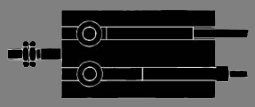


# Free Mount Cylinder

# *Series CU*

**ø6, ø10, ø16, ø20, ø25, ø32**

## A space-saving air cylinder with multiple surfaces for mounting. The series consist of an array of cylinders.

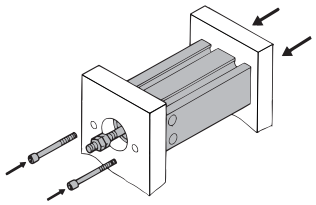
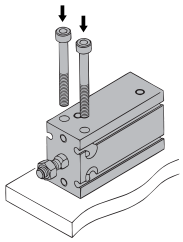
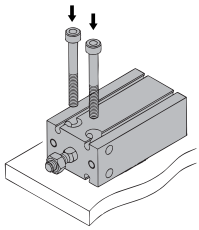
### Space-saving

Having a square shape without a bracket, any of its surfaces can be used for mounting, thus enabling a space saving equipment layout.

### Auto switch capable



**Mounting**

| Axial mounting (Body tapped hole) | Vertical mounting (Body through-hole) | Lateral mounting (Body through-hole) |
|---|---|---|
|  |  |  |

**Series Variations**

| Series | Action | Rod | Basic | Standard variations: Built-in magnet | Standard variations: Copper-free | Bore size (mm) | Page |
|---|---|---|---|---|---|---|---|
| **Standard** *Series CU*  | Double acting | Single rod | ● | ● | ● | 6, 10, 16, 20, 25, 32 | 7-3-4 |
| | | Double rod | ● | ● | ● | | 7-3-10 |
| | Single acting | Single rod (Spring return/ Spring extend) | ● | ● | ● | | 7-3-15 |
| **Non-rotating Rod** *Series CUK*  | Double acting | Single rod | ● | ● | ● | | 7-3-24 |
| | | Double rod | ● | ● | ● | | 7-3-28 |
| | Single acting | Single rod (Spring return/ Spring extend) | ● | ● | ● | | 7-3-32 |
| **Long Stroke, Standard** *Series CU*  | Double acting | Single rod | ● | ● | ● | 6, 10, 16, 20, 25, 32 | 7-3-38 |
| **Long Stroke, Non-rotating Rod** *Series CUK*  | Double acting | Single rod | ● | ● | ● | | 7-3-42 |

**Applicable Auto Switch**

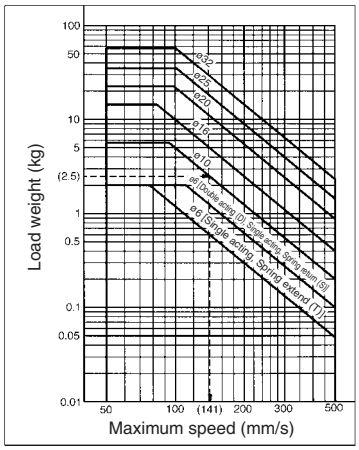
| | | |
|---|---|---|
| Direct mounting | Reed switch | D-A9□, D-A9□V |
| | Solid state switch | D-M9□, D-M9□V<br>D-F9□W, D-F9□WV |

## Precautions on Free Mount

### 1. Operating speed

Make sure to connect a speed controller to the cylinder and adjust its speed to 500 mm/s or less.
If a load is to be attached to the end of the rod, adjust the speed to the maximum speed shown in Graph (1) or less, in accordance with the added mass.

**Graph (1) Load Weight and Maximum Speed**




How to read the graph
- Using the CU10 to drive a load weighing 2.5 kg: From the vertical axis in the graph on the left, extend the horizontally from 2.5 kg., and drop down from the point at which it intersects with the tube bore ø10. The maximum speed will be 141 mm/s.

### 2. Rod end allowable lateral load

Make sure that the lateral load that is applied to the rod end will be no more than the values shown in the tables.
The tables show the value for a single rod. For double rods, please contact SMC.

## Standard Double Acting, Single Rod

**Without auto switch: CU□-□D** (N)

| Model | Stroke (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **CU6** | 0.085 | 0.075 | 0.068 | 0.061 | 0.056 | 0.052 | 0.045 | 0.039 | 0.035 | — | — | — | — |
| **CU10** | 0.34 | 0.30 | 0.27 | 0.25 | 0.23 | 0.21 | 0.18 | 0.16 | 0.15 | — | — | — | — |
| **CU16** | 0.69 | 0.61 | 0.55 | 0.50 | 0.46 | 0.43 | 0.37 | 0.33 | 0.29 | — | — | — | — |
| **CU20** | 2.2 | 2.0 | 1.8 | 1.6 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.92 | 0.85 | 0.78 | 0.73 |
| **CU25** | 3.5 | 3.2 | 3.0 | 2.7 | 2.6 | 2.4 | 2.1 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 |
| **CU32** | 5.4 | 4.9 | 4.6 | 4.3 | 4.0 | 3.8 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 |

**With auto switch: CDU□-□D** (N)

| Model | Stroke (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **CDU6** | 0.085 | 0.075 | 0.068 | 0.061 | 0.056 | 0.052 | 0.045 | 0.039 | 0.035 | — | — | — | — |
| **CDU10** | 0.34 | 0.30 | 0.27 | 0.25 | 0.23 | 0.21 | 0.18 | 0.16 | 0.15 | — | — | — | — |
| **CDU16** | 0.99 | 0.89 | 0.81 | 0.74 | 0.69 | 0.64 | 0.56 | 0.50 | 0.45 | — | — | — | — |
| **CDU20** | 3.0 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| **CDU25** | 4.7 | 4.3 | 4.0 | 3.7 | 3.5 | 3.2 | 2.9 | 2.6 | 2.4 | 2.2 | 2.0 | 1.9 | 1.7 |
| **CDU32** | 7.1 | 6.6 | 6.1 | 5.7 | 5.4 | 5.1 | 4.6 | 4.1 | 3.8 | 3.5 | 3.2 | 3.0 | 2.8 |

## Single Acting, Spring Return (S)

**Without auto switch: CU□-□S** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CU6** | 0.19 | 0.17 | 0.15 |
| **CU10** | 0.66 | 0.59 | 0.60 |
| **CU16** | 1.4 | 1.3 | 1.3 |
| **CU20** | 4.7 | 4.2 | 4.4 |
| **CU25** | 6.8 | 6.2 | 6.5 |
| **CU32** | 10 | 9.8 | 10 |

**With auto switch: CDU□-□S** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CDU6** | 0.17 | 0.15 | 0.13 |
| **CDU10** | 0.66 | 0.59 | 0.60 |
| **CDU16** | 1.6 | 1.5 | 1.5 |
| **CDU20** | 5.3 | 4.8 | 4.9 |
| **CDU25** | 7.6 | 7.0 | 7.2 |
| **CDU32** | 12 | 11 | 11 |

## Single Acting, Spring Extend (T)

**Without auto switch: CU□-□T** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CU6** | 0.067 | 0.059 | 0.052 |
| **CU10** | 0.29 | 0.26 | 0.24 |
| **CU16** | 0.99 | 0.89 | 0.81 |
| **CU20** | 2.2 | 2.0 | 1.8 |
| **CU25** | 3.5 | 3.2 | 3.0 |
| **CU32** | 5.4 | 4.9 | 4.6 |

**With auto switch: CDU□-□T** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CDU6** | 0.062 | 0.055 | 0.049 |
| **CDU10** | 0.29 | 0.26 | 0.24 |
| **CDU16** | 0.99 | 0.89 | 0.81 |
| **CDU20** | 3.0 | 2.7 | 2.5 |
| **CDU25** | 4.7 | 4.3 | 4.0 |
| **CDU32** | 7.1 | 6.6 | 6.1 |

## Non-rotating Rod Type

**Without auto switch: CUK□-□D** (N)

| Model | Stroke (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **CUK6** | 0.075 | 0.068 | 0.061 | 0.056 | 0.052 | 0.048 | 0.042 | 0.037 | 0.033 | — | — | — | — |
| **CUK10** | 0.30 | 0.27 | 0.25 | 0.23 | 0.21 | 0.20 | 0.17 | 0.15 | 0.14 | — | — | — | — |
| **CUK16** | 0.55 | 0.50 | 0.46 | 0.43 | 0.40 | 0.37 | 0.33 | 0.29 | 0.26 | — | — | — | — |
| **CUK20** | 1.8 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.92 | 0.85 | 0.78 | 0.73 | 0.68 |
| **CUK25** | 3.0 | 2.7 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.2 |
| **CUK32** | 4.3 | 4.0 | 3.8 | 3.5 | 3.3 | 3.2 | 2.9 | 2.6 | 2.4 | 2.2 | 2.1 | 2.0 | 1.8 |

**With auto switch: CDUK□-□D** (N)

| Model | Stroke (mm) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **CDUK6** | 0.075 | 0.068 | 0.061 | 0.056 | 0.052 | 0.048 | 0.042 | 0.037 | 0.033 | — | — | — | — |
| **CDUK10** | 0.30 | 0.27 | 0.25 | 0.23 | 0.21 | 0.20 | 0.17 | 0.15 | 0.14 | — | — | — | — |
| **CDUK16** | 0.81 | 0.74 | 0.69 | 0.64 | 0.60 | 0.56 | 0.50 | 0.45 | 0.41 | — | — | — | — |
| **CDUK20** | 2.5 | 2.3 | 2.1 | 2.0 | 1.9 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 |
| **CDUK25** | 4.0 | 3.7 | 3.5 | 3.2 | 3.1 | 2.9 | 2.6 | 2.4 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 |
| **CDUK32** | 5.7 | 5.4 | 5.1 | 4.8 | 4.6 | 4.4 | 4.0 | 3.6 | 3.4 | 3.1 | 2.9 | 2.7 | 2.6 |

## Non-rotating Rod Type

**Single Acting, Spring Return (S)**

**Without auto switch: CUK□-□S** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CUK6** | 0.17 | 0.15 | 0.14 |
| **CUK10** | 0.59 | 0.54 | 0.56 |
| **CUK16** | 1.1 | 1.0 | 1.1 |
| **CUK20** | 3.9 | 3.6 | 3.8 |
| **CUK25** | 5.7 | 5.3 | 5.7 |
| **CUK32** | 8.5 | 7.9 | 8.6 |

**With auto switch: CDUK□-□S** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CDUK6** | 0.15 | 0.13 | 0.12 |
| **CDUK10** | 0.59 | 0.54 | 0.56 |
| **CDUK16** | 1.3 | 1.2 | 1.3 |
| **CDUK20** | 4.4 | 4.1 | 4.3 |
| **CDUK25** | 6.5 | 6.1 | 6.4 |
| **CDUK32** | 9.7 | 9.1 | 9.6 |

## Non-rotating Rod Type

**Single Acting, Spring Extend (T)**

**Without auto switch: CUK□-□T** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CUK6** | 0.059 | 0.052 | 0.047 |
| **CUK10** | 0.26 | 0.24 | 0.22 |
| **CUK16** | 0.81 | 0.74 | 0.69 |
| **CUK20** | 1.8 | 1.6 | 1.5 |
| **CUK25** | 3.0 | 2.7 | 2.6 |
| **CUK32** | 4.3 | 4.0 | 3.8 |

**With auto switch: CDUK□-□T** (N)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **CDUK6** | 0.055 | 0.049 | 0.044 |
| **CDUK10** | 0.26 | 0.24 | 0.22 |
| **CDUK16** | 0.81 | 0.74 | 0.69 |
| **CDUK20** | 2.5 | 2.3 | 2.1 |
| **CDUK25** | 4.0 | 3.7 | 3.5 |
| **CDUK32** | 5.7 | 5.4 | 5.1 |

# Free Mount Cylinder
# Double Acting, Single Rod
# *Series CU*
## ø6, ø10, ø16, ø20, ø25, ø32

## How to Order

**Without auto switch** CU 6 — 30 D

**With auto switch** CDU 6 — 30 D — F9BW ☐

**Built-in magnet**

**Bore size**

| | |
|---|---|
| **6** | 6 mm |
| **10** | 10 mm |
| **16** | 16 mm |
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |

**Standard stroke (mm)**

| | |
|---|---|
| **ø6, ø10, ø16** | 5, 10, 15, 20, 25, 30 |
| **ø20, ø25, ø32** | 5, 10, 15, 20, 25, 30, 40, 50 |

**Action**

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

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch |

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

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |

**Applicable Auto Switch**/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage | | | Auto switch model | | Lead wire length (m)∗ | | | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DC | | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.

**JIS Symbol**

Double acting,
Single rod

## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.12 MPa | 0.06 MPa | | 0.05 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16** | 5, 10, 15, 20, 25, 30 |
| **20**, **25**, **32** | 5, 10, 15, 20, 25, 30, 40, 50 |

For "Long Stroke", refer to page 7-3-38.

## Minimum Stroke for Auto Switch Mounting

(mm)

| No. of auto switches mounted | Applicable auto switch | | |
|---|---|---|---|
| | **D-A9□, D-A9□V** | **D-M9□, D-M9□V** | **D-F9□W, D-F9□WV** |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

## Theoretical Output

(N)

| Bore size (mm) | Rod size (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | |
|---|---|---|---|---|---|---|
| | | | | 0.3 | 0.5 | 0.7 |
| **6** | 3 | OUT | 28.3 | 8.49 | 14.2 | 19.8 |
| | | IN | 21.2 | 6.36 | 10.6 | 14.8 |
| **10** | 4 | OUT | 78.5 | 23.6 | 39.3 | 55.0 |
| | | IN | 66.0 | 19.8 | 33.0 | 46.2 |
| **16** | 6 | OUT | 201 | 60.3 | 101 | 141 |
| | | IN | 172 | 51.6 | 86.0 | 121 |
| **20** | 8 | OUT | 314 | 94.2 | 157 | 220 |
| | | IN | 264 | 79.2 | 132 | 185 |
| **25** | 10 | OUT | 491 | 147 | 246 | 344 |
| | | IN | 412 | 124 | 206 | 288 |
| **32** | 12 | OUT | 804 | 241 | 402 | 563 |
| | | IN | 691 | 207 | 346 | 454 |

## Weight

/( ): Denotes the values with D-A93.

(g)

| Model | Cylinder stroke (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| **C(D)U6-□D** | 22 (27) | 25 (35) | 28 (38) | 31 (41) | 34 (44) | 37 (47) | — | — |
| **C(D)U10-□D** | 36 (41) | 40 (50) | 44 (54) | 48 (58) | 52 (62) | 56 (66) | — | — |
| **C(D)U16-□D** | 50 (75) | 56 (86) | 62 (92) | 68 (98) | 74 (104) | 80 (110) | — | — |
| **C(D)U20-□D** | 95 (128) | 106 (143) | 117 (154) | 128 (165) | 139 (176) | 150 (187) | 172 (209) | 194 (231) |
| **C(D)U25-□D** | 176 (230) | 193 (252) | 210 (269) | 227 (286) | 244 (303) | 261 (320) | 295 (354) | 329 (388) |
| **C(D)U32-□D** | 262 (335) | 286 (364) | 310 (388) | 334 (412) | 358 (436) | 382 (460) | 430 (508) | 478 (556) |

∗ For the auto switch weight, refer to page 7-9-1.

## Made to Order Specifications (For details, refer to page 7-10-1.)

| Symbol | Specifications |
|---|---|
| **-XB6** | Heat resistant cylinder (150°C) |
| **-XB7** | Cold resistant cylinder |
| **-XB9** | Low speed cylinder (10 to 50 mm/s) |
| **-XB13** | Low speed cylinder (5 to 50 mm/s) |
| **-XC18** | NPT finish piping port |
| **-XC19** | Intermediate stroke (Compliant for spacer) |
| **-XC22** | Fluoro rubber seals |

**Refer to "Pneumatic Clean Series" catalog for clean room specifications.**

## Tightening Torque

When mounting Series CU, refer to the below table.

| Bore size (mm) | Hexagon socket head cap screw dia. (mm) | Proper tightening torque (N·m) |
|---|---|---|
| **6**, **10** | M3 | 1.08 ±10% |
| **16** | M4 | 2.45 ±10% |
| **20**, **25** | M5 | 5.10 ±10% |
| **32** | M6 | 8.04 ±10% |

## Copper-free

**20-CU** **Bore size** — **Stroke** **D**

**•Copper-free**

The type which prevents copper based ions from generating by changing the copper based materials into electroless nickel plated treatment or non-copper materials in order to eliminate the effects by copper based ions or fluororesins over the color cathode ray tube.

### Minimum Operating Pressure

(MPa)

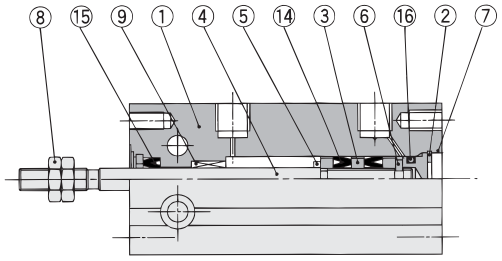
| Bore size (mm) | 6 | 10, 16 | 20, 25, 32 |
|---|---|---|---|
| Minimum operating pressure | 0.12 | 0.06 | 0.05 |

### Specifications

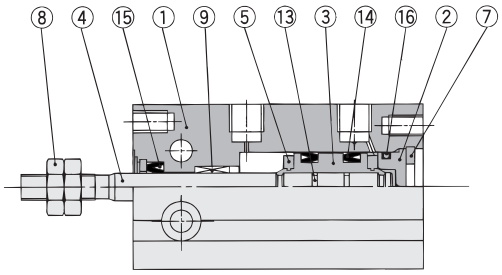
| | |
|---|---|
| Action | Double acting, Single rod |
| Bore size (mm) | 6, 10, 16, 20, 25, 32 |
| Maximum operating pressure | 1.05 MPa |
| Cushion | Rubber bumper |
| Stroke | Same as standard model (Refer to page 7-3-4.) |
| Auto switch | Mountable |

## Construction

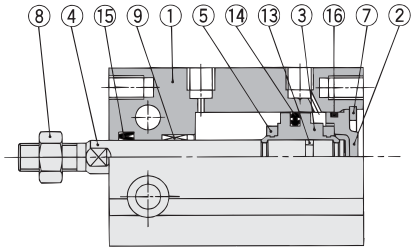
**ø6**



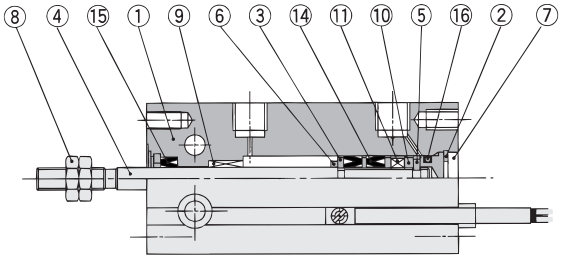

**ø10**

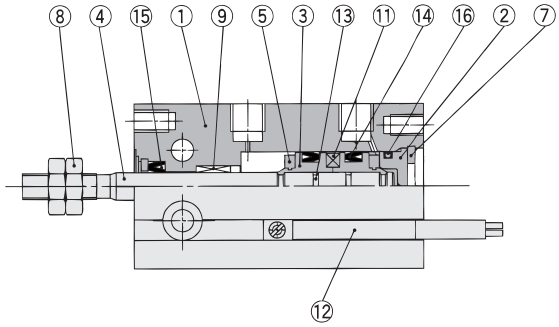


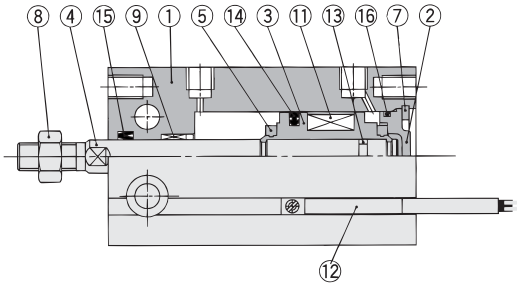

**ø16 to ø32**




**With auto switch**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ③ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ④ | Piston rod | Stainless steel | |
| ⑤ | Bumper A | Urethane | |
| ⑥ | Bumper B | Urethane | |
| ⑦ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑧ | Rod end nut | Carbon steel | Nickel plated |
| ⑨ | Bushing | Oil-impregnated sintered alloy | |
| ⑩ | Magnet holder | Brass | ø6 |
| ⑪ | Magnet | Magnetic material | |
| ⑫ | Auto switch | — | |
| ⑬ | Piston gasket | NBR | |
| ⑭* | Piston seal | | |
| ⑮* | Rod seal | | |
| ⑯* | Gasket | | |

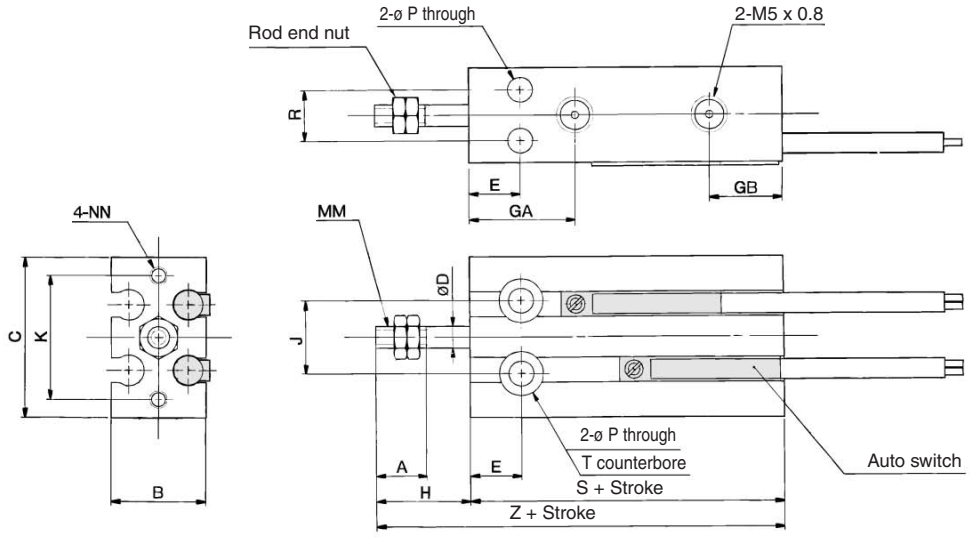
### Replacement Parts: Seal Kit

| Bore size (mm) | Kit no. | Contents |
|---|---|---|
| 10 | CU10D-PS | Set of nos. above ⑭, ⑮, ⑯ |
| 16 | CU16D-PS | |
| 20 | CU20D-PS | |
| 25 | CU25D-PS | |
| 32 | CU32D-PS | |

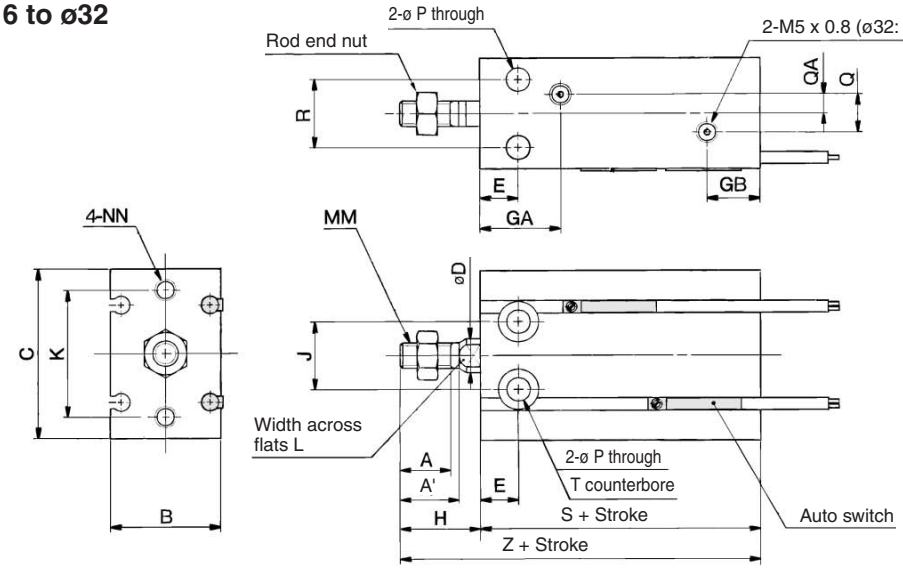
* Seal kit includes ⑭, ⑮, ⑯. Order the seal kit, based on each bore size.

