



Free Mount Cylinder

A space-saving air cylinder with multiple surfaces capable of direct mounting. Offered in many variations.

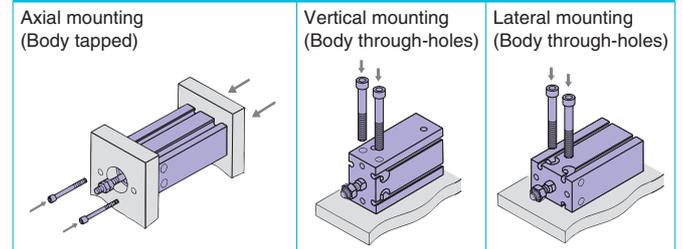


Space-saving

The multiple surface direct mounted rectangular body with no brackets allows freedom of the mounting surface. This enables space-saving designs for equipment.

Auto Switch Capable

Mounting



Series Variations

| Series | Action | Rod | Bore size(mm) | Page |
|--|---------------|------------------------------------|-----------------------|------|
| Standard Series CU | Double acting | Single rod | 6, 10, 16, 20, 25, 32 | 2 |
| | Single acting | Double rod | | 8 |
| Non-rotating Series CUK | Double acting | Single rod (Retracted/Extended) | | 13 |
| | Single acting | Single rod (Retracted/Extended) | | 21 |
| Long stroke Series CU | Double acting | Double rod | | 25 |
| | Double acting | Single rod (Retracted/Extended) | | 29 |
| Long stroke, Non-rotating rod Series CUK | Double acting | Single rod | 35 | |
| With air cushion Series CU-A | Double acting | Single rod | 39 | |
| For vacuum Series ZCUK | Double acting | Single rod | 20, 25, 32 | 46 |
| | Double acting | Single rod | 10, 16, 20, 25, 32 | 55 |

Made to Order

- XB6 : Heat resistant (150°C)
- XB7 : Cold resistant (-40°C)
- XB9 : Low speed (10 to 50 mm/s)
- XB13 : Low speed (5 to 50 mm/s)
- XC19 : Intermediate stroke (with a spacer built-in)
- XC22 : Seals made of fluorine rubber
- XC34 : Non-rotating plate
(No protrusion from the rod end)

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Related Products

- Copper/Fluorine-free: Series 20-

P. 4, 23, 37

- Clean Series: Series 10/11-
- Copper/Fluorine/Silicon-based free
+ Low particle generation: Series 21/22-
- Low speed: Series CUX

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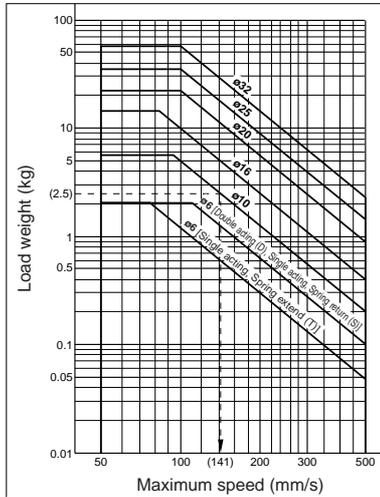
Precautions on Free Mount

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 |

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 |

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 |

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 |

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 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 - M9B []

Built-in magnet

Bore size

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

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Standard stroke (mm)

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

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Action

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

Applicable Auto Switches/Refer to page P.68 to 72 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-wired connector | Applicable load | | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|-------------------|---------|-----------------------|-------|-------|---------------------|-----------------|------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | IC circuit | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24V | 5 V, 12 V | 100 V or less | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | — | |
| | | | | 2-wire | | | | M9BV | M9B | ● | ● | ○ | ○ | — | |
| | | | | 3-wire (NPN) | | | | M9NWV | M9NW | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | M9PWV | M9PW | ● | ● | ○ | ○ | — | |
| | | | | 2-wire | | | | M9BWV | M9BW | ● | ● | ○ | ○ | — | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

* Solid state switches marked with "O" are produced upon receipt of order.

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.

Series CU



JIS Symbol

Double acting,
Single rod



Made to Order Specifications (For details, refer to P.43.)

| Symbol | Specifications |
|--------|--|
| -XB6 | Heat resistant (150°C) |
| -XB7 | Cold resistant (-40°C) |
| -XB9 | Low speed (10 to 50 mm/s) |
| -XB13 | Low speed (5 to 50 mm/s) |
| -XC19 | Intermediate stroke (with a spacer built-in) |
| -XC22 | Seals made of fluorine rubber |

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% |

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) 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

(mm)

| 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 P. 36.

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-M9□W, D-M9□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 P.68 to 72.

Copper-free

20-CU **Bore size** — **Stroke** D

• Copper-free

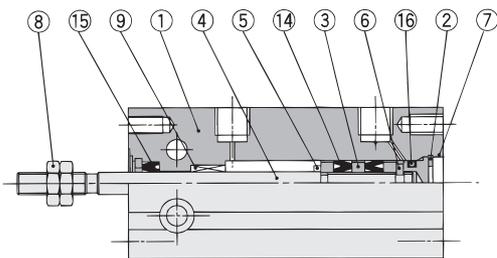
The type which prevents copper based ions from generating by changing the copper based materials into electroless nickel plated treatment or non-copper materials in order to eliminate the effects by copper based ions or fluororesins over the colour cathode ray tube.

Minimum Operating Pressure (MPa)

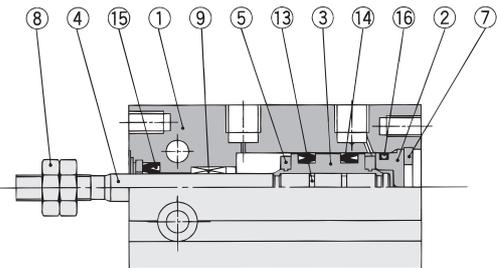
| Bore size (mm) | 6 | 10, 16 | 20, 25, 32 |
|----------------------------|------|--------|------------|
| Minimum operating pressure | 0.12 | 0.06 | 0.05 |

Construction

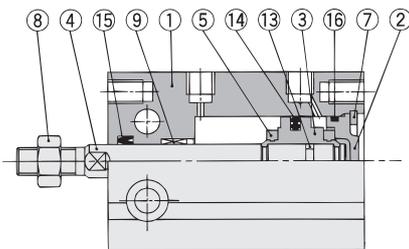
ø6



ø10



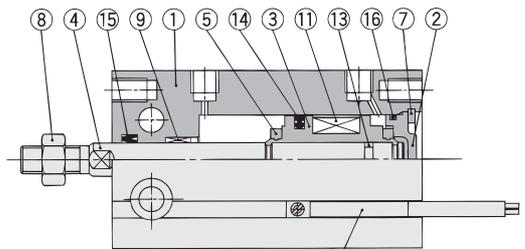
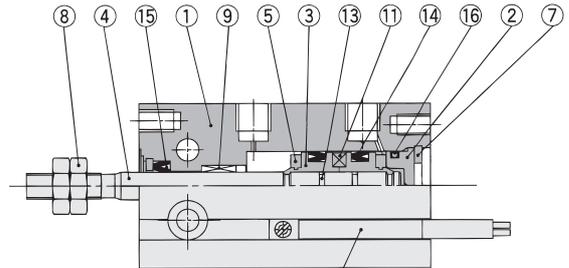
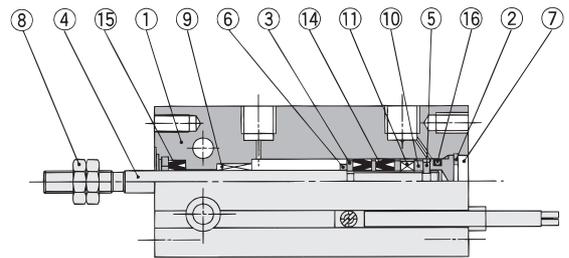
ø16 to ø32



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 type (Refer to page 2.) |
| Auto switch | Mountable |

With auto switch



Component Parts

| No. | Description | Material | Note |
|-----|---------------|-------------------|--------------------------------------|
| 1 | Cylinder tube | Aluminum alloy | Hard anodized |
| 2 | Head cover | Brass | ø6 to ø10, Electroless 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 |

Component Parts

| No. | Description | Material | Note |
|-----|---------------|--------------------------------|---------------|
| 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 | |

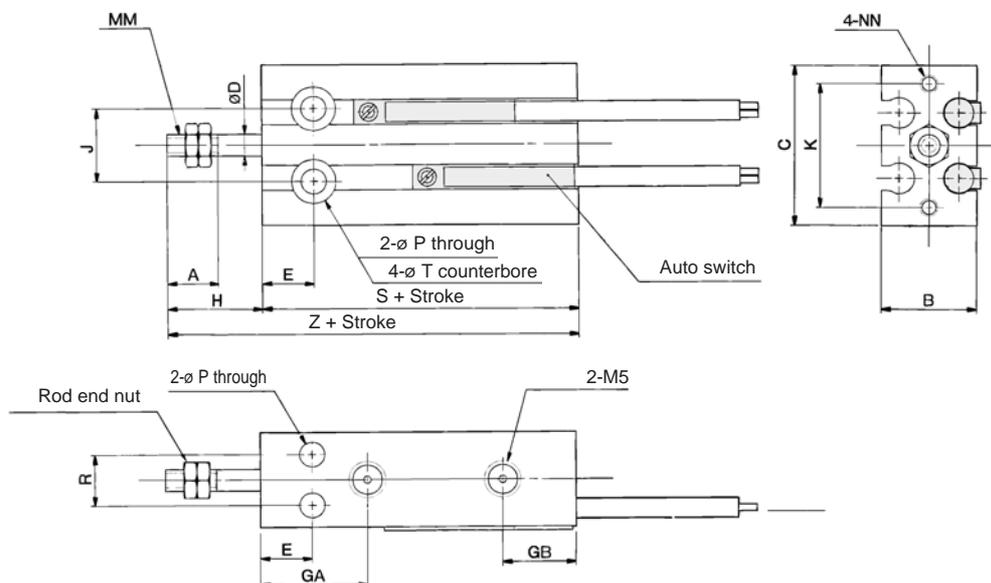


* Seal kit includes (14), (15), (16). Order the seal kit, based on each bore size.

