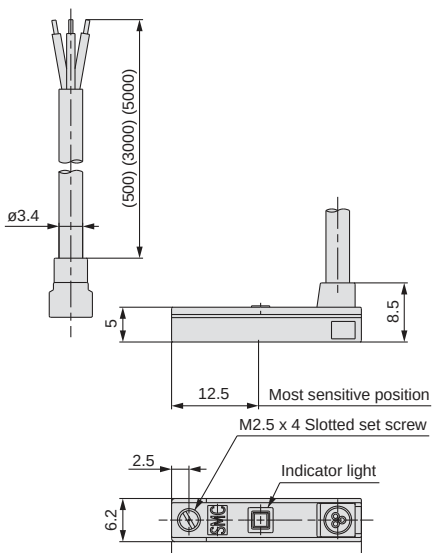



## Dimensions

**D-Y59A, D-Y59B**
**D-Y7P**




**D-Y69A, D-Y69B**
**D-Y7PV**



# Solid State Switches with 2-Colour Display:
## Direct Mounting Type
# D-Y7NW(V), D-Y7PW(V), D-Y7BW(V)

**Grommet**

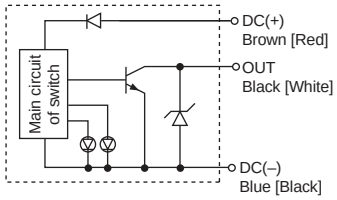
## Specifications

| D-Y7□W, D-Y7□WV (with indicator light ) | | | | | | |
|---|---|---|---|---|---|---|
| **Auto switch part no.** | **D-Y7NW** | **D-Y7NWV** | **D-Y7PW** | **D-Y7PWV** | **D-Y7BW** | **D-Y7BWV** |
| **Electrical entry direction** | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| **Wiring type** | 3-wire | | | | 2-wire | |
| **Output type** | NPN | | PNP | | — | |
| **Applicable load** | IC circuit, Relay, PLC | | | | 24VDC relay, PLC | |
| **Power supply voltage** | 5, 12, 24VDC (4.5 to 28VDC) | | | | — | |
| **Current consumption** | 10mA or less | | | | — | |
| **Load voltage** | 28VDC or less | | — | | 24VDC (10 to 28VDC) | |
| **Load current** | 40mA or less | | 80mA or less | | 5 to 40mA | |
| **Internal voltage drop** | 1.5V or less (0.8V or less at 10mA load current) | | 0.8V or less | | 4V or less | |
| **Leakage current** | 100A or less at 24VDC | | | | 0.8mA or less at 24VDC | |
| **Indicator light** | Operating position ..... Red LED lights up<br>Optimum operating position ..... Green LED lights up | | | | | |

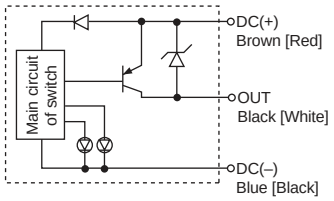
• Lead wire ..... Oilproof, heavy-duty, flexible vinyl cord: ø3.4, 0.5m
D-Y7NW(V), D-Y7PW(V): 0.15mm² x 3 cores (Brown, Black, Blue [Red, White, Black])
D-Y7BW(V): 0.15mm² x 2 cores (Brown, Blue [Red, Black])

## Internal circuits

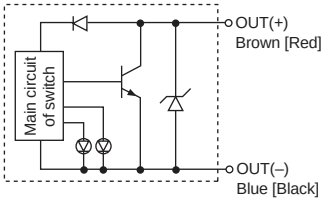
**D-Y7NW(V)**



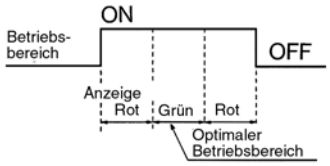

**D-Y7PW(V)**




**D-Y7BW(V)**




**Indicator light**



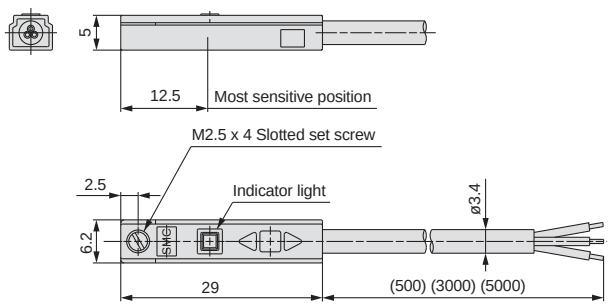

## Weights

(g)

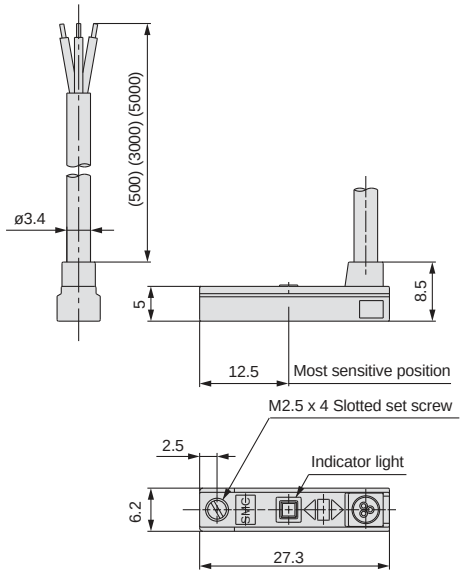
| Auto switch part no. | Lead wire length | |
|---|---|---|
| | 0.5m | 3m |
| **D-Y7NW, D-Y7NWV, D-Y7PW, D-Y7PWV** | 11 | 54 |
| **D-Y7BW, D-Y7BWV** | 11 | 54 |

## Dimensions

**D-Y7NW, D-Y7PW**
**D-Y7BW**




**D-Y7NWV, D-Y7PWV**
**D-Y7BWV**



# Water-Resistant Solid State Switch with 2-Colour Display: Direct Mounting Type
# D-Y7BAL

**Grommet**

## Water-resistant type (for coolant also)

## Specifications

| D-Y7BAL (with indicator light ) | |
|---|---|
| **Auto switch part no.** | **D-Y7BAL** |
| **Electrical entry direction** | In-line |
| **Wiring type** | 2-wire |
| **Applicable load** | 24VDC relay, PLC |
| **Load voltage** | 24VDC (10 to 28VDC) |
| **Load current** | 5 to 40mA |
| **Internal voltage drop** | 4V or less |
| **Leakage current** | 0.8mA or less at 24VDC |
| **Indicator light** | Operating position ..... Red LED lights up<br>Optimum operating position ..... Green LED lights up |

• Lead wire ..... Oilproof, heavy-duty, flexible vinyl cord: ø3.4, 3m, 0.15mm² x 2 cores (Brown, Blue [Red, Black])

## Weight

(g)

| Auto switch part no. | Lead wire length |
|---|---|
| | 3m |
| **D-Y7BAL** | 54 |

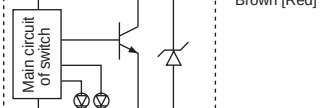
## Usage

**⚠Caution**

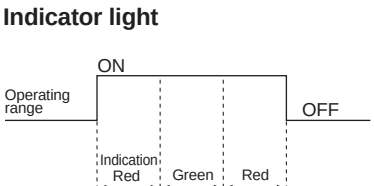
Consult with SMC if the switches are to be used with a liquid other than water.

## Internal circuits

**D-Y7BAL**

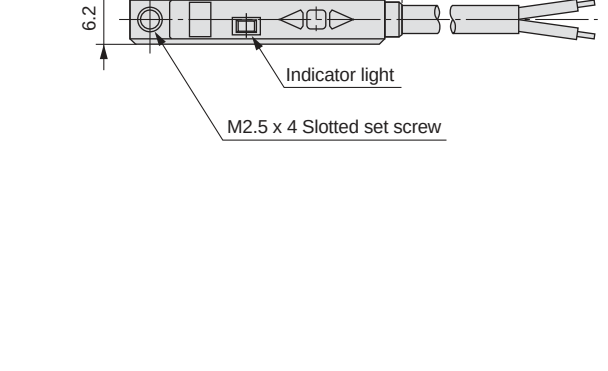



**Indicator light**




## Dimensions

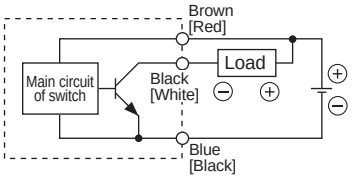
**D-Y7BAL**



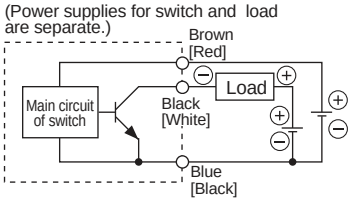
# Auto Switch Connections and Examples

## Basic Wiring

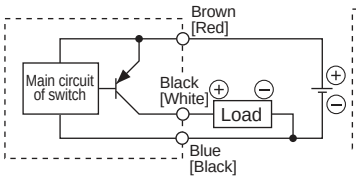
### Solid state 3-wire, NPN



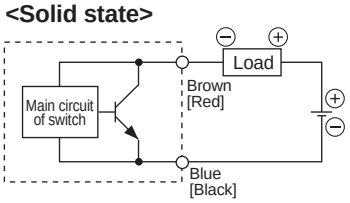

(Power supplies for switch and load are separate.)

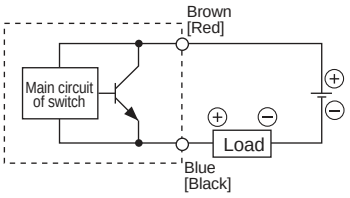



### Solid state 3-wire, PNP

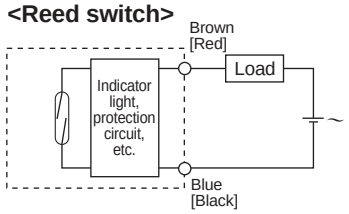


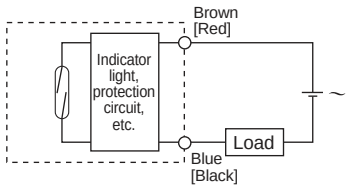

### 2-wire <Solid state>




### 2-wire <Reed switch>

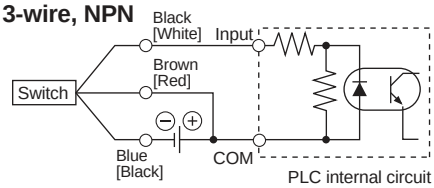


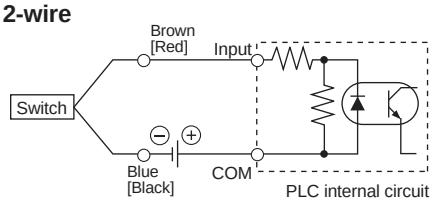

## Examples of Connection to PLC

### Sink input specifications

#### 3-wire, NPN

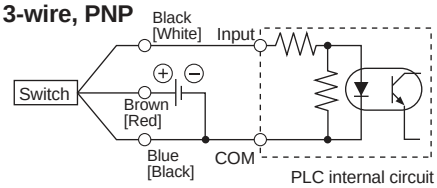



#### 2-wire

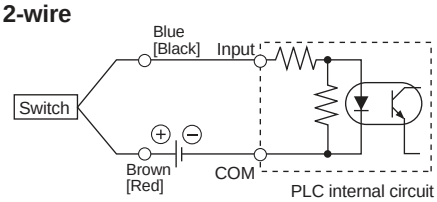



### Souce input specifications

#### 3-wire, PNP




#### 2-wire

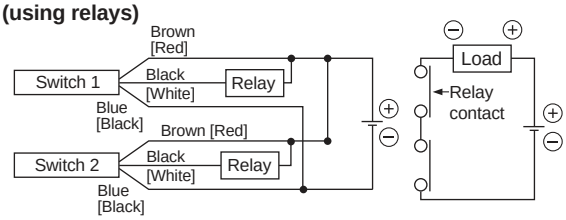



The connection method will vary depending on the applicable PLC input specifications.

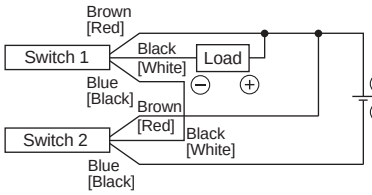
## Connection Examples for AND (Series) and OR (Parallel)

### 3-wire

#### AND connection for NPN output (using relays)

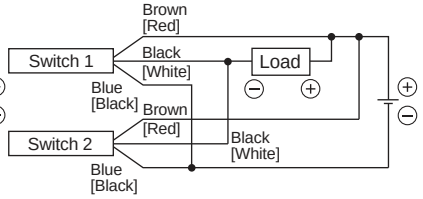



#### AND connection for NPN output (performed with switches only)

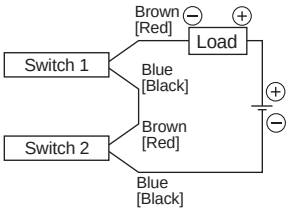



The indicator lights will light up when both switches are turned ON.