## Dimensions: Double Acting, Single Rod

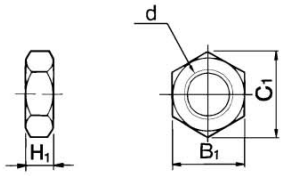
### ø6, ø10




### ø16 to ø32




### Rod End Nut/Accessory




Material: Carbon steel

| Part no. | Applicable bore (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

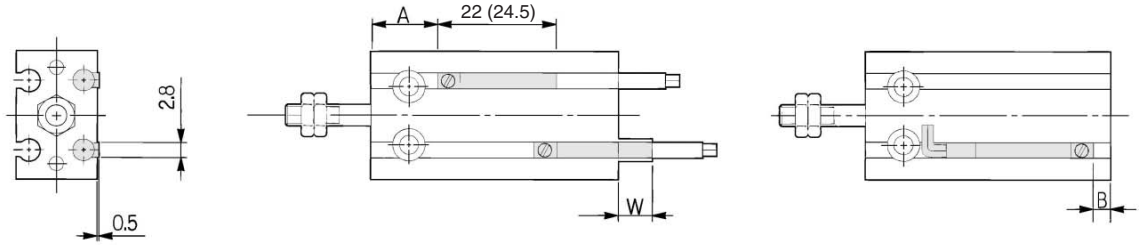
| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 15 | 10 | 13 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 | 3.2 | — | — |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 | 3.2 | — | — |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5[Note] | 11.5 | 16 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 | 4.5 | 4 | 2 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 12.5 | 19 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 13 | 23 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 23 | 12.5 | 27 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 |

| Bore size (mm) | R | T | Without auto switch | | With auto switch | |
|---|---|---|---|---|---|---|
| | | | S | Z | S | Z |
| **6** | 7 | 6 depth 4.8 | 33 | 46 | 33 | 46 |
| **10** | 9 | 6 depth 5 | 36 | 52 | 36 | 52 |
| **16** | 12 | 7.6 depth 6.5 | 30 | 46 | 40 | 56 |
| **20** | 16 | 9.3 depth 8 | 36 | 55 | 46 | 65 |
| **25** | 20 | 9.3 depth 9 | 40 | 63 | 50 | 73 |
| **32** | 24 | 11 depth 11.5 | 42 | 69 | 52 | 79 |

Note) 5 stroke (CU16-5D): 14.5 mm

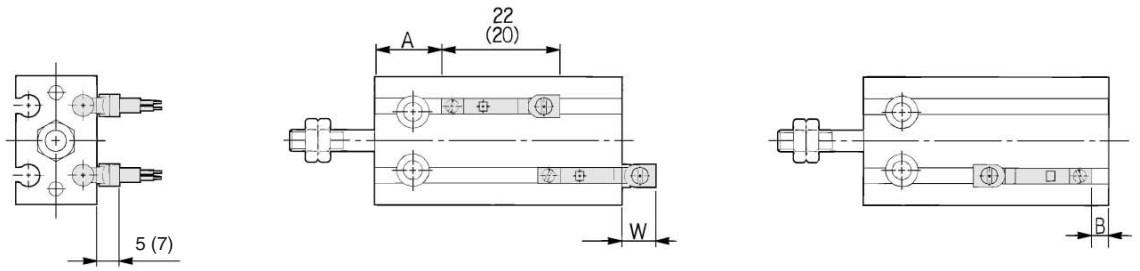
## Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

**D-A9□**
**D-M9□**
**D-F9□W**




( ): Denotes the values of D-A93.

**D-A9□V**
**D-M9□V**
**D-F9□WV**




( ): Denotes the values of D-M9□V, D-F9□WV.

### CDU Double Acting, Single Rod

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-F9□W | | | D-M9□V, D-F9□WV | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | W | A | B | W | A | B | W |
| **6** | 13.5 | –0.5 | 2.5(5) | 17.5 | 3.5 | 6.5 | 17.5 | 3.5 | 4.5 |
| **10** | 12.5 | 3.5 | –1.5(1) | 16.5 | 7.5 | 2.5 | 16.5 | 7.5 | 0.5 |
| **16** | 16 | 4 | –2(0.5) | 20 | 8 | 1.5 | 20 | 8 | –0.5 |
| **20** | 20 | 6 | –4(–1.5) | 24 | 10 | 0 | 24 | 10 | –2 |
| **25** | 22.5 | 7 | –5.5(–3) | 26.5 | 11 | –1.5 | 26.5 | 11 | –3.5 |
| **32** | 23.5 | 8.5 | –6.5(–4) | 27.5 | 12.5 | –2.5 | 27.5 | 12.5 | –4.5 |

Note 1) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.
Note 2) In the case of the 5 stroke or the 10 stroke, there are times in which the switch will not turn OFF or 2 switches will turn ON simultaneously due to their movement range. Therefore, set the position approximately 1 to 4 mm outward from the values given in the table above. Then, perform an operation inspection to make sure that the switches operate normally (if 1 switch is used, make sure that it turns ON and OFF properly; if 2 switches are used, make sure that both switches turn ON).

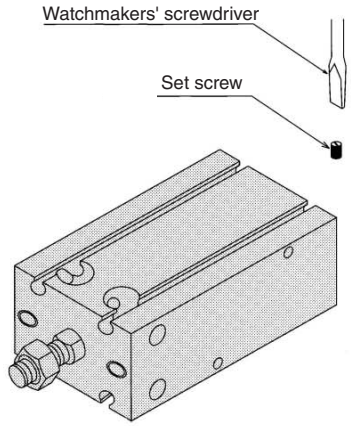
## Operating Range

| Auto switch model | Bore size (mm) | | | | | |
|---|---|---|---|---|---|---|
| | 6 | 10 | 16 | 20 | 25 | 32 |
| **D-A9□/A9□V** | 5 | 6 | 9 | 11 | 12.5 | 14 |
| **D-M9□/M9□V** | 2.5 | 2.5 | 3.5 | 5 | 5 | 5 |
| **D-F9□W/F9□WV** | 3 | 3.5 | 5.5 | 6.5 | 7 | 7 |

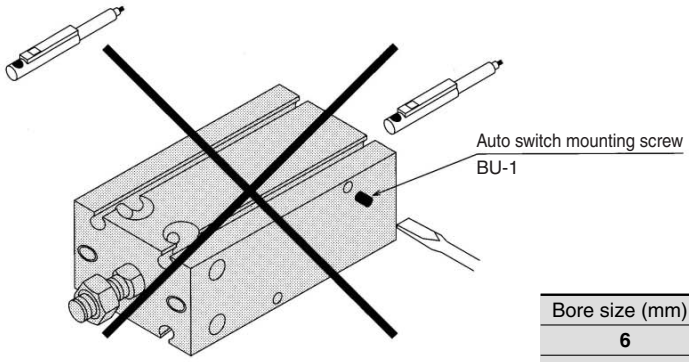
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

## Mounting of Auto Switch

**D-A9□/M9□/A9□V/M9□V/F9□W/F9□WV**

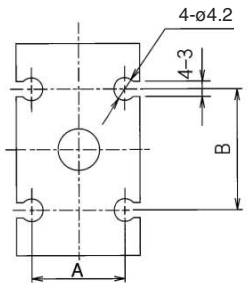



- When tightening an auto switch mounting screw, use a watchmakers' screwdriver with a grip diameter of 5 to 6 mm.
- Use a tightening torque of approximately 0.10 to 0.20 N·m.




- Never use BU-1 (Mounting screw for D-9□ auto switch).
(Auto switch may be damaged.)

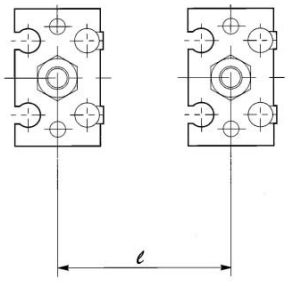
## Auto Switch Groove




| Bore size (mm) | A | B |
|---|---|---|
| **6** | 8.2 | 9 |
| **10** | 10.3 | 13 |
| **16** | 15 | 18 |
| **20** | 21 | 23 |
| **25** | 27 | 25 |
| **32** | 35 | 27 |

## Caution on Proximity Installation

When universal mounting cylinders equipped with D-A9□ or D-M9□ auto switches are used, the auto switches could activate unintentionally if the installed distance is less than the dimensions shown in the table. Therefore, make sure to provide a greater clearance. Due to unavoidable circumstances, if they must be used with less distance than the dimensions given in the table, the cylinders must be shielded. Therefore, affix a steel plate or a magnetic shield plate (MU-S025) to the area on the cylinder that corresponds to the adjacent auto switch. (Please contact SMC for details.)




| Bore size (mm) | Mounting pitch ℓ (mm) |
|---|---|
| **6** | 18 |
| **10** | 20 |
| **16** | 33 |
| **20** | 40 |
| **25** | 46 |
| **32** | 56 |

Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted. For detailed specifications, refer to page 7-9-1.

| Type | Model | Electrical entry (Fetching direction) | Features |
|---|---|---|---|
| Reed switch | D-A90 | Grommet (In-line) | Without indicator light |
| | D-A90V | Grommet (Perpendicular) | |

∗ Normally closed (NC = b contact), solid state switch (D-F9G/F9H type) are also available. For details, refer to page 7-9-23.

# Free Mount Cylinder
# Double Acting, Double Rod
# *Series CUW*
## ø6, ø10, ø16, ø20, ø25, ø32

## How to Order

**Without auto switch** CUW **6** — **30** **D**

**With auto switch** CDUW **6** — **30** **D** — **F9BW** ☐

**Built-in magnet**

**Double rod**

**Bore size**

| | |
|---|---|
| **6** | 6 mm |
| **10** | 10 mm |
| **16** | 16 mm |
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |

**Standard stroke (mm)**

| | |
|---|---|
| **ø6, ø10, ø16** | 5, 10, 15, 20, 25, 30 |
| **ø20, ø25, ø32** | 5, 10, 15, 20, 25, 30, 40, 50 |

**Action**

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

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch |

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

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |

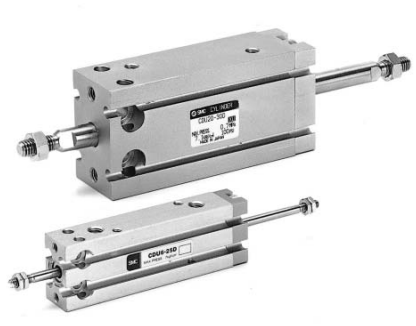
### Applicable Auto Switch/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length (m)∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.



**JIS Symbol**
Double acting,
Double rod

## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.15 MPa | 0.10 MPa | | 0.08 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16** | 5, 10, 15, 20, 25, 30 |
| **20**, **25**, **32** | 5, 10, 15, 20, 25, 30, 40, 50 |

## Minimum Stroke for Auto Switch Mounting (mm)

| No. of auto switches mounted | Applicable auto switch | | |
|---|---|---|---|
| | **D-A9□, D-A9□V** | **D-M9□, D-M9□V** | **D-F9□W, D-F9□WV** |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

## Theoretical Output (N)

| Bore size (mm) | Rod size (mm) | Piston area ($mm^2$) | Operating pressure (MPa) | | |
|---|---|---|---|---|---|
| | | | 0.3 | 0.5 | 0.7 |
| **6** | 3 | 21.2 | 6.36 | 10.6 | 14.8 |
| **10** | 4 | 66.0 | 19.8 | 33.0 | 46.2 |
| **16** | 6 | 172 | 51.6 | 86.0 | 121 |
| **20** | 8 | 264 | 79.2 | 132 | 185 |
| **25** | 10 | 412 | 124 | 206 | 288 |
| **32** | 12 | 691 | 207 | 346 | 484 |

## Weight (g)

/( ): Denotes the values with D-A93.

| Model | Stroke (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| **C(D)UW6-□D** | 27 (32) | 30 (40) | 34 (44) | 37 (47) | 40 (50) | 44 (54) | — | — |
| **C(D)UW10-□D** | 44 (49) | 49 (59) | 53 (63) | 58 (68) | 62 (72) | 67 (77) | — | — |
| **C(D)UW16-□D** | 74 (99) | 81 (111) | 88 (118) | 95 (125) | 102 (132) | 109 (139) | — | — |
| **C(D)UW20-□D** | 132 (165) | 145 (182) | 158 (195) | 171 (208) | 184 (221) | 197 (234) | 223 (260) | 250 (287) |
| **C(D)UW25-□D** | 240 (294) | 260 (319) | 280 (339) | 300 (359) | 321 (380) | 341 (400) | 381 (440) | 421 (480) |
| **C(D)UW32-□D** | 365 (438) | 394 (472) | 422 (500) | 451 (529) | 479 (557) | 508 (586) | 586 (664) | 622 (700) |

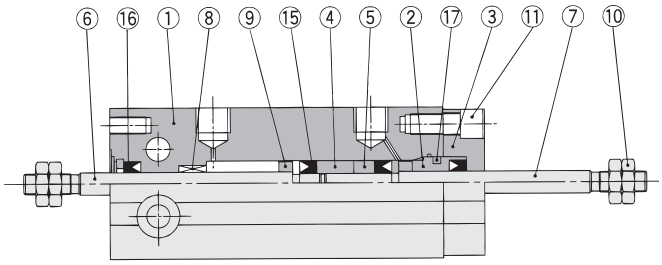
∗ For the auto switch weight, refer to page 7-9-1.

## Tightening Torque

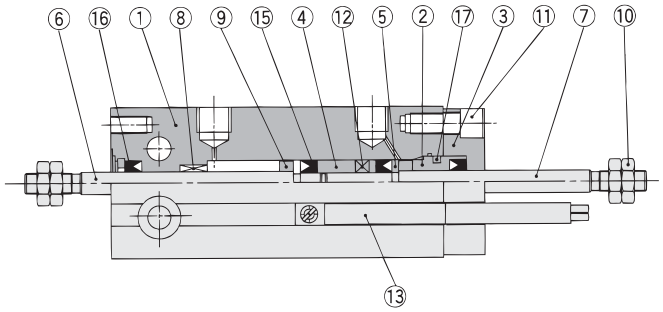
When mounting Series CUW, refer to page 7-3-5.

## Construction

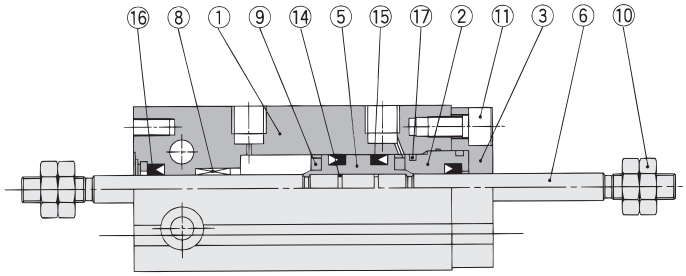
### ø6

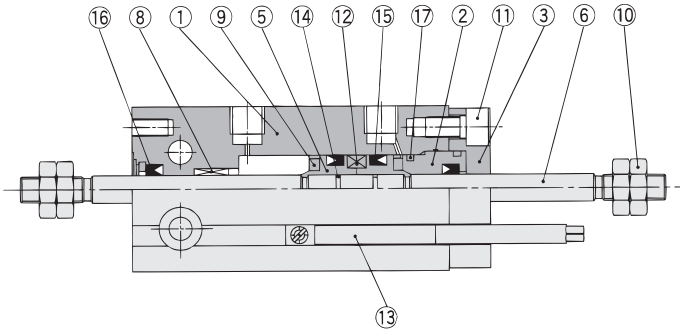



### With auto switch

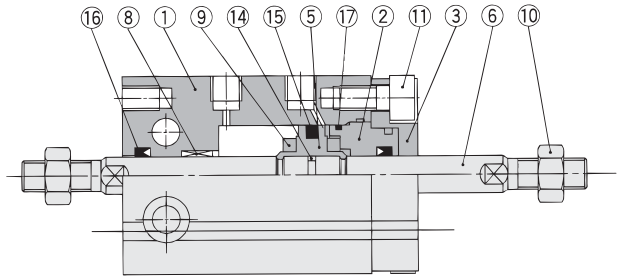


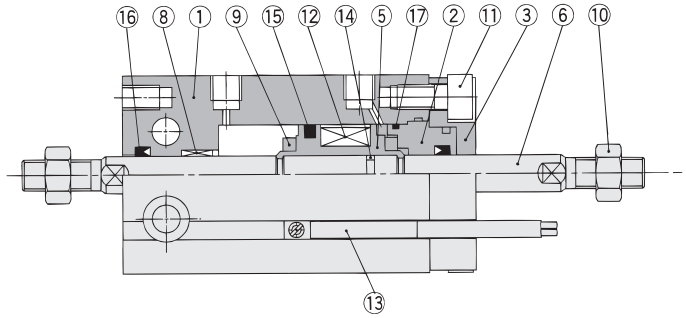

### ø10




### ø16 to 32




## Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Rod cover | Aluminum bearing alloy | Chromated |
| ③ | Rod cover retainer | Aluminum alloy | Hard anodized |
| ④ | Piston | Brass | ø6 |
| ⑤ | Piston | Brass | ø6, ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ⑥ | Piston rod | Stainless steel | |
| ⑦ | Piston rod | Stainless steel | ø6 |
| ⑧ | Bushing | Oil-impregnated sintered alloy | |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑨ | Bumper | Urethane | |
| ⑩ | Rod end nut | Carbon steel | Nickel plated |
| ⑪ | Hexagon socket head cap screw | Carbon steel | Nickel plated |
| ⑫ | Magnet | Magnetic material | |
| ⑬ | Auto switch | —— | |
| ⑭ | Piston gasket | NBR | |
| ⑮* | Piston seal | | |
| ⑯* | Rod seal | | |
| ⑰* | Gasket | | |

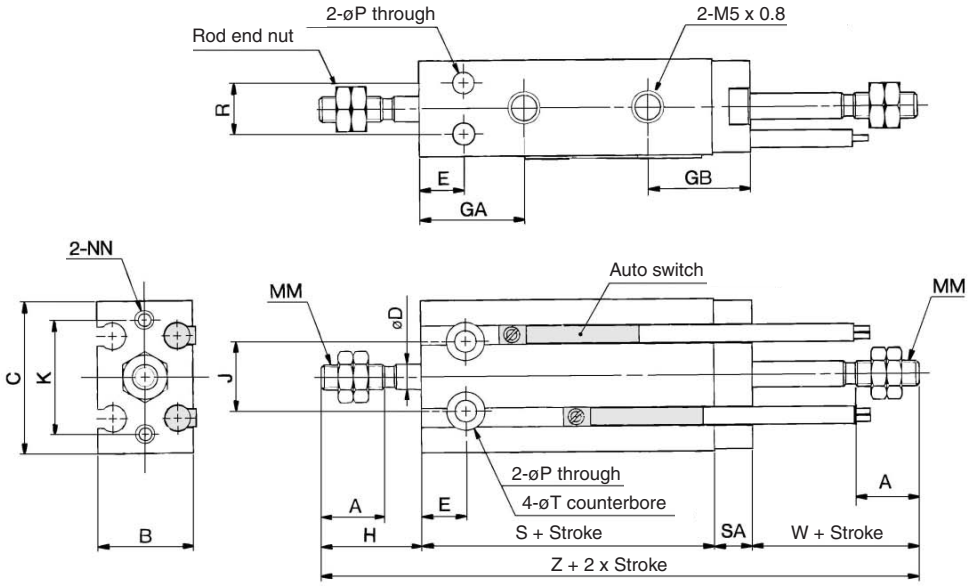
## Replacement Parts: Seal Kit

| | Bore size (mm) | | | | |
|---|---|---|---|---|---|
| | **10** | **16** | **20** | **25** | **32** |
| Kit no. | CUW10D-PS | CUW16D-PS | CUW20D-PS | CUW25D-PS | CUW32D-PS |

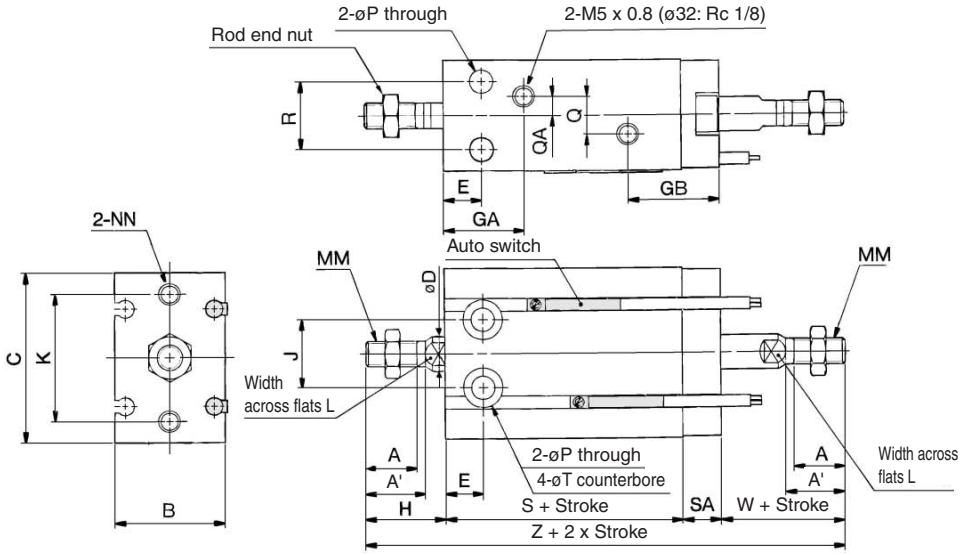
* Seal kit includes ⑮, ⑯, ⑰. Order the seal kit, based on each bore size.

## Dimensions: Double Acting, Double Rod

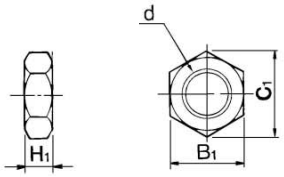
### ø6, ø10




### ø16 to ø32




### Rod End Nut/Accessory




Material: Carbon steel

| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

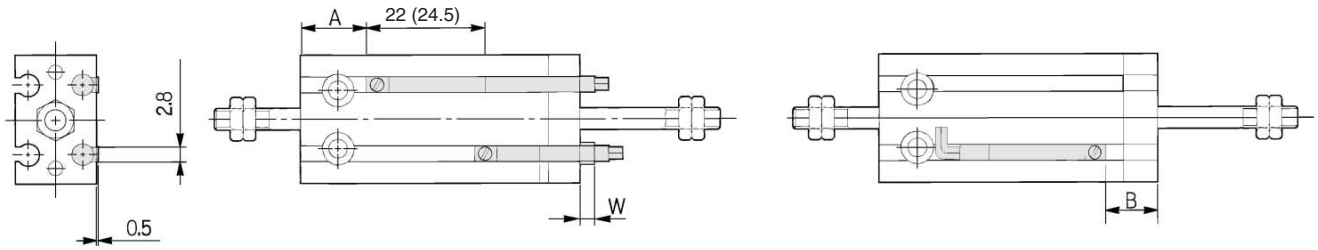
| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 15 | 16 | 13 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 | 3.2 | — | — |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 16 | 16 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 | 3.2 | — | — |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5 Note) | 19 | 16 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 | 4.5 | 4 | 2 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 21.5 | 19 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 22 | 23 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 23 | 22.5 | 27 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 |

Note) 5 stroke (CUW16-5D): GA = 14.5

| Bore size (mm) | R | SA | T | W | Without auto switch | | With auto switch | |
|---|---|---|---|---|---|---|---|---|
| | | | | | S | Z | S | Z |
| **6** | 7 | 6 | 6 depth 4.8 | 13 | 38 | 70 | 38 | 70 |
| **10** | 9 | 6 | 6 depth 5 | 16 | 36 | 74 | 36 | 74 |
| **16** | 12 | 7.5 | 7.6 depth 6.5 | 16 | 30 | 69.5 | 40 | 79.5 |
| **20** | 16 | 9 | 9.3 depth 8 | 19 | 36 | 83 | 46 | 93 |
| **25** | 20 | 9 | 9.3 depth 9 | 23 | 40 | 95 | 50 | 105 |
| **32** | 24 | 10 | 11 depth 11.5 | 27 | 42 | 106 | 52 | 116 |

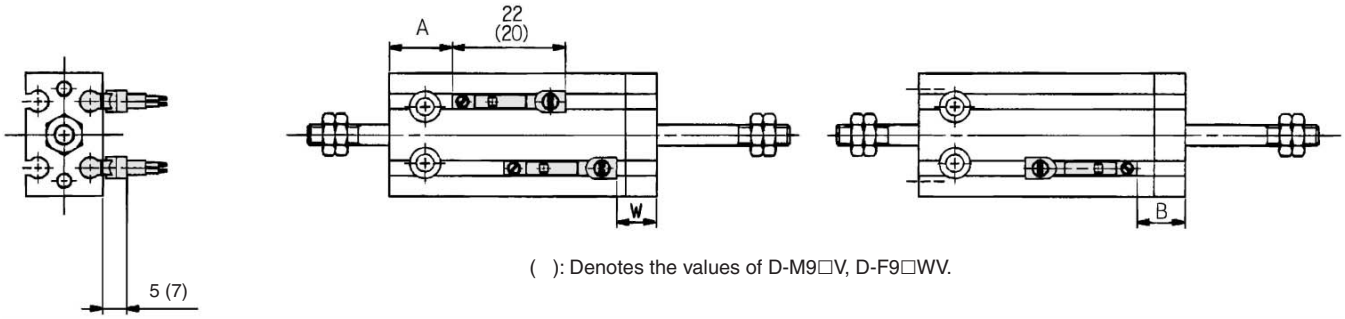
## Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

**D-A9□**
**D-M9□**
**D-F9□W**




( ): Denotes the values of D-A93.