Series CU

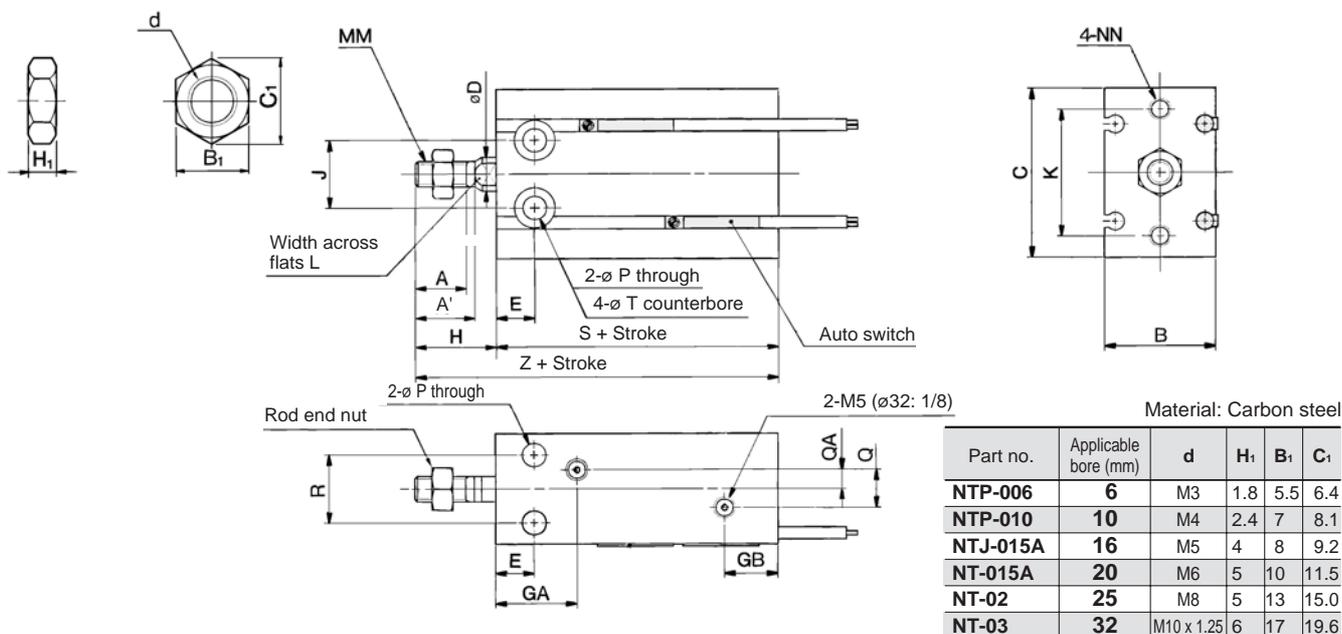
Dimensions: Double Acting, Single Rod

ø6, ø10



ø16 to ø32

Rod End Nut/Accessory



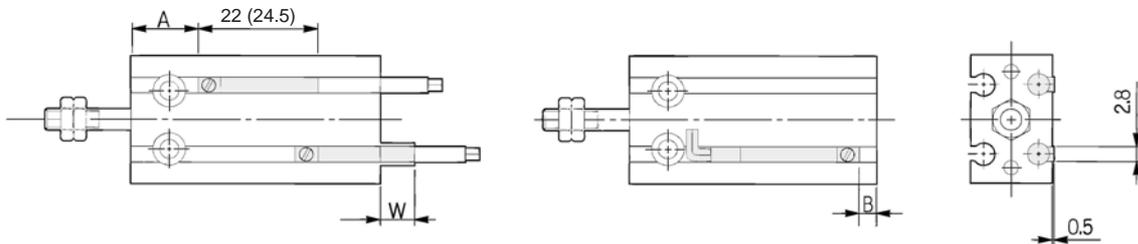
| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA |
|----------------|------|------|----|----|----|----|------------------------|------|----|----|----|----|------------|------------|-----|------|-----|
| 6 | 7 | — | 13 | 22 | 3 | 7 | 15 | 10 | 13 | 10 | 17 | —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

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

| 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 |

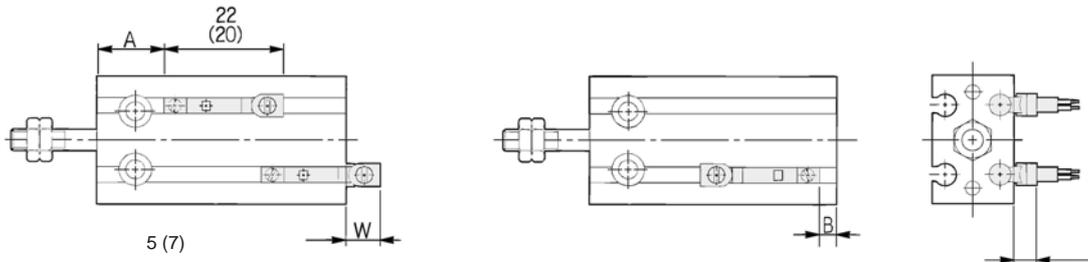
Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

D-A9□
D-M9□
D-M9□W



() : Denotes the values of D-A93.

D-A9□V
D-M9□V
D-M9□WV



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

CDU Double Acting, Single Rod

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-M9□W | | | D-M9□V, D-M9□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) Figures in the table above are used as a reference when mounting the auto switches for stroke end detection. In the case of actually setting the auto switches, adjust them after confirming their operation.

Note 2) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.

Note 3) 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 4) () in column W is the dimensions of D-A93.

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-M9□W/M9□WV | 3 | 3.5 | 5.5 | 6.5 | 7 | 7 |

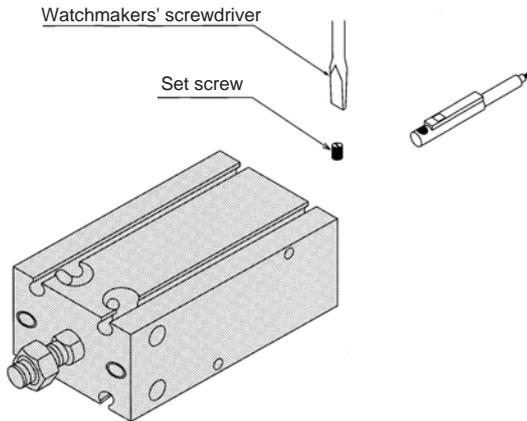
* Since this is a guideline including hysteresis, not meant to be guaranteed.
(assuming approximately ±30% dispersion.)

There may be the case it will vary substantially depending on an ambient environment.

Series CU

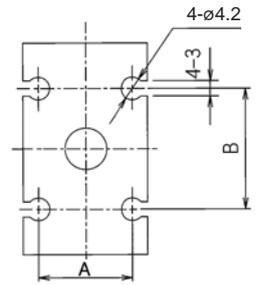
Mounting of Auto Switch

D-A9□/M9□/A9□V/M9□V/M9□W/M9□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.

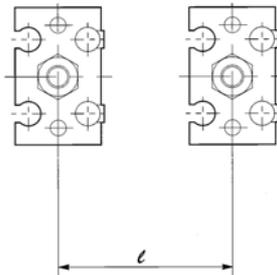
Auto Switch Groove



| 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 free mounting cylinders equipped with 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.) Auto switches may malfunction if a shield plate is not used.



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

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** **M9B**

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 |

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Action

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

Standard stroke (mm)

| | |
|---------------|--|
| ø6, ø10, ø16 | 5, 10, 15, 20, 25, 30, 40, 50, 60 |
| ø20, ø25, ø32 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|---------------|-------------------|-----------|-----------------------|-------|-----------------|---------------------|-----------------|---|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | Applicable load | | | |
| | | | | | | | | | | | | IC circuit | | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | — |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | — | — |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | — | — |
| | | | | 2-wire | | | | M9BV | M9B | ● | ● | ○ | ○ | — | — |
| | | | | 3-wire (NPN) | | | | M9NVV | M9NV | ● | ● | ○ | ○ | — | — |
| | | | | 3-wire (PNP) | | | | M9PVV | M9PV | ● | ● | ○ | ○ | — | — |
| | | | | 2-wire | | | | M9BWW | M9BW | ● | ● | ○ | ○ | — | — |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

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

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.

Series CUW



Specifications

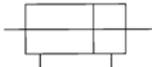
| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|-------------------------------|---|----------|----------|----|----|----|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.15 MPa | 0.10 MPa | 0.08 MPa | | | |
| Ambient and fluid temperature | Without auto switch: -10 to 70°C (No freezing) 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, 40, 50, 60 |
| 20, 25, 32 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |

JIS Symbol

Double acting,
Double rod



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-M9□W, D-M9□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/(): Denotes the values with D-A93.

(g)

| Model | Stroke (mm) | | | | | | | | | | | | |
|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| C(D)UW6-□D | 27 (32) | 30 (40) | 34 (44) | 37 (47) | 40 (50) | 44 (54) | 51 (61) | 58 (68) | 65 (75) | — | — | — | — |
| C(D)UW10-□D | 44 (49) | 49 (59) | 53 (63) | 58 (68) | 62 (72) | 67 (77) | 76 (86) | 85 (95) | 94 (104) | — | — | — | — |
| C(D)UW16-□D | 74 (99) | 81 (111) | 88 (118) | 95 (125) | 102 (132) | 109 (139) | 123 (153) | 137 (167) | 151 (181) | — | — | — | — |
| C(D)UW20-□D | 132 (165) | 145 (182) | 158 (195) | 171 (208) | 184 (221) | 197 (234) | 223 (260) | 250 (287) | 275 (312) | 301 (338) | 327 (364) | 353 (390) | 379 (416) |
| C(D)UW25-□D | 240 (294) | 260 (319) | 280 (339) | 300 (359) | 321 (380) | 341 (400) | 381 (440) | 421 (480) | 461 (520) | 501 (560) | 541 (600) | 581 (640) | 621 (680) |
| C(D)UW32-□D | 365 (438) | 394 (472) | 422 (500) | 451 (529) | 479 (557) | 508 (586) | 586 (664) | 622 (700) | 679 (757) | 736 (814) | 793 (871) | 850 (928) | 907 (985) |

* For the auto switch weight, refer to page 68 to 72.