#### OR connection for NPN output




#### 2-wire with 2-switch AND connection




When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state.
The indicator lights will light up if both of the switches are in the ON state.

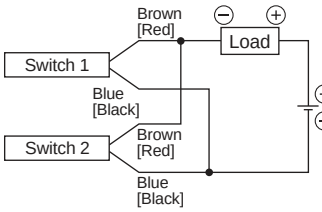
$$\text{Load voltage at ON} = \left(\text{Power supply voltage} - \text{Internal voltage drop}\right) \times 2 \text{ pcs.}$$

$$= 24\text{V} - 4\text{V} \times 2 \text{ pcs.}$$

$$= 16\text{V}$$

Example: Power supply is 24VDC.
Internal voltage drop in switch is 4V.

#### 2-wire with 2-switch OR connection




<Solid state>
When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

$$\text{Load voltage at OFF} = \text{Leakage current} \times 2 \text{ pcs.} \times \text{Load impedance}$$

$$= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}$$

$$= 6\text{V}$$

Example: Load impedance is 3k.
Leakage current from switch is 1mA.

<Reed switch>
Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes grow dim or not light up because of the dispersion and reduction of the current flowing to the switches.

# *Series CXS*
# Made to Order Specifications 1

Made to Order

Contact SMC regarding the availability of Made to Order specifications for Compact Type Dual-Rod Cylinder, Dual-Rod Cylinder with Air Cushion/End Lock, or Dual-Double-Rod Cylinder.

| Made to order description | | Symbol |
|---|---|---|
| ① | Heat-resistant cylinder | **-XB6** |
| ② | Low-speed cylinder (10 to 50mm/s) | **-XB9** |
| ③ | Low-speed cylinder (5 to 50mm/s) | **-XB13** |
| ④ | Long-stroke cylinder | **-XB11** |

| Made to order description | | Symbol |
|---|---|---|
| ⑤ | High-speed cylinder | **-XB19** |
| ⑥ | NPT finish piping port | **-XC18** |
| ⑦ | Fluoro rubber seal | **-XC22** |
| ⑧ | Without plate | **-X593** |

## 1 Heat-resistant cylinder -XB6

**CXS** □ **Bore size** – **Stroke** – **XB6**

**Heat-resistant cylinder**

Air cylinder whose seal and grease materials are changed to withstand the applications in the ambient temperature of up to 150°C.

Note 1) Operate without lubrication from a pneumatic system lubricator.

Note 2) Maintenance period for this type of cylinder is different from that of the standard cylinder. Contact SMC.

Note 3) Heat-resistant cylinder with auto switch is not available per Made to Order specifications. Contact SMC if such cylinders are required.

### ⚠Warning

**Operating precautions**

Be sure to wash your hands after handling the grease used for this cylinder. Toxic gas may be released when you smoke with the grease residual left on your hands, causing a health hazard.

### Specifications

| Series | CXSM | CXSL |
|---|---|---|
| Bearing type | Slide bearing | Ball bushing bearing |
| Lubrication | Non-lube | |
| Bore size (mm) | ø6, ø10, ø15, ø20, ø25, ø32 | |
| Ambient temperature | –10° to 150°C | |
| Seal material | Fluoro rubber | |
| Grease | Heat-resistant grease | |
| Other specifications and dimensions | Refer to pages 10 through 17. | |

## 2 Low-speed cylinder (10 to 50mm/s) -XB9

**CXS** □ **Bore size** – **Stroke** – **Auto switch** – **XB9**

**Low-speed cylinder**

This cylinder operates smoothly with minimal stick-slip even at 10 to 50mm/s.

Note) Operate without lubrication from a pneumatic system lubricator.

### ⚠Warning

**Operating precautions**

Be sure to wash your hands after handling the grease used for this cylinder. Toxic gas may be released when you smoke with the grease residue left on your hands, causing a health hazard.

### Specifications

| Series | CXSM | CXSL |
|---|---|---|
| Bearing type | Slide bearing | Ball bushing bearing |
| Lubrication | Non-lube | |
| Bore size (mm) | ø6, ø10, ø15, ø20, ø25, ø32 | |
| Piston speed | 10 to 50mm/s | |
| Cushion | Rubber bumper | |
| Auto switch | Mountable | |
| Other specifications and dimensions | Refer to pages 10 through 17. | |

## 3 Low-speed cylinder (5 to 50mm/s) -XB13

**CXS** □ **Bore size** – **Stroke** – **Auto switch** – **XB13**

**Low-speed cylinder**

This cylinder operates smoothly with minimal stick-slip even at 5 to 50mm/s.

Note 1) Operate without lubrication from a pneumatic system lubricator.
Note 2) Use a low speed controller (Series AS-FM, AS-M) to adjust a speed.

### Specifications

| Series | CXSM | CXSL |
|---|---|---|
| Bearing type | Slide bearing | Ball bushing bearing |
| Bore size (mm) | ø6, ø10, ø15, ø20, ø25, ø32 | |
| Piston speed | 5 to 50mm/s | |
| Cushion | Rubber bumper | |
| Auto switch | Mountable | |
| Other specifications and dimensions | Refer to pages 10 through 17. | |

# *Series CXS*
# Made to Order Specifications 2

Made to Order

Contact SMC regarding the availability of Made to Order specifications for Compact Type Dual-Rod Cylinder, Dual-Rod Cylinder with Air Cushion/End Lock, or Dual-Double-Rod Cylinder.

## 4 Long-stroke cylinder -XB11

**CXS / CXSW** □ **Bore size** – **Stroke** – **Auto switch** – **XB11**

**Long-stroke cylinder**

Long-stroke cylinder whose stroke range is beyond that of the standard.

Note) The specification for long-stroke cylinder -XB11 is available within the ranges shown in the table at right. Cylinders with even longer strokes are available as a special order.

### Specifications

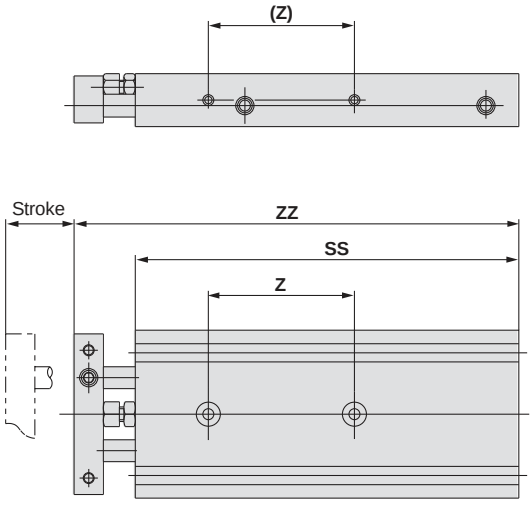
| Series | CXSM, CXSWM | CXSL, CXSWL |
|---|---|---|
| Bearing type | Slide bearing | Ball bushing bearing |
| Bore size (mm) | ø10, ø15, ø20, ø25, ø32 | |
| Auto switch | Mountable | |
| Other specifications and dimensions | Refer to pages 10 through 17. | |

### Stroke range

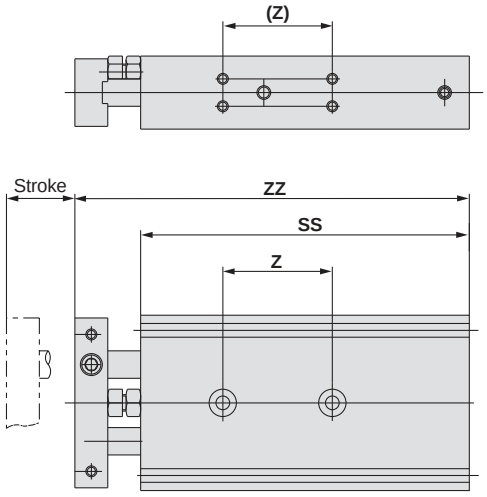
| Series | Bore sizes (mm) | Standard strokes (mm) | Long strokes (mm) |
|---|---|---|---|
| CXSM CXSL | 10 | 10 to 75 | 80, 90, 100, 110, 120, 125, 150 |
| | 15 | 10 to 100 | 110, 120, 125, 150 |
| | 20, 25, 32 | | 110, 120, 125, 150, 175, 200 |
| CXSWM CXSWL | 10,15 | 10, 20, 30, 40, 50 | 75, 100, 125, 150 |
| | 20, 25, 32 | 10, 20, 30, 40, 50, 75, 100 | 125, 150, 175, 200 |

## Dimensions

**CXS□10, 15**




**CXS□20, 25, 32**




| Model | | CXS□10 | | | | | | | CXS□15 | | | | CXS□20 | | | | | | CXS□25 | | | | | | CXS□32 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stroke | | 80 | 90 | 100 | 110 | 120 | 125 | 150 | 110 | 120 | 125 | 150 | 110 | 120 | 125 | 150 | 175 | 200 | 110 | 120 | 125 | 150 | 175 | 200 | 110 | 120 | 125 | 150 | 175 | 200 |
| Symbol | SS | 135 | 145 | 155 | 165 | 175 | 180 | 205 | 170 | 180 | 185 | 210 | 180 | 190 | 195 | 220 | 245 | 270 | 182 | 192 | 197 | 222 | 247 | 272 | 192 | 202 | 207 | 232 | 257 | 282 |
| | ZZ | 152 | 162 | 172 | 182 | 192 | 197 | 222 | 189 | 199 | 204 | 229 | 204 | 214 | 219 | 244 | 269 | 294 | 206 | 216 | 221 | 246 | 271 | 296 | 222 | 232 | 237 | 262 | 287 | 312 |
| | Z | 50 | 60 | | 70 | | | 80 | 65 | | | 75 | 80 | | | | 100 | | 80 | | | | 100 | | 90 | | | | 110 | |

Refer to pages 36 through 38 for dimensions of CXSW dual-double-rod cylinder.



SMC

# *Series CXS*
# Made to Order Specifications 3

Made to Order

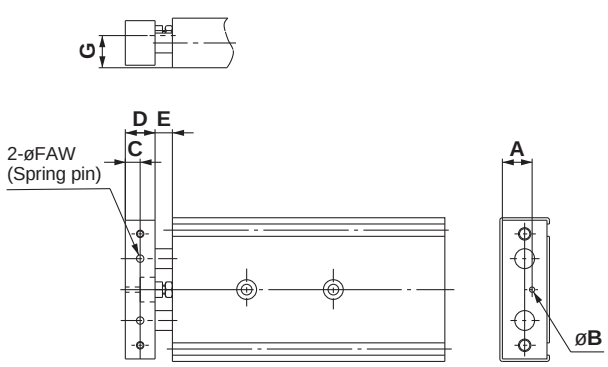
Contact SMC regarding the availability of Made to Order specifications for Compact Type Dual-Rod Cylinder, Dual-Rod Cylinder with Air Cushion/End Lock, or Dual-Double-Rod Cylinder.

## 5 High-speed cylinder -XB19

**CXS** □ **Bore size** – **Stroke** – **Auto switch** – **XB19**

**High-speed cylinder**

Oversized orifice for twice the speed of the standard cylinder (Max. 1500mm/s for ø6 to ø20, and Max. 1000mm/s for ø25 and ø32). The absorbed energy of the retracted end bumper and strength of a plate and piston rod connection are improved.




### Specifications

| Series: Bearing type | **CXSM:** Slide bearing, **CXSL:** Ball bushing bearing | | | | | |
|---|---|---|---|---|---|---|
| Bore size (mm) | 6 | 10 | 15 | 20 | 25 | 32 |
| Proof pressure | 1.05MPa | | | | | |
| Maximum operating pressure | 0.7MPa | | | | | |
| Minimum operating pressure | 0.15MPa | 0.1MPa | | 0.05MPa | | |
| Fluid | Air (non-lube) | | | | | |
| Ambient and fluid temperature | –10° to 60°C (with no freezing) | | | | | |
| Piston speed | 30 to 1500mm/s | | | | 30 to 1000mm/s | |
| Port size | M5 x 0.8 | | | | Rc 1/8 | |
| Stroke adjustable range | 0 to –5mm compared to the standard stroke | | | | | |
| Bearing type | Slide bearing, Ball bushing bearing (Same dimensions for both) | | | | | |
| Cushion | Rubber bumper | | | | | |

∗ The maximum piston speed shown in the table above is for extension.
The maximum piston speeds for retraction is approximately 70% that of the extension.

| Model | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| **CXS□6** | 9 | 2.1 | 3.25 | 6.5 | 7 | 1.2 x 12 | 10 |
| **CXS□10** | 9 | 2.1 | 5 | 10 | 7 | 2.5 x 14 | 10 |
| **CXS□15** | 12 | 2.1 | 6 | 12 | 7 | 3 x 16 | 13 |
| **CXS□20** | 15 | 3.1 | 7 | 14 | 10 | 4 x 20 | 16 |
| **CXS□25** | 20 | 3.1 | 7 | 14 | 10 | 5 x 22 | 21 |
| **CXS□32** | 26 | 4.1 | 9 | 18 | 12 | 6 x 32 | 27 |

∗ Dimensions other than those listed above are the same as for the standard type.