**D-A9□V**
**D-M9□V**
**D-F9□WV**




( ): Denotes the values of D-M9□V, D-F9□WV.

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-F9□W | | | D-M9□V, D-F9□WV | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | W | A | B | W | A | B | W |
| **6** | 13.5 | 5.5 | –3.5(–1) | 17.5 | 9.5 | 0.5 | 17.5 | 9.5 | –1.5 |
| **10** | 12.5 | 9.5 | –7.5(–5) | 16.5 | 13.5 | –3.5 | 16.5 | 13.5 | –5.5 |
| **16** | 16 | 11.5 | –9.5(–7) | 20 | 15.5 | 5.5 | 20 | 15.5 | –7.5 |
| **20** | 20 | 15 | –13(–10.5) | 24 | 19 | –9 | 24 | 19 | –11 |
| **25** | 22.5 | 16 | –14.5(–12) | 26.5 | 20 | –10.5 | 26.5 | 20 | –12.5 |
| **32** | 23.5 | 18.5 | –16.5(–14) | 27.5 | 22.5 | –12.5 | 27.5 | 22.5 | –14.5 |

Note 1) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.
Note 2) In the case of the 5 stroke or the 10 stroke, there are times in which the switch will not turn OFF or 2 switches will turn ON simultaneously due to their movement range. Therefore, set the position approximately 1 to 4 mm outward from the values given in the table above. Then, perform an operation inspection to make sure that the switches operate normally (if 1 switch is used, make sure that it turns ON and OFF properly; if 2 switches are used, make sure that both switches turn ON).
Note 3) ( ) in column W is the dimensions of D-A93.

# Free Mount Cylinder
## Single Acting, Single Rod, Spring Return/Extend
# *Series CU*
### ø6, ø10, ø16, ø20, ø25, ø32



## How to Order

**Without auto switch** CU 10 — 15 S

**With auto switch** CDU 10 — 15 S — F9BW ☐

**Built-in magnet**

**Bore size**

| | |
|---|---|
| 6 | 6 mm |
| 10 | 10 mm |
| 16 | 16 mm |
| 20 | 20 mm |
| 25 | 25 mm |
| 32 | 32 mm |

**Standard stroke (mm)**

| | |
|---|---|
| ø6, ø10, ø16 ø20, ø25, ø32 | 5, 10, 15 |

**Action**

| | |
|---|---|
| S | Single acting, Spring return |
| T | Single acting, Spring extend |

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch |

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

**Number of auto switches**

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

**Applicable Auto Switch**/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length (m)∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

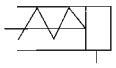
∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

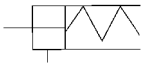
• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.

**JIS Symbol**

Single acting, Spring return



Single acting, Spring extend



## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.2 MPa | 0.15 MPa | | 0.13 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread Note) | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |

Note) ø6 with auto switch type: One side rubber bumper

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16**, **20**, **25**, **32** | 5, 10, 15 |

## Minimum Stroke for Auto Switch Mounting (mm)

| No. of auto switches mounted | Applicable auto switch | | |
|---|---|---|---|
| | **D-A9□, D-A9□V** | **D-M9□, D-M9□V** | **D-F9□W, D-F9□WV** |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

## Made to Order Specifications (For details, refer to page 7-10-1.)

| Symbol | Specifications |
|---|---|
| **-XC18** | NPT finish piping port |
| **-XC22** | Fluoro rubber seals |

## Theoretical Output (N)

| Action | Bore size (mm) | Operating pressure (MPa) | | |
|---|---|---|---|---|
| | | 0.3 | 0.5 | 0.7 |
| Spring return (S) | 6 | 4.99 | 10.7 | 16.3 |
| | 10 | 16.7 | 32.4 | 48.1 |
| | 16 | 45.6 | 86.3 | 126 |
| | 20 | 73 | 136 | 199 |
| | 25 | 119 | 218 | 316 |
| | 32 | 207 | 368 | 529 |
| Spring extend (T) | 6 | 2.86 | 7.10 | 11.3 |
| | 10 | 12.9 | 26.1 | 39.3 |
| | 16 | 37.2 | 71.8 | 106 |
| | 20 | 58 | 111 | 164 |
| | 25 | 95 | 178 | 260 |
| | 32 | 173 | 312 | 450 |

For the reactive force of spring return, refer to page 7-12-3.

## Weight/( ): Denotes the values with D-A93. (g)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| **C(D)U6-□S,T** | 22(27) | 25(35) | 28(38) |
| **C(D)U10-□S,T** | 36(41) | 40(50) | 48(58) |
| **C(D)U16-□S,T** | 50(75) | 56(86) | 71(101) |
| **C(D)U20-□S,T** | 95(128) | 106(143) | 133(170) |
| **C(D)U25-□S,T** | 176(230) | 193(252) | 235(294) |
| **C(D)U32-□S,T** | 262(335) | 286(364) | 347(425) |

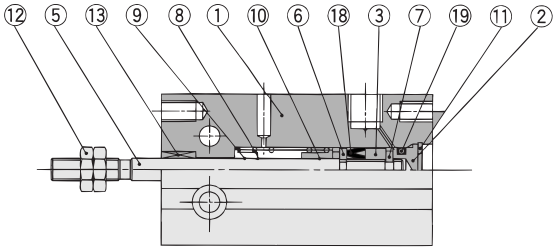
∗ For the weight of auto switch, refer to page 7-9-1.

## Tightening Torque

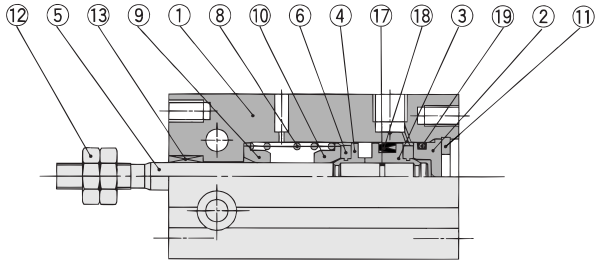
When mounting a CU single acting series, refer to page 7-3-5.

## Construction

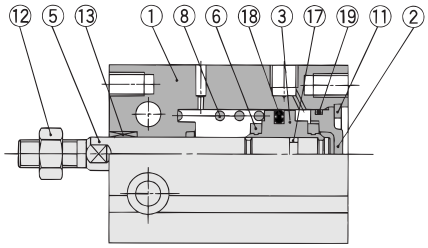
### Single acting, Spring return



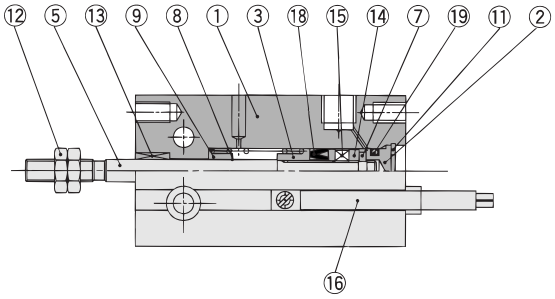

**ø10**

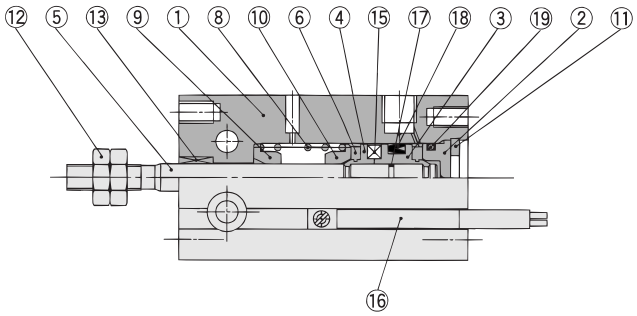


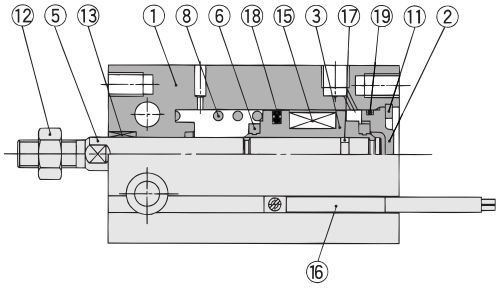

**ø16 to ø32**




### With auto switch




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ③ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ④ | Piston | Brass | ø10 |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Bumper A | Urethane | |
| ⑦ | Bumper B | Urethane | |
| ⑧ | Return spring | Piano wire | Zinc chromated |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑨ | Spring seat | Brass | |
| ⑩ | Spring seat | Brass | |
| ⑪ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑫ | Rod end nut | Carbon steel | Nickel plated |
| ⑬ | Bushing | Oil-impregnated sintered alloy | |
| ⑭ | Magnet holder | Brass | ø6 |
| ⑮ | Magnet | Magnetic material | |
| ⑯ | Auto switch | — | |
| ⑰ | Piston gasket | NBR | |
| ⑱ * | Piston seal | | |
| ⑲ * | Gasket | | |

### Replacement Parts: Seal Kit

| | Bore size (mm) | | | | |
|---|---|---|---|---|---|
| | **10** | **16** | **20** | **25** | **32** |
| Kit no. | CU10S-PS | CU16S-PS | CU20S-PS | CU25S-PS | CU32S-PS |

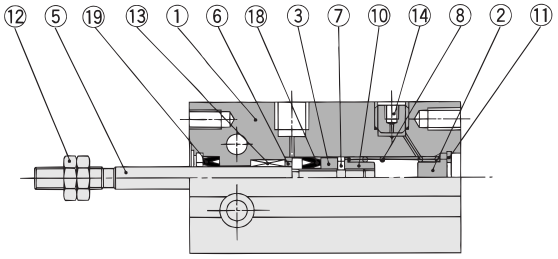
* Seal kit includes ⑱, ⑲. Order the seal kit, based on each bore size.

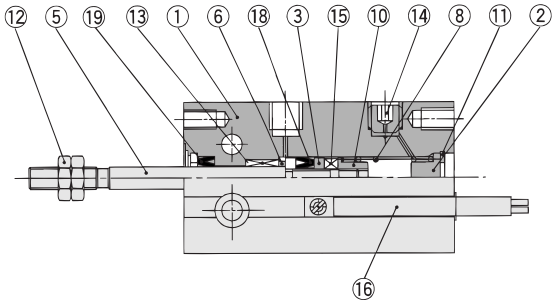
## Construction

### Single acting, Spring extend

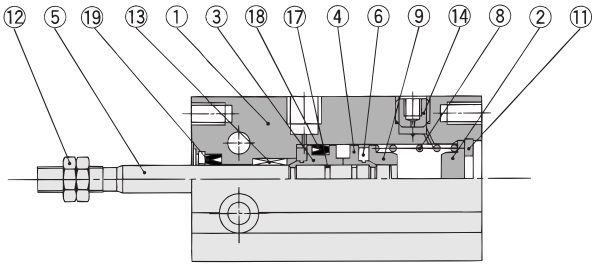
### With auto switch

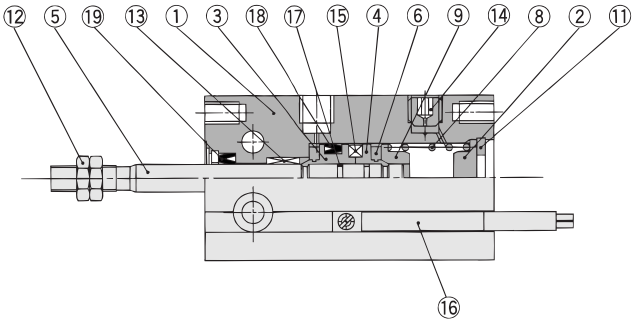
**ø6**



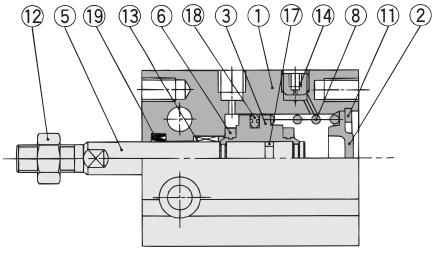



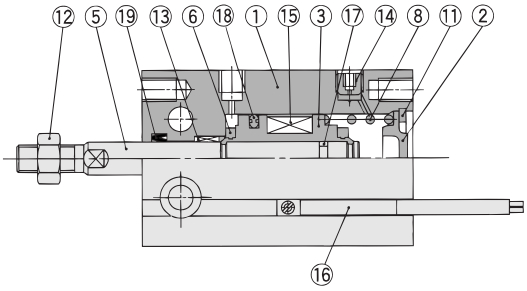

**ø10**




**ø16 to ø32**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ③ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ④ | Piston | Brass | ø10 |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Bumper A | Urethane | |
| ⑦ | Bumper B | Urethane | |
| ⑧ | Return spring | Piano wire | Zinc chromated |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑨ | Spring seat | Brass | |
| ⑩ | Stopper | Brass | ø6 |
| ⑪ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑫ | Rod end nut | Carbon steel | Nickel plated |
| ⑬ | Bushing | Oil-impregnated sintered alloy | |
| ⑭ | Plug with fixed orifice | Alloy steel | Black zinc chromated |
| ⑮ | Magnet | Magnetic material | |
| ⑯ | Auto switch | — | |
| ⑰ | Piston gasket | NBR | |
| ⑱* | Piston seal | | |
| ⑲* | Rod seal | | |

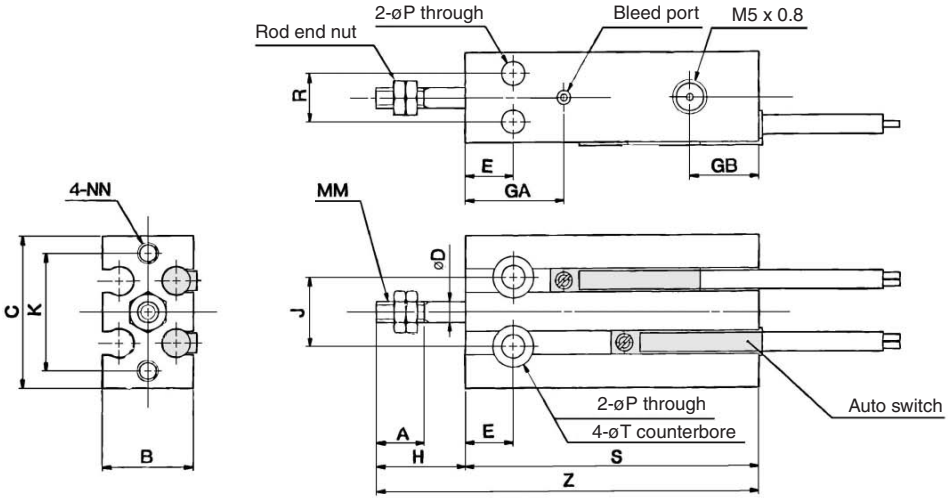
### Replacement Parts: Seal Kit

| | Bore size (mm) | | | | |
|---|---|---|---|---|---|
| | **10** | **16** | **20** | **25** | **32** |
| Kit no. | CU10T-PS | CU16T-PS | CU20T-PS | CU25T-PS | CU32T-PS |

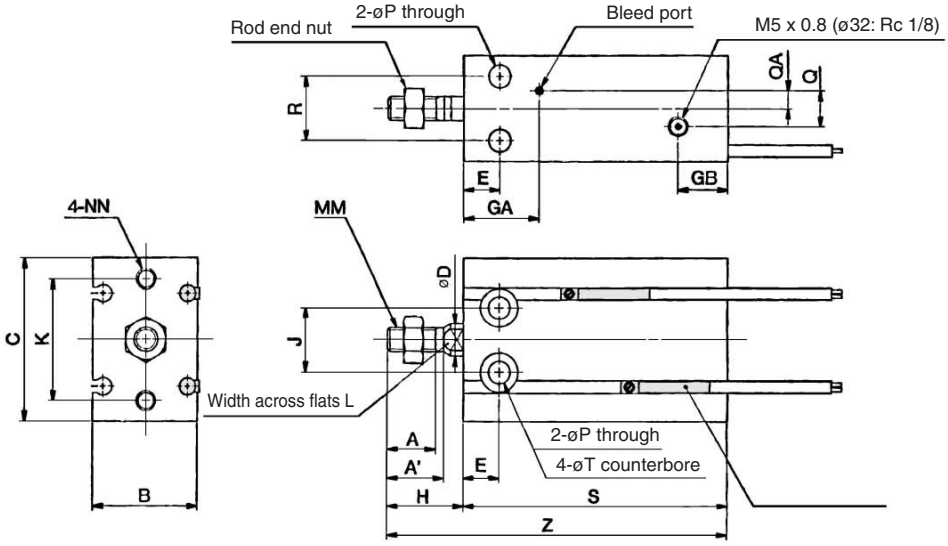
* Seal kit includes ⑱, ⑲. Order the seal kit, based on each bore size.

## Dimensions: Single Acting, Spring Return

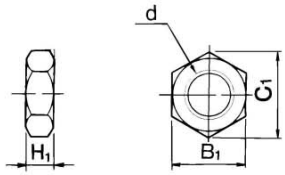
### ø6, ø10




### ø16 to ø32




### Rod End Nut/Accessory




Material: Carbon steel

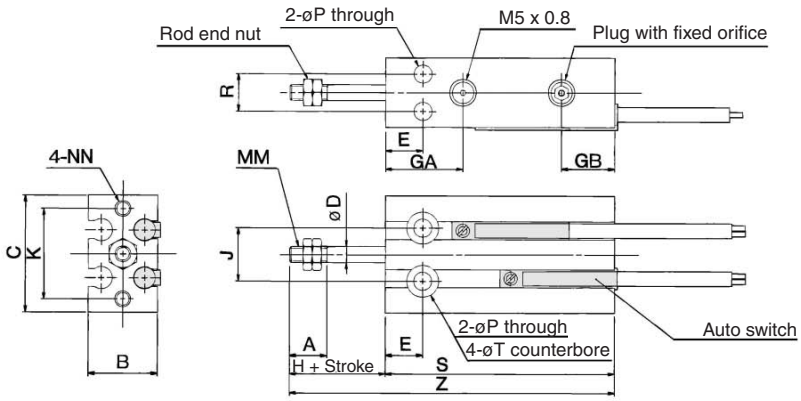
| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 15 | 10 | 13 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 | 3.2 | — | — | 9 | 6 depth 5 |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5 | 11.5 | 16 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 12.5 | 19 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 13 | 23 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 23 | 12.5 | 27 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 |

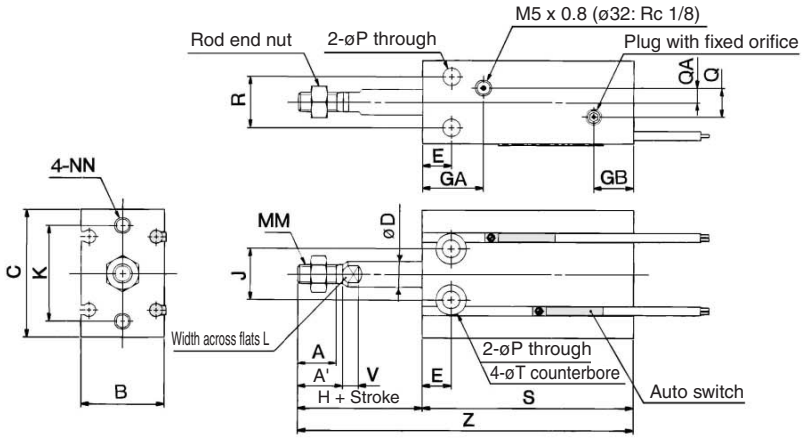
| Bore size (mm) | Without auto switch | | | | | | With auto switch | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | | | Z | | | S | | | Z | | |
| | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st |
| **6** | 38 | 43 | 48 | 51 | 56 | 61 | 38 | 43 | 48 | 51 | 56 | 61 |
| **10** | 41 | 46 | 56 | 57 | 62 | 72 | 41 | 46 | 56 | 57 | 62 | 72 |
| **16** | 35 | 40 | 50 | 51 | 56 | 66 | 45 | 50 | 60 | 61 | 66 | 76 |
| **20** | 41 | 46 | 56 | 60 | 65 | 75 | 51 | 56 | 66 | 70 | 75 | 85 |
| **25** | 45 | 50 | 60 | 68 | 73 | 83 | 55 | 60 | 70 | 78 | 83 | 93 |
| **32** | 47 | 52 | 62 | 74 | 79 | 89 | 57 | 62 | 72 | 84 | 89 | 99 |

## Dimensions: Single Acting, Spring Extend

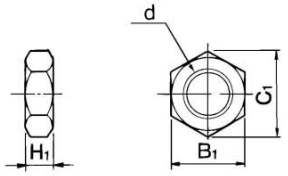
### ø6, ø10




### ø16 to ø32




### Rod End Nut/Accessory




Material: Carbon steel

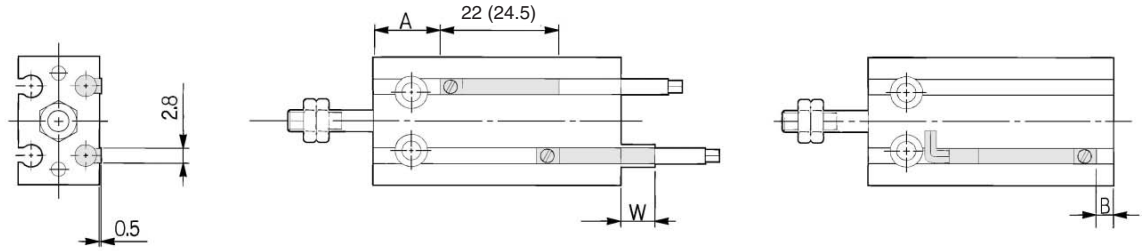
| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA | R | T | V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 15 | 10 | 13 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 | — |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 | 3.2 | — | — | 9 | 6 depth 5 | — |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5 | 11.5 | 16 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 3.5 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 12.5 | 19 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 5 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 13 | 23 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 5 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 23 | 12.5 | 27 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 | 5 |

| Bore size (mm) | Without auto switch | | | | | | With auto switch | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | | | Z | | | S | | | Z | | |
| | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st |
| **6** | 38 | 43 | 48 | 56 | 66 | 76 | 38 | 43 | 48 | 56 | 66 | 76 |
| **10** | 41 | 46 | 56 | 62 | 72 | 87 | 41 | 46 | 56 | 62 | 72 | 87 |
| **16** | 45 | 50 | 60 | 66 | 76 | 91 | 45 | 50 | 60 | 66 | 76 | 91 |
| **20** | 41 | 46 | 56 | 65 | 75 | 90 | 51 | 56 | 66 | 75 | 85 | 100 |
| **25** | 45 | 50 | 60 | 73 | 83 | 98 | 55 | 60 | 70 | 83 | 93 | 108 |
| **32** | 47 | 52 | 62 | 79 | 89 | 104 | 57 | 62 | 72 | 89 | 99 | 114 |

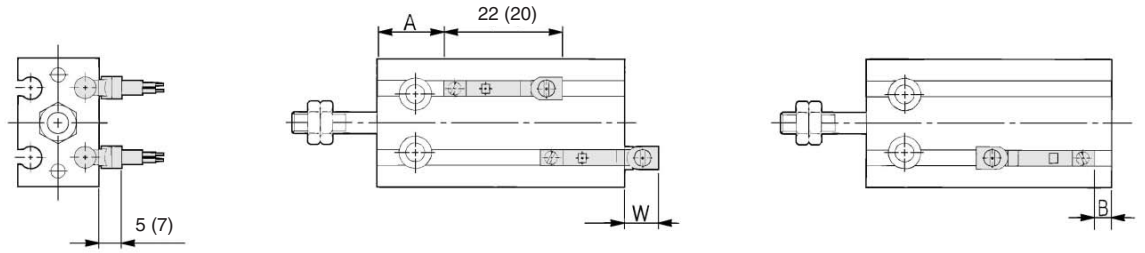
## Proper Auto Switch Mounting Position and Its Mounting Height: Single Acting, Spring Return

**D-A9□**
**D-M9□**
**D-M9□W**




( ): Denotes the values of D-A93.