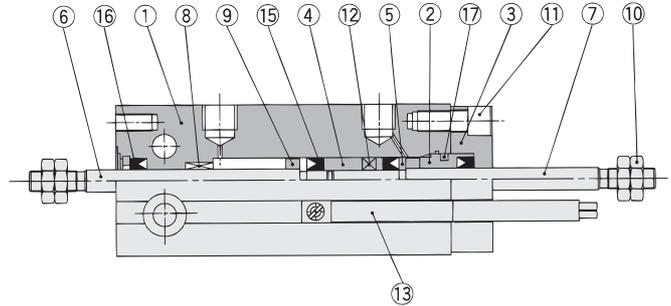
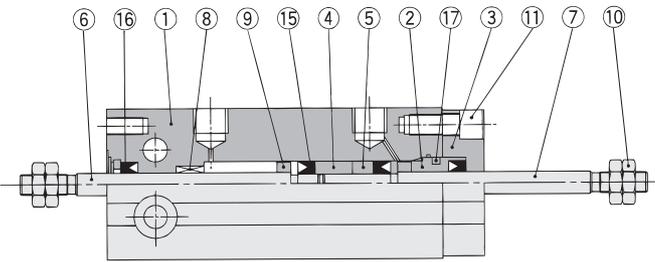
Tightening Torque

When mounting Series CUW, refer to page 3.

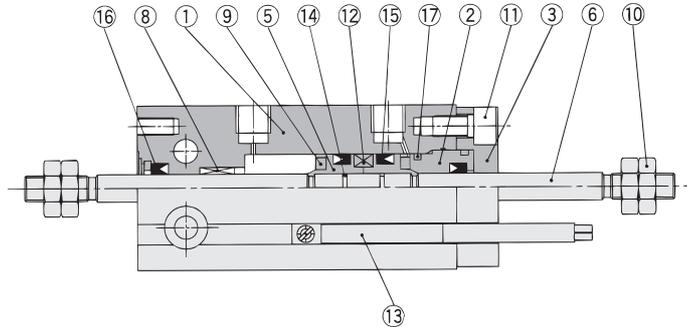
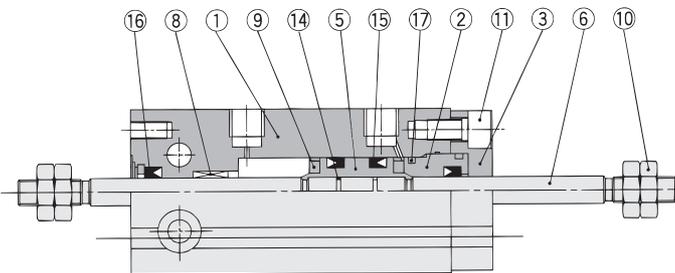
Construction

ø6

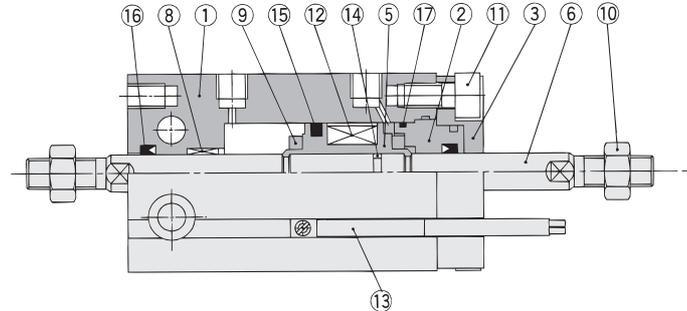
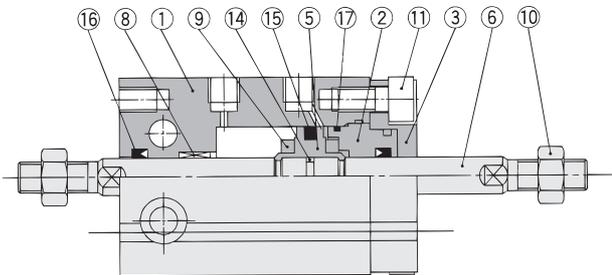
With auto switch



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 | |

Component Parts

| 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

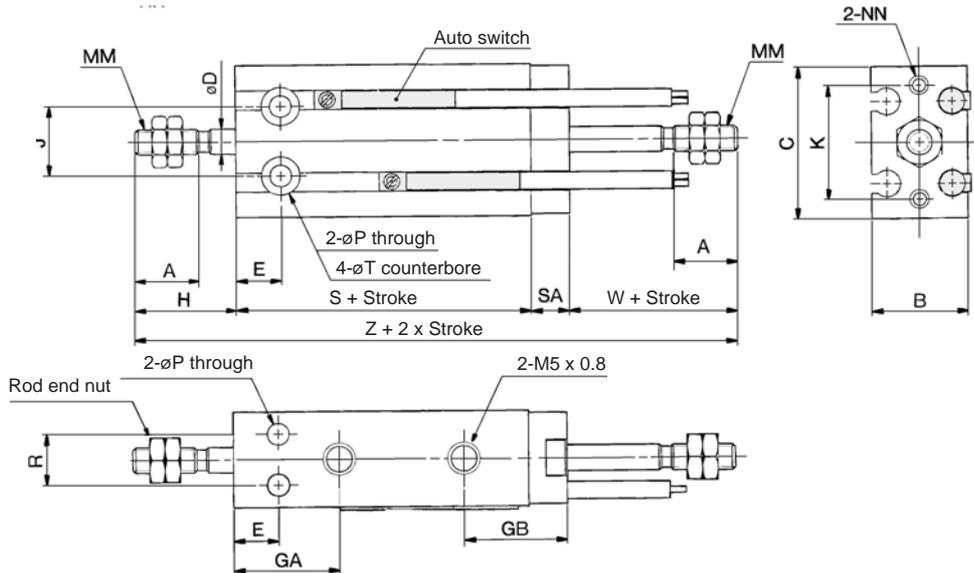
| Kit no. | Bore size (mm) / Part no. | | | | |
|---------|---------------------------|-----------|-----------|-----------|-----------|
| | 10 | 16 | 20 | 25 | 32 |
| | CUW10D-PS | CUW16D-PS | CUW20D-PS | CUW25D-PS | CUW32D-PS |

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

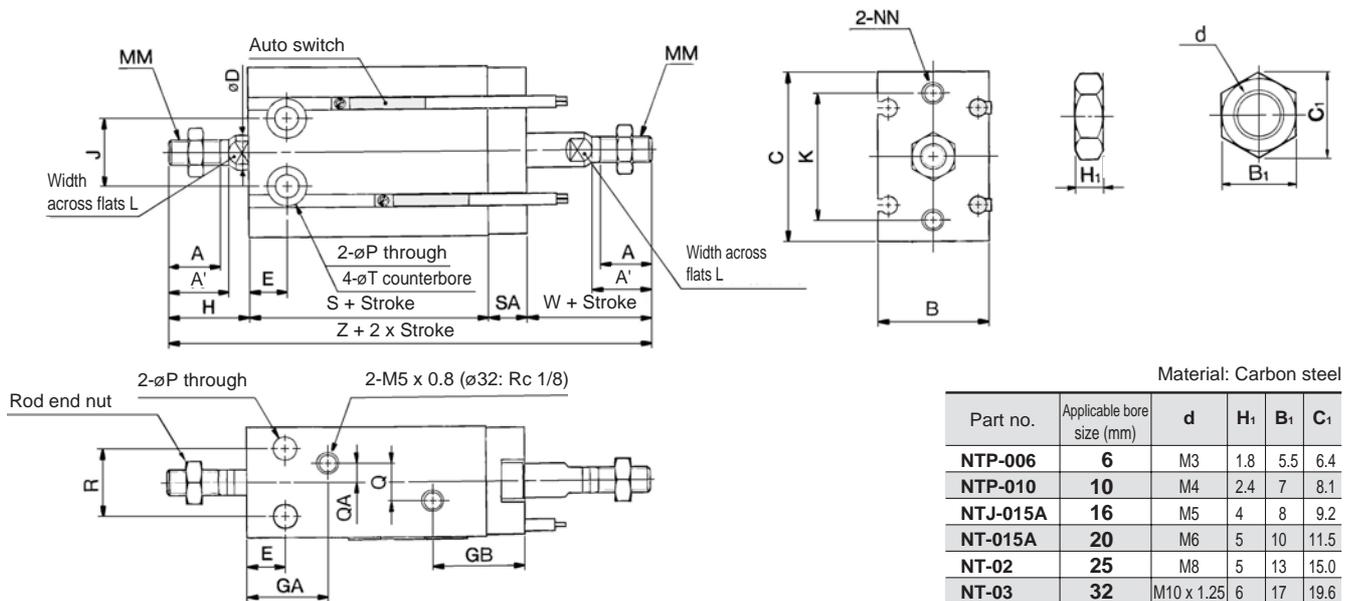
Series CU

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 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 5 | 13 | 15.0 |
| NT-03 | 32 | M10 x 1.25 | 6 | 17 | 19.6 |

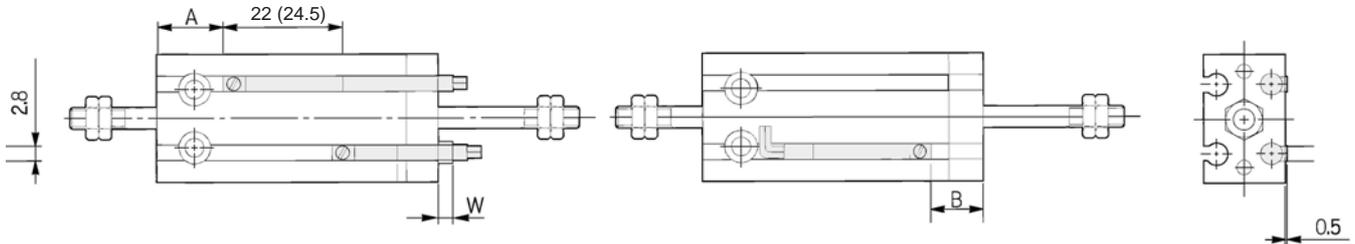
| Bore size (mm) | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA |
|----------------|------|------|----|----|----|----|-----------------------|------|----|----|----|----|------------|------------------|-----|------|-----|
| 6 | 7 | — | 13 | 22 | 3 | 7 | 15 | 16 | 13 | 10 | 17 | — | M3 | M3 depth 5 | 3.2 | — | — |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 16 | 16 | 11 | 18 | — | M4 | M3 depth 5 | 3.2 | — | — |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5 ^{Note)} | 19 | 16 | 14 | 25 | 5 | M5 | M4 depth 6 | 4.5 | 4 | 2 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 21.5 | 19 | 16 | 30 | 6 | M6 | M5 depth 8 | 5.5 | 9 | 4.5 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 22 | 23 | 20 | 38 | 8 | M8 | M5 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 |

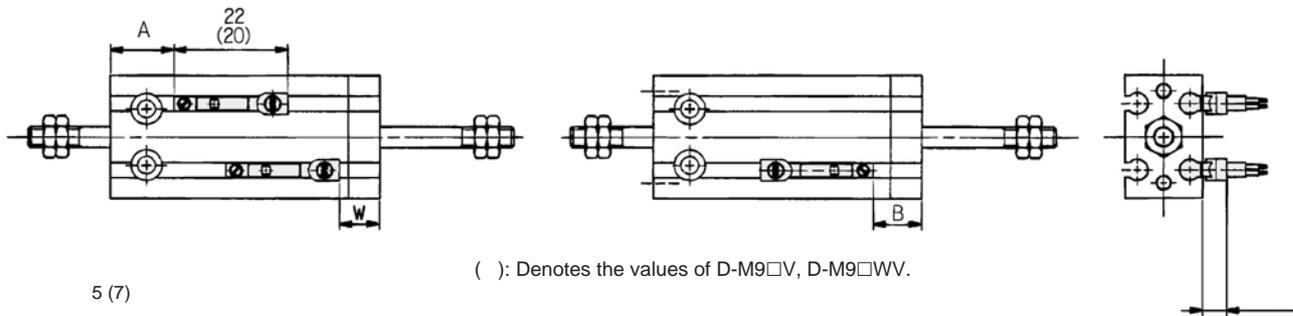
Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

D-A9□
D-M9□
D-M9□W



() : Denotes the values of D-A93.