## 6 NPT finish piping port -XC18

**CXS** □ **Bore size** – **Stroke** – **Auto switch** – **XC18**

**NPT finish piping port**

Piping port thread NPT is used instead of Rc.

### Specifications

| Series | **CXSM** | **CXSL** |
|---|---|---|
| Bearing type | Slide bearing | Ball bushing bearing |
| Bore size (mm) | ø25, ø32 | |
| Cushion | Rubber bumper | |
| Auto switch | Mountable | |
| Other specifications and dimensions | Refer to pages 10 through 17. | |

## 7 Fluoro rubber seal -XC22

**CXS** □ **Bore size** – **Stroke** – **Auto switch** – **XC22**

**Fluoro rubber seal**

Chemical-resistant fluoro rubber is used for seal materials.

Note 1) Contact SMC upon operation of the cylinder with fluoro rubber seal. Although the seal material of this cylinder is chemical-resistant, the cylinder is not suitable and should not be operated with certain types of chemical and/or the operating temperature.

Note 2) Auto switch cylinders can be manufactured. However, contact SMC regarding the applicability of the cylinder in your desired operating environment before the cylinder is put into service since auto switch related parts (such as auto switch body, mounting bracket, built-in magnet) are same as those of the standard cylinders.

### Specifications

| Series | **CXSM** | **CXSL** |
|---|---|---|
| Bearing type | Slide bearing | Ball bushing bearing |
| Bore size (mm) | ø6, ø10, ø15, ø20, ø25, ø32 | |
| Ambient temperature range | Without auto switch: –10°C to 70°C<br>With auto switch: –10° to 60°C (with no freezing) | |
| Cushion | Rubber bumper (Both sides) | |
| Auto switch | Mountable | |
| Other specifications and dimensions | Refer to pages 10 through 17. | |

# *Series CXS*
# Made to Order Specifications 4

Made to Order

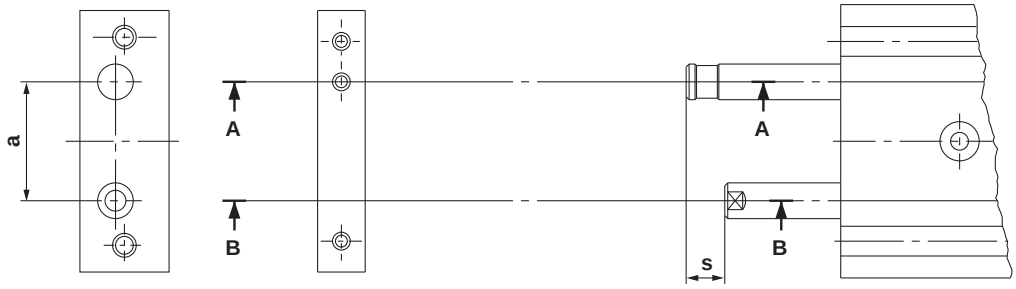
Contact SMC regarding the availability of Made to Order specifications for Compact Type Dual-Rod Cylinder, Dual-Rod Cylinder with Air Cushion/End Lock, or Dual-Double-Rod Cylinder.

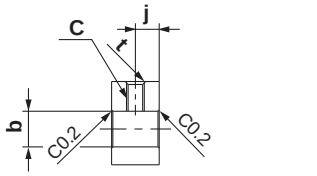
## 8 Without plate -X593

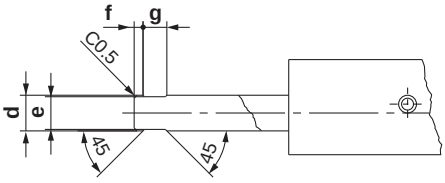
**CXS** □ **Bore size** – **Stroke** – **Auto switch** – **X593**

**Without plate**

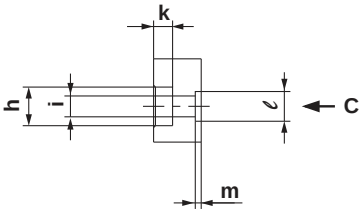
This specification is for the cylinder without a plate. This cylinder is suitable for mounting your own plate.
Please note that the rod end dimensions of this cylinder are different from those of the standard cylinder.

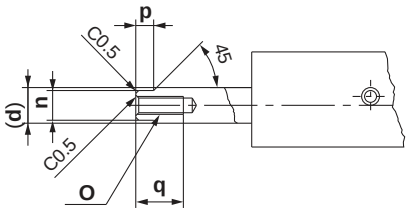


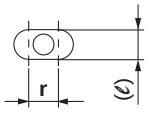




**Section A-A**




**Section B-B**




**View C**

(mm)

| Model | a | b | c | d | e | f | g | h | i | j | k | ℓ | m | n | o | p | q | r | s | t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CXS□ 6** | $16^{0.1}$ | $ø4^{+0.013}_{+0.001}$ | M3 | ø4 | ø3.5 | 1 | 3 | ø5.5 | $ø6^{0}_{-0.2}$ | 2.75 | $2.8^{+0.2}_{0}$ | $3.5^{+0.1}_{0}$ | $0.5^{+0.2}_{0}$ | $3.5^{-0.05}_{-0.15}$ | M2.5 | 3 | 4.5 | 3.5 | 4.75 | C0.5 |
| **CXS□10** | $20^{0.1}$ | $ø6^{+0.016}_{+0.001}$ | M5 | ø6 | ø5.5 | 1.25 | 4.5 | ø6.5 | $ø3.5^{0}_{-0.2}$ | 4 | $3.2^{+0.2}_{0}$ | $5^{+0.1}_{0}$ | $1^{+0.2}_{0}$ | $5^{-0.05}_{-0.15}$ | M3 | | 8 | 5 | 6.5 | C0.5 |
| **CXS□15** | $25^{0.1}$ | $ø8^{+0.016}_{+0.001}$ | M6 | ø8 | ø7.5 | 2 | 5 | ø9.5 | $ø5.5^{0}_{-0.2}$ | 5 | $5.2^{+0.3}_{0}$ | $6^{+0.2}_{0}$ | $1.5^{+0.2}_{0}$ | $6^{-0.05}_{-0.15}$ | M5 | | 8 | 7 | 8 | C0.5 |
| **CXS□20** | $28^{0.1}$ | $ø10^{+0.016}_{+0.001}$ | M8 | ø10 | ø9.5 | 2 | 7 | ø11 | $ø6.6^{0}_{-0.2}$ | 6 | $6.2^{+0.3}_{0}$ | $8^{+0.2}_{0}$ | $2^{+0.2}_{0}$ | $8^{-0.05}_{-0.15}$ | M6 | | 10 | 8 | 9.5 | C0.5 |
| **CXS□25** | $35^{0.1}$ | $ø12^{+0.019}_{+0.001}$ | M8 | ø12 | ø11.5 | 2 | 7 | ø11 | $ø6.6^{0}_{-0.2}$ | 6 | $6.2^{+0.3}_{0}$ | $10^{+0.2}_{0}$ | $2^{+0.2}_{0}$ | $10^{-0.05}_{-0.15}$ | M6 | | 12 | 8.5 | 9.5 | C0.7 |
| **CXS□32** | $44^{0.1}$ | $ø16^{+0.019}_{+0.001}$ | M10 | ø16 | ø15.5 | 3.5 | 8 | ø14 | $ø9^{0}_{-0.2}$ | 8 | $8.2^{+0.4}_{0}$ | $13^{+0.2}_{0}$ | $2^{+0.2}_{0}$ | $13^{-0.05}_{-0.15}$ | M8 | | 12.5 | 11 | 13.5 | C0.7 |

Notes) • Dimension tolerances that are not indicated in the table above are based on JIS B 0405 Permissible Machining Deviations in Dimensions without Tolerance Indication.

• Piston rod A and B must be extended in order to install a plate. Supply air (0.2MPa or more) from the supply port of the extended end when installing a plate.
When installing the plate, first secure the plate on piston rod B, and then piston rod A afterward. Apply Loctite® to the mounting threads. After anchoring the plate, operate the cylinder to check for proper operation (e.g., the cylinder operates smoothly when moved by hand or at least operates properly at the minimum operating pressure).



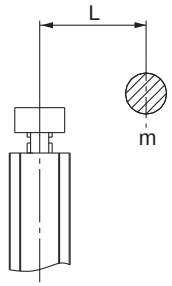
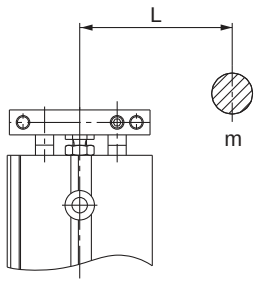
SMC

# Series CXS
# Model Selection

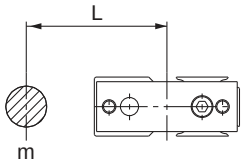
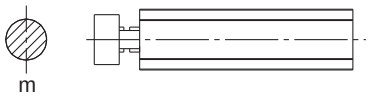
**⚠Caution** **Theoretical output must be confirmed separately, referring to the table on page 2.**

## Compact Type: CXSJ

### Vertical mounting

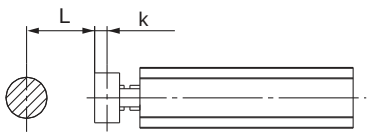
| Mounting orientation | |  | |  | |
|---|---|---|---|---|---|
| Maximum speed (mm/s) | | up to 200 | up to 400 | up to 600 | up to 800 |
| Stroke (mm) | | All strokes | | | |
| Selection graph | ø6<br>ø10 | 1 | 2 | 3 | 4 |

### Horizontal mounting

| Mounting orientation | |  | |  ∗ Refer to the caution notes below. | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Stroke (mm) | | up to 10 | | up to 30 | | up to 50 | | up to 75 | |
| Maximum speed (mm/s) | | up to 400 | up to 800 | up to 400 | up to 800 | up to 400 | up to 800 | up to 400 | up to 800 |
| Selection graph | ø6<br>ø10 | 5 | | 6 | | 7 | | 8 | |

## ⚠Caution

If the cylinder is horizontally mounted and the plate end does not reach the load's centre of gravity, use the formula below to calculate the imaginary stroke L' that includes the distance between the load's centre of gravity and the plate end. Select the graph that corresponds to the imaginary stroke L'.




Imaginary stroke L' = (Stroke) + k + L

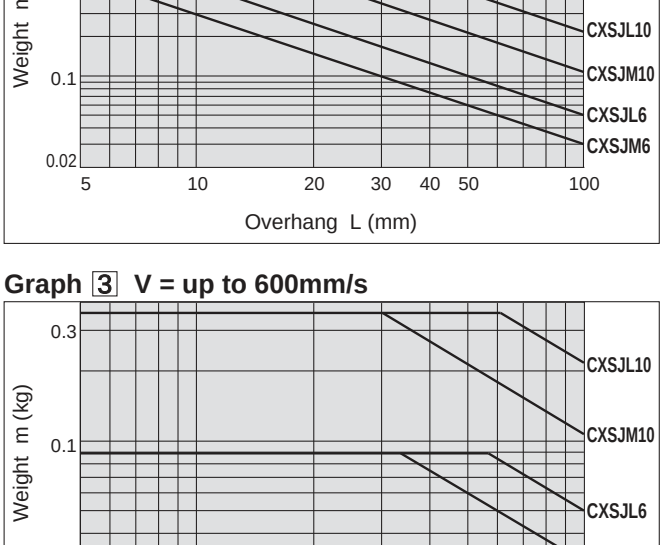
k: Distance between the centre and end of the plate

| | |
|---|---|
| **ø6** | 2.75mm |
| **ø10** | 4mm |

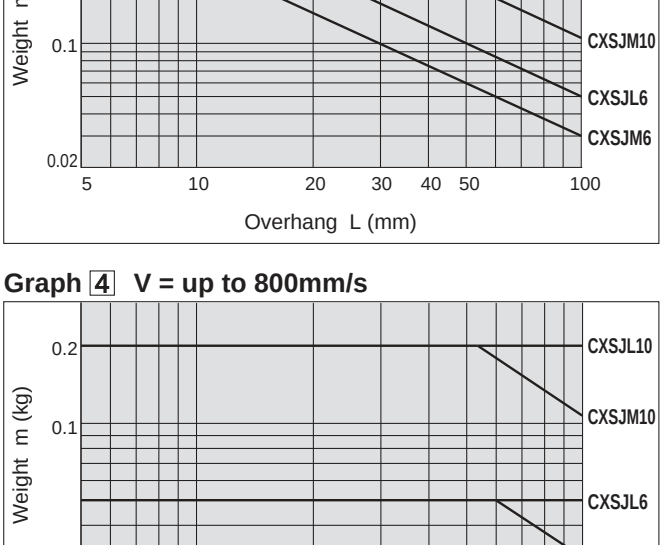
(Example)
When using CXSJM6-10 and L = 15mm:
Imaginary stroke L' = 10 + 2.75 + 15 = 27.75
Therefore, the graph used for your model selection should be the one for CXSJM6-30 ( 6 ).