**D-A9□V**
**D-M9□V**
**D-F9□WV**




( ): Denotes the values of D-M9□V, D-F9□WV.

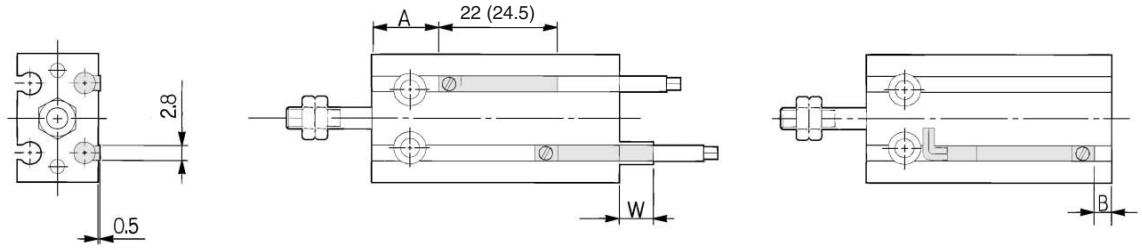
### Single Acting, Spring Return

| Bore size (mm) | Stroke | D-A9□, D-A9□V | | | D-M9□, D-F9□W | | | D-M9□V, D-F9□WV | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | W | A | B | W | A | B | W |
| 6 | All stroke | 13.5 | 0 | 2.5(5) | 17.5 | 4 | 6.5 | 17.5 | 4 | 4.5 |
| 10 | 5, 10 | 12.5 | 3.5 | –1.5(1) | 16.5 | 7.5 | 2.5 | 16.5 | 7.5 | 0.5 |
| | 15 | 17.5 | | | 21.5 | | | 21.5 | | |
| 16 | 5, 10 | 16 | 4 | –2(0.5) | 20 | 8 | 2 | 20 | 8 | –0.5 |
| | 15 | 21 | | | 25 | | | 25 | | |
| 20 | 5, 10 | 20 | 6 | –4(–1.5) | 24 | 10 | 0 | 24 | 10 | –2 |
| | 15 | 25 | | | 29 | | | 29 | | |
| 25 | 5, 10 | 22.5 | 7 | –5.5(–3) | 26.5 | 11 | –1.5 | 26.5 | 11 | –3.5 |
| | 15 | 27.5 | | | 31.5 | | | 31.5 | | |
| 32 | 5, 10 | 23.5 | 8.5 | –6.5(–4) | 27.5 | 12.5 | –2.5 | 27.5 | 12.5 | –4.5 |
| | 15 | 28.5 | | | 32.5 | | | 32.5 | | |

Note 1) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.
Note 2) In the case of the 5 stroke or the 10 stroke, there are times in which the switch will not turn OFF or 2 switches will turn ON simultaneously due to their movement range. Therefore, set the position approximately 1 to 4 mm outward from the values given in the table above. Then, perform an operation inspection to make sure that the switches operate normally (if 1 switch is used, make sure that it turns ON and OFF properly; if 2 switches are used, make sure that both switches turn ON).
Note 3) ( ) in column W is the dimensions of D-A93.

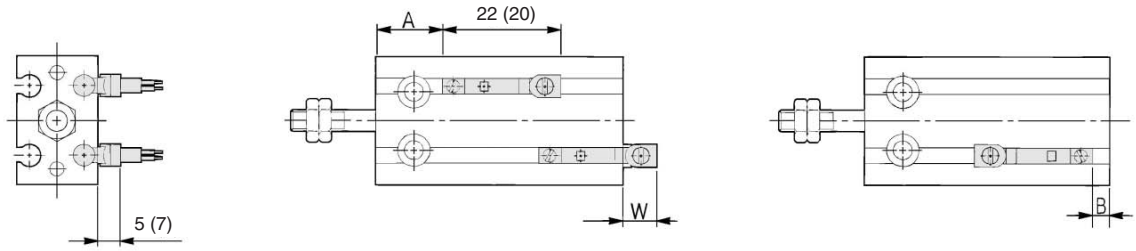
## Proper Auto Switch Mounting Position and Its Mounting Height: Single Acting, Spring Extend

**D-A9□**
**D-M9□**
**D-F9□W**




( ): Denotes the values of D-A93.

**D-A9□V**
**D-M9□V**
**D-F9□WV**




( ): Denotes the values of D-M9□V, D-F9□WV.

### Single Acting, Spring Extend

| Bore size (mm) | Stroke | D-A9□, D-A9□V | | | D-M9□, D-F9□W | | | D-M9□V, D-F9□WV | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | W | A | B | W | A | B | W |
| 6 | All stroke | 10.5 | 1.5 | 0.5(3) | 14.5 | 5.5 | 4.5 | 14.5 | 5.5 | 2.5 |
| 10 | 5, 10 | 12.5 | 3.5 | –1.5(1) | 16.5 | 7.5 | 2.5 | 16.5 | 7.5 | 0.5 |
| | 15 | | 8.5 | –6.5(–4) | | 12.5 | –2.5 | | 12.5 | –4.5 |
| 16 | 5, 10 | 16 | 4 | –2(0.5) | 20 | 8 | 2 | 20 | 8 | 0 |
| | 15 | | 9 | –7(–4.5) | | 13 | –3 | | 13 | –5 |
| 20 | 5, 10 | 20 | 6 | –4(–1.5) | 24 | 10 | 0 | 24 | 10 | –2 |
| | 15 | | 11 | –9(–6.5) | | 15 | –5 | | 15 | –7 |
| 25 | 5, 10 | 22.5 | 7 | –5.5(–3) | 26.5 | 11 | –1.5 | 26.5 | 11 | –3.5 |
| | 15 | | 12 | –10.5(–8) | | 16 | –6.5 | | 16 | –8.5 |
| 32 | 5, 10 | 23.5 | 8.5 | –6.5(–4) | 27.5 | 12.5 | –2.5 | 27.5 | 12.5 | –4.5 |
| | 15 | | 13.5 | –11.5(–9) | | 17.5 | –7.5 | | 17.5 | –9.5 |

Note 1) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.
Note 2) In the case of the 5 stroke or the 10 stroke, there are times in which the switch will not turn OFF or 2 switches will turn ON simultaneously due to their movement range. Therefore, set the position approximately 1 to 4 mm outward from the values given in the table above. Then, perform an operation inspection to make sure that the switches operate normally (if 1 switch is used, make sure that it turns ON and OFF properly; if 2 switches are used, make sure that both switches turn ON).
Note 3) ( ) in column W is the dimensions of D-A93.

# Free Mount Cylinder: Non-rotating Rod Type
# Double Acting, Single Rod
# *Series CUK*
## ø6, ø10, ø16, ø20, ø25, ø32

## How to Order

**Without auto switch** CUK 6 — 30 D

**With auto switch** CDUK 6 — 30 D — F9BW ☐

**Built-in magnet**

**Non-rotating rod type**

**Bore size**

| | |
|---|---|
| 6 | 6 mm |
| 10 | 10 mm |
| 16 | 16 mm |
| 20 | 20 mm |
| 25 | 25 mm |
| 32 | 32 mm |

**Standard stroke (mm)**

| | |
|---|---|
| ø6, ø10, ø16 | 5, 10, 15, 20, 25, 30 |
| ø20, ø25, ø32 | 5, 10, 15, 20, 25, 30, 40, 50 |

**Action**

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

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch |

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

**Number of auto switches**

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

### Applicable Auto Switch/Refer to page 7-9-1 for further information on auto switches.

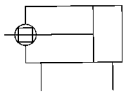
| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model: Perpendicular | Auto switch model: In-line | Lead wire length (m) ∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | F9NWV | F9NW | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | F9PWV | F9PW | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | F9BWV | F9BW | ● | ● | ○ | ○ | — | |

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-5 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.

**JIS Symbol**
Double acting,
Single rod type



## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.15 MPa | 0.10 MPa | | 0.08 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |
| Rod non-rotating accuracy Note) | ±0.8° | | | ±0.5° | | |

Note) No load: Rod at retracted

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) | |
|---|---|---|
| **6**, **10**, **16** | 5, 10, 15, 20, 25, 30 | For long stroke, refer to page 7-3-42. |
| **20**, **25**, **32** | 5, 10, 15, 20, 25, 30, 40, 50 | |

## Minimum Stroke for Auto Switch Mounting (mm)

| No. of auto switches mounted | Applicable auto switch | | |
|---|---|---|---|
| | **D-A9□, D-A9□V** | **D-M9□, D-M9□V** | **D-F9□W, D-F9□WV** |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

## Weight /( ): Denotes the values with D-A93. (g)

| Bore size (mm) | Stroke (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| **C(D)UK6-□D** | 28 (33) | 31 (41) | 34 (44) | 37 (47) | 40 (50) | 43 (53) | — | — |
| **C(D)UK10-□D** | 43 (48) | 47 (57) | 51 (61) | 55 (65) | 59 (69) | 63 (73) | — | — |
| **C(D)UK16-□D** | 60 (85) | 66 (96) | 72 (102) | 78 (108) | 84 (114) | 90 (120) | — | — |
| **C(D)UK20-□D** | 113 (147) | 124 (164) | 136 (176) | 148 (188) | 160 (200) | 172 (211) | 195 (235) | 219 (260) |
| **C(D)UK25-□D** | 212 (266) | 229 (288) | 246 (305) | 263 (322) | 280 (339) | 297 (356) | 335 (390) | 370 (424) |
| **C(D)UK32-□D** | 331 (404) | 357 (435) | 383 (461) | 409 (487) | 435 (513) | 461 (539) | 513 (591) | 565 (643) |

∗ For the auto switch weight, refer to page 7-9-1.

## Allowable Rotational Torque

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Allowable rotational torque (N·m) | 0.0015 | 0.02 | 0.04 | 0.10 | 0.15 | 0.20 |

## Made to Order Specifications (For details, refer to page 7-10-1.)

| Symbol | Specifications |
|---|---|
| **-XB6** | Heat resistant cylinder (150°C) |
| **-XB7** | Cold resistant cylinder |
| **-XB9** | Low speed cylinder (10 to 50 mm/s) |
| **-XB13** | Low speed cylinder (5 to 50 mm/s) |
| **-XC18** | NPT finish piping port |
| **-XC19** | Intermediate stroke (Compliant for spacer) |
| **-XC22** | Fluoro rubber seals |
| **-XC34** | Rod does not extend beyond non-rotating plate |

# ⚠ Precautions

**Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 7-13-3 to 7-13-6.**

## Operating Precautions

### ⚠ Caution

**1. Do not place your fingers in the clearance between the non-rotating plate and the cylinder tube.**
Your fingers could get caught between the non-rotating plate and the cylinder tube when the piston rod retracts. Therefore, never place your finger in this area.
Because the cylinder outputs a great force, it could lead to injury if precautions are not taken to prevent your fingers from getting caught.

**2.** When using the non-rotating style, make sure that rotational torque is not applied to the piston rod. If rotational torque must be applied due to unavoidable circumstances, make sure to use it at the allowable rotational torque or less, which is shown in the table on the right.

## Tightening Torque

When mounting Series CUK, refer to page 7-3-5.

## Theoretical Output

Specifications are the same as CU series double acting, single rod. Refer to page 7-3-5.

## Auto Switch Mounting Position

For the auto switch mounting position of Series CDUK, refer to page 7-3-8, since specifications are the same as standard type, double acting, single rod type.

## Copper-free

**20-CUK** **Bore size** — **Stroke** **D**

**•Copper-free**

The type which prevents copper based ions from generating by changing the copper based materials into electroless nickel plated treatment or non-copper materials in order to eliminate the effects by copper based ions or fluororesins over the color cathode ray tube.

### Minimum Operating Pressure

(MPa)

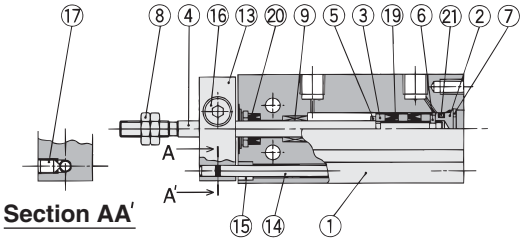
| Bore size (mm) | 6 | 10, 16 | 20, 25, 32 |
|---|---|---|---|
| Minimum operating pressure | 0.15 | 0.10 | 0.08 |

### Specifications

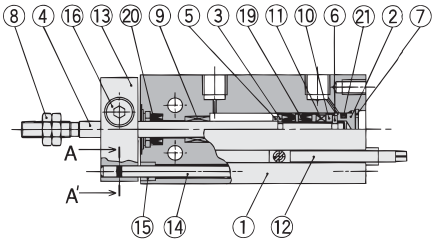
| | |
|---|---|
| Action | Double acting, Single rod |
| Bore size (mm) | 6, 10, 16, 20, 25, 32 |
| Maximum operating pressure | 1.05 MPa |
| Cushion | Rubber bumper |
| Stroke | Same as standard model (Refer to page 7-3-5.) |
| Auto switch | Mountable |

## Construction

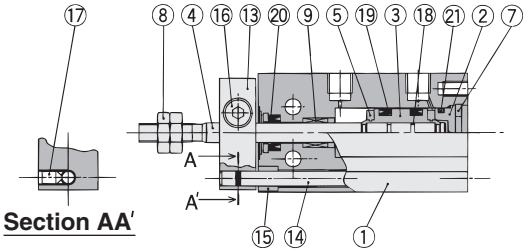
**ø6**

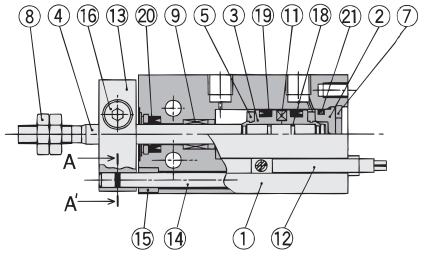



**With auto switch**

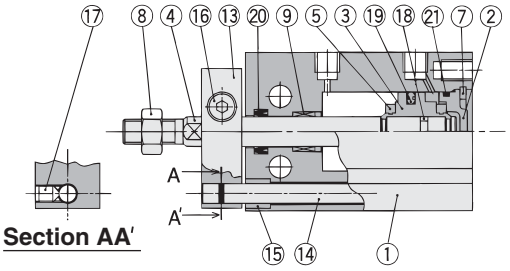


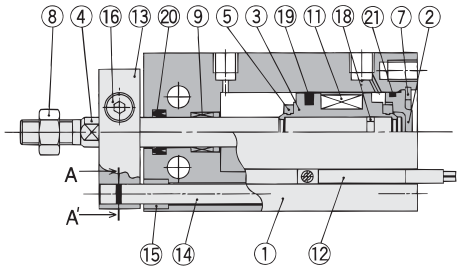

**ø10**




**ø16 to ø32**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ③ | Piston | Brass | ø6 to ø10, |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ④ | Piston rod | Stainless steel | |
| ⑤ | Bumper A | Urethane | |
| ⑥ | Bumper B | Urethane | |
| ⑦ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑧ | Rod end nut | Carbon steel | Nickel plated |
| ⑨ | Bushing | Oil-impregnated sintered alloy | |
| ⑩ | Magnet holder | Brass | ø6 |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑪ | Magnet | Magnetic material | |
| ⑫ | Auto switch | ——— | |
| ⑬ | Non-rotating plate | Aluminum alloy | Nickel plated |
| ⑭ | Guide rod | Stainless steel | |
| ⑮ | Bushing | Oil-impregnated sintered alloy | |
| ⑯ | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| ⑰ | Hexagon socket head set screw | Carbon steel | Black zinc chromated |
| ⑱ | Piston gasket | NBR | |
| ⑲ * | Piston seal | | |
| ⑳ * | Rod seal | | |
| ㉑ * | Gasket | | |

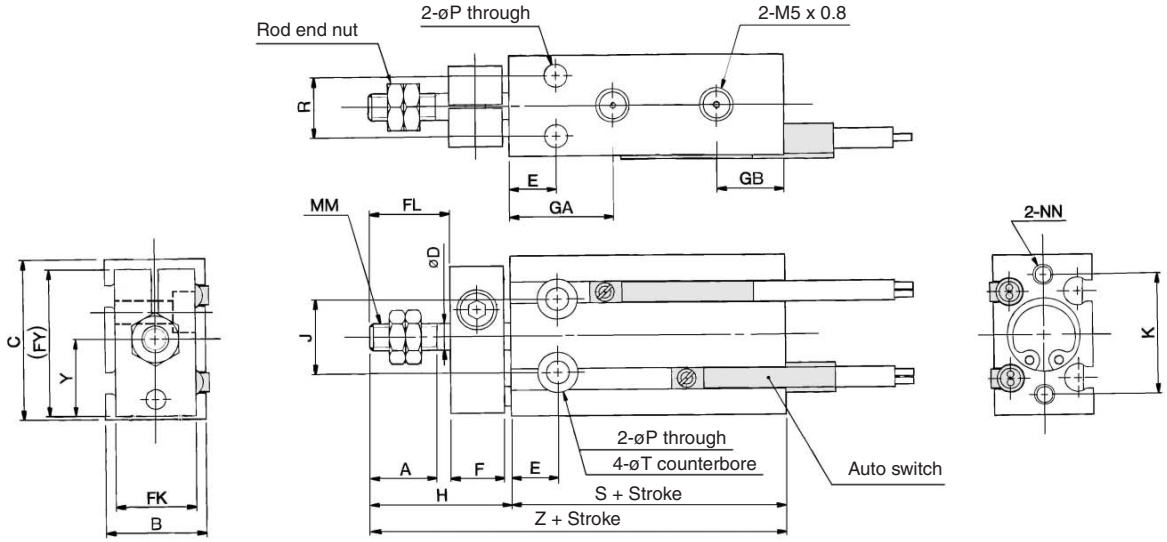
### Replacement Parts: Seal Kit

| Bore size (mm) | Kit no. | Contents |
|---|---|---|
| 10 | CU10D-PS | Set of nos. above ⑲, ⑳, ㉑. |
| 16 | CU16D-PS | |
| 20 | CU20D-PS | |
| 25 | CU25D-PS | |
| 32 | CU32D-PS | |

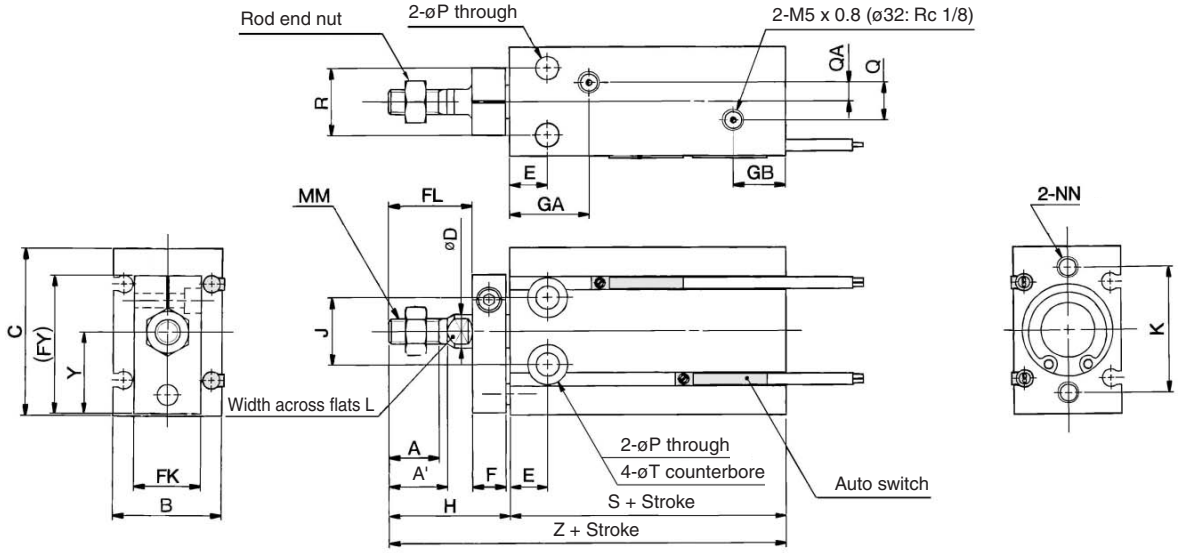
* Seal kit includes ⑲, ⑳, ㉑. Order the seal kit, based on each bore size.

## Dimensions: Non-rotating Rod Type; Double Acting, Single Rod

**ø6, ø10**

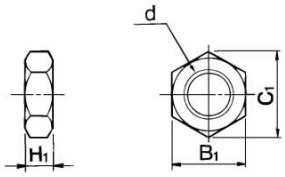



**ø16 to ø32**




### Rod End Nut/Accessory

Material: Carbon steel




| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | F | FL | FK | FY | GA | GB | H | J | K | L | MM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 8 | 9 | 11 | 20.5 | 15 | 10 | 18 | 10 | 17 | — | M3 x 0.5 |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 x 0.7 |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 Note) | 11.5 | 26 | 14 | 25 | 5 | M5 x 0.8 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 x 1.0 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 x 1.25 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 12 | 29 | 24 | 51.5 | 23 | 12.5 | 42 | 24 | 48 | 10 | M10 x 1.25 |

| Bore size (mm) | NN | P | Q | QA | R | T | Y | Without auto switch | | With auto switch | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | Z | S | Z |
| **6** | M3 x 0.5 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 | 10.5 | 33 | 51 | 33 | 51 |
| **10** | M3 x 0.5 depth 5 | 3.2 | — | — | 9 | 6 depth 5 | 11.5 | 36 | 57 | 36 | 57 |
| **16** | M4 x 0.7 depth 6 | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 15.5 | 30 | 56 | 40 | 66 |
| **20** | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 19.5 | 36 | 65 | 46 | 75 |
| **25** | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 24.5 | 40 | 73 | 50 | 83 |
| **32** | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 | 30.5 | 42 | 84 | 52 | 94 |

Note) 5 stroke (CUK16-5D): GA = 14.5

# Free Mount Cylinder: Non-rotating Rod Type
# Double Acting, Double Rod
# *Series CUKW*
## ø6, ø10, ø16, ø20, ø25, ø32

## How to Order

**Without auto switch** CUKW 6 — 30 D

**With auto switch** CDUKW 6 — 30 D — F9BW ☐

- **Built-in magnet**
- **Non-rotating rod type**
- **Double rod**
- **Bore size**

| | |
|---|---|
| **6** | 6 mm |
| **10** | 10 mm |
| **16** | 16 mm |
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |

- **Standard stroke (mm)**

| | |
|---|---|
| **ø6, ø10, ø16** | 5, 10, 15, 20, 25, 30 |
| **ø20, ø25, ø32** | 5, 10, 15, 20, 25, 30, 40, 50 |

- **Action**

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

- **Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch |

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

- **Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |

### Applicable Auto Switch/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length (m)∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.

## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.18 MPa | 0.13 MPa | | 0.11 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |
| Rod non-rotating accuracy Note) | ±0.8° | | | ±0.5° | | |

Note) No load: Rod in the non-rotating plate side at retracted

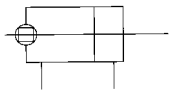
## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16** | 5, 10, 15, 20, 25, 30 |
| **20**, **25**, **32** | 5, 10, 15, 20, 25, 30, 40, 50 |

## Minimum Stroke for Auto Switch Mounting (mm)

| No. of auto switches mounted | Applicable auto switch | | |
|---|---|---|---|
| | **D-A9□, D-A9□V** | **D-M9□, D-M9□V** | **D-F9□W, D-F9□WV** |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

**JIS Symbol**
Non-rotating rod



## Weight /( ): Denotes the values with D-A93. (g)

| Model | Stroke (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| **C(D)UKW6-□D** | 33 (38) | 36 (46) | 40 (50) | 43 (53) | 46 (56) | 50 (60) | — | — |
| **C(D)UKW10-□D** | 51 (56) | 56 (66) | 60 (70) | 65 (75) | 69 (79) | 74 (84) | — | — |
| **C(D)UKW16-□D** | 84 (109) | 91 (121) | 98 (128) | 105 (135) | 112 (142) | 119 (149) | — | — |
| **C(D)UKW20-□D** | 150 (185) | 163 (203) | 177 (217) | 191 (231) | 205 (245) | 219 (259) | 246 (286) | 275 (315) |
| **C(D)UKW25-□D** | 276 (330) | 296 (355) | 316 (375) | 336 (395) | 357 (416) | 377 (436) | 421 (476) | 462 (516) |
| **C(D)UKW32-□D** | 434 (507) | 465 (543) | 495 (573) | 526 (604) | 556 (634) | 587 (665) | 669 (747) | 709 (787) |

∗ For the auto switch weight, refer to page 7-9-1.