D-A9□V
D-M9□V
D-M9□WV



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

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-M9□W | | | D-M9□V, D-M9□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) Figures in the table above are used as a reference when mounting the auto switches for stroke end detection. In the case of actually setting the auto switches, adjust them after confirming their operation.

Note 2) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.

Note 3) 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 4) () 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 M9B

Built-in magnet

Bore size

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

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Action

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

Standard stroke (mm)

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

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|---------------|-------------------|-----------|-----------------------|-------|-----------------|---------------------|-----------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | Applicable load | | | |
| | | | | | | | | | | | | IC circuit | | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 5 V, 12 V | 100 V or less | A93V | A93 | ● | ● | — | — | — | IC circuit |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | — | IC circuit |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | — | IC circuit |
| | | | | 2-wire | | | | M9BV | M9B | ● | ● | ○ | ○ | — | — |
| | | | | 3-wire (NPN) | | | | M9NWV | M9NW | ● | ● | ○ | ○ | — | IC circuit |
| | | | | 3-wire (PNP) | | | | M9PWV | M9PW | ● | ● | ○ | ○ | — | IC circuit |
| | | | | 2-wire | | | | M9BWV | M9BW | ● | ● | ○ | ○ | — | — |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

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

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.



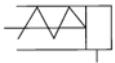
Specifications

| 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) With auto switch: -10 to 60°C (No freezing) | | | | | |
| Lubrication | Non-lube | | | | | |
| Piston speed | 50 to 500 mm/s | | | | | |
| Cushion | Rubber bumper ^{Note)} | | | | | |
| Rod end thread | Male thread | | | | | |
| Thread tolerance | JIS Class 2 | | | | | |
| Stroke length tolerance | +1.0 0 mm | | | | | |

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

JIS Symbol

Single acting,
Spring return



Single acting,
Spring extend



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-M9□W, D-M9□WV |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |



Made to Order Specifications (For details, refer to page 43.)

| Symbol | Specifications |
|--------|-------------------------------|
| -XC22 | Seals made of fluorine rubber |

Theoretical Output

(N)

| Action | Bore size (mm) | Operating pressure (MPa) | | |
|-------------------|----------------|--------------------------|------|------|
| | | 0.3 | 0.5 | 0.7 |
| Spring return (S) | ø6 | 4.99 | 10.7 | 16.3 |
| | ø10 | 16.7 | 32.4 | 48.1 |
| | ø16 | 45.6 | 86.3 | 126 |
| | ø20 | 73 | 136 | 199 |
| | ø25 | 119 | 218 | 316 |
| | ø32 | 207 | 368 | 529 |
| Spring extend (T) | ø6 | 2.86 | 7.10 | 11.3 |
| | ø10 | 12.9 | 26.1 | 39.3 |
| | ø16 | 37.2 | 71.8 | 106 |
| | ø20 | 58 | 111 | 164 |
| | ø25 | 95 | 178 | 260 |
| | ø32 | 173 | 312 | 450 |

For the reactive force of spring return, refer to Best Pneumatics catalogue.

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 68 to 72.

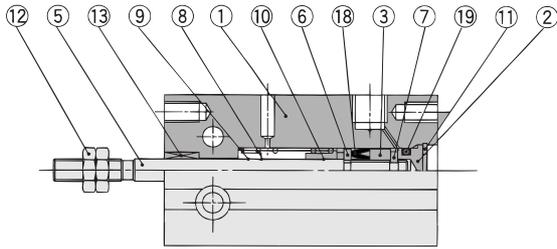
Tightening Torque

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

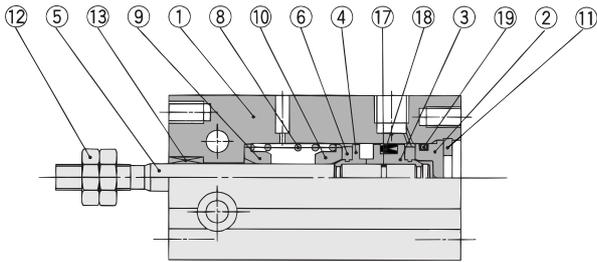
Series CU

Construction

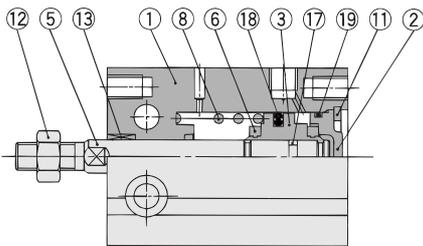
Single acting, Spring return



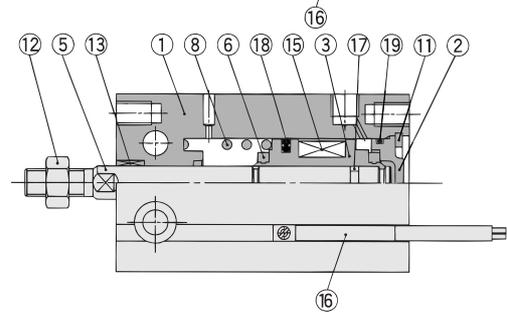
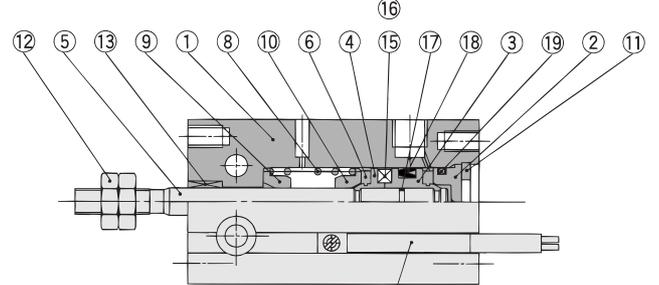
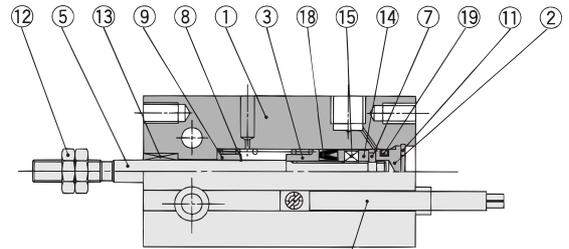
ø10



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, Electroless 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 |

Component Parts

| 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

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

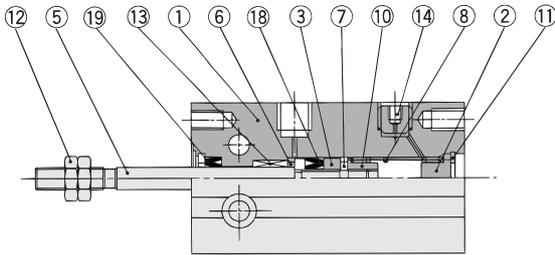


* Seal kit includes 18, 19. Order the seal kit, based on each bore size.

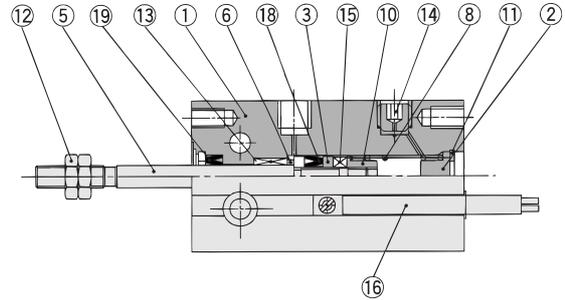
Construction

Single acting, Spring extend

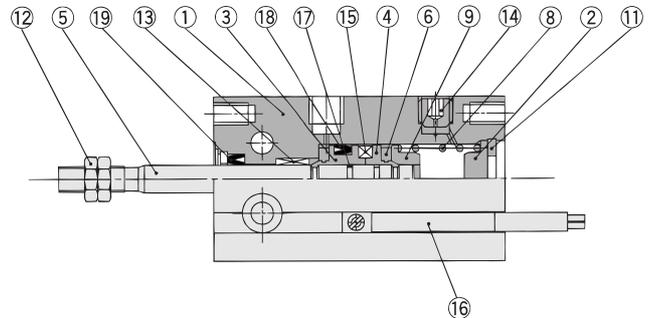
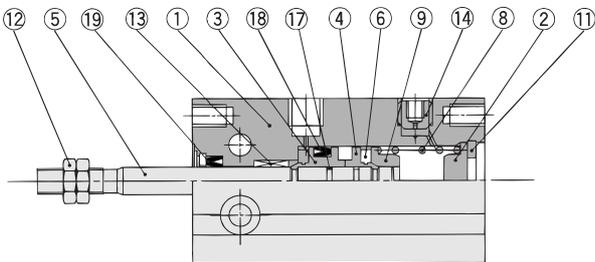
ø6



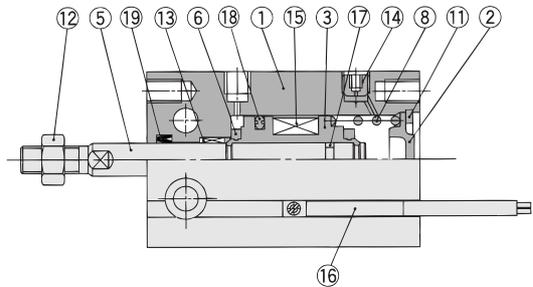
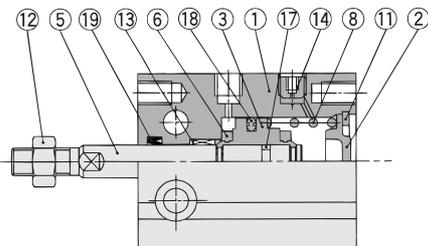
With auto switch