## Vertical Mounting [based on maximum speed (v)]

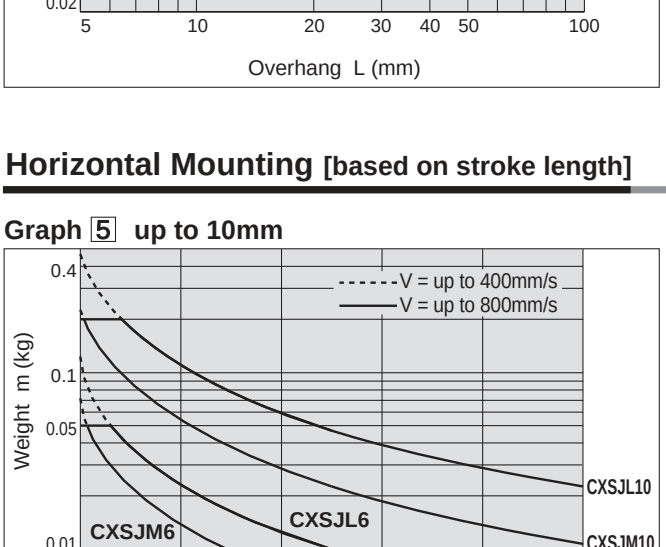
### Graph 1 V = up to 200mm/s



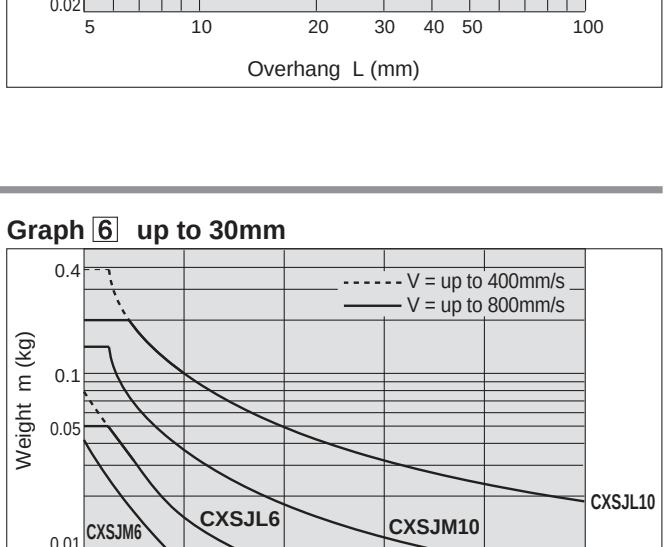

### Graph 2 V = up to 400mm/s




### Graph 3 V = up to 600mm/s




### Graph 4 V = up to 800mm/s




## Horizontal Mounting [based on stroke length]

### Graph 5 up to 10mm




### Graph 6 up to 30mm




### Graph 7 up to 50mm



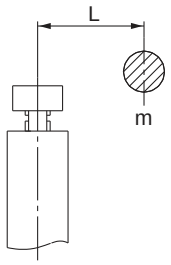
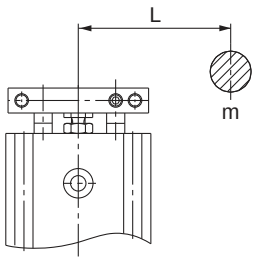

### Graph 8 up to 75mm

# *Series CXS*
# Model Selection

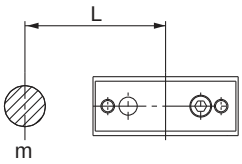
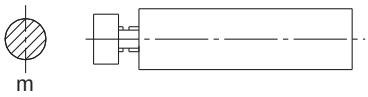
**⚠Caution** **Theoretical output must be confirmed separately, referring to the table on page 10.**

## Standard Type: CXS

### Vertical mounting

| Mounting orientation | |  | | |  | | |
|---|---|---|---|---|---|---|---|
| Max. speed (mm/s) | | up to 100 | up to 200 | up to 300 | up to 400 | up to 600 | up to 700 ( up to 800) |
| Stroke (mm) | | All strokes | | | | | |
| Selection graph | ø6 | 1 | | 2 | | | |
| | ø10 | | 3 | | 4 | 5 | 6 |
| | ø15 | | | | | | |
| | ø20 | | | | | | |
| | ø25 | | | | | | |
| | ø32 | | | | | | |

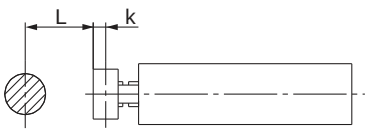
### Horizontal mounting

| Mounting orientation | |  |  ∗ Refer to the caution notes below. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stroke (mm) | | up to 10 | | | | up to 30 | | | | up to 50 | | | | up to 75 | | | | up to 100 | | | |
| Max. speed (mm/s) | | up to 100 | up to 300 | up to 400 | More than 400 | up to 100 | up to 300 | up to 400 | More than 400 | up to 100 | up to 300 | up to 400 | More than 400 | up to 100 | up to 300 | up to 400 | More than 400 | up to 100 | up to 300 | up to 400 | More than 400 |
| Selection graph | ø6 | 7 | | | | 8 | | | | 9 | | | | | | | | | | | |
| | ø10 | | | | | | | | | | | | | | | | | | | | |
| | ø15 | | | | | | | | | | | | | | | | | | | | |
| | ø20 | | | 10 | 11 | | | 12 | 13 | | | 14 | 15 | | 16 | | | | 17 | | |
| | ø25 | | | | | | | | | | | | | | | | | | | | |
| | ø32 | | | | | | | | | | | | | | | | | | | | |

∗ The maximum speeds for ø10 to ø32 are:
ø10: up to 800mm/s; ø15, 20: up to 700mm/s; ø25, 32: up to 600mm/s

## ⚠Caution

If the cylinder is horizontally mounted and the plate end does not reach the load's centre of gravity, use the formula below to calculate the imaginary stroke L' that includes the distance between the load's centre of gravity and the plate end. Select the graph that corresponds to the imaginary stroke L'.




Imaginary stroke L' = (Stroke) + k + L

k: Distance between the centre and end of the plate

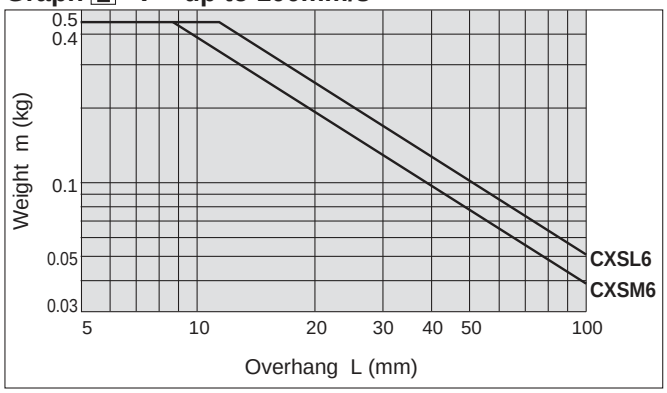
| | |
|---|---|
| **ø6** | 2.75mm |
| **ø10** | 4mm |
| **ø15** | 5mm |
| **ø20** | 6mm |
| **ø25** | |
| **ø32** | 8mm |

(Example)
When using CXSM6-10 and L = 15mm:
Imaginary stroke L' = 10 + 2.75 + 15 = 27.75
Therefore, the graph used for your model selection should be the one for CXSM6-30 (8).

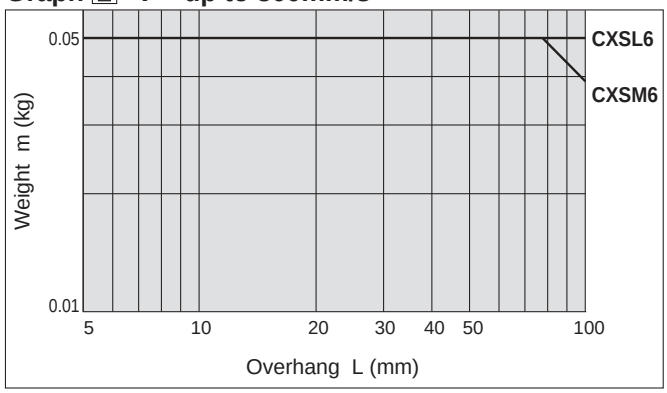
## Vertical Mounting [based on maximum speed (V)]