### Theoretical Output

Specifications are the same as double acting, double rod (Series CUW). Refer to page 7-3-11.

### Tightening Torque

When mounting Series CUKW, refer to page 7-3-5.

### Allowable Rotational Torque

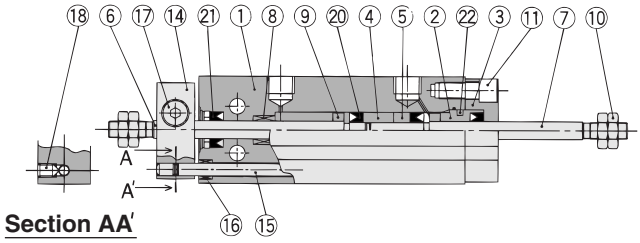
Ensure that rotational torque is not applied to the piston rod of Series CUKW. If rotational torque are applied unavoidably, refer to page 7-3-25.

### Auto Switch Mounting Position

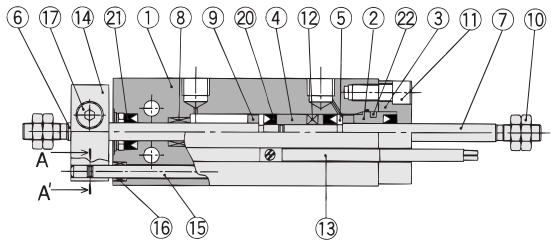
For the auto switch mounting position of Series CUKW, refer to page 7-3-14, since specifications are the same as double acting, double rod type.

## Construction

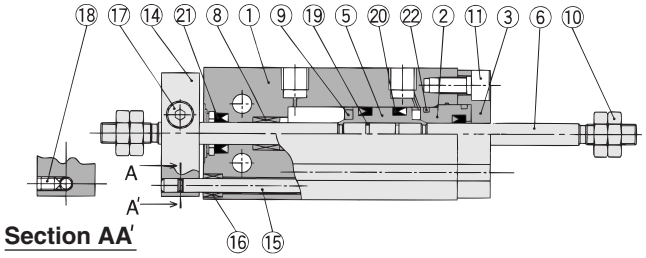
### ø6

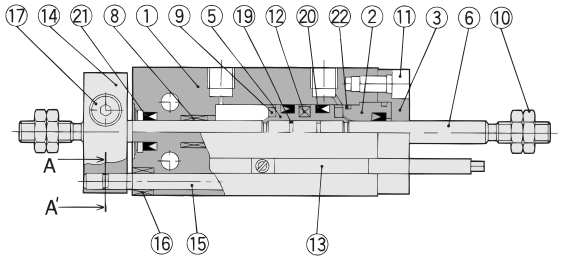



**With auto switch**

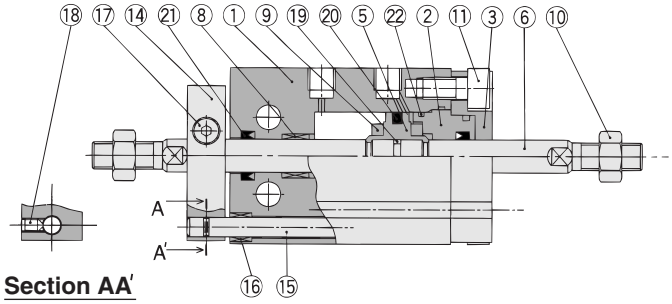


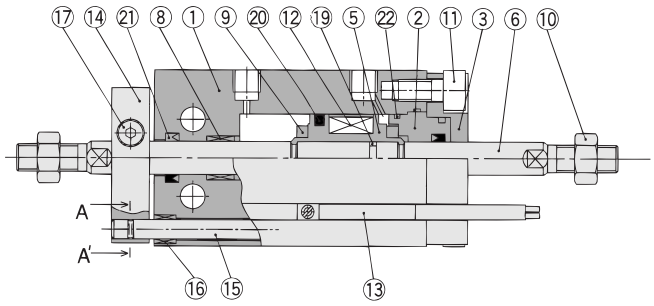

### ø10




### ø16 to ø32




## Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Rod cover | Aluminum bearing alloy | Chromated |
| ③ | Rod cover retainer | Aluminum alloy | Hard anodized |
| ④ | Piston | Brass | ø6 |
| ⑤ | Piston | Brass | ø6, ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ⑥ | Piston rod | Stainless steel | |
| ⑦ | Piston rod | Stainless steel | ø6 |
| ⑧ | Bushing | Oil-impregnated sintered alloy | |
| ⑨ | Bumper | Urethane | |
| ⑩ | Rod end nut | Carbon steel | Nickel plated |
| ⑪ | Hexagon socket head cap screw | Carbon steel | Nickel plated |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑫ | Magnet | Magnetic material | |
| ⑬ | Auto switch | — | |
| ⑭ | Non-rotating plate | Aluminum alloy | Nickel plated |
| ⑮ | Guide rod | Stainless steel | |
| ⑯ | Bushing | Oil-impregnated sintered alloy | |
| ⑰ | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| ⑱ | Hexagon socket head set screw | Carbon steel | Black zinc chromated |
| ⑲ | Piston gasket | NBR | |
| ⑳ | Piston seal | | |
| ㉑ | Rod seal | | |
| ㉒ | Gasket | | |

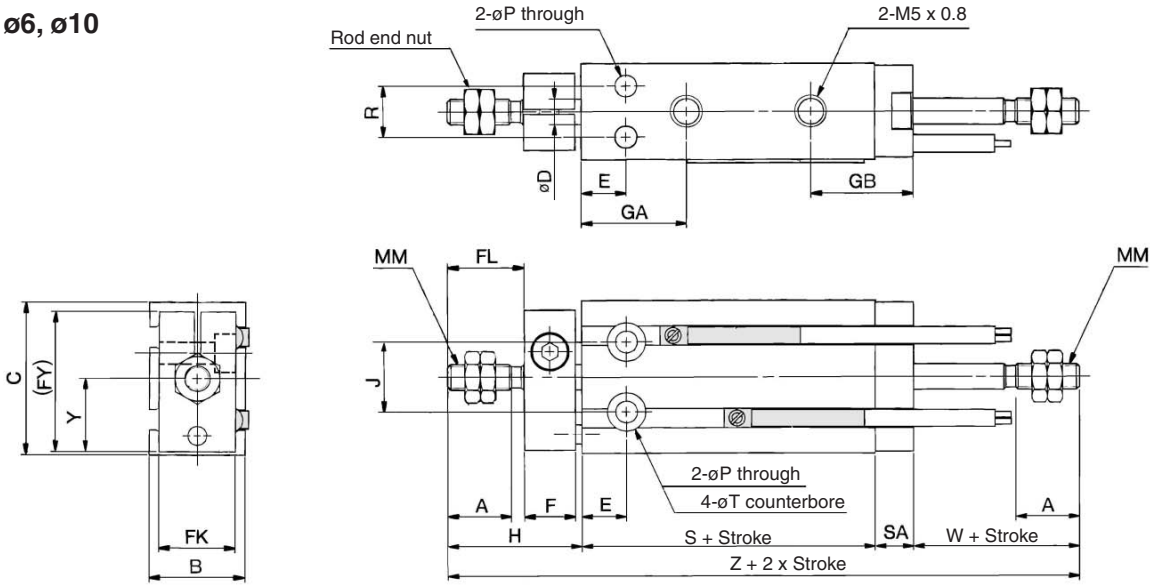
## Replacement Parts: Seal Kit

| | Bore size (mm) | | | | |
|---|---|---|---|---|---|
| | **10** | **16** | **20** | **25** | **32** |
| Kit no. | CUW10D-PS | CUW16D-PS | CUW20D-PS | CUW25D-PS | CUW32D-PS |

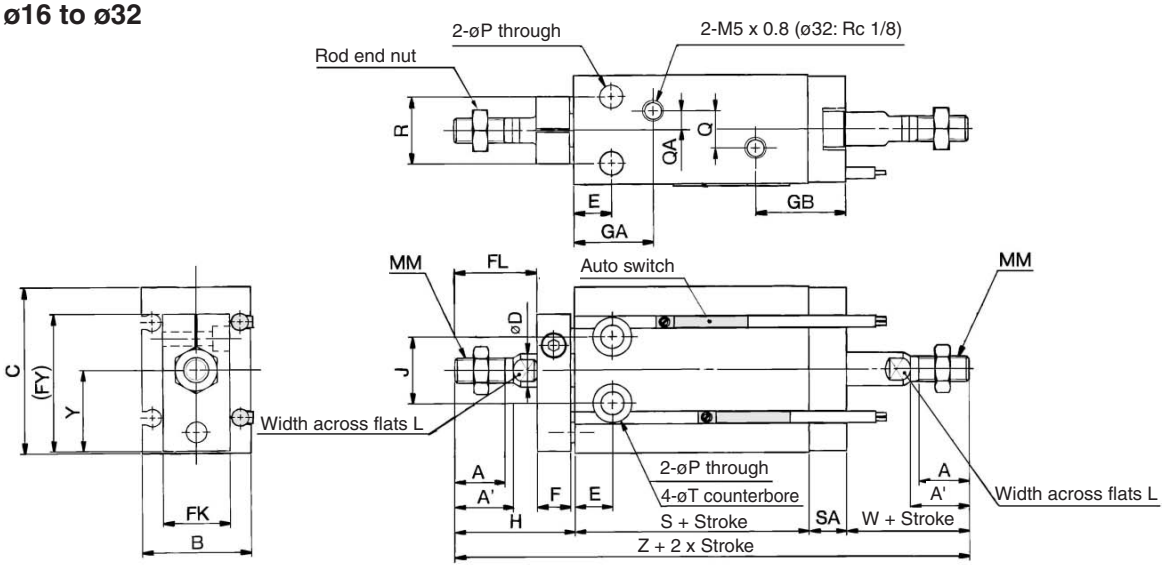
∗ Seal kit includes ⑳, ㉑, ㉒. Order the seal kit, based on each bore size.

## Dimensions: Non-rotating Rod Type; Double Acting, Double Rod

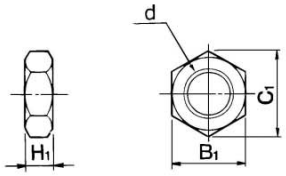
**ø6, ø10**




**ø16 to ø32**




### Rod End Nut/Accessory




Material: Carbon steel

| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | F | FL | FK | FY | GA | GB | H | J | L | MM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 8 | 9 | 11 | 20.5 | 15 | 16 | 18 | 10 | — | M3 x 0.5 |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 16 | 21 | 11 | — | M4 x 0.7 |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 Note) | 19 | 26 | 14 | 5 | M5 x 0.8 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 21.5 | 29 | 16 | 6 | M6 x 1.0 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 22 | 33 | 20 | 8 | M8 x 1.25 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 12 | 29 | 24 | 51.5 | 23 | 22.5 | 42 | 24 | 10 | M10 x 1.25 |

| Bore size (mm) | P | Q | QA | R | SA | T | W | Y | Without auto switch | | With auto switch | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | S | Z | S | Z |
| **6** | 3.2 | — | — | 7 | 6 | 6 depth 4.8 | 13 | 10.5 | 38 | 75 | 38 | 75 |
| **10** | 3.2 | — | — | 9 | 6 | 6 depth 5 | 16 | 11.5 | 36 | 79 | 36 | 79 |
| **16** | 4.5 | 4 | 2 | 12 | 7.5 | 7.6 depth 6.5 | 16 | 15.5 | 30 | 79.5 | 40 | 89.5 |
| **20** | 5.5 | 9 | 4.5 | 16 | 9 | 9.3 depth 8 | 19 | 19.5 | 36 | 93 | 46 | 103 |
| **25** | 5.5 | 9 | 4.5 | 20 | 9 | 9.3 depth 9 | 23 | 24.5 | 40 | 105 | 50 | 115 |
| **32** | 6.6 | 13.5 | 4.5 | 24 | 10 | 11 depth 11.5 | 27 | 30.5 | 42 | 121 | 52 | 131 |

Note) 5 stroke (CUKW16-5D): GA = 14.5

# Free Mount Cylinder: Non-rotating Rod Type
# Single Acting, Single Rod, Spring Return/Extend

# Series CUK

**ø6, ø10, ø16, ø20, ø25, ø32**

## How to Order

**Without auto switch** CUK **10** **15** **S**

**With auto switch** CDUK **10** **15** **S** **F9BW** ☐

**Built-in magnet**

**Non-rotating rod type**

**Bore size**

| | |
|---|---|
| **6** | 6 mm |
| **10** | 10 mm |
| **16** | 16 mm |
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |

**Standard stroke (mm)**

| | |
|---|---|
| **ø6, ø10, ø16 ø20, ø25, ø32** | 5, 10, 15 |

**Action**

| | |
|---|---|
| **S** | Single acting, Spring return |
| **T** | Single acting, Spring extend |

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch |

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

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |

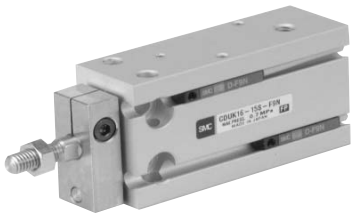
**Applicable Auto Switch**/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length (m)∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.



## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.23 MPa | 0.18 MPa | | 0.16 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion (1) | Rubber bumper on both ends | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |
| Rod non-rotating accuracy (2) | ±0.8° | | | ±0.5° | | |

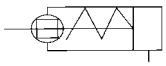
Note 1) ø6: With auto switch, single rubber bumper
Note 2) No load: Rod at retracted

## Standard Stroke

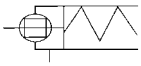
| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16**, **20**, **25**, **32** | 5, 10, 15 |

**JIS Symbol**

Single acting, Spring return



Single acting, Spring extend



## Minimum Stroke for Auto Switch Mounting (mm)

| No. of auto switches mounted | Applicable auto switch | | |
|---|---|---|---|
| | **D-A9□, D-A9□V** | **D-M9□, D-M9□V** | **D-F9□W, D-F9□WV** |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

## Weight /( ): Denotes the values with D-A93 (g)

| Model | Stroke (mm) | | |
|---|---|---|---|
| | 5 | 10 | 15 |
| C(D)UK6-□S/T | 28 (33) | 31 (41) | 34 (44) |
| C(D)UK10-□S/T | 43 (48) | 47 (57) | 55 (65) |
| C(D)UK16-□S/T | 60 (85) | 66 (90) | 81 (111) |
| C(D)UK20-□S/T | 113 (147) | 124 (164) | 153 (193) |
| C(D)UK25-□S/T | 212 (266) | 229 (288) | 271 (330) |
| C(D)UK32-□S/T | 331 (404) | 357 (435) | 422 (500) |

∗ For the auto switch weight, refer to page 7-9-1.

## Made to Order Specifications (For details, refer to page 7-10-1.)

| Symbol | Specifications |
|---|---|
| **-XC18** | NPT finish piping port |
| **-XC22** | Fluoro rubber seals |
| **-XC34** | Rod does not extend beyond non-rotating plate |

## Tightening Torque

When mounting a CUK single acting series, refer to page 7-3-5.

## Theoretical Output

Specifications are the same as single acting, spring return/spring extend type (Series CU). Refer to page 7-3-16.

## Spring Reaction Force

For “Spring Reaction Force”, refer to page 7-12-2.

## Auto Switch Mounting Position

For the auto switch mounting position of CDUK series single acting, spring return/spring extend, refer to page 7-3-21 to 22, since specification are the same as standard type, single acting, spring return/spring extend type.

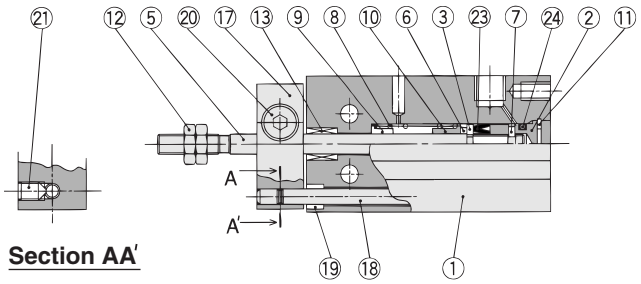
## Allowable Rotational Torque

Make sure that rotational torque is not applied to the piston rod of the CUK series single acting type cylinder. If the rotation torque were applied unavoidably, refer to page 7-3-25.

## Construction

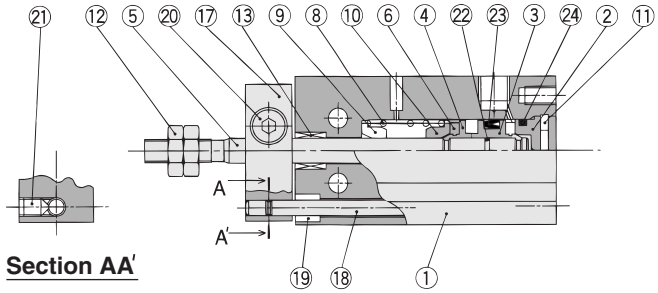
### Single acting, Spring return

#### ø6



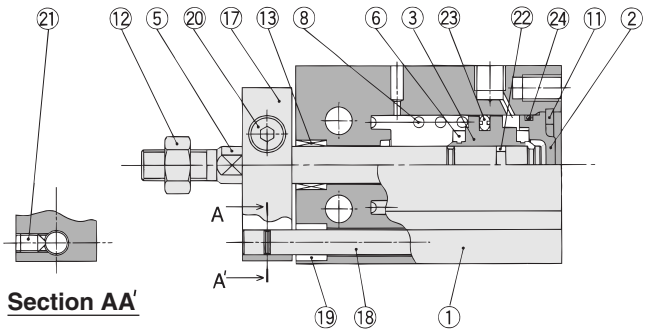

Section AA′

#### ø10



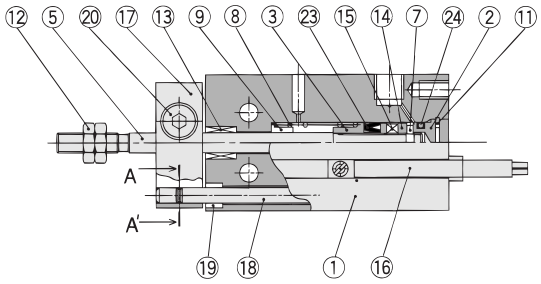

Section AA′

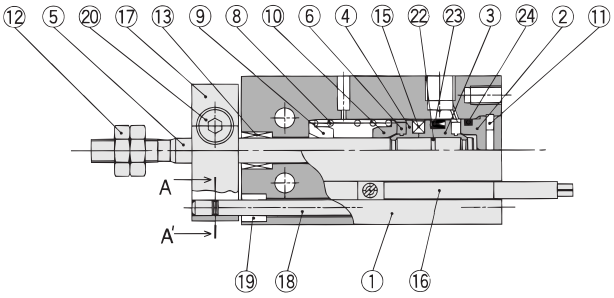
#### ø16 to ø32

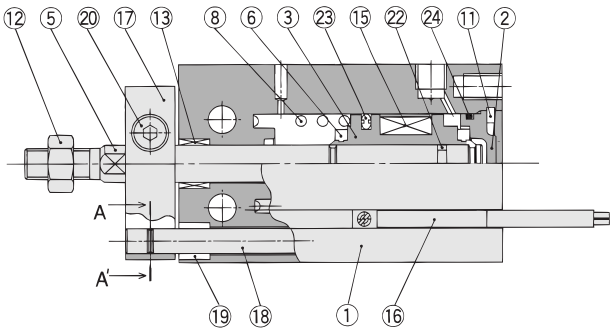



Section AA′

### With auto switch




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ③ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ④ | Piston | Brass | ø10 |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Bumper A | Urethane | |
| ⑦ | Bumper B | Urethane | |
| ⑧ | Return spring | Piano wire | Zinc chromated |
| ⑨ | Spring seat | Brass | |
| ⑩ | Spring seat | Brass | |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑪ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑫ | Rod end nut | Carbon steel | Nickel plated |
| ⑬ | Bushing | Oil-impregnated sintered alloy | |
| ⑭ | Magnet holder | Brass | ø6 |
| ⑮ | Magnet | Magnetic material | |
| ⑯ | Auto switch | — | |
| ⑰ | Non-rotating plate | Aluminum alloy | Nickel plated |
| ⑱ | Guide rod | Stainless steel | |
| ⑲ | Bushing | Oil-impregnated sintered alloy | Black zinc chromated |
| ⑳ | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| ㉑ | Hexagon socket head set screw | Carbon steel | |
| ㉒ | Piston gasket | NBR | |
| ㉓* | Piston seal | | |
| ㉔* | Gasket | | |

### Replacement Parts: Seal Kit

| | Bore size (mm) | | | | |
|---|---|---|---|---|---|
| | **10** | **16** | **20** | **25** | **32** |
| Kit no. | CU10S-PS | CU16S-PS | CU20S-PS | CU25S-PS | CU32S-PS |

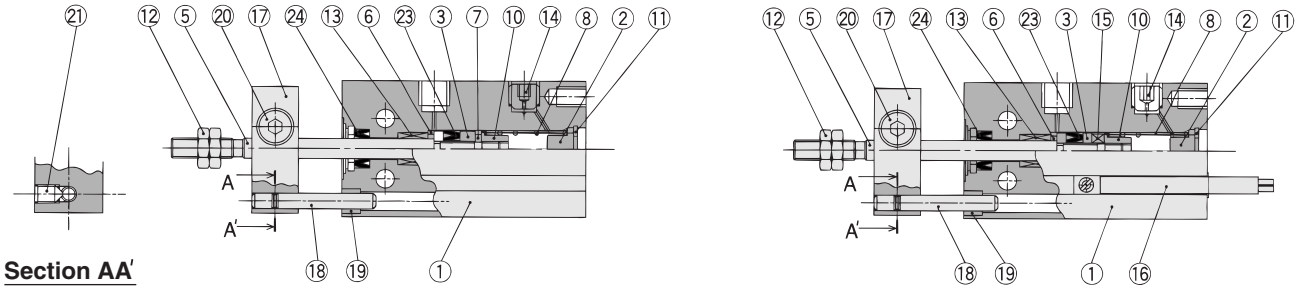
∗ Seal kit includes ㉓, ㉔. Order the seal kit, based on each bore size.