ø10



ø16 to ø32



Component Parts

| No. | Description | Material | Note |
|-----|---------------|-----------------|--------------------------------------|
| 1 | Cylinder tube | Aluminum alloy | Hard anodized |
| 2 | Head cover | Brass | ø6 to ø10, Electroless 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 |

Component Parts

| 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

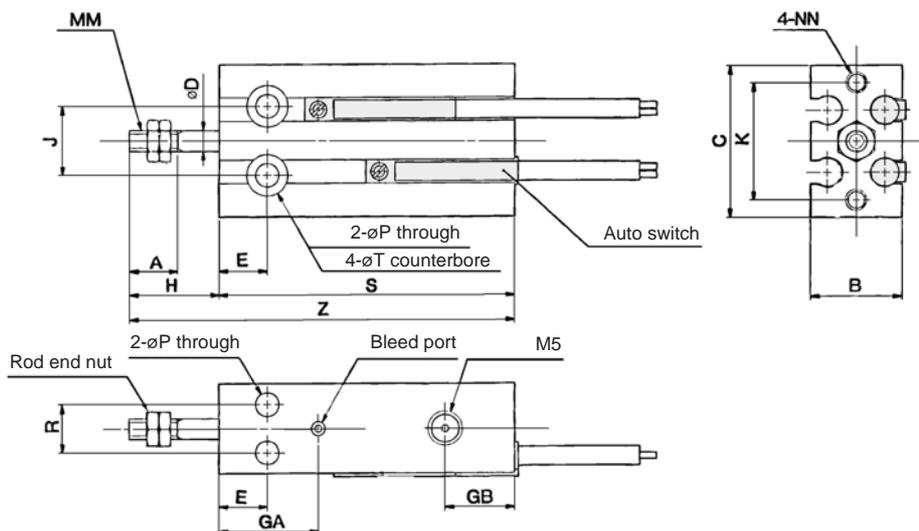
| Kit no. | Bore size (mm) / Part no. | | | | |
|---------|---------------------------|----------|----------|----------|----------|
| | 10 | 16 | 20 | 25 | 32 |
| | CU10T-PS | CU16T-PS | CU20T-PS | CU25T-PS | CU32T-PS |

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

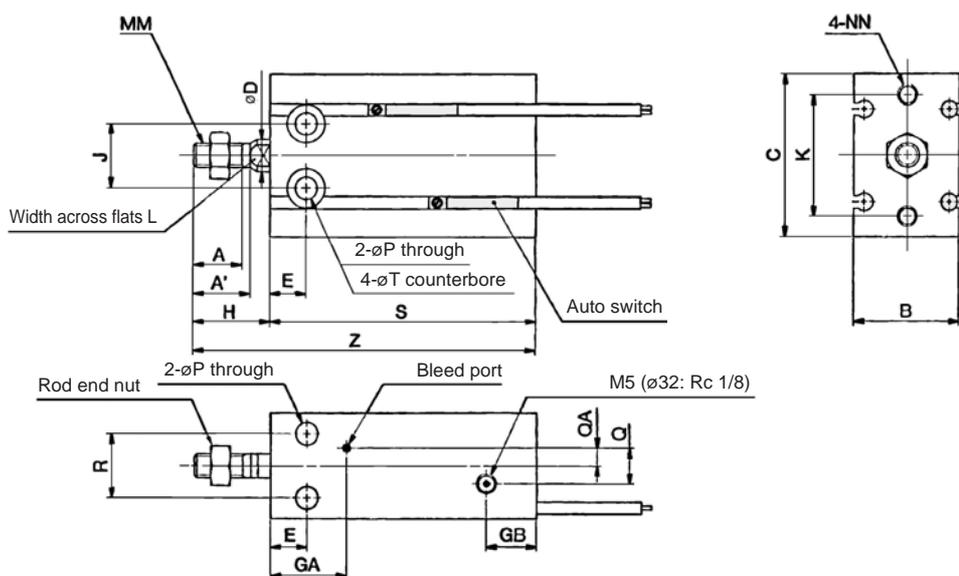
Series CU

Dimensions: Single Acting, Spring Return

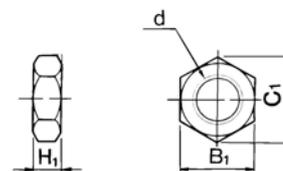
ø6, ø10



ø16 to ø32



Rod End Nut/Accessory



Material: Carbon steel

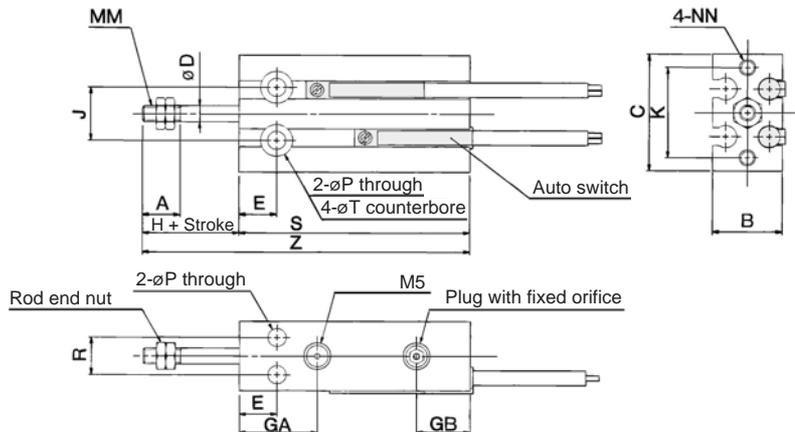
| Part no. | Applicable bore size (mm) | d | H ₁ | B ₁ | C ₁ |
|----------|---------------------------|------------|----------------|----------------|----------------|
| NTP-006 | 6 | M3 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 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 | M3 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 | M3 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 | M4 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 | M5 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 | M5 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 depth 9 | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 |

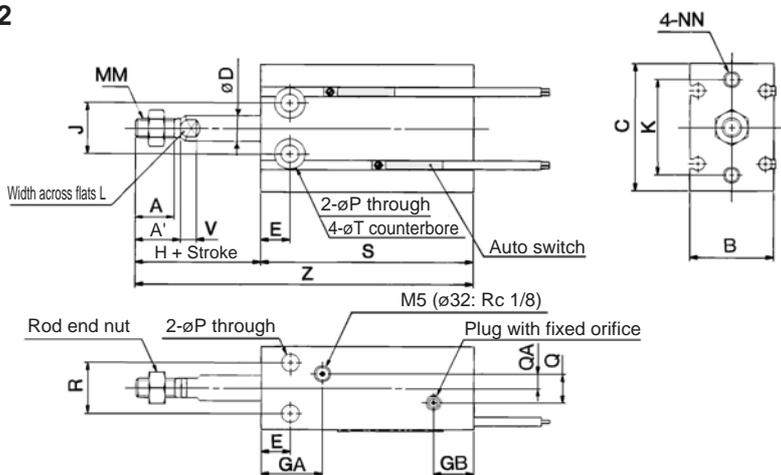
| Bore size (mm) | Without auto switch | | | | | | With auto switch | | | | | |
|----------------|---------------------|-------|-------|------|-------|-------|------------------|-------|-------|------|-------|-------|
| | S | | | Z | | | S | | | Z | | |
| | 5 st | 10 st | 15 st | 5 st | 10 st | 15 st | 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

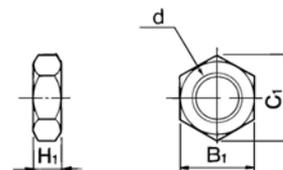
ø6, ø10



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 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 5 | 13 | 15.0 |
| NT-03 | 32 | M10 x 1.25 | 6 | 17 | 19.6 |

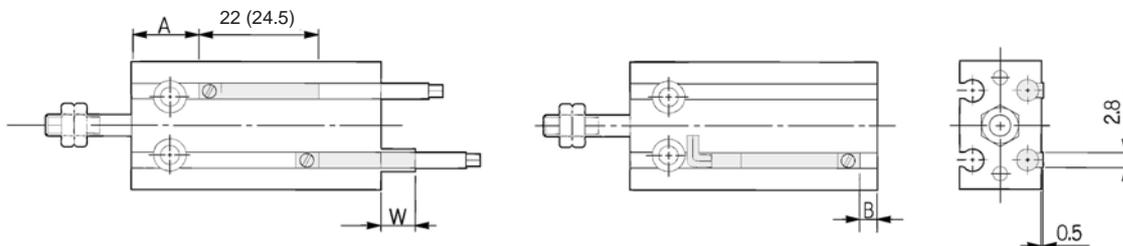
| Bore size (mm) | (mm) | | | | | | | | | | | | | | | | | | | |
|----------------|------|------|----|----|----|----|------|------|----|----|----|----|------------|------------|-----|------|-----|----|---------------|-----|
| | A | A' | B | C | D | E | GA | GB | H | J | K | L | MM | NN | P | Q | QA | R | T | V |
| 6 | 7 | — | 13 | 22 | 3 | 7 | 15 | 10 | 13 | 10 | 17 | — | M3 | M3 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 | — |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 | M3 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 | M4 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 | M5 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 | M5 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 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 |

Series CU

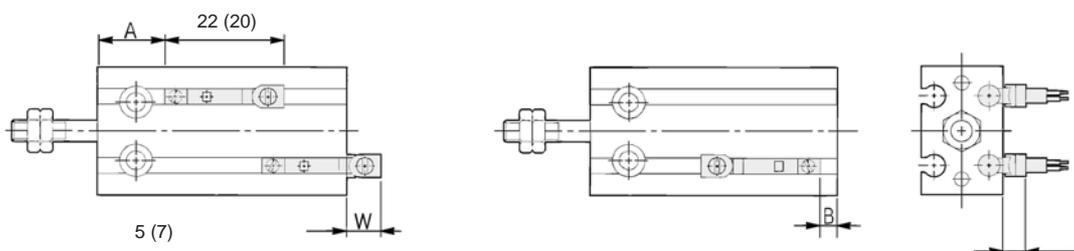
Proper Auto Switch Mounting Position and Its Mounting Height: Single Acting, Spring Return

D-A9□
D-M9□
D-M9□W



() 内数値は D-A93 の寸法で (): Denotes the values of D-A93.