### ø6

**Graph 1 V = up to 100mm/s**

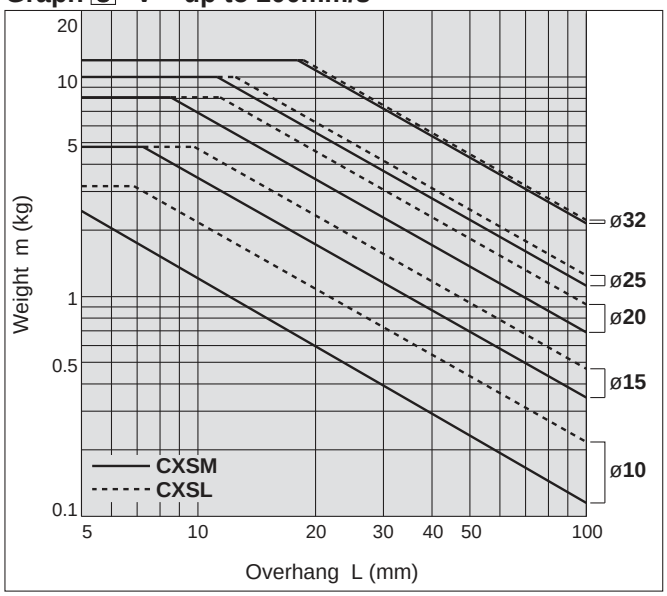



**Graph 2 V = up to 300mm/s**

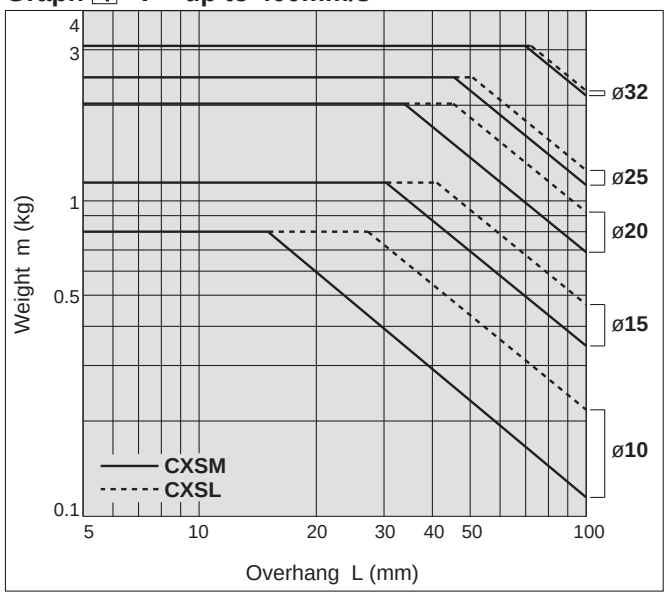



### ø10 to ø32

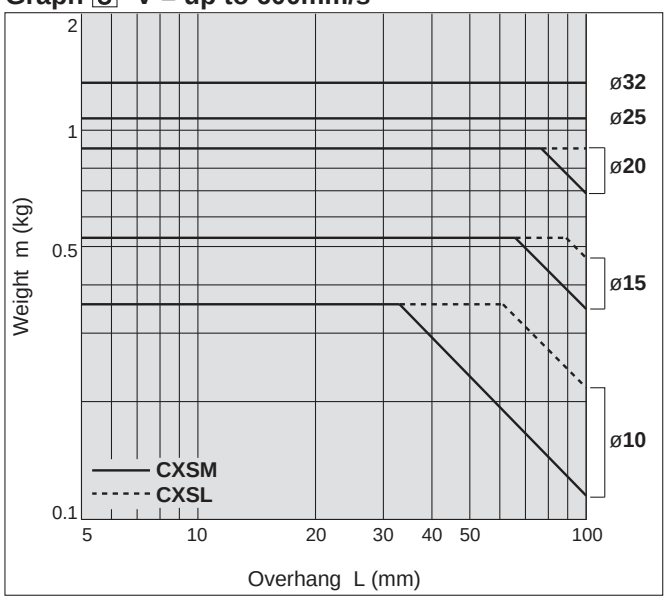
**Graph 3 V = up to 200mm/s**



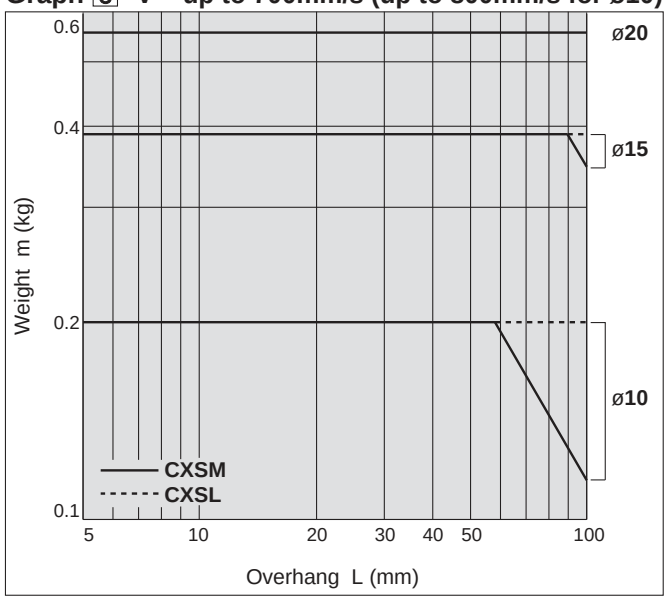

**Graph 4 V = up to 400mm/s**




**Graph 5 V = up to 600mm/s**



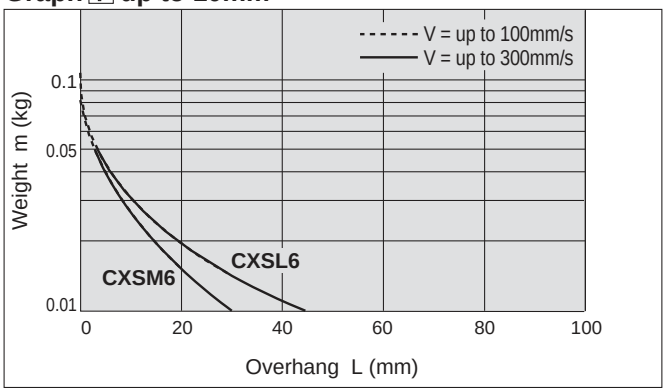

**Graph 6 V = up to 700mm/s (up to 800mm/s for ø10)**



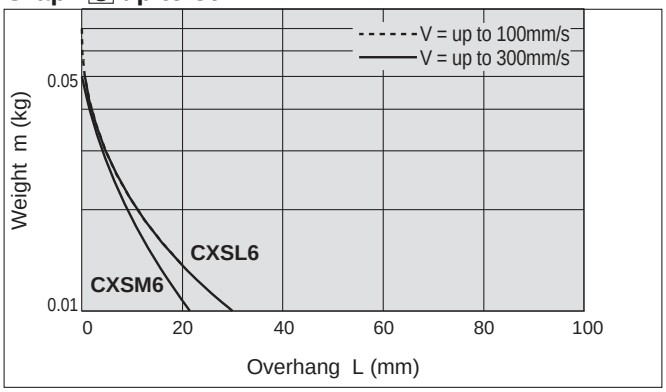
## Horizontal Mounting [based on stroke length]

### ø6

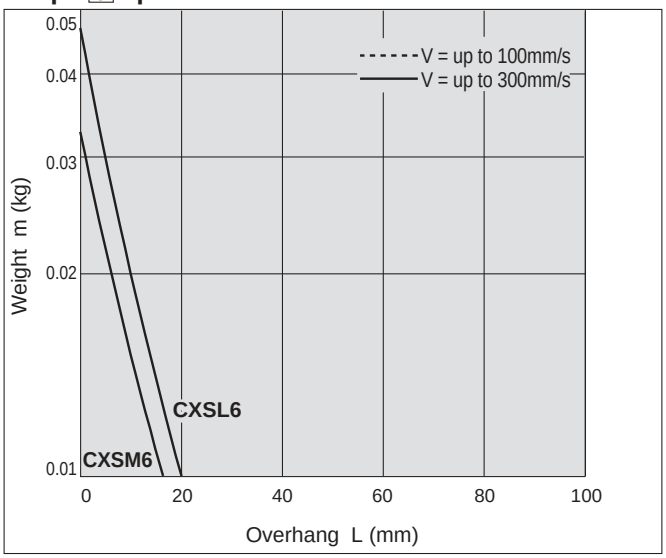
**Graph 7 up to 10mm**




**Graph 8 up to 30mm**



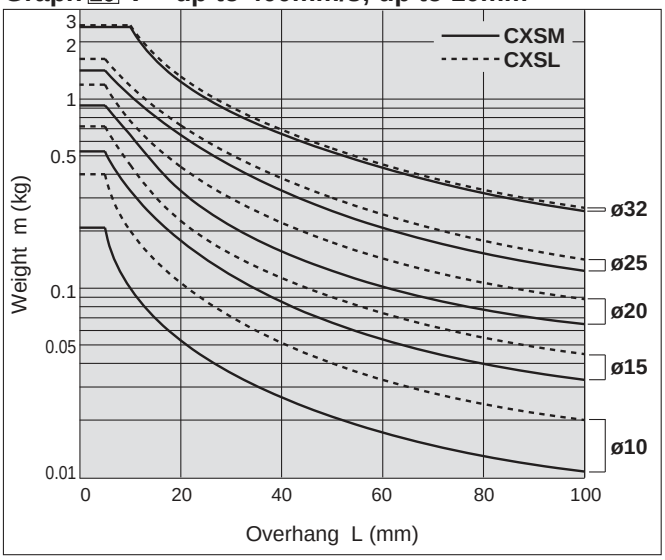

**Graph 9 up to 50mm**



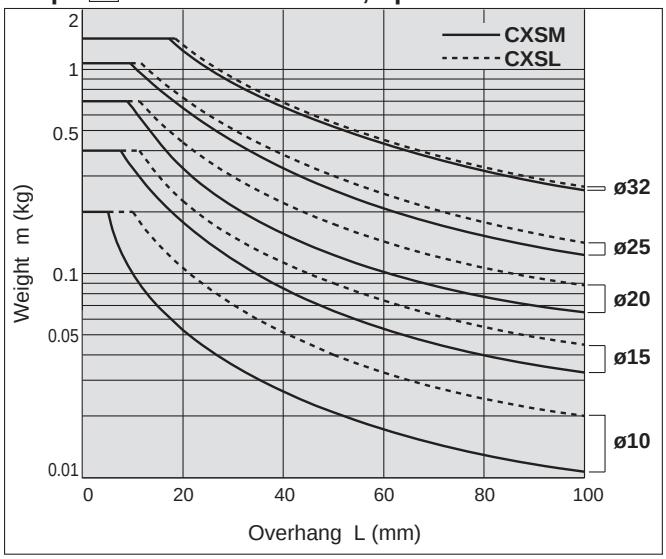

## [based on maximum speed (V) and stroke length]

### ø10 to ø32

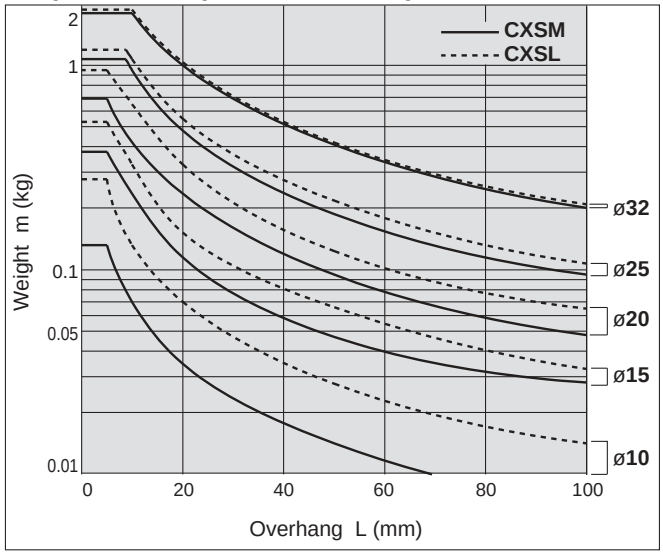
**Graph 10 V = up to 400mm/s; up to 10mm**




**Graph 11 V = over 400mm/s; up to 10mm**



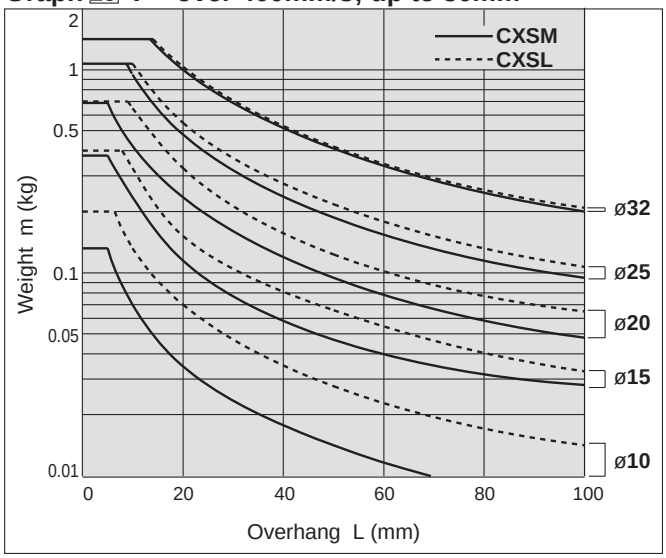

**Graph 12 V = up to 400mm/s; up to 30mm**



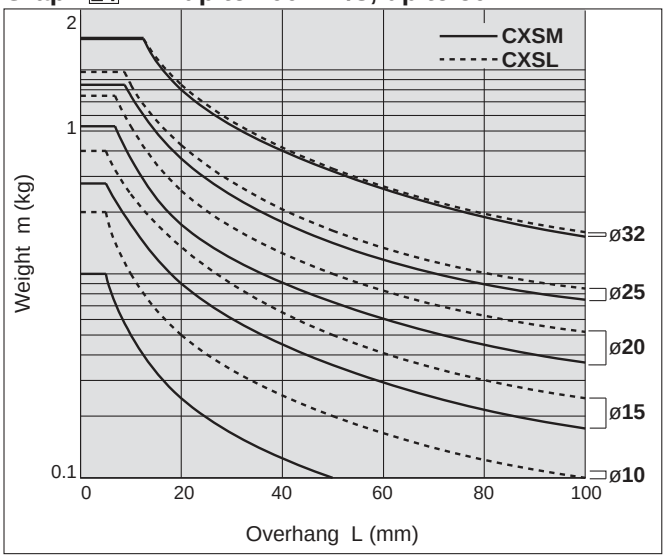
## Horizontal Mounting [based on maximum speed and stroke length]

### ø10 to ø32

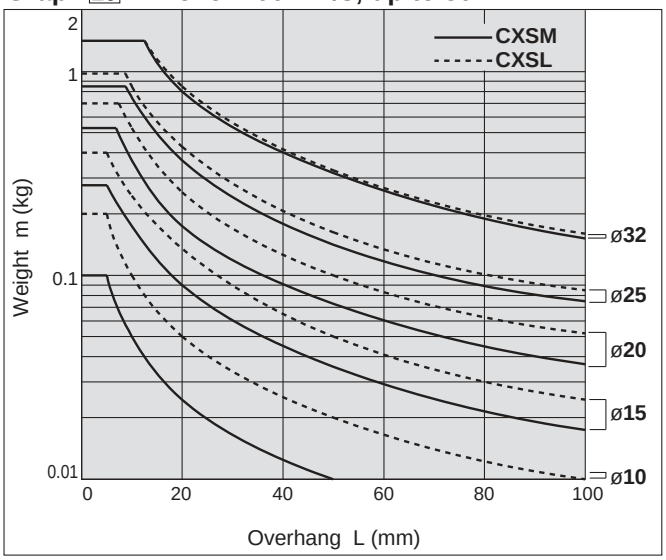
**Graph 13 V = over 400mm/s; up to 30mm**