## Construction

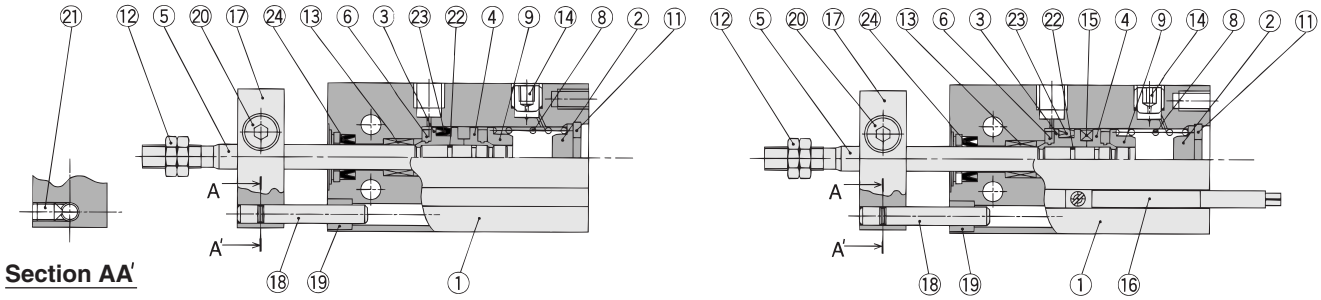
### Single acting, Spring extend

### With auto switch

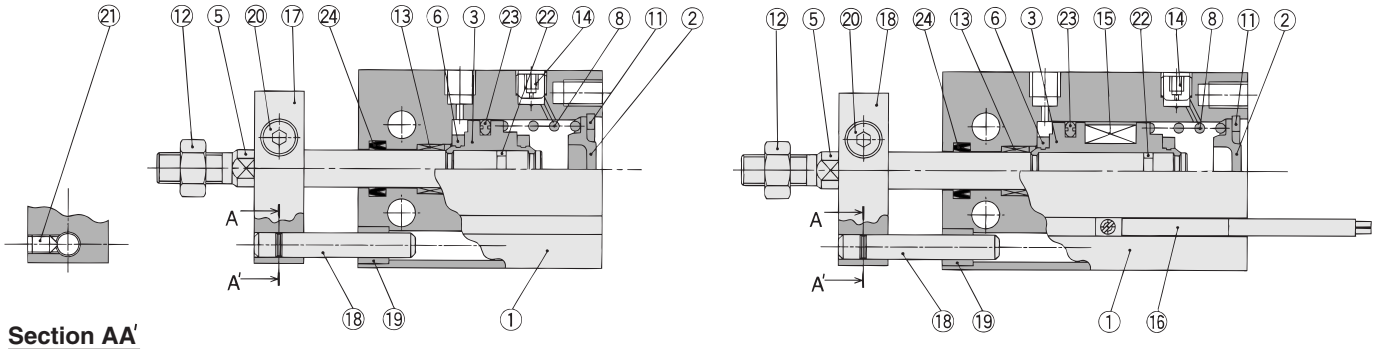
**ø6**




**ø10**




**ø16 to ø32**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ③ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ④ | Piston | Brass | ø10 |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Bumper A | Urethane | |
| ⑦ | Bumper B | Urethane | |
| ⑧ | Return spring | Piano wire | Zinc chromated |
| ⑨ | Spring seat | Brass | |
| ⑩ | stopper | Brass | ø6 |
| ⑪ | Snap ring | Carbon tool steel | Phosphate coated |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑫ | Rod end nut | Carbon steel | Nickel plated |
| ⑬ | Bushing | Oil-impregnated sintered alloy | |
| ⑭ | Plug with fixed orifice | Alloy steel | Black zinc chromated |
| ⑮ | Magnet | Magnetic material | |
| ⑯ | Auto switch | — | |
| ⑰ | Non-rotating plate | Aluminum alloy | Nickel plated |
| ⑱ | Guide rod | Stainless steel | |
| ⑲ | Bushing | Oil-impregnated sintered alloy | Black zinc chromated |
| ⑳ | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| ㉑ | Hexagon socket head set screw | Carbon steel | |
| ㉒ | Piston gasket | NBR | |
| ㉓ * | Piston seal | | |
| ㉔ * | Rod seal | | |

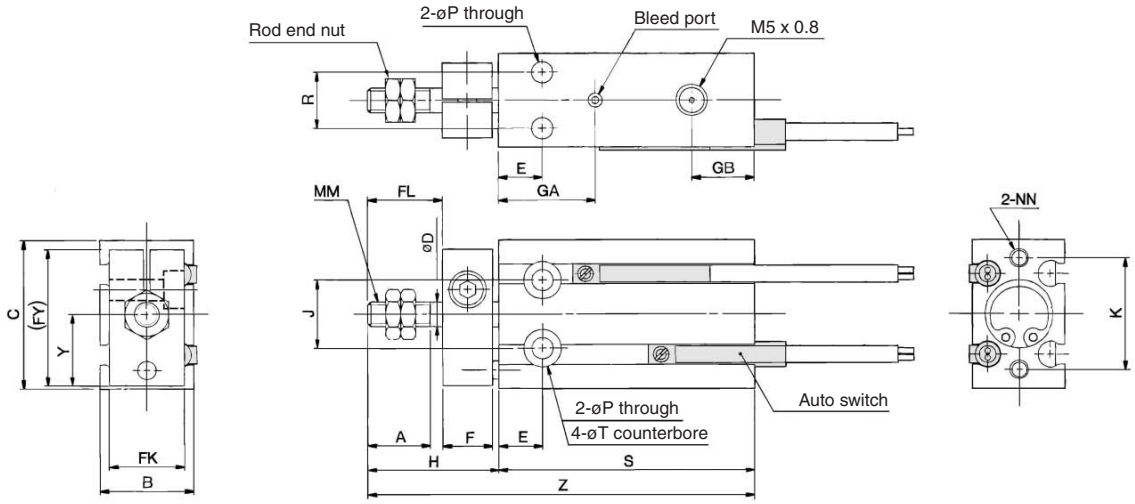
### Replacement Parts: Seal Kit

| | Bore size (mm) | | | | |
|---|---|---|---|---|---|
| | **10** | **16** | **20** | **25** | **32** |
| Kit no. | CU10T-PS | CU16T-PS | CU20T-PS | CU25T-PS | CU32T-PS |

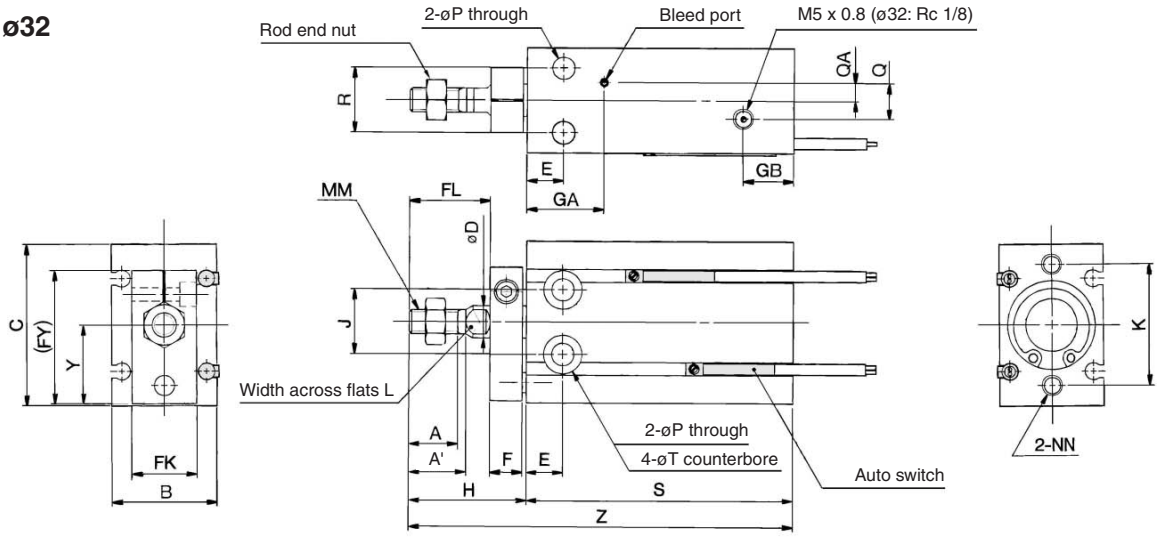
* Seal kit includes ㉓, ㉔. Order the seal kit, based on each bore size.

## Dimensions: Non-rotating Rod Type; Single Acting, Spring Return

### ø6, ø10

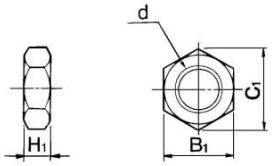



### ø16 to ø32




## Rod End Nut/Accessory

Material: Carbon steel



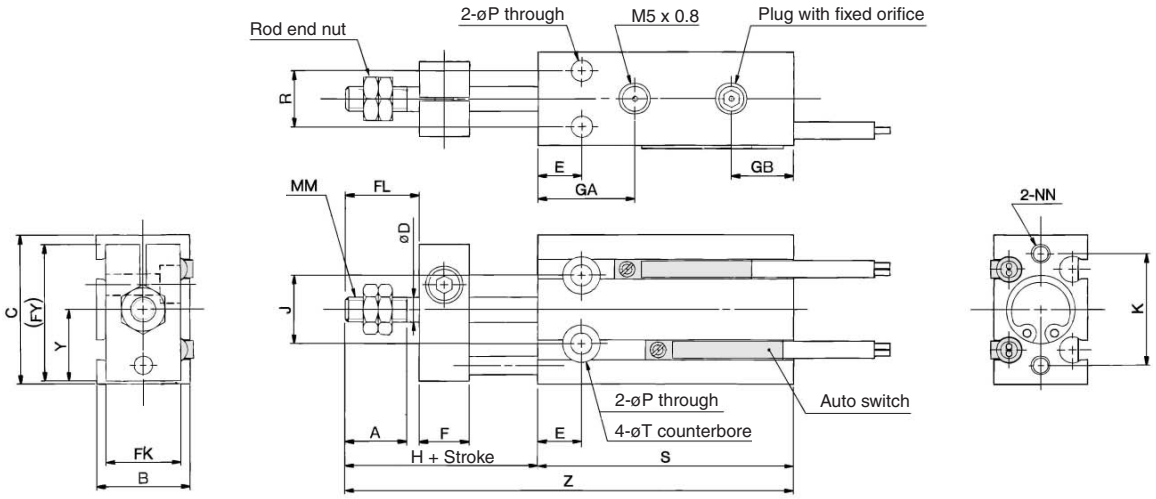

| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | F | FL | FK | FY | GA | GB | H | J | K | L | MM | NN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 8 | 9 | 11 | 20.5 | 15 | 10 | 18 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 | 11.5 | 26 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 12 | 29 | 24 | 51.5 | 23 | 12.5 | 42 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 |

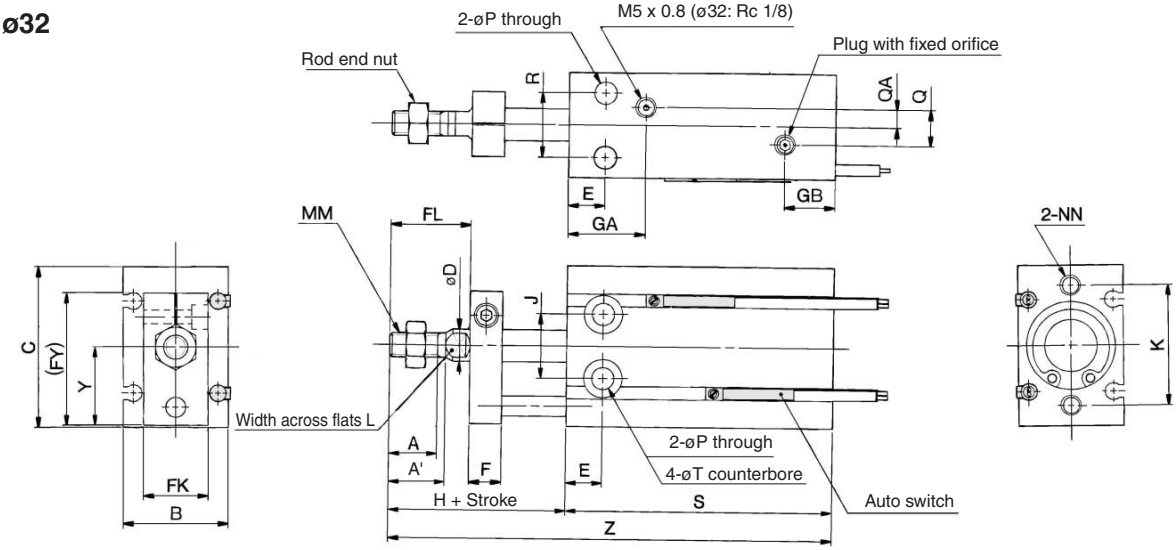
| Bore size (mm) | P | Q | QA | R | T | Y | Without auto switch | | | | | | With auto switch | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | | | Z | | | S | | | Z | | |
| | | | | | | | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st |
| **6** | 3.2 | — | — | 7 | 6 depth 4.8 | 10.5 | 38 | 43 | 48 | 56 | 61 | 66 | 38 | 43 | 48 | 56 | 61 | 66 |
| **10** | 3.2 | — | — | 9 | 6 depth 5 | 11.5 | 41 | 46 | 56 | 62 | 67 | 77 | 41 | 46 | 56 | 62 | 67 | 77 |
| **16** | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 15.5 | 35 | 40 | 50 | 61 | 66 | 76 | 45 | 50 | 60 | 71 | 76 | 86 |
| **20** | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 19.5 | 41 | 46 | 56 | 70 | 75 | 85 | 51 | 56 | 66 | 80 | 85 | 95 |
| **25** | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 24.5 | 45 | 50 | 60 | 78 | 83 | 93 | 55 | 60 | 70 | 88 | 93 | 103 |
| **32** | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 | 30.5 | 47 | 52 | 62 | 89 | 94 | 104 | 57 | 62 | 72 | 99 | 104 | 114 |

## Dimensions: Non-rotating Rod Type; Single Acting, Spring Extend

### ø6, ø10

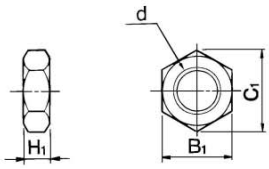



### ø16 to ø32




### Rod End Nut/Accessory

Material: Carbon steel




| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | F | FL | FK | FY | GA | GB | H | J | K | L | MM | NN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 8 | 9 | 11 | 20.5 | 15 | 10 | 18 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 | 11.5 | 26 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 12 | 29 | 24 | 51.5 | 23 | 12.5 | 42 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 |

| Bore size (mm) | P | Q | QA | R | T | Y | Without auto switch | | | | | | With auto switch | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | S | | | Z | | | S | | | Z | | |
| | | | | | | | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 5 st | 10 st | 15st |
| **6** | 3.2 | — | — | 7 | 6 depth 4.8 | 10.5 | 38 | 43 | 48 | 61 | 71 | 81 | 38 | 43 | 48 | 61 | 71 | 81 |
| **10** | 3.2 | — | — | 9 | 6 depth 5 | 11.5 | 41 | 46 | 56 | 67 | 77 | 92 | 41 | 46 | 56 | 67 | 77 | 92 |
| **16** | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 15.5 | 45 | 50 | 60 | 76 | 86 | 101 | 45 | 50 | 60 | 76 | 86 | 101 |
| **20** | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 19.5 | 41 | 46 | 56 | 75 | 85 | 100 | 51 | 56 | 66 | 85 | 95 | 110 |
| **25** | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 24.5 | 45 | 50 | 60 | 83 | 93 | 108 | 55 | 60 | 70 | 93 | 103 | 118 |
| **32** | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 | 30.5 | 47 | 52 | 62 | 94 | 104 | 119 | 57 | 62 | 72 | 104 | 114 | 129 |

# Free Mount Cylinder: Long Stroke Type
## Double Acting, Single Rod
# *Series CU*
### ø6, ø10, ø16, ø20, ø25, ø32

## How to Order

**Without auto switch** CU [6] — [60] [D]

**With auto switch** CDU [6] — [60] [D] — [F9BW] [ ]

**Built-in magnet**

**Bore size**

| | |
|---|---|
| **6** | 6 mm |
| **10** | 10 mm |
| **16** | 16 mm |
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |

**Long stroke (mm)**

| | |
|---|---|
| **ø6, ø10, ø16** | 40, 50, 60 |
| **ø20, ø25, ø32** | 60, 70, 80, 90, 100 |

**Action**

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

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch |

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

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |

**Applicable Auto Switch**/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model: Perpendicular | Auto switch model: In-line | Lead wire length (m)∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.

## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.12 MPa | 0.06 MPa | | 0.05 MPa | | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16** | 40, 50, 60 |
| **20**, **25**, **32** | 60, 70, 80, 90, 100 |

**JIS Symbol**
Double acting,
Spring rod type

## Weight

/( ): Denotes the values with D-A93. (g)

| Model | Stroke (mm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **C(D)U6-□D** | 43 (53) | 49 (59) | 50 (65) | — | — | — | — |
| **C(D)U10-□D** | 64 (74) | 72 (82) | 80 (90) | — | — | — | — |
| **C(D)U16-□D** | 92 (122) | 104 (134) | 116 (146) | — | — | — | — |
| **C(D)U20-□D** | — | — | 216 (253) | 238 (275) | 260 (297) | 282 (319) | 304 (341) |
| **C(D)U25-□D** | — | — | 363 (422) | 397 (456) | 431 (490) | 465 (524) | 499 (558) |
| **C(D)U32-□D** | — | — | 526 (604) | 574 (652) | 622 (700) | 670 (748) | 718 (796) |

∗ For the auto switch weight, refer to page 7-9-1.

Made to Order

## Made to Order Specifications (For details, refer to page 7-10-1.)

| Symbol | Specifications |
|---|---|
| **-XB9** | Low speed cylinder (10 to 50 mm/s) |
| **-XB13** | Low speed cylinder (5 to 50 mm/s) |
| **-XC19** | Intermediate stroke (Spacer type) |

## Auto Switch Mounting Position

For the auto switch mounting position of CDU long stroke series, refer to page 7-3-8, since specifications are the same as standard type, double acting, single rod type.

## Tightening Torque

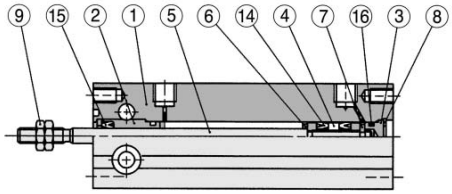
Refer to page 7-3-5 for mounting a long stroke type.

## Theoretical Output

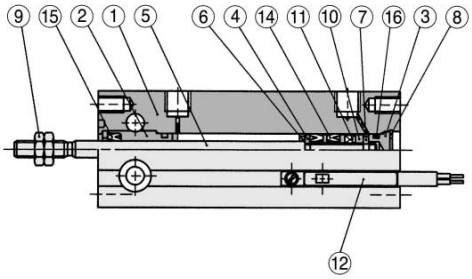
Specifications are the same as CU series double acting, single rod. Refer to page 7-3-5.

## Construction

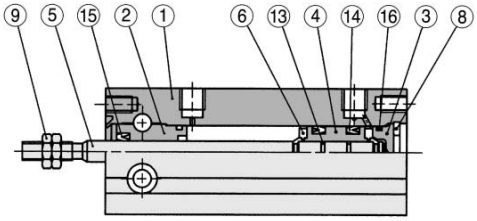
**ø6**

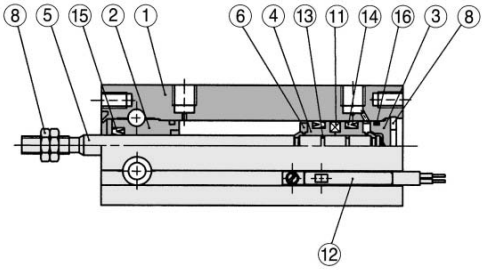



**With auto switch**

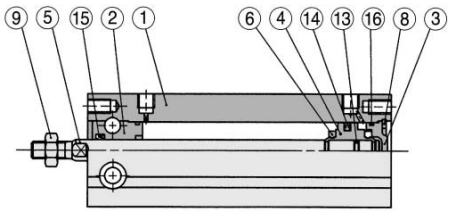


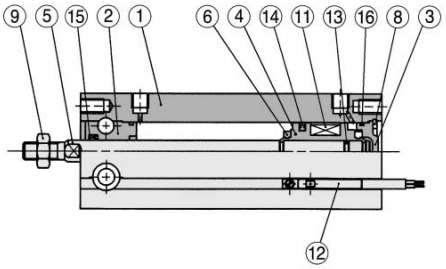

**ø10**




**ø16 to ø32**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Rod cover | Aluminum bearing alloy | Hard anodized |
| ③ | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ④ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Bumper A | Urethane | |
| ⑦ | Bumper B | Urethane | |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑧ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑨ | Rod end nut | Carbon steel | Nickel plated |
| ⑩ | Magnet holder | Brass | ø6 |
| ⑪ | Magnet | Magnetic material | |
| ⑫ | Auto switch | — | |
| ⑬ | Piston gasket | NBR | |
| ⑭ | Piston seal | | |
| ⑮ | Rod seal | | |
| ⑯ | Gasket | | |

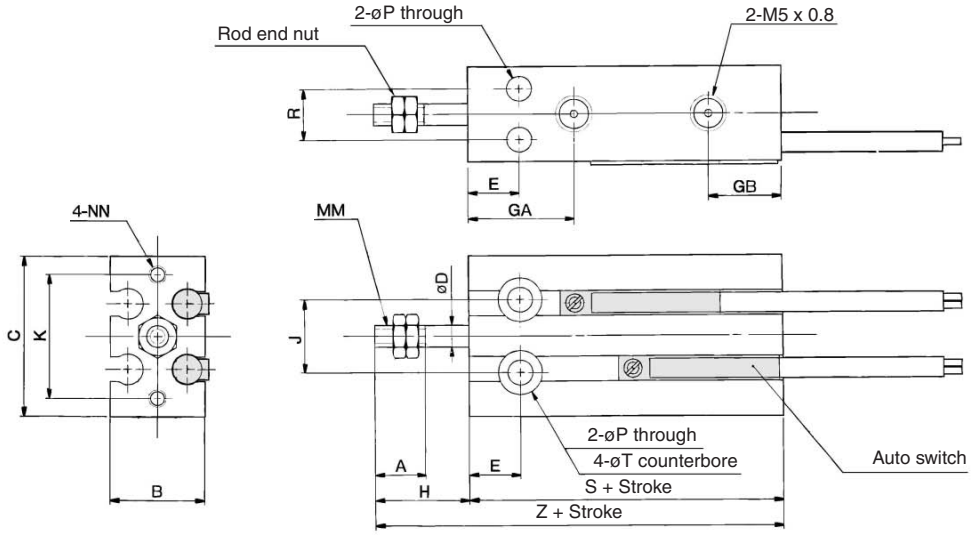
### Replacement Parts: Seal Kit

| Bore size (mm) | Kit no. | Contents |
|---|---|---|
| 10 | CU10D-PS | Set of nos. above ⑭, ⑮, ⑯. |
| 16 | CU16D-PS | |
| 20 | CU20D-PS | |
| 25 | CU25D-PS | |
| 32 | CU32D-PS | |

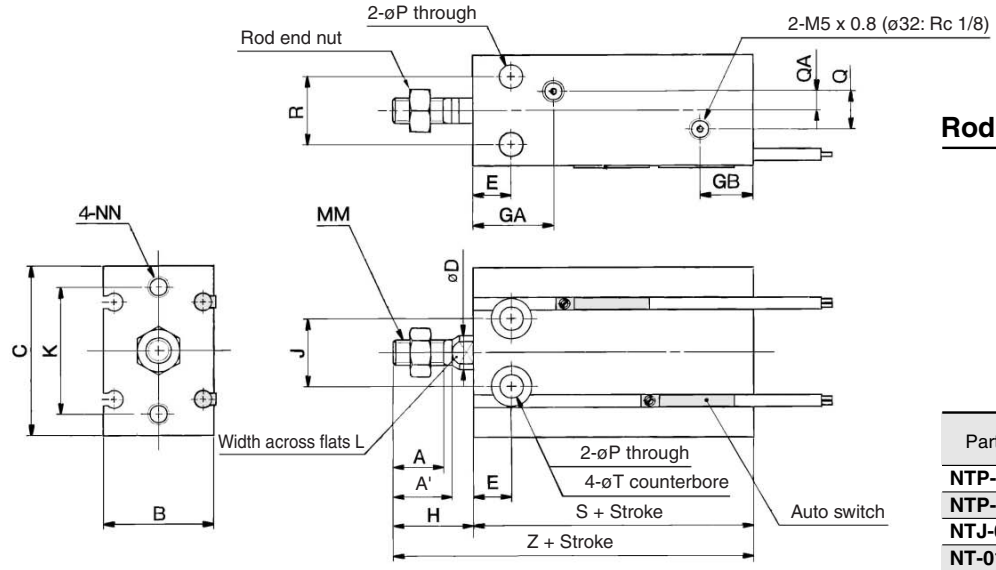
∗ Seal kit includes ⑭, ⑮, ⑯. Order the seal kit, based on each bore size.