D-A9□V
D-M9□V
D-M9□WV



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

Single Acting, Spring Return

| Bore size (mm) | Stroke | D-A9□, D-A9□V | | | D-M9□, D-M9□W | | | D-M9□V, D-M9□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) Figures in the table above are used as a reference when mounting the auto switches for stroke end detection. In the case of actually setting the auto switches, adjust them after confirming their operation.

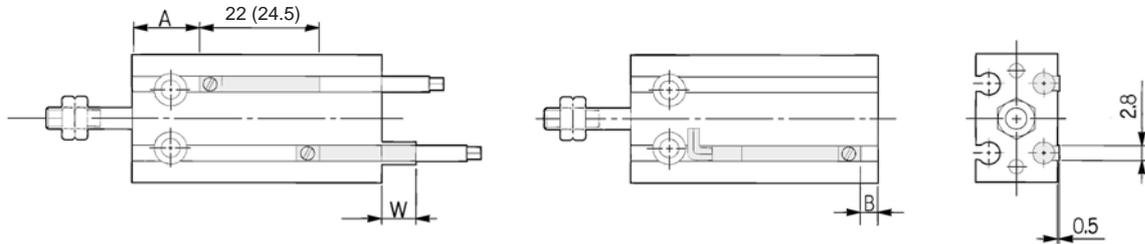
Note 2) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.

Note 3) 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 4) () in column W is the dimensions of D-A93.

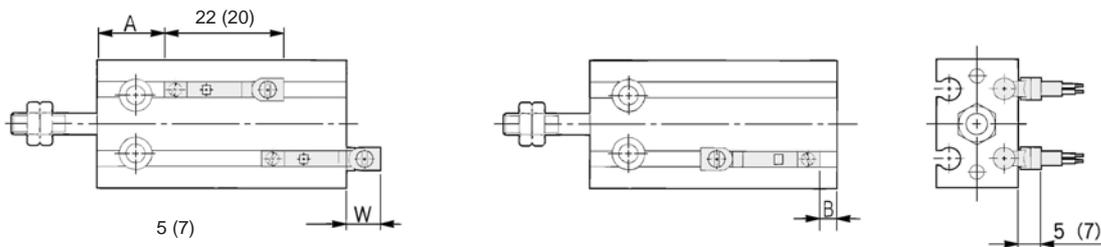
Proper Auto Switch Mounting Position and Its Mounting Height: Single Acting, Spring Extend

D-A9□
D-M9□
D-M9□W



() 内数値は D-A93 の寸法です。(): Denotes the values of D-A93.

D-A9□V
D-M9□V
D-M9□WV



() 内数値は D-F9□V、D-F9□W (): Denotes the values of D-M9□V、D-M9□WV.

Single Acting, Spring Extend

| Bore size (mm) | Stroke | D-A9□, D-A9□V | | | D-M9□, D-M9□W | | | D-M9□V, D-M9□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) Figures in the table above are used as a reference when mounting the auto switches for stroke end detection. In the case of actually setting the auto switches, adjust them after confirming their operation.

Note 2) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.

Note 3) 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 4) () 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** **M9B**

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 |

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Action

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

Standard stroke (mm)

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

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|-------------------|---------|-----------------------|-------|-------|---------------------|-----------------|------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | IC circuit | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | | | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | — |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | — | |
| | | | | 2-wire | | | | M9BV | M9B | ● | ● | ○ | ○ | — | |
| | | | | 3-wire (NPN) | | | | M9NVV | M9NV | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | M9PVV | M9PV | ● | ● | ○ | ○ | IC circuit | |
| | | | | 2-wire | | | | M9BVV | M9BV | ● | ● | ○ | ○ | — | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

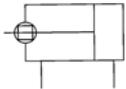
* Solid state switches marked with "○" are produced upon receipt of order.

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.



JIS Symbol
Double acting,
Single rod



Made to Order Specifications
(For details, refer to page 43, 44.)

| Symbol | Specifications |
|--------|---|
| -XB6 | Heat resistant (150°C) |
| -XB7 | Cold resistant (-40°C) |
| -XB9 | Low speed (10 to 50 mm/s) |
| -XB13 | Low speed (5 to 50 mm/s) |
| -XC19 | Intermediate stroke (with a spacer built-in) |
| -XC22 | Seals made of fluorine rubber |
| -XC34 | Threaded for mounting a work on non-rotating plate (No protrusion from the edge of rod) |

⚠ Precautions

Be sure to read before handling.
Refer to back page 1 through to 6 for
Safety Instructions, Actuator Precautions
and Auto Switch Precautions.

Operating Precautions

⚠ Caution

- 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.
- 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.

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) 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)} | $\pm 0.8^\circ$ | | | $\pm 0.5^\circ$ | | |

Note) No load: Rod retracted

Standard Stroke

| Bore size (mm) | Standard stroke (mm) | For long stroke, refer to page 39. |
|----------------|-------------------------------|------------------------------------|
| 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-M9□W, D-M9□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 68 to 72.

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 |

Tightening Torque

When mounting Series CUK, refer to page 3.

Auto Switch Mounting Position

For the auto switch mounting position of Series CDUK, refer to page 6, since specifications are the same as standard type, double acting, single rod type.

Theoretical Output

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

Series CUK

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 colour cathode ray tube.

Minimum Operating Pressure (MPa)

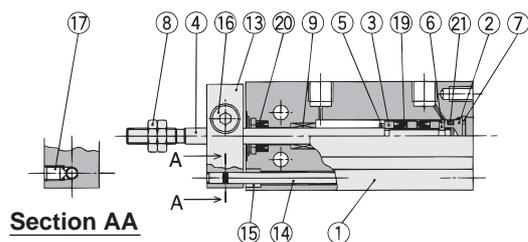
| Bore size (mm) | 6 | 10, 16 | 20, 25, 32 |
|----------------------------|------|--------|------------|
| Minimum operating pressure | 0.15 | 0.10 | 0.08 |

Specifications

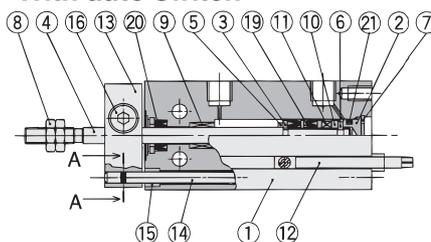
| | |
|----------------------------|--|
| Action | Double acting, Single rod |
| Bore size (mm) | 6, 10, 16, 20, 25, 32 |
| Maximum operating pressure | 1.05 MPa |
| Cushion | Rubber bumper |
| Stroke | Same as standard type (Refer to page 2.) |
| Auto switch | Mountable |

Construction

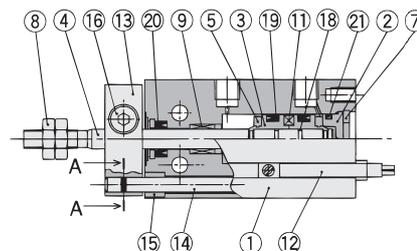
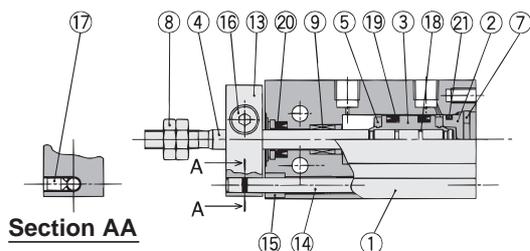
ø6



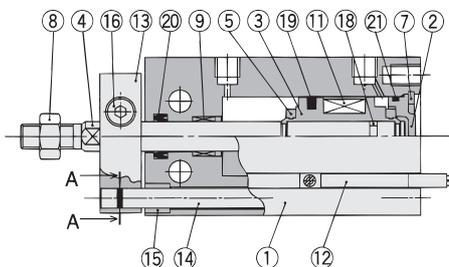
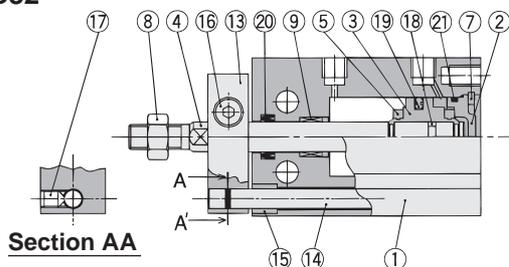
With auto switch



ø10



ø16 to ø32



Component Parts

| No. | Description | Material | Note |
|-----|---------------|--------------------------------|--------------------------------------|
| 1 | Cylinder tube | Aluminum alloy | Hard anodized |
| 2 | Head cover | Brass | ø6 to ø10, Electroless 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 |