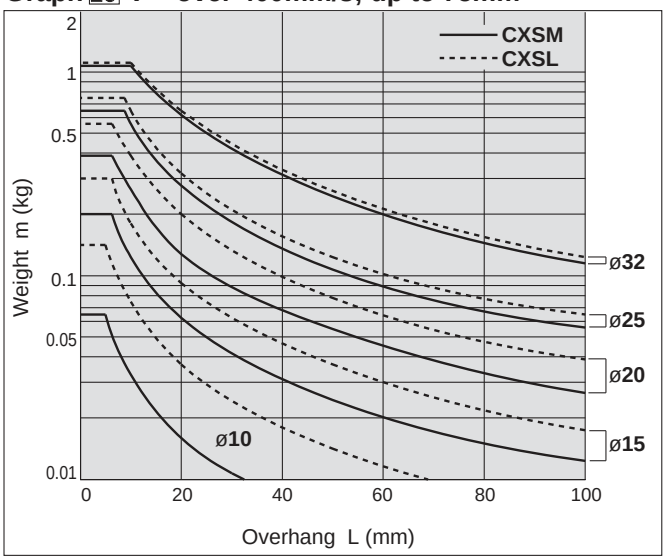

**Graph 14 V = up to 400mm/s; up to 50mm**



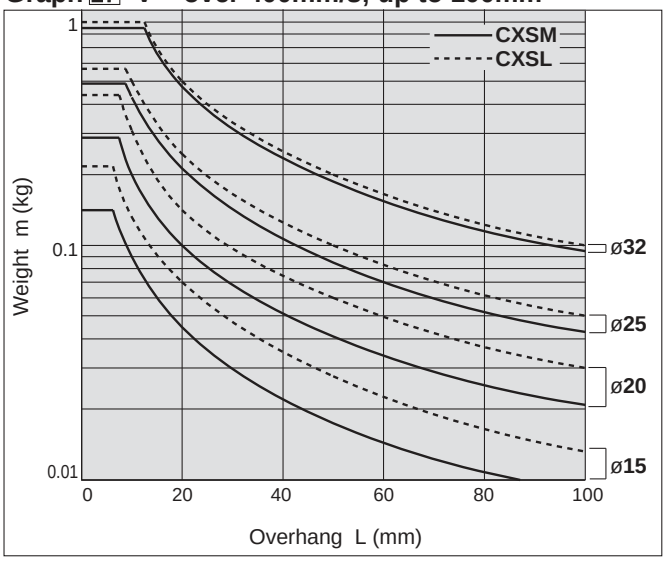

**Graph 15 V = over 400mm/s; up to 50mm**




**Graph 16 V = over 400mm/s; up to 75mm**




**Graph 17 V = over 400mm/s; up to 100mm**



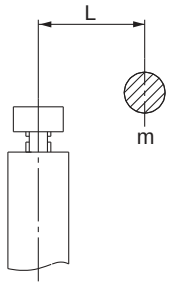
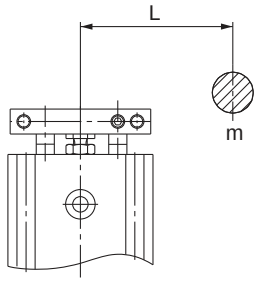
## *Series CXS*

# Model Selection

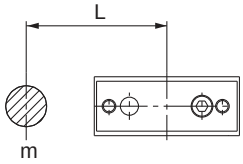
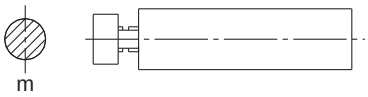
**⚠Caution** **Theoretical output must be confirmed separately, referring to the table on page 20.**

## With Air Cushion: CXS

### Vertical mounting

| Mounting orientation | |   | | | | |
|---|---|---|---|---|---|---|
| Maximum speed (mm/s) | | up to 200 | up to 400 | up to 600 | up to 800 | up to 1000 |
| Stroke (mm) | | All strokes | | | | |
| Selection graph | ø20<br>ø25<br>ø32 | 1 | 2 | 3 | 4 | 5 |

### Horizontal mounting

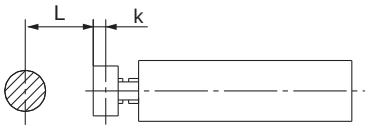
| Mounting orientation | |   ∗ Refer to the caution notes below. | | | | | |
|---|---|---|---|---|---|---|---|
| Stroke (mm) | | up to 10 | | up to 30 | | up to 50 | up to 75 | up to 100 |
| Maximum speed (mm/s) | | up to 800 | up to 1000 | up to 800 | up to 1000 | up to 1000 | up to 1000 | up to 1000 |
| Selection graph | ø20<br>ø25<br>ø32 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

# ⚠Caution

If the cylinder is horizontally mounted and the plate end does not reach the load's centre of gravity, use the formula below to calculate the imaginary stroke L' that includes the distance between the load's centre of gravity and the plate end. Select the graph that corresponds to the imaginary stroke L'.

Imaginary stroke L' = (Stroke) + k + L

k: Distance between the centre and the end of the plate

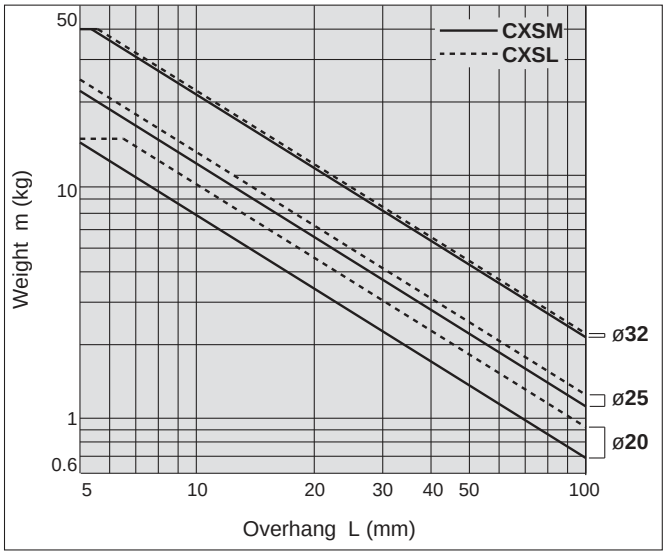



| | |
|---|---|
| ø20 | 6mm |
| ø25 | |
| ø32 | 8mm |

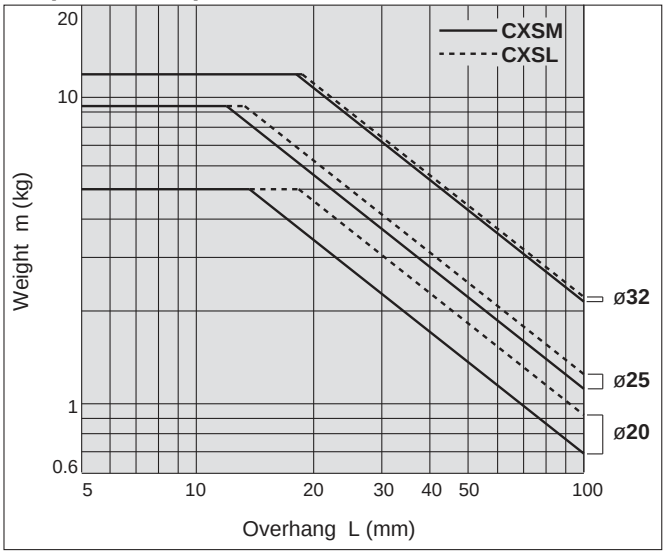
(Example)
When using CXSM20-10 and L = 10mm:
Imaginary stroke L' = 10 + 6 + 10 = 26
Therefore, the graph used for your model selection should be the one for CXSM20-30 (8, 9).

## Vertical Mounting [based on maximum speed (V)]

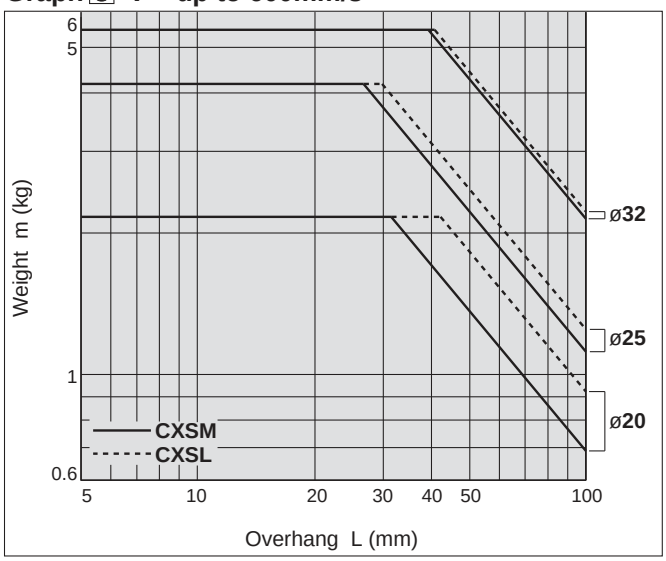
### Graph 1 V = up to 200mm/s



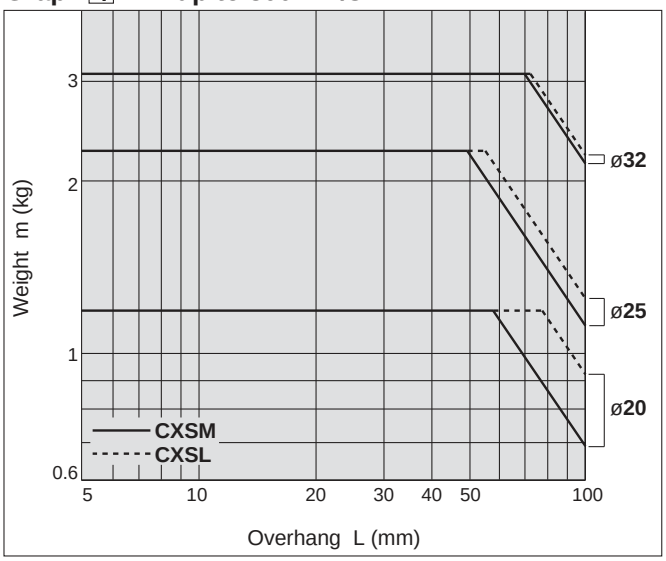

### Graph 2 V = up to 400mm/s



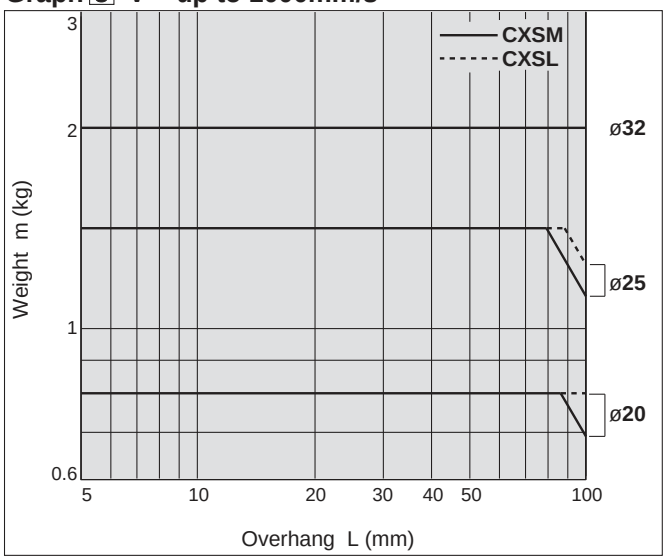

### Graph 3 V = up to 600mm/s




### Graph 4 V = up to 800mm/s

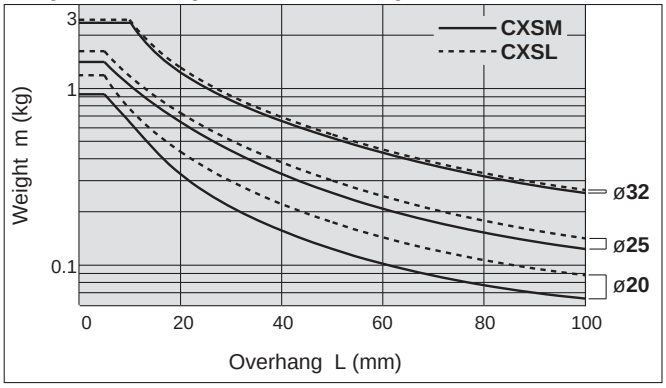



### Graph 5 V = up to 1000mm/s

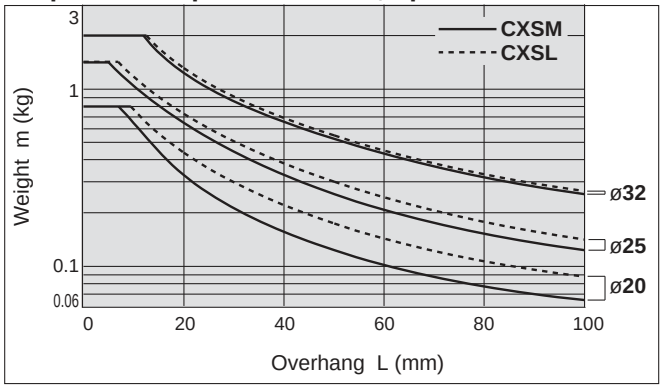


## Horizontal Mounting [based on maximum speed and stroke length]

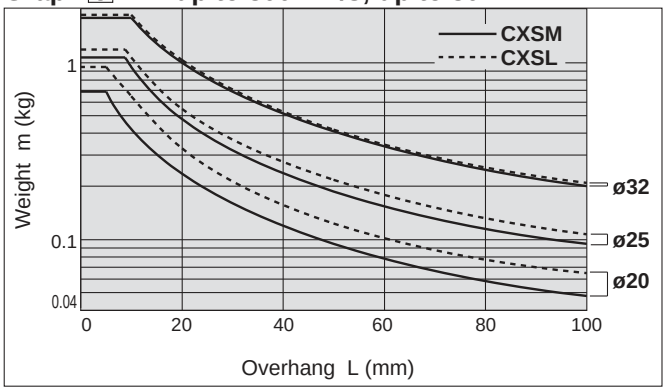
### Graph 6 V = up to 800mm/s; up to 10mm