## Dimensions: Double Acting, Single Rod

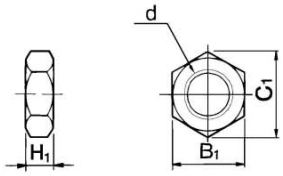
### ø6, ø10




### ø16 to ø32




### Rod End Nut/Accessory




Material: Carbon steel

| Part no. | Applicable bore (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 15 | 10 | 13 | 10 | 17 | — | M3 x 0.5 | M3 x 0.5 depth 5 | 3.2 | — | — |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 x 0.7 | M3 x 0.5 depth 5 | 3.2 | — | — |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5 | 11.5 | 16 | 14 | 25 | 5 | M5 x 0.8 | M4 x 0.7 depth 6 | 4.5 | 4 | 2 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 12.5 | 19 | 16 | 30 | 6 | M6 x 1.0 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 13 | 23 | 20 | 38 | 8 | M8 x 1.25 | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 23 | 12.5 | 27 | 24 | 48 | 10 | M10 x 1.25 | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 |

| Bore size (mm) | R | T | Without auto switch | | With auto switch | |
|---|---|---|---|---|---|---|
| | | | S | Z | S | Z |
| **6** | 7 | 6 depth 4.8 | 33 | 46 | 33 | 46 |
| **10** | 9 | 6 depth 5 | 36 | 52 | 36 | 52 |
| **16** | 12 | 7.6 depth 6.5 | 30 | 46 | 40 | 56 |
| **20** | 16 | 9.3 depth 8 | 36 | 55 | 46 | 65 |
| **25** | 20 | 9.3 depth 9 | 40 | 63 | 50 | 73 |
| **32** | 24 | 11 depth 11.5 | 42 | 69 | 52 | 79 |

# Free Mount Cylinder: Long Stroke Type
# Non-rotating Rod, Double Acting, Single Rod

# Series CUK

**ø6, ø10, ø16, ø20, ø25, ø32**

## How to Order

**Without auto switch** CUK 6 — 60 D

**With auto switch** CDUK 6 — 60 D — F9BW □

**Built-in magnet**

**Non-rotating rod type**

**Bore size**

| | |
|---|---|
| 6 | 6 mm |
| 10 | 10 mm |
| 16 | 16 mm |
| 20 | 20 mm |
| 25 | 25 mm |
| 32 | 32 mm |

**Cylinder stroke (mm)**

| | |
|---|---|
| ø6, ø10, ø16 | 40, 50, 60 |
| ø20, ø25, ø32 | 60, 70, 80, 90, 100 |

**Action**

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

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch |

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

**Number of auto switches**

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

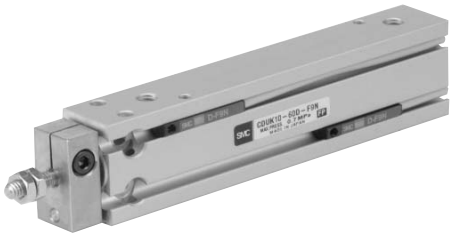
**Applicable Auto Switch**/Refer to page 7-9-1 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model Perpendicular | Auto switch model In-line | Lead wire length (m)∗ 0.5 (Nil) | 3 (L) | 5 (Z) | Pre-wire connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | — | Relay, PLC |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | ○ | — | |

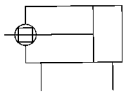
∗ Lead wire length symbols: 0.5 m·····Nil (Example) A93
3 m·····L (Example) A93L
5 m·····Z (Example) F9NWZ

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

• Since there are other applicable auto switches than listed, refer to page 7-3-9 for details.
• For details about auto switches with pre-wire connector, refer to page 7-9-36.



**JIS Symbol**
Double acting,
Single rod type



## Made to Order Specifications (For details, refer to page 7-10-1.)

| Symbol | Specifications |
|---|---|
| **-XB9** | Low speed cylinder (10 to 50 mm/s) |
| **-XB13** | Low speed cylinder (5 to 50 mm/s) |
| **-XC19** | Intermediate stroke (Spacer type) |

## Specifications

| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|---|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.15 MPa | | 0.10 MPa | | 0.08 MPa | |
| Ambient and fluid temperature | Without auto switch: –10 to 70°C (No freezing)<br>With auto switch: –10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | $^{+1.0}_{0}$ mm | | | | | |
| Rod non-rotating accuracy Note) | ±0.8° | | | ±0.5° | | |

Note) No load: Rod at retracted

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **6**, **10**, **16** | 40, 50, 60 |
| **20**, **25**, **32** | 60, 70, 80, 90, 100 |

## Weight /( ): Denotes the values with D-A93. (g)

| Model | Stroke (mm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **C(D)UK6-□D** | 49 (59) | 55 (65) | 61 (71) | — | — | — | — |
| **C(D)UK10-□D** | 71 (81) | 79 (89) | 87 (97) | — | — | — | — |
| **C(D)UK16-□D** | 102 (132) | 114 (144) | 126 (156) | — | — | — | — |
| **C(D)UK20-□D** | — | — | 243 (284) | 267 (308) | 291 (332) | 315 (356) | 339 (380) |
| **C(D)UK25-□D** | — | — | 405 (460) | 440 (495) | 475 (530) | 510 (565) | 545 (600) |
| **C(D)UK32-□D** | — | — | 617 (695) | 669 (747) | 721 (799) | 773 (851) | 825 (903) |

∗ For the auto switch weight, refer to page 7-9-1.

## Allowable Rotational Torque

Make sure that rotational torque is not applied to the piston rod of a long stroke type cylinder. If the rotation torque were applied unavoidably, refer to page 7-3-25 for details.

## Tightening Torque

When mounting a CUK long stroke series, refer to page 7-3-5.

## Theoretical Output

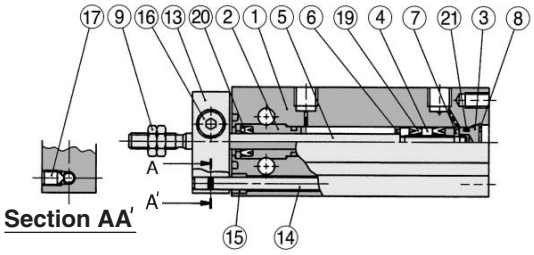
Specifications are the same as CU series double acting, single rod. Refer to page 7-3-5.

## Auto Switch Mounting Position

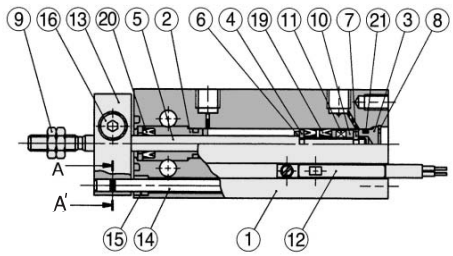
For the auto switch mounting position of CDU long stroke series, refer to page 7-3-8, since specifications are the same as standard type, double acting, single rod type.

## Construction

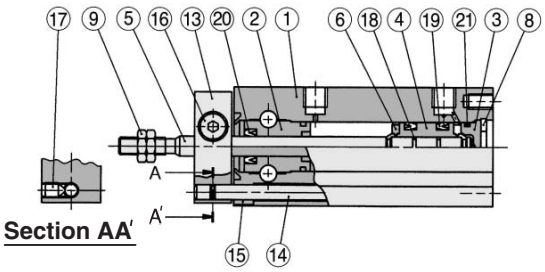
**ø6**

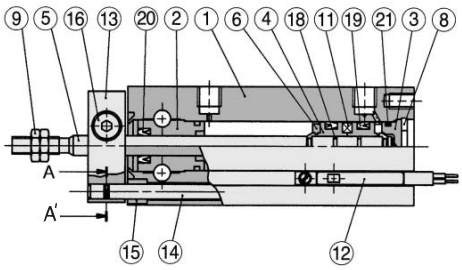



**With auto switch**

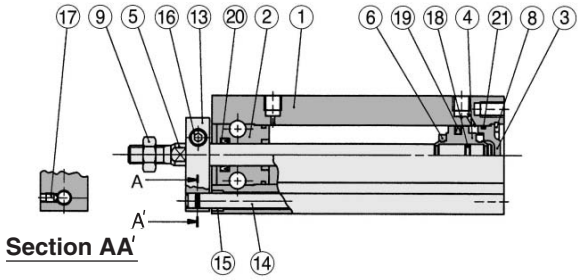


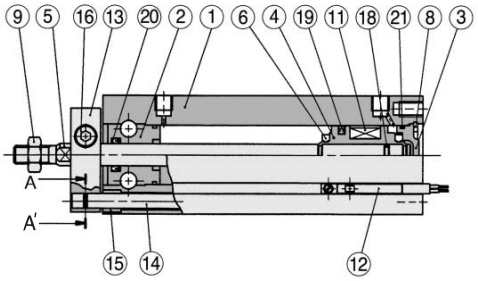

**ø10**




**ø16 to ø32**




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | Hard anodized |
| ② | Rod cover | Aluminum bearing alloy | Hard anodized |
| ③ | Head cover | Brass | ø6 to ø10, Nickel plated |
| | | Aluminum alloy | ø16 to ø32, Clear chromated |
| ④ | Piston | Brass | ø6 to ø10 |
| | | Aluminum alloy | ø16 to ø32, Chromated |
| ⑤ | Piston rod | Stainless steel | |
| ⑥ | Bumper A | Urethane | |
| ⑦ | Bumper B | Urethane | |
| ⑧ | Snap ring | Carbon tool steel | Phosphate coated |
| ⑨ | Rod end nut | Carbon steel | Nickel plated |
| ⑩ | Magnet holder | Brass | ø6 |

| No. | Description | Material | Note |
|---|---|---|---|
| ⑪ | Magnet | Magnetic material | |
| ⑫ | Auto switch | — | |
| ⑬ | Non-rotating plate | Aluminum alloy | Nickel plated |
| ⑭ | Guide rod | Stainless steel | |
| ⑮ | Bushing | Oil-impregnated sintered alloy | Black zinc chromated |
| ⑯ | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| ⑰ | Hexagon socket head set screw | Carbon steel | |
| ⑱ | Piston gasket | NBR | |
| ⑲ | Piston seal | | |
| ⑳ | Rod seal | | |
| ㉑ | Gasket | | |

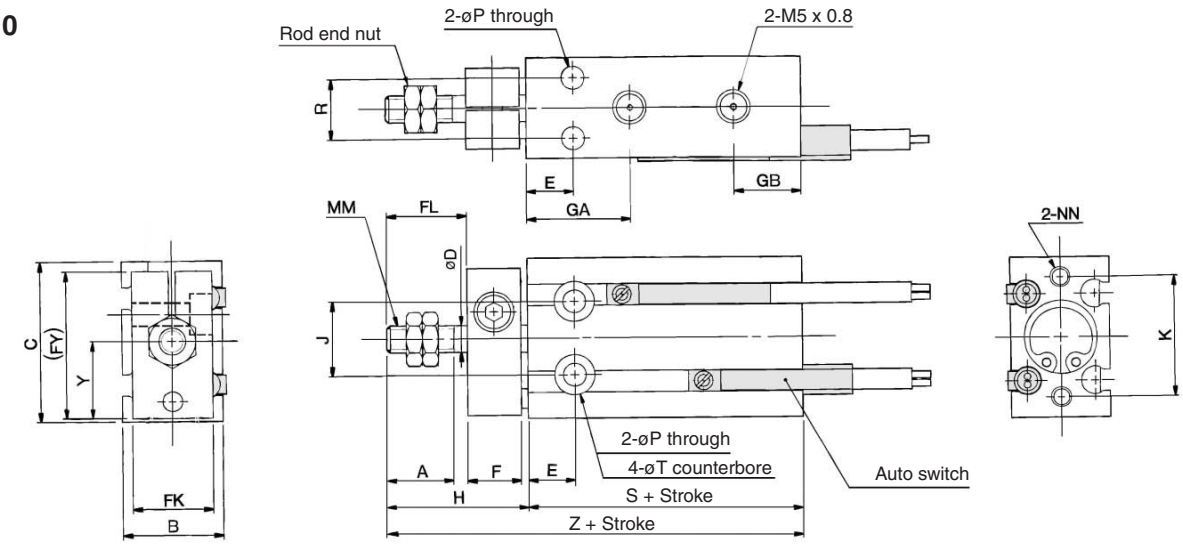
### Replacement Parts: Seal Kit

| Bore size (mm) | Kit no. | Contents |
|---|---|---|
| 10 | CU10D-PS | Set of nos. above ⑲, ⑳, ㉑. |
| 16 | CU16D-PS | |
| 20 | CU20D-PS | |
| 25 | CU25D-PS | |
| 32 | CU32D-PS | |

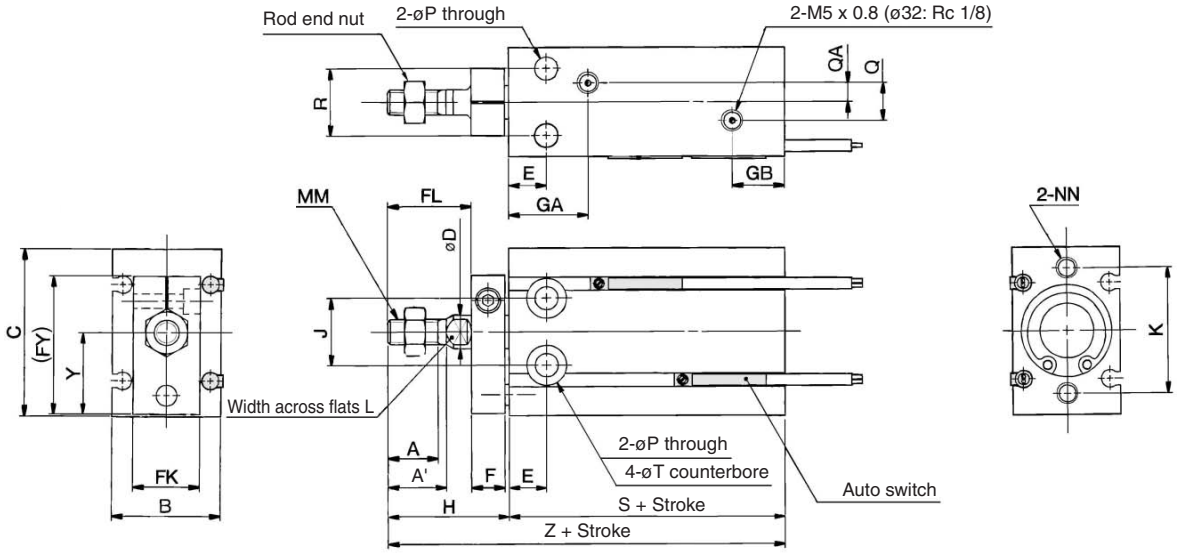
∗ Seal kit includes ⑲, ⑳, ㉑. Order the seal kit, based on each bore size.

## Dimensions: Non-rotating Rod Type; Double Acting, Single Rod

**ø6, ø10**

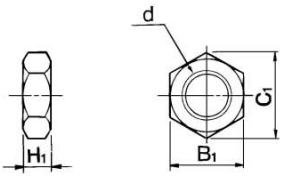



**ø16 to ø32**




### Rod End Nut/Accessory

Material: Carbon steel




| Part no. | Applicable bore size (mm) | d | $H_1$ | $B_1$ | $C_1$ |
|---|---|---|---|---|---|
| **NTP-006** | **6** | M3 x 0.5 | 1.8 | 5.5 | 6.4 |
| **NTP-010** | **10** | M4 x 0.7 | 2.4 | 7 | 8.1 |
| **NTJ-015A** | **16** | M5 x 0.8 | 4 | 8 | 9.2 |
| **NT-015A** | **20** | M6 x 1.0 | 5 | 10 | 11.5 |
| **NT-02** | **25** | M8 x 1.25 | 5 | 13 | 15.0 |
| **NT-03** | **32** | M10 x 1.25 | 6 | 17 | 19.6 |

| Bore size (mm) | A | A' | B | C | D | E | F | FL | FK | FY | GA | GB | H | J | K | L | MM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 7 | — | 13 | 22 | 3 | 7 | 8 | 9 | 11 | 20.5 | 15 | 10 | 18 | 10 | 17 | — | M3 x 0.5 |
| **10** | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 x 0.7 |
| **16** | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 | 11.5 | 26 | 14 | 25 | 5 | M5 x 0.8 |
| **20** | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 x 1.0 |
| **25** | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 x 1.25 |
| **32** | 19.5 | 22 | 40 | 62 | 12 | 11 | 12 | 29 | 24 | 51.5 | 23 | 12.5 | 42 | 24 | 48 | 10 | M10 x 1.25 |

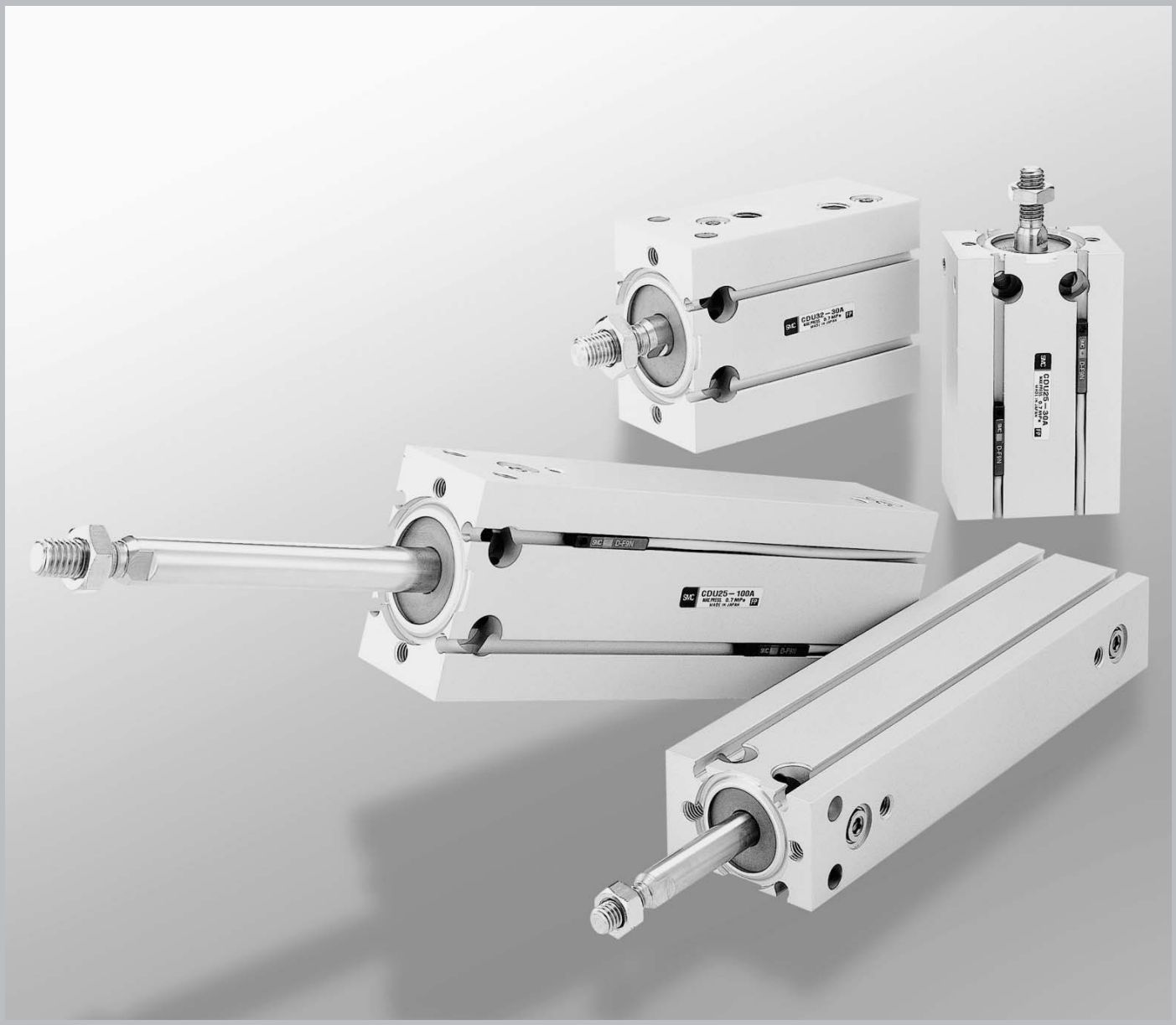
| Bore size (mm) | NN | P | Q | QA | R | T | Y | Without auto switch | | With auto switch | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | S | Z | S | Z |
| **6** | M3 x 0.5 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 | 10.5 | 33 | 51 | 33 | 51 |
| **10** | M3 x 0.5 depth 5 | 3.2 | — | — | 9 | 6 depth 5 | 11.5 | 36 | 57 | 36 | 57 |
| **16** | M4 x 0.7 depth 6 | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 15.5 | 30 | 56 | 40 | 66 |
| **20** | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 19.5 | 36 | 65 | 46 | 75 |
| **25** | M5 x 0.8 depth 8 | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 24.5 | 40 | 73 | 50 | 83 |
| **32** | M6 x 1.0 depth 9 | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 | 30.5 | 42 | 84 | 52 | 94 |

# Free Mount Cylinder with Air Cushion

# *Series CU*

**ø20, ø25, ø32**






**A unique air cushion** mechanism has been added to Series CU free mount cylinder.

# Free Mount Cylinder with Air Cushion

# Series CU

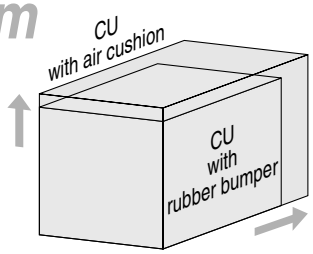
## New air cushion mechanism

## Free mount cylinder *Series CU* now employs an air cushion mechanism.

## Extended dimensions (compared to the standard *CU* models) are hardly noticeable.

**(with rubber bumper)**

- **Overall length:** *+1.5 to 7 mm*
- **Overall height:** *+0 to 2 mm*
  **No air cushion protrusion!**
- **Overall width: not affected**



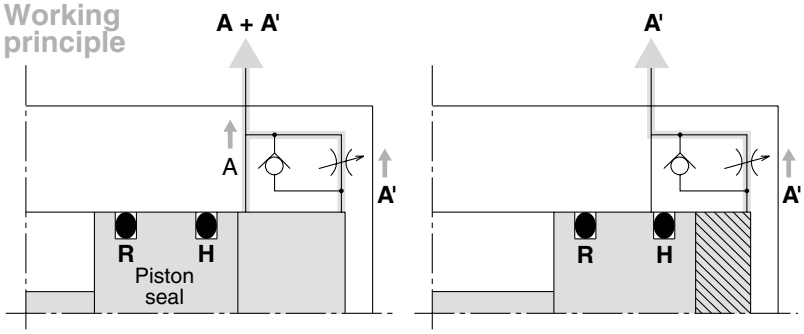

(mm)

| Bore size | Extended dimensions | |
|---|---|---|
| | Length | Height |
| ø20 | 7 | 2 |
| ø25 | 1.5 | 0 |
| ø32 | 4 | 0 |

### Unique air cushion construction requires 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.**

Working 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 valve opens and the piston extends with no delay.

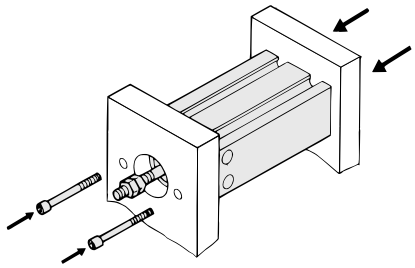
# Reduced stroke end impact and noise:
## New standards to meet consumer demand.



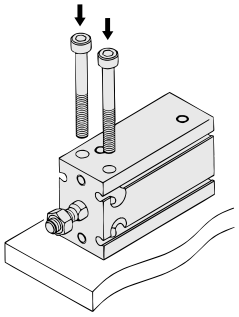
## Free mounting

3 types of mounting orientations can be accommodated depending on the installation conditions.

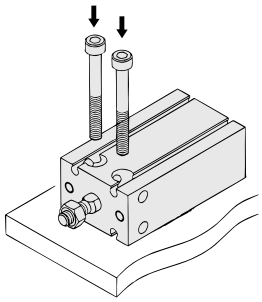
**Axial mounting (Tapped hole)**



**Vertical mounting (Body through-hole)**



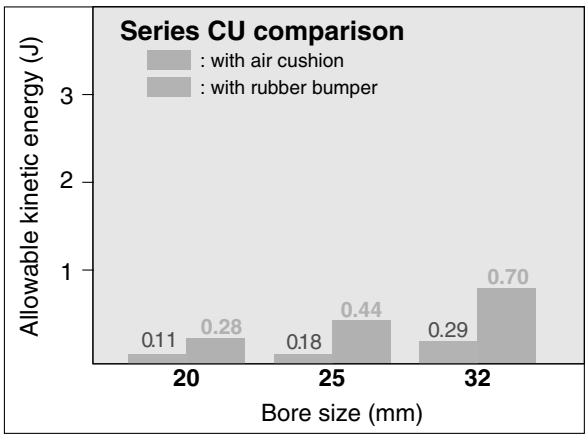
**Lateral mounting (Body through-hole)**



## Approximately 2.4 times of allowable kinetic energy

(Compared to the old Series CU with rubber bumper)

Improved allowable kinetic energy absorption.