Component Parts

| 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 | | |

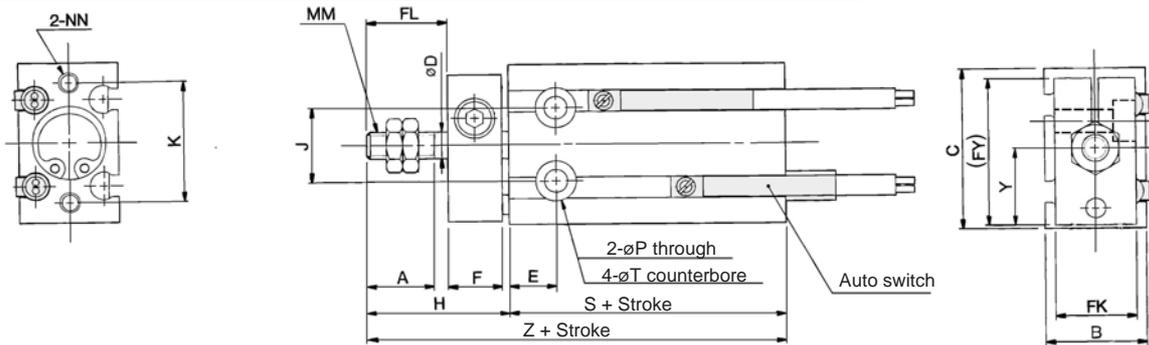
Replacement Parts: Seal Kit

| 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 | |

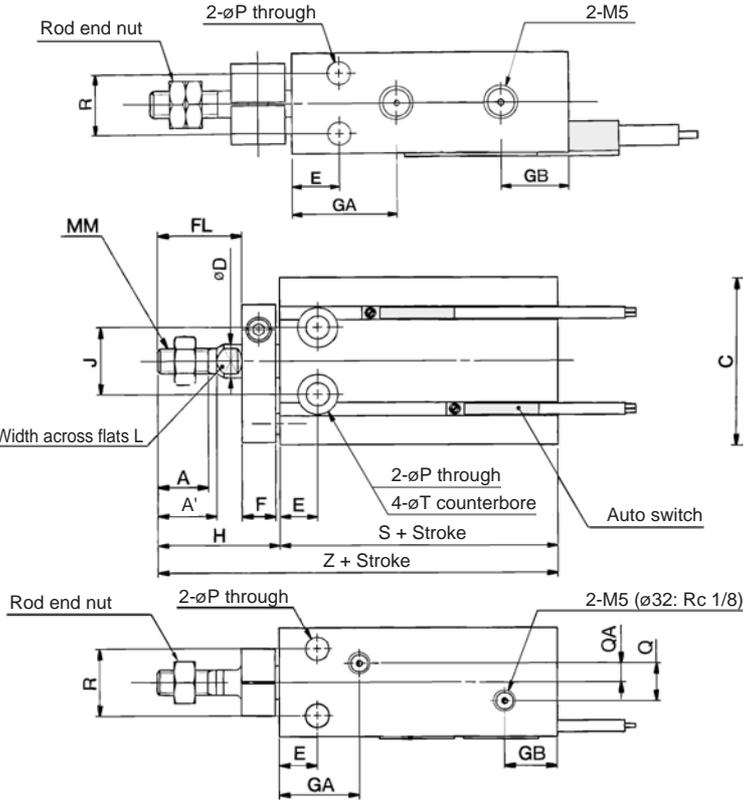
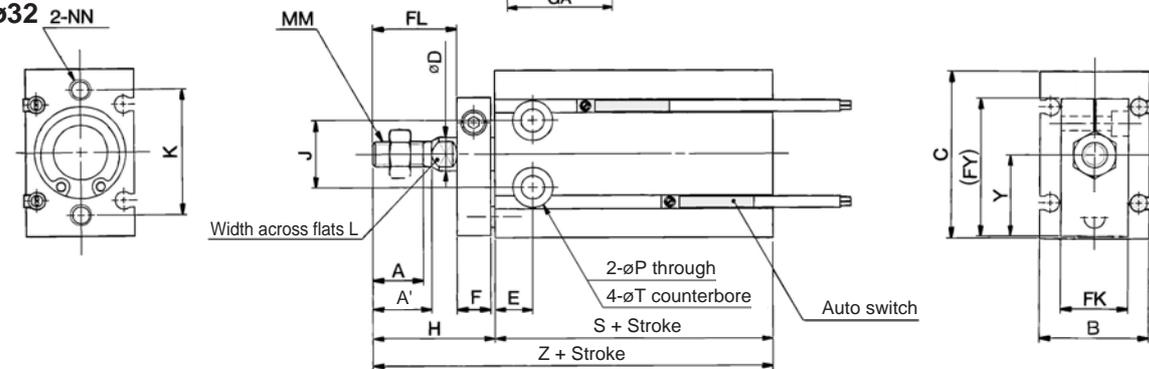
* Seal kit includes 19, 20, 21. Order the seal kit, based on each bore size.

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

ø6, ø10

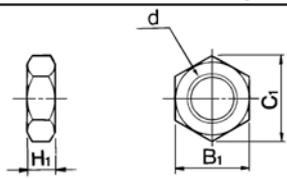


ø16 to ø32



Rod End Nut/Accessory

Material: Carbon steel



| Part no. | Applicable bore size (mm) | d | H ₁ | B ₁ | C ₁ |
|----------|---------------------------|------------|----------------|----------------|----------------|
| NTP-006 | 6 | M3 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 5 | 13 | 15.0 |
| NT-03 | 32 | M10 x 1.25 | 6 | 17 | 19.6 |

(mm)

| 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 |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 ^{Note)} | 11.5 | 26 | 14 | 25 | 5 | M5 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 |
| 32 | 19.5 | 22 | 40 | 62 | 12 | 11 | 12 | 29 | 24 | 51.5 | 23 | 12.5 | 42 | 24 | 48 | 10 | M10 |

| Bore size (mm) | NN | P | Q | QA | R | T | Y | Without auto switch | | With auto switch | |
|----------------|------------|-----|------|-----|----|---------------|------|---------------------|----|------------------|----|
| | | | | | | | | S | Z | S | Z |
| 6 | M3 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 | 10.5 | 33 | 51 | 33 | 51 |
| 10 | M3 depth 5 | 3.2 | — | — | 9 | 6 depth 5 | 11.5 | 36 | 57 | 36 | 57 |
| 16 | M4 depth 6 | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 15.5 | 30 | 56 | 40 | 66 |
| 20 | M5 depth 8 | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 19.5 | 36 | 65 | 46 | 75 |
| 25 | M5 depth 8 | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 24.5 | 40 | 73 | 50 | 83 |
| 32 | M6 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 - M9B []

Bore size

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

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Action

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

Standard stroke (mm)

| ø6, ø10, ø16 | 5, 10, 15, 20, 25, 30, 40, 50, 60 |
|---------------|--|
| ø20, ø25, ø32 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |

Built-in magnet
Non-rotating rod type
Double rod

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|-------------------|---------|-----------------------|-------|-------|---------------------|-----------------|------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | IC circuit | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | | | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | IC circuit |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | — | IC circuit |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | — | IC circuit |
| | | | | 2-wire | M9BV | M9B | ● | ● | ○ | ○ | — | — | | | |
| | | | | 3-wire (NPN) | M9NVV | M9NV | ● | ● | ○ | ○ | — | IC circuit | | | |
| | | | | 3-wire (PNP) | M9PVV | M9PV | ● | ● | ○ | ○ | — | IC circuit | | | |
| | | | | 2-wire | M9BVV | M9BV | ● | ● | ○ | ○ | — | — | | | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

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

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.



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) 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 retracted on the non-rotating plate side.

Standard Stroke

| Bore size (mm) | Standard stroke (mm) |
|-------------------|--|
| 6, 10, 16 | 5, 10, 15, 20, 25, 30, 40, 50, 60 |
| 20, 25, 32 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |

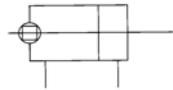
Minimum Stroke for Auto Switch Mounting

(mm)

| No. of auto switches mounted | Applicable auto switch | | |
|------------------------------|------------------------|---------------|-----------------|
| | D-A9□, D-A9□V | D-M9□, D-M9□V | D-M9□W, D-M9□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 | 60 | 70 | 80 | 90 | 100 |
| C(D)UKW6-□D | 33 (38) | 36 (46) | 40 (50) | 43 (53) | 46 (56) | 50 (60) | 57 (67) | 64 (74) | 71 (81) | — | — | — | — |
| C(D)UKW10-□D | 51 (56) | 56 (66) | 60 (70) | 65 (75) | 69 (79) | 74 (84) | 83 (93) | 92 (102) | 101 (111) | — | — | — | — |
| C(D)UKW16-□D | 84 (109) | 91 (121) | 98 (128) | 105 (135) | 112 (142) | 119 (149) | 133 (163) | 147 (177) | 161 (191) | — | — | — | — |
| C(D)UKW20-□D | 150 (185) | 163 (203) | 177 (217) | 191 (231) | 205 (245) | 219 (259) | 247 (286) | 275 (315) | 303 (343) | 331 (371) | 359 (399) | 387 (427) | 415 (455) |
| C(D)UKW25-□D | 276 (330) | 296 (355) | 316 (375) | 336 (395) | 357 (416) | 377 (436) | 421 (476) | 462 (516) | 500 (559) | 541 (600) | 582 (641) | 623 (682) | 664 (723) |
| C(D)UKW32-□D | 434 (507) | 465 (543) | 495 (573) | 526 (604) | 556 (634) | 587 (665) | 669 (747) | 709 (787) | 770 (848) | 831 (909) | 892 (970) | 953 (1031) | 1014 (1092) |

* For the auto switch weight, refer to page 68 to 72.

Theoretical Output

Specifications are the same as double acting, double rod (Series CUW). Refer to page 9.

Tightening Torque

When mounting Series CUKW, refer to page 3.

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 22.

Auto Switch Mounting Position

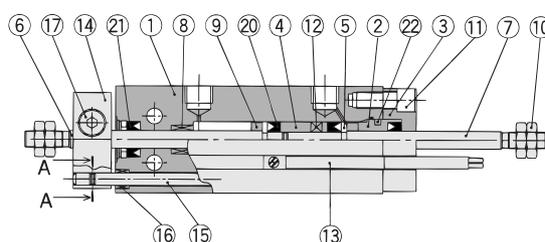
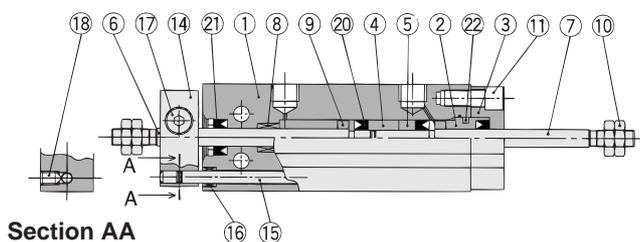
For the auto switch mounting position of Series CUKW, refer to page 12, since specifications are the same as double acting, double rod type.