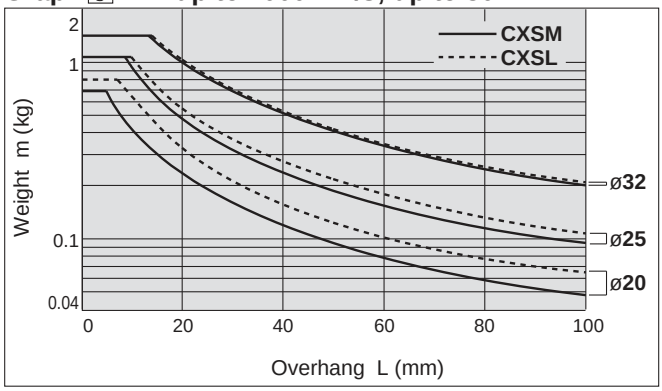

### Graph 7 V = up to 1000mm/s; up to 10mm



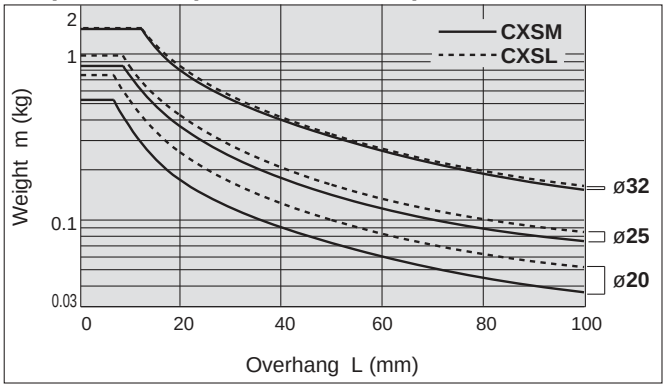

### Graph 8 V = up to 800mm/s; up to 30mm



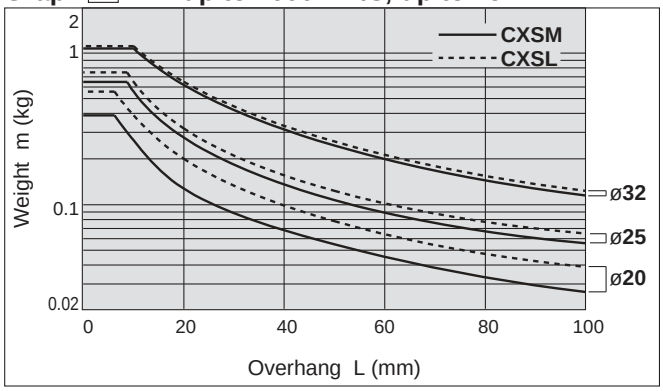

### Graph 9 V = up to 1000mm/s; up to 30mm



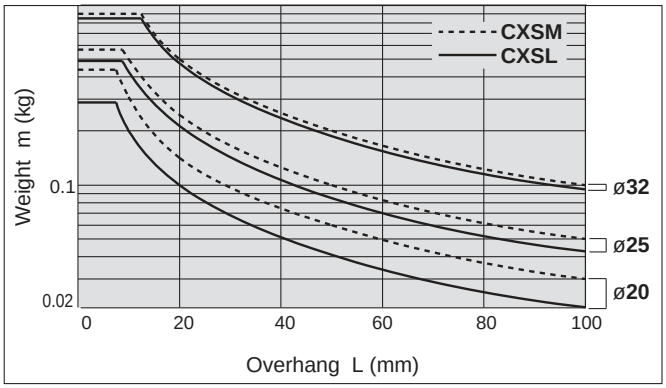

### Graph 10 V = up to 1000mm/s; up to 50mm




### Graph 11 V = up to 1000mm/s; up to 75mm




### Graph 12 V = up to 1000mm/s; up to 100mm



# *Series CXS*
# Actuator Precautions 1

Be sure to read before handling.

## Design

### ⚠Warning

**1. There is a danger of sudden or erratic action by cylinders if sliding parts of machinery are twisted and changes in forces occur.**

In such cases, bodily injury may occur, e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machinery should be adjusted to operate smoothly and designed to prevent such dangers.

**2. A protective cover is recommended to minimize the risk of bodily injury.**

If a driven object and moving parts of a cylinder pose a serious danger of bodily injury, design the structure to avoid contact with the human body.

**3. Securely tighten all stationary parts and connected parts so that they will not become loose.**

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

**4. A deceleration circuit or shock absorber may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve impact. In this case, the rigidity of the machinery should also be examined.

**5. Take into account a possible drop in operating pressure due to a power outage.**

When a cylinder is used as a clamping mechanism, there is a danger of work pieces dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage. Therefore, safety equipment should be installed to prevent damage to machinery and bodily injury. Suspension mechanisms and lifting devices also require drop prevention measures.

**6. Take into account a possible loss of power source.**

Measures should be taken to protect against bodily injury and equipment damage in the event that there is a loss of power to equipment controlled by air pressure, electricity, or hydraulics.

**7. Design circuitry to prevent sudden lurching of driven objects.**

Take special care when a cylinder is operated by an exhaust centre type directional control valve or when it is starting up after residual pressure is exhausted from the circuit. The piston and its driven object will lurch at high speed if pressure is applied to one side of the cylinder because of the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits designed to prevent sudden lurching because when this occurs, there is a danger of bodily injury, particularly to limbs, and/or damage to equipment.

**8. Take into account emergency stops.**

Design the system so that bodily injury and/or damage to machinery and equipment will not occur when machinery is stopped by a manual emergency stop or a safety device triggered by abnormal conditions.

**9. Consider a system's action when operation is restarted after an emergency or abnormal stop.**

Design machinery so that bodily injury or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the starting position, install safe manual control equipment.

## Selection

### ⚠Warning

**1. Confirm the specifications.**

The products featured in this catalog are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunction may occur. Do not use in these conditions. (Refer to specifications.)

Consult with SMC if fluid other than compressed air is to be used.

**2. Intermediate stops**

When intermediate stopping of a cylinder piston is performed with a 3-position closed centre type directional control valve, it is difficult to achieve stopping positions as accurately and precisely as with hydraulic pressure due to the compressibility of air.

Furthermore, since valves and cylinders are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Contact SMC if it is necessary to hold a stopped position for an extended period.

### ⚠Caution

**1. Operate within the limits of the maximum usable stroke.**

The piston rod will be damaged if operated beyond the maximum stroke. Refer to the cylinder model selection procedure for the maximum usable stroke.

**2. Operate the piston in such a way that collision damage will not occur at the stroke end.**

The operation range should prevent damage from occurring when a piston, having inertial force, stops by striking the cover at the stroke end. Refer to the cylinder model selection procedure for the maximum usable stroke.

**3. Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.**

## Piping

### ⚠Caution

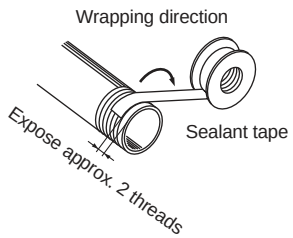
**1. Preparation before piping**

Before piping is connected, it should be thoroughly flushed out with air or water to remove chips, cutting oil, and other debris.

**2. Wrapping of sealant tape**

When screwing together pipes and fittings, be certain that chips from the pipe threads and sealing material do not get inside the piping.

Also, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



# *Series CXS*
# Actuator Precautions 2
Be sure to read before handling.

## Mounting

### ⚠Caution

**1. Do not scratch or gouge the cylinder tube or the sliding parts of the piston rod by striking or grasping them with other objects.**

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation.

Also, scratches or gouges in the piston rod may lead to damaged seals and cause air leakage.

**2. When attaching and tightening a work piece to the end of the plate, the plate should be secured while the piston rod is fully retracted to avoid excessive torque applied to the piston rod.**

**3. Do not use until you can verify that equipment can operate properly.**

Following mounting, repairs, or conversions, verify correct mounting by conducting suitable function and leakage tests after piping and power connections have been made.

**4. Instruction manual**

The product should be mounted and operated after thoroughly reading the manual and understanding its contents.

Keep the instruction manual where it can be readily referred to as needed.

## Cushion

### ⚠Caution

**1. Readjust using the cushion needle.**

Cushion needles are adjusted at the time of shipment. When the cylinder is put into service, the cushion needles on the housing should be readjusted based on factors such as the size of the load and the operating speed. When the cushion needles are turned clockwise, restriction of the air flow becomes greater and thus the cushioning effect also increases.

**2. Do not operate with the cushion needles fully closed.**

Seals may be damaged.

## Lubrication

### ⚠Caution

**1. Lubrication of non-lube type cylinder**

The cylinder is lubricated for life at the factory and can be used without any further lubrication.

However, in the event that additional cylinder lubrication is required, be sure to use ISO VG32 Class 1 turbine oil (with no additives).

Stopping lubrication later may lead to malfunctions because the new lubricant will cancel out the original lubricant. Therefore, additional lubrication must be continued once it has been started.

## Air Supply

### ⚠Warning

**1. Use clean air.**

Do not use compressed air containing chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, as this can cause damage or malfunctions.

## Air Supply

### ⚠Caution

**1. Install air filters.**

Install air filters immediately upstream of valves. The filtration degree should be 5m or finer.

**2. Install an after-cooler, air dryer, or water separator (Drain Catch).**

Air that includes excessive drainage or condensate may cause malfunction of valves and other pneumatic equipment. To prevent this, install an after-cooler, air dryer, or water separator (Drain Catch).

**3. Use the product within the specified range of fluid and ambient temperature.**

Take measures to prevent freezing when below 5C, since moisture in circuits can freeze and cause damage to seals and lead to malfunctions.

Refer to SMC's "Air Preparation System" catalog for further details on compressed air quality.

## Operating Environment

### ⚠Warning

**1. Do not use in environments where there is a danger of corrosion.**

Refer to the construction drawings regarding cylinder materials.

**2. In dusty locations or where water or oil splashing is a regular occurrence, protect the rod by installing a rod cover.**

In dusty locations, use a coil scraper type (available through special order). When there is splashing or spraying of liquid, use a water-resistant cylinder (available through special order).

**3. When using auto switches, do not operate in an environment where there are strong magnetic fields.**

## Maintenance

### ⚠Warning

**1. Perform maintenance inspection and service according to the procedures indicated in the instruction manual.**

Improper handling and maintenance may cause malfunctioning and damage of machinery or equipment to occur.

**2. Removal of components, and supply/exhaust of compressed air**

Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the fall or erratic movement of driven objects and equipment, then cut off the electric power and reduce the pressure in the system to zero. Only then should you proceed with the removal of any machinery and equipment.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from lurching.

### ⚠Caution

**1. Filter drainage**

Drain out condensate from air filters regularly.

# Series CXS
# Specific Product Precautions

Be sure to read before handling.

## Mounting

## ⚠Caution

**1. Make sure that the surface on which the cylinder is to be mounted is flat (reference value for flatness: 0.05 or less ).**

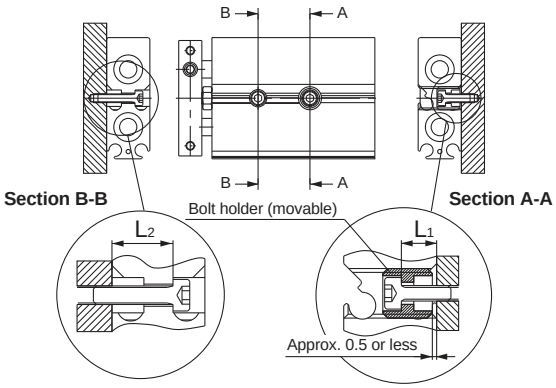
Dual-rod cylinders can be mounted from 3 directions, however, make sure that the surface on which the cylinder is to be mounted is flat (reference value for flatness: 0.5 or less). Otherwise, the accuracy of the piston rod operation is not achieved, and malfunctioning can occur.

**2. The piston rod must be retracted when mounting the cylinder.**

Scratches or gouges in the piston rod may lead to damaged bearings and seals and cause malfunctions or air leakage.

**3. CXSJ**

Adjust the bolt holder using a hexagon wrench 3mm in width across flats so that it does not protrude from the cylinder surface (approx. 0.5mm depth from the cylinder surface to the top of the holder). If the bolt holder is not properly adjusted, it can interfere with the switch rail, hindering the auto switch mounting. The required length of the mounting bolt for a bolt holder and mounting hole in the rod cover side varies depending on the bearing surface position for the mounting bolt. Refer to dimensions $L_1$ and $L_2$ provided below to select the appropriate mounting bolt length.




| | $L_1$ (mm) | $L_2$ (mm) |
|---|---|---|
| **CXSJ□6** | 5 | 8.4 |
| **CXSJ□10** | 5 | 9.5 |

## Piping

**1. Plug the appropriate supply port(s) according to the operating conditions.**

Dual-rod cylinders have 2 supply ports for each operating direction (3 supply ports for ø6 only). Plug the appropriate supply port according to the operating conditions. However, when switching the plugged port, verify air leakage. If small air leakage is detected, unplug the port, check the seat surface, and reassemble it.