## Improved repeatability

When compared to rubber bumper type actuators, air cushion type cylinders are less likely to be affected by pressure fluctuations, and therefore better able to achieve a stable and smooth stroke.

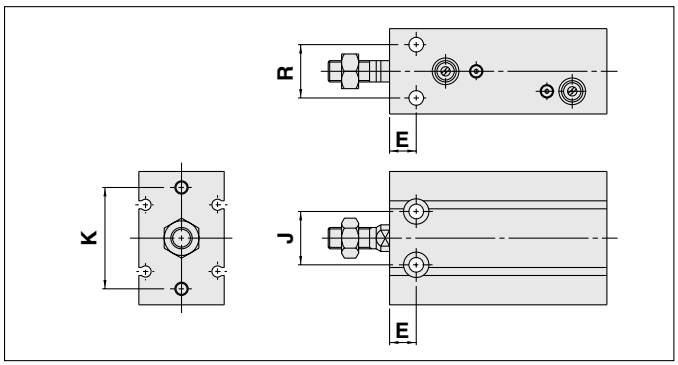
## Improved sound insulation

### (Reduced impact noise at the stroke end)

- Noise reduction of more than 11dB is possible (compared to Series CU20 with rubber bumper).

## Interchangeable mounting

Mounting dimensions (J, K, R, and E) are the same as the rubber bumper type Series CU.




## Size Variations

| Model | Standard stroke | Auto switch |
|---|---|---|
| | 20 30 40 50 60 70 80 90 100 | |
| C(D)U20 | | • ø20 to ø32 Direct mounting style auto switch |
| C(D)U25 | | |
| C(D)U32 | | |

# Free Mount Cylinder with Air Cushion

# Series CU

## ø20, ø25, ø32

## How to Order

**Without auto switch** CU 32 □ — 50 A

**With auto switch** CDU 32 □ — 50 A — F9BW □

**Built-in magnet**

**Bore size**

| | |
|---|---|
| **20** | 20 mm |
| **25** | 25 mm |
| **32** | 32 mm |

**Thread type**

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

**Cylinder stroke (mm)**
Refer to "Standard Stroke" on page 7-3-51.

**Air cushion**

| | |
|---|---|
| **A** | With air cushion |

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch |

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

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |

**Applicable Auto Switch**/Refer to page 7-9-1 for further infomation on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (output) | Load voltage | | | Auto switch model | | Lead wire length (m)∗ | | | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DC | | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | |
| Reed switch | — | Grommet | No | 2-wire | 24 V | 5 V, 12 V | 100 V or less | **A90V** | **A90** | ● | ● | — | IC circuit | Relay PLC |
| | | | Yes | | | 12 V | 100 V | **A93V** | **A93** | ● | ● | — | — | |
| | | | | 3-wire (NPN equiv.) | — | 5 V | — | **A96V** | **A96** | ● | ● | — | IC circuit | — |
| Solid state 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 indication) | | | 3-wire (NPN) | | 5 V, 12 V | | **F9NWV** | **F9NW** | ● | ● | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **F9PWV** | **F9PW** | ● | ● | ○ | | |
| | | | | 2-wire | | 12 V | | **F9BWV** | **F9BW** | ● | ● | ○ | — | |

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) A93
3 m ····· L A93L
5 m ····· Z F9NWZ

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

## Specifications

| | |
|---|---|
| Type | Pneumatic (Non-lube) |
| Fluid | Air |
| Proof pressure | 1.0 MPa |
| Maximum operating pressure | 0.7 MPa |
| Minimum operating pressure | 0.08 MPa |
| Ambient and fluid temperature | Without auto switch: –10°C to 70°C (No freezing)<br>With auto switch: –10°C to 60°C (No freezing) |
| Rod end thread | Male thread |
| Rod end thread tolerance | JIS Class 2 |
| Stroke length tolerance | $^{+1.0}_{0}$ |
| Piston speed | 50 to 500 mm/s |

## Effective Cushion Length

| Bore size (mm) | **20** | **25** | **32** |
|---|---|---|---|
| Effective cushion length (mm) | 6.6 | 6.7 | 7.7 |

## Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|---|---|
| **20, 25, 32** | 20, 30, 40, 50, 60, 70, 80, 90, 100 |

∗ Intermediate strokes are also available upon receipt of order. Please contact SMC.
Minimum stroke length is 20 mm.

**Tightening Torque:** When mounting Series CU refer to the table below.

| Bore size (mm) | Hexagon socket head cap screw size (mm) | Proper tightening torque (N◊m) |
|---|---|---|
| **20, 25** | M5 | 5.10 ±10% |
| **32** | M6 | 8.04 ±10% |

**Allowable Kinetic Energy**

**Refer to "Selection" on 7-3-56 regarding allowable kinetic energy.**

## Theoretical Output

OUT IN

(N)

| Bore size (mm) | Operating direction | Operating pressure (MPa) | | |
|---|---|---|---|---|
| | | 0.3 | 0.5 | 0.7 |
| **20** | OUT | 94.2 | 157 | 220 |
| | IN | 79.2 | 132 | 185 |
| **25** | OUT | 147 | 246 | 344 |
| | IN | 124 | 206 | 288 |
| **32** | OUT | 241 | 402 | 563 |
| | IN | 207 | 346 | 454 |

## Weight

### Basic Weight

(g)

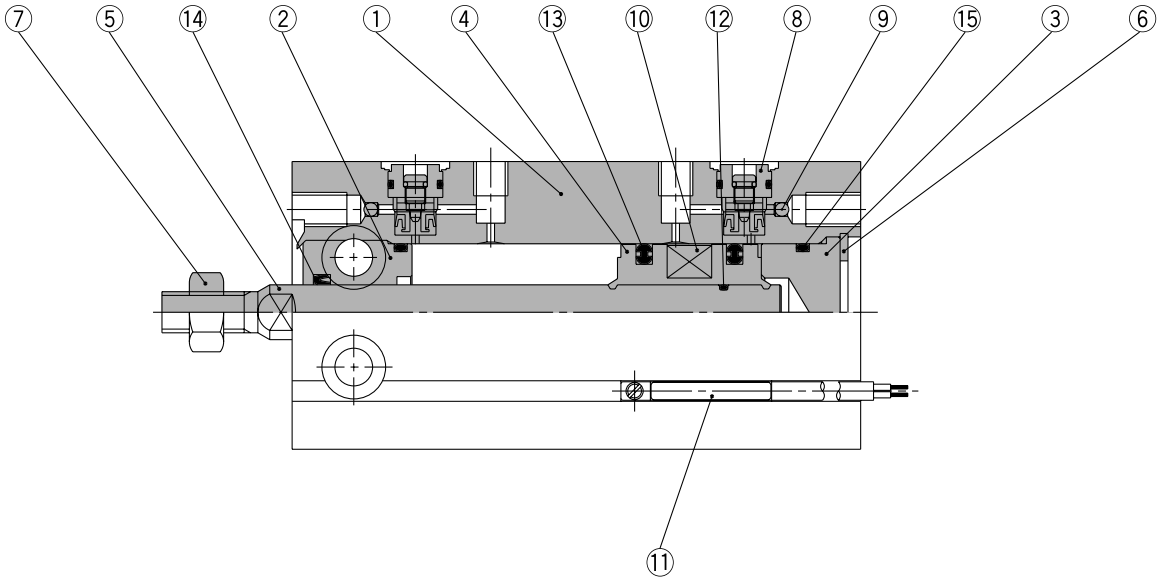
| Bore size (mm) | Standard stroke (mm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **20** | 186 | 208 | 230 | 252 | 274 | 296 | 318 | 340 | 362 |
| **25** | 289 | 323 | 357 | 391 | 425 | 459 | 493 | 527 | 561 |
| **32** | 464 | 512 | 560 | 608 | 656 | 704 | 752 | 800 | 848 |

### Additional Weight

(g)

| Bore size (mm) | Magnet |
|---|---|
| **20** | 5 |
| **25** | 6 |
| **32** | 11 |

## Construction



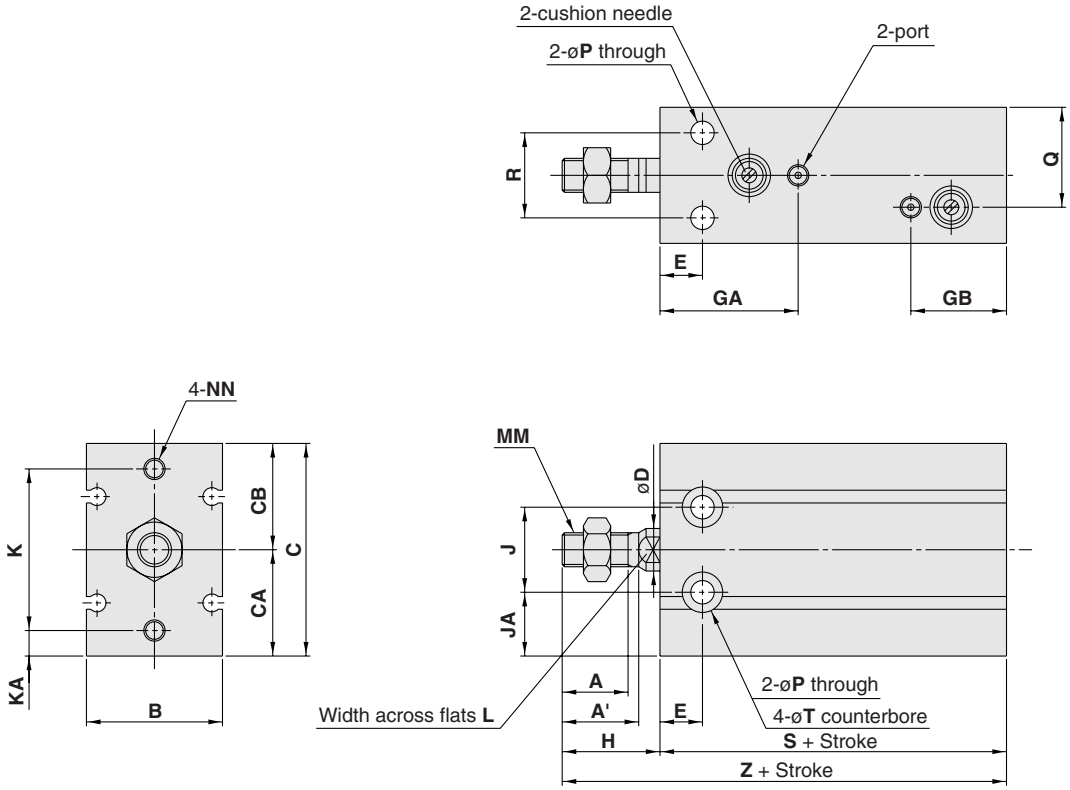

### Component Parts

| No. | Description | Material | No. of pcs. | Note |
|---|---|---|---|---|
| ① | Cylinder tube | Aluminum alloy | 1 | Hard anodized |
| ② | Rod cover/Bearing | Aluminum alloy | 1 | Hard anodized |
| ③ | Head cover | Aluminum alloy | 1 | Clear chromated |
| ④ | Piston | Aluminum alloy | 1 | Chromated |
| ⑤ | Piston rod | Stainless steel | 1 | |
| ⑥ | Snap ring | Carbon tool steel | 1 | Phosphate coated |
| ⑦ | Rod end nut | Carbon steel | 1 | Nickel plated |
| ⑧ | Cushion needle assembly | — | (2) | |
| ⑨ | Steel ball | Carbon steel | 2 | |
| ⑩ | Magnet | Magnetic material | 1 | |
| ⑪ | Auto switch | — | (2) | D-M9□ type |
| ⑫ | Piston gasket | NBR | 1 | |
| ⑬ | Piston seal | NBR | 2 | |
| ⑭ | Rod seal | NBR | 1 | |
| ⑮ | Gasket | NBR | 1 | |

### Replacement Parts: Seal Kit

| Bore size (mm) | Kit no. | Contents |
|---|---|---|
| 20 | CU20A-PS | ⑬, ⑭, and ⑮ |
| 25 | CU25A-PS | |
| 32 | CU32A-PS | |

## Dimensions

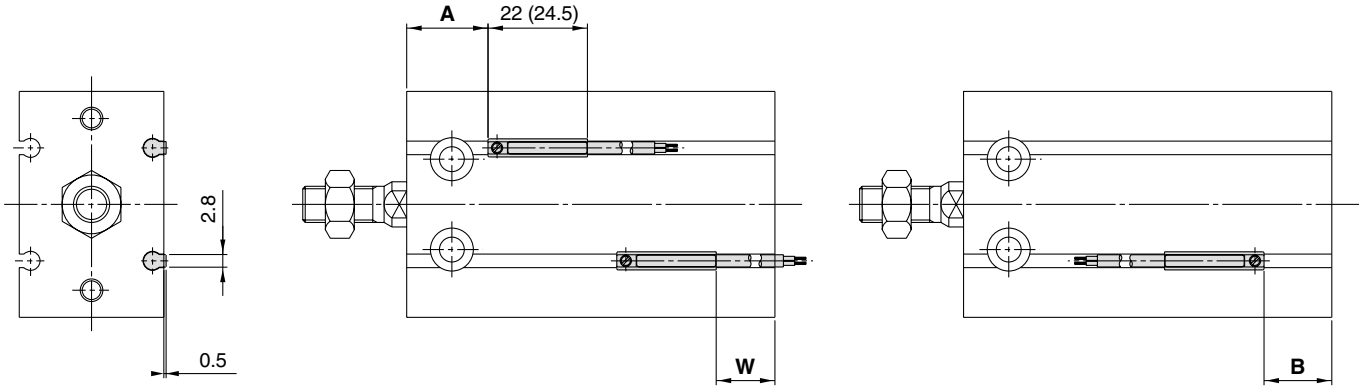



| Bore size (mm) | Port size | A | A' | B | C | CA | CB | D | E | GA | GB | H | J | JA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | M5 x 0.8 | 12 | 14 | 26 | 42 | 20 | 22 | 8 | 9 | 29 | 27 | 19 | 16 | 12 |
| **25** | M5 x 0.8 | 15.5 | 18 | 32 | 50 | 25 | 25 | 10 | 10 | 32.5 | 22.5 | 23 | 20 | 15 |
| **32** | Rc 1/8 | 19.5 | 22 | 40 | 62 | 31 | 31 | 12 | 11 | 35 | 25 | 27 | 24 | 19 |

| Bore size (mm) | K | KA | L | MM | NN | P | Q | R | T | S | Z | Standard stroke |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | 30 | 5 | 5 | M6 x 1.0 | M5 x 0.8 with depth 8 | 5.5 | 13 | 16 | 9.3 with depth 8 | 53 | 72 | 20, 30, 40, 50, 60, 70, 80, 90, 100 |
| **25** | 38 | 6 | 6 | M8 x 1.25 | M5 x 0.8 with depth 8 | 5.5 | 23.5 | 20 | 9.3 with depth 9 | 51.5 | 74.5 | |
| **32** | 48 | 7 | 8 | M10 x 1.25 | M6 x 1.0 with depth 9 | 6.6 | 29 | 24 | 11 with depth 11.5 | 56 | 83 | |

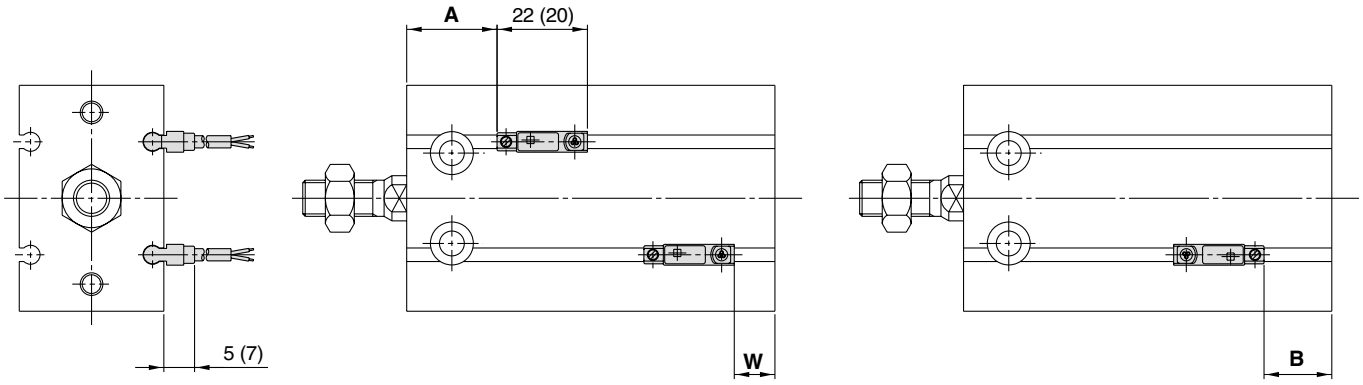
## Proper Auto Switch Mounting Position (Detection at stroke end) and Its Height

**D-A9□**
**D-M9□**
**D-F9□W**




The dimension in ( ) is for D-A93 type.

**D-A9□V**
**D-M9□V**
**D-F9□WV**




The dimension in ( ) is for D-M9□V and D-F9□WV.

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-F9□W | | | D-M9□V, D-F9□WV | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | W | A | B | W | A | B | W |
| **20** | 18 | 15 | 13 (10.5) | 22 | 19 | 9 | 22 | 19 | 11 |
| **25** | 20 | 11 | 9 (6.5) | 24.5 | 15 | 5 | 24.5 | 15 | 7 |
| **32** | 22.5 | 13.5 | 11.5 (9) | 26.5 | 17.5 | 7.5 | 26.5 | 17.5 | 9.5 |

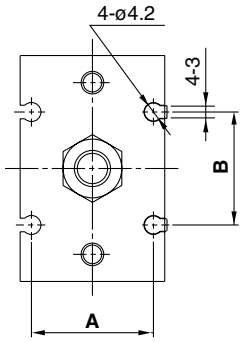
∗ Values in ( ) are dimensions for D-A93 type.

## Operating Range

| Switch model | Bore size (mm) | | |
|---|---|---|---|
| | **20** | **25** | **32** |
| **D-A9□, D-A9□V** | 11 | 12.5 | 14 |
| **D-M9□, D-M9□V** | 5 | 5 | 5 |
| **D-F9□W, D-F9□WV** | 6.5 | 7 | 7 |

∗ Values in this table include hysteresis and are to be used as a guide only. They do not guarantee an actual fixed range (expect approximately ±30% dispersion). Values may vary greatly depending on the operating environment.

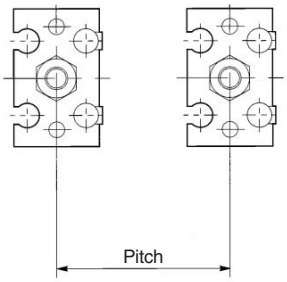
## Auto Switch Rail Position




| Bore size (mm) | A | B |
|---|---|---|
| **20** | 21 | 23 |
| **25** | 27 | 25 |
| **32** | 35 | 27 |

## Caution on Proximity Installation

When free mount cylinders equipped with D-A9□ or D-F9□ type auto switches are used, be sure to provide an extra clearance in addition to what is suggested in the table at right. If the distance between two cylinders is less than the noted value, auto switches may malfunction. When for some reason you cannot avoid installing cylinders closer than the required clearance, install a steel plate or magnetic shield plate (MU-SO25) on the side of the cylinder facing the auto switches to shield them. (Please contact SMC for details.) Auto switches may malfunction if a shielding plate is not used.




| Bore size (mm) | Mounting pitch (mm) |
|---|---|
| **20** | 40 |
| **25** | 46 |
| **32** | 56 |

# Specific Product Precautions

**Be sure to read before handling.**

## Installation and Removal of Snap Rings

### ⚠Caution

**1. Use appropriate pliers (Type C snap ring installing tool) for installation and removal of snap rings.**

**2. Even when using appropriate pliers (Type C snap ring installing tool), proceed with caution as there is a danger of the snap ring flying off the end of the pliers (tool) and causing bodily injury or damage to nearby equipment. After installation, make sure that the snap ring is securely seated into the snap ring groove before supplying air.**

## Mounting

### ⚠Caution

**1. Refer to the below table for mounting cylinders.**

**Tightening Torque**

| Bore sizes (mm) | Hexagon socket head cap screw (mm) | Proper tightening torque (N·m) |
|---|---|---|
| **20, 25** | M5 | 5.10 ±10% |
| **32** | M6 | 8.04 ±10% |

## Selection

### ⚠Caution

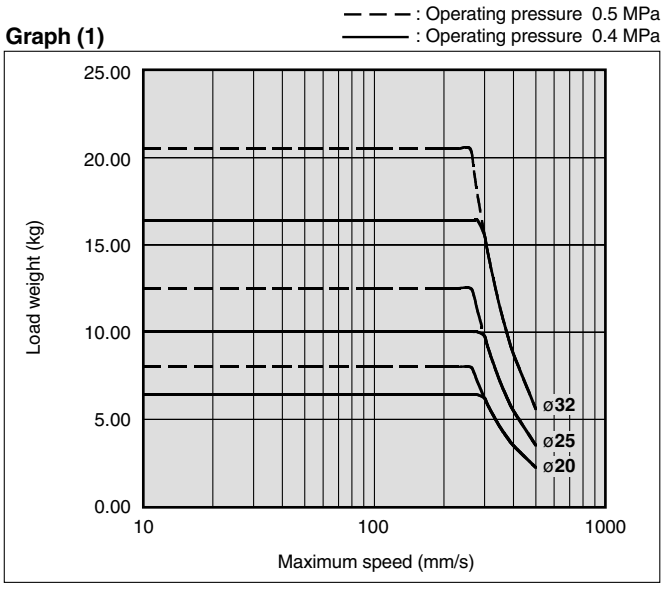
**1. Operate the cylinder to the stroke end.**

When the stroke is restricted by an external stopper or a clamped workpiece, sufficient cushioning and noise reduction may not be achieved.

**2. Strictly observe the limiting ranges for load weight and maximum speed (Graph (1)). Also, the limiting ranges provided here are based on the condition that the cylinder is operated to the stroke end with a proper cushion needle adjustment.**

If operated beyond the limiting ranges, excessive impact will occur and this may cause damage to equipment.

**Graph (1)**




## Selection

### ⚠Caution

**3. Adjust the cushion needle to reduce excessive kinetic energy from the piston impact at the stroke end by allowing it to absorb sufficient kinetic energy during the cushion stroke.**

If due to improper adjustment, the piston impacts the stroke end with excessive kinetic energy (values above those given in Table (1)), an excessive impact will occur and this may cause damage to equipment.

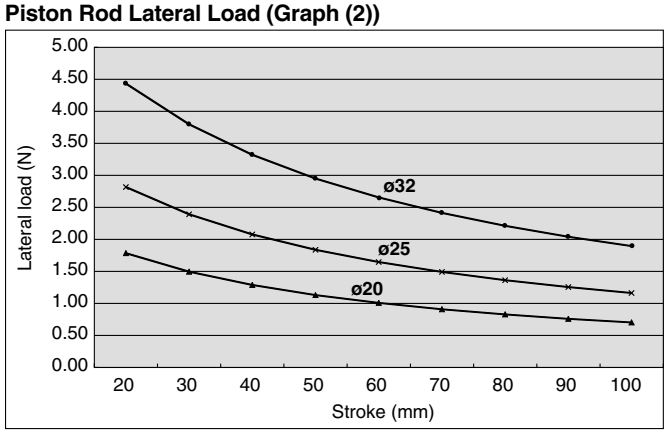
**Table (1) Allowable Kinetic Energy at Piston Impact** (J)

| | 20 | 25 | 32 |
|---|---|---|---|
| Piston speed | 50 to 500 mm/s | | |
| Allowable kinetic energy | 0.055 | 0.09 | 0.15 |

**4. Strictly observe the limiting ranges for the piston rod lateral load (Graph (2)).**

If operated beyond the limiting ranges, equipment life may be reduced or damage to equipment may occur.

**Piston Rod Lateral Load (Graph (2))**




## Cushion Needle Adjustment

### ⚠Caution

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

| | Rotations |
|---|---|
| ø20 to ø32 | 2.5 rotations or less |

Use a 3 mm flat head watchmakers' screwdriver to adjust the cushion needle. The adjustment range for the cushion needle must be between the fully closed position and the open position ranges indicated in the above table. A retaining mechanism prevents the cushion needle from slipping out; however, it may spring out during operation if it is rotated beyond the ranges shown above.