**2. CXSJ**

For axial piping, the side port of the standard cylinder is plugged. However, a plugged port can be switched according to the operating conditions. When switching the plugged port, check for air leakage. If small air leakage is detected, unplug the port, check the seat surface, and reassemble it.

## Stroke Adjustment

## ⚠Caution

**1. After adjusting the stroke, make sure to tighten the hexagon nut to prevent it from loosening.**

Dual-rod cylinders have a bolt to adjust 0 to –5mm strokes on the retracted end (IN).

Loosen the hexagon nut to adjust the stroke; however, make sure to tighten the hexagon nut after making an adjustment.

**2. Never operate a cylinder with its bumper bolt removed. Also, do not attempt to tighten the bumper bolt without using a nut.**

If the bumper bolt is removed, the piston hits the head cover causing damage to the cylinder. Therefore, do not use a cylinder without a bumper bolt.

Furthermore, if the bumper bolt is tightened without a nut, the piston seal is caught in the leveled part, damaging the seal.

**3. A bumper at the end of the bumper bolt is replaceable.**

In case a missing bumper, or a bumper has a permanent settling, use a following part numbers for ordering.

| Bore size (mm) | 6, 10, 15 | 20, 25 | 32 |
|---|---|---|---|
| Part no. | CXS10-34A 28747 | CXS20-34A 28749 | CXS32-34A 28751 |
| No. of bumpers | 1 | | |

## Disassembly and Maintenance

## ⚠Caution

**1. Never use a cylinder with its plate removed.**

When removing the hexagon socket head cap screw on the end plate, the piston rod must be secured to prevent from rotating. However, if the sliding parts of the piston rod are scratched and gouged, a malfunction may occur. If the plate is not required for your applications, use the cylinder that does not come with a plate, available through Made to Order (-X593) on page 52.

**2. When disassembling and reassembling the cylinder, contact SMC or refer to the separate instruction manual.**

## ⚠Warning

**1. Take precautions when your hands are near the plate and housing.**

When the cylinder is operated, take extra precautions to avoid getting your hands and fingers caught between the plate and housing, that can cause a bodily injury.

# *Series CXS*
# Auto Switch Precautions 1

Be sure to read before handling.

## Design and Selection

## ⚠Warning

### 1. Confirm the specifications.

Read the specifications carefully and use the product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications for load current, voltage, temperature, or impact.

### 2. Take precautions when multiple cylinders are used close together.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

### 3. Monitor the length of time that a switch is ON at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V(\text{mm/s}) = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

### 4. Keep wiring as short as possible.

<Reed switches>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5m or longer.

<Solid state switches>

2) Although wire length should not affect switch function, use a wire that is 100m or shorter.

### 5. Monitor the internal voltage drop of the switch.

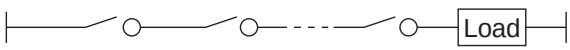
<Reed switches>

1) Switches with an indicator light (except D-Z76, D-A96, D-A96V)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

  [The voltage drop will be "n" times larger when "n" auto switches are connected.]

  Even though an auto switch operates normally, the load may not operate.




- Similarly, when operating below a specified voltage, it is possible that the load may be ineffective even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \frac{\text{Internal voltage}}{\text{drop of switch}} > \frac{\text{Minimum operating}}{\text{voltage of load}}$$

2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (D-Z80, D-A90, D-A90V).

<Solid state switches>

3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1) above.

   Also note that a 12VDC relay is not applicable.

### 6. Monitor leakage current.

<Solid state switches>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

If the condition given in the below formula is not met, the switch will not reset correctly (it stays ON).

Current to operate load (OFF condition) > Leakage current

Use a 3-wire switch if this condition cannot be satisfied. Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

### 7. Do not use a load that generates surge voltage.

<Reed switches>

If driving a load that generates surge voltage, such as a relay, use a switch with a built-in contact protection circuit or a contact protection box.

<Solid state switches>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if a surge is applied repeatedly. When directly driving a load that generates surge, such as a relay or solenoid valve, use a switch with a built-in surge absorbing element.

### 8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to safeguard against malfunctions by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also perform periodic maintenance inspections and confirm proper operation.

### 9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

# *Series CXS*
# Auto Switch Precautions 2

Be sure to read before handling.

## Mounting and Adjustment

## ⚠Warning

### 1. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (300m/s² or more for reed switches and 1000m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

### 2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

### 3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of tightening torque, the mounting screws or switch may be damaged.

On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position.

### 4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalog indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), the operation will be unstable.

## Wiring

## ⚠Warning

### 1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to the lead wires.

### 2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned on when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

### 3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (such as contact with other circuits, ground fault, improper insulation between terminals). Damage may occur due to excess current flow into a switch.

### 4. Do not wire in conjunction with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise from these other lines.

## Wiring

## ⚠Warning

### 5. Do not allow short circuiting of loads.

<Reed switches>

If the power is turned on with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

Take special care to avoid reverse wiring with the brown [red] power supply line and the black [white] output line on 3-wire type switches.

### 6. Avoid incorrect wiring.

<Reed switches>

A 24VDC switch with indicator light has polarity. The brown [red] lead wire is (+), and the blue [black] lead wire is (–).

1) If connections are reversed, the switch will still operate, but the light emitting diode will not light up.

   Also note that a current greater than the maximum specified one will damage a light emitting diode and make it inoperable.

   Applicable models: D-A93, D-A93V, D-Z73

<Solid state switches>

1) Even if connections are reversed on a 2-wire type switch, the switch will not be damaged because it is protected by a protection circuit, but it will remain in a normally ON state. However, it is still necessary to avoid reversed connections since the switch will be damaged if a load short circuits in this condition.
2) Even if (+) and (–) power supply line connections are reversed on a 3-wire type switch, the switch will still be protected by a protection circuit. However, if the (+) power supply line is connected to the blue [black] wire and the (–) power supply line is connected to the black [white] wire, the switch will be damaged.

### ∗ Lead wire colour changes

Lead wire colours of SMC switches have been changed in order to meet NECA Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided.
Special care should be taken regarding wire polarity during the time that the old colours still coexist with the new colours.

**2-wire**

| | Old | New |
|---|---|---|
| Output (+) | Red | Brown |
| Output (–) | Black | Blue |

**3-wire**

| | Old | New |
|---|---|---|
| Power supply (+) | Red | Brown |
| Power supply GND | Black | Blue |
| Output | White | Black |

**Solid state with diagnostic output**

| | Old | New |
|---|---|---|
| Power supply (+) | Red | Brown |
| Power supply GND | Black | Blue |
| Output | White | Black |
| Diagnostic output | Yellow | Orange |

**Solid state with latch type diagnostic output**

| | Old | New |
|---|---|---|
| Power supply (+) | Red | Brown |
| Power supply GND | Black | Blue |
| Output | White | Black |
| Latch type diagnostic output | Yellow | Orange |

# Series CXS
# Auto Switch Precautions 3
Be sure to read before handling.

## Operating Environment

### ⚠Warning

**1. Never use in the presence of explosive gases.**

The construction of our auto switches does not make them explosion-proof. Never use them in the presence of an explosive gas, as this may cause a serious explosion

**2. Do not use in an area where a magnetic field is generated.**

Auto switches will malfunction or magnets inside cylinders will become demagnetized if used in such an environment.

**3. Do not use in an environment where the auto switch will be continually exposed to water.**

Auto switches satisfy IEC standard IP67 construction (JIS C0920: watertight construction). Nevertheless, they should not be used in applications where they are continually exposed to water splash or spray. This may cause deterioration of the insulation or swelling of the potting resin inside switches and may lead to a malfunction.

**4. Do not use in an environment laden with oil or chemicals.**

Consult with SMC if auto switches will be used in an environment laden with coolants, cleaning solvents, various oils, or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by a deterioration of the insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.

**5. Do not use in an environment with temperature cycles.**

Consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

**6. Do not use in an environment where there is excessive impact shock.**

<Reed switches>

When excessive impact (300m/s² or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1ms or less). Consult with SMC regarding the need to use a solid state switch depending on the environment.

**7. Do not use in an area where surges are generated.**

<Solid state switch>

When there are units (such as solenoid type lifters, high frequency induction furnaces, motors) that generate a large amount of surge in the area around cylinders with solid state auto switches, their proximity may cause deterioration or damage to the internal circuit elements of the switches. Avoid and protect against sources of surge generation and crossed lines.

**8. Avoid close contact with accumulated iron waste or magnetic substances.**

When a large accumulated amount of ferrous waste such as machining chips or welding spatter, or a magnetic substance (something attracted by a magnet) is brought into close proximity to an cylinder with auto switches, this may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.

## Maintenance

### ⚠Warning

**1. Perform the following maintenance inspection and services periodically in order to prevent possible danger due to unexpected auto switch malfunction.**

1) Securely tighten switch mounting screws.
If screws become loose or the mounting position is dislocated, retighten screws securely after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.
To prevent faulty insulation, replace switches or repair lead wires if damage is discovered.

3) Confirm that the green light on the 2-color indicator type switch lights up.
Confirm that the Green LED is ON when stopped at the set position. If the Red LED is ON when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the Green LED lights up.

## Other

### ⚠Warning

**1. Consult with SMC concerning water resistance, elasticity of lead wires, and usage at welding sites.**

# ⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

**⚠ Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**⚠ Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**⚠ Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - Safety.
etc.

## ⚠ Warning

**1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

**2. Only personnel with appropriate training should operate machinery and equipment.**
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

**3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

**4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

## ⚠ Caution

**1. The product is provided for use in manufacturing industries.**
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

# Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

## Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, wichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

## Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## ⚠ Caution

**SMC products are not intended for use as instruments for legal metrology.**
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

**⚠ Safety Instructions** | Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.


**SMC Corporation (Europe)**

| | | | |
|---|---|---|---|
| Austria | ☎+43 (0)2262622800 | www.smc.at | office@smc.at |
| Belgium | ☎+32 (0)33551464 | www.smcpneumatics.be | info@smcpneumatics.be |
| Bulgaria | ☎+359 (0)2807670 | www.smc.bg | office@smc.bg |
| Croatia | ☎+385 (0)13707288 | www.smc.hr | office@smc.hr |
| Czech Republic | ☎+420 541424611 | www.smc.cz | office@smc.cz |
| Denmark | ☎+45 70252900 | www.smcdk.com | smc@smcdk.com |
| Estonia | ☎+372 6510370 | www.smcpneumatics.ee | smc@smcpneumatics.ee |
| Finland | ☎+358 207513513 | www.smc.fi | smcfi@smc.fi |
| France | ☎+33 (0)164761000 | www.smc-france.fr | info@smc-france.fr |
| Germany | ☎+49 (0)61034020 | www.smc.de | info@smc.de |
| Greece | ☎+30 210 2717265 | www.smchellas.gr | sales@smchellas.gr |
| Hungary | ☎+36 23511390 | www.smc.hu | office@smc.hu |
| Ireland | ☎+353 (0)14039000 | www.smcpneumatics.ie | sales@smcpneumatics.ie |
| Italy | ☎+39 0292711 | www.smcitalia.it | mailbox@smcitalia.it |
| Latvia | ☎+371 67817700 | www.smclv.lv | info@smclv.lv |
| Lithuania | ☎+370 5 2308118 | www.smclt.lt | info@smclt.lt |
| Netherlands | ☎+31 (0)205318888 | www.smcpneumatics.nl | info@smcpneumatics.nl |
| Norway | ☎+47 67129020 | www.smc-norge.no | post@smc-norge.no |
| Poland | ☎+48 222119600 | www.smc.pl | office@smc.pl |
| Portugal | ☎+351 226166570 | www.smc.eu | postpt@smc.smces.es |
| Romania | ☎+40 213205111 | www.smcromania.ro | smcromania@smcromania.ro |
| Russia | ☎+7 8127185445 | www.smc-pneumatik.ru | info@smc-pneumatik.ru |
| Slovakia | ☎+421 (0)413213212 | www.smc.sk | office@smc.sk |
| Slovenia | ☎+386 (0)73885412 | www.smc.si | office@smc.si |
| Spain | ☎+34 902184100 | www.smc.eu | post@smc.smces.es |
| Sweden | ☎+46 (0)86031200 | www.smc.nu | post@smc.nu |
| Switzerland | ☎+41 (0)523963131 | www.smc.ch | info@smc.ch |
| Turkey | ☎+90 212 489 0 440 | www.smcpnomatik.com.tr | info@smcpnomatik.com.tr |
| UK | ☎+44 (0)845 121 5122 | www.smcpneumatics.co.uk | sales@smcpneumatics.co.uk |

**SMC CORPORATION** Akihabara UDX 15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN Phone: 03-5207-8249 FAX: 03-5298-5362



1st printing TT printing TU 00 Printed in Spain