Series CUKW

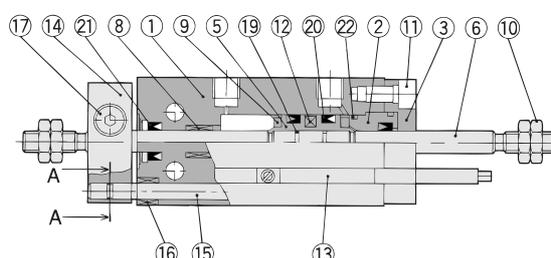
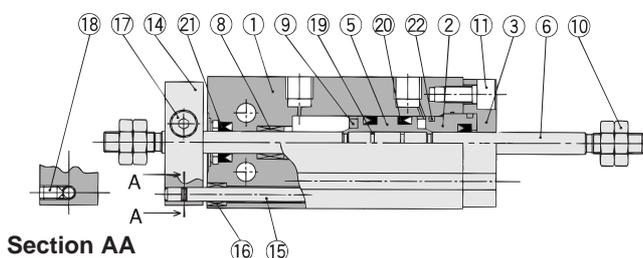
Construction

ø6

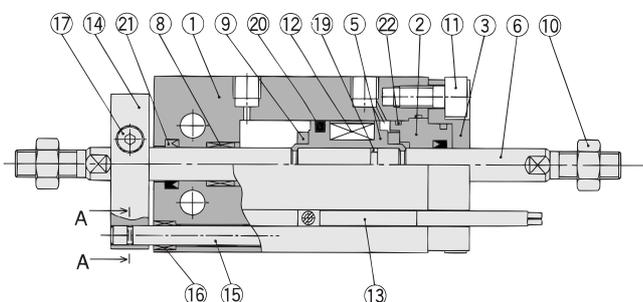
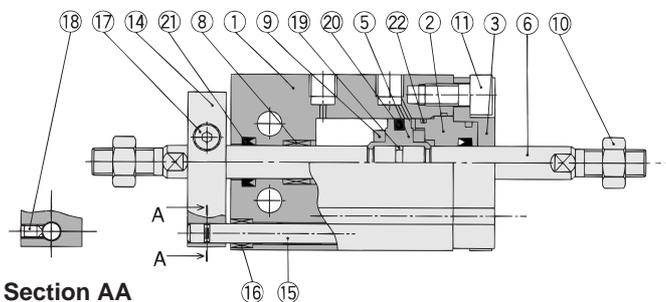
With auto switch



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 |

Component Parts

| 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 | | |

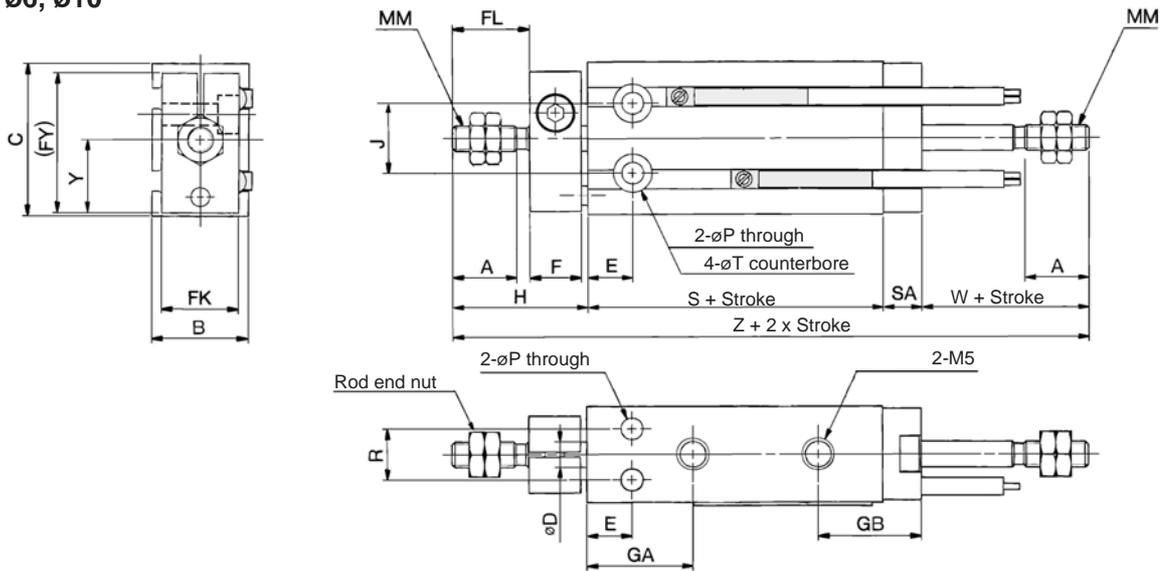
Replacement Parts: Seal Kit

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

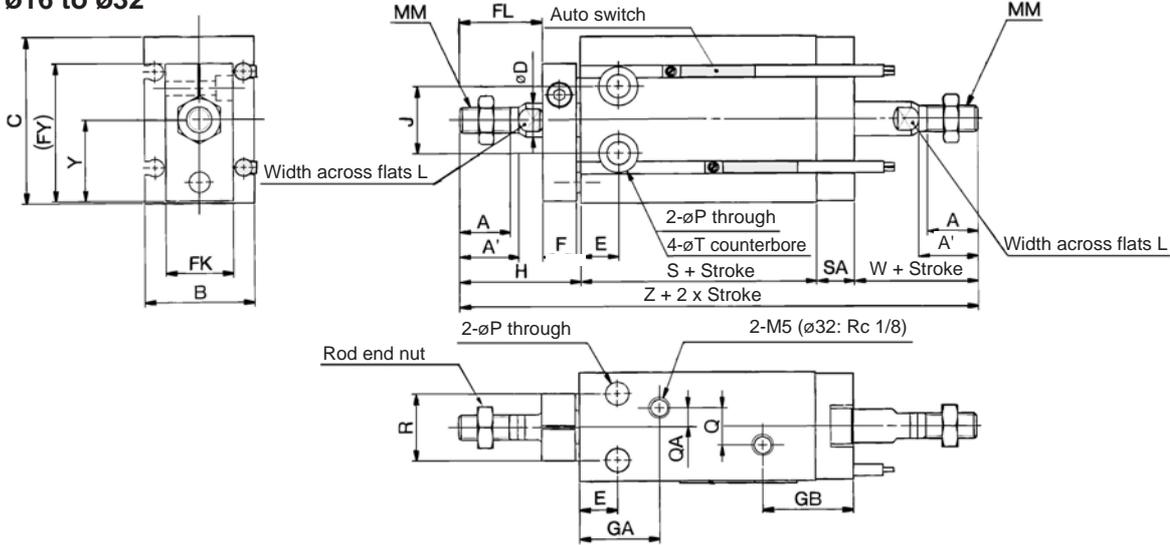
* Seal kit includes 20, 21, 22. Order the seal kit, based on each bore size.

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

ø6, ø10

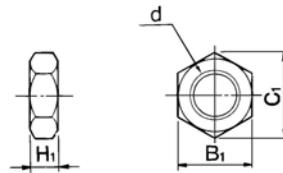


ø16 to ø32



Rod End Nut/Accessory

Material: Carbon steel



| Part no. | Applicable bore size (mm) | d | H ₁ | B ₁ | C ₁ |
|-----------|---------------------------|------------|----------------|----------------|----------------|
| NTP-006 | 6 | M3 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NT-J-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 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 |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 16 | 21 | 11 | — | M4 |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 ^{Note)} | 19 | 26 | 14 | 5 | M5 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 21.5 | 29 | 16 | 6 | M6 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 22 | 33 | 20 | 8 | M8 |
| 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

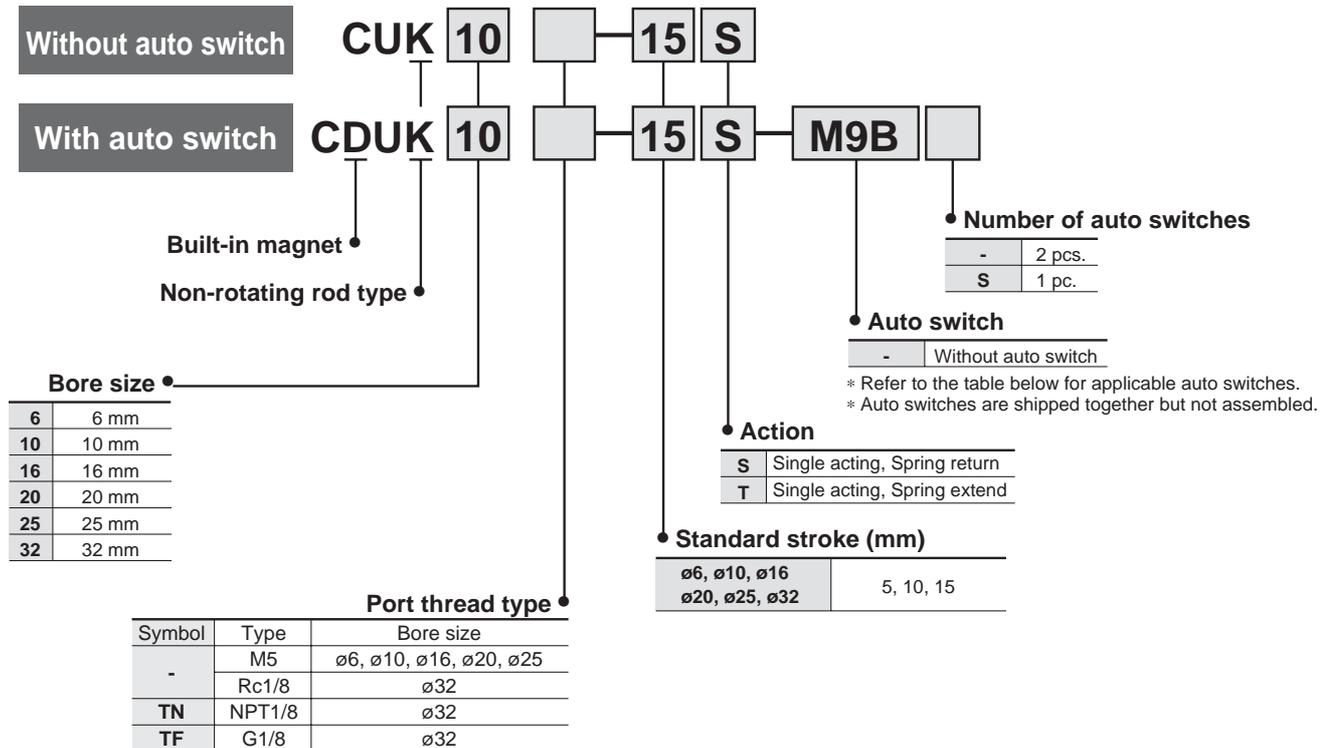
Single Acting, Single Rod, Spring Return/Extend

Series CUK

ø6, ø10, ø16, ø20, ø25, ø32



How to Order



Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|-------------------|---------|-----------------------|-------|------------|---------------------|-----------------|------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | IC circuit | Relay, PLC | |
| 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 | No | 3-wire (NPN) | 24 V | 5 V, 12 V | 100 V or less | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | IC circuit | |
| | | | | 2-wire | M9BV | M9B | ● | ● | ○ | ○ | — | | | | |
| | | | | 3-wire (NPN) | M9NVV | M9NV | ● | ● | ○ | ○ | IC circuit | | | | |
| | | | | 3-wire (PNP) | M9PVV | M9PV | ● | ● | ○ | ○ | IC circuit | | | | |
| | | | | 2-wire | M9BVV | M9BV | ● | ● | ○ | ○ | — | | | | |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | 100 V or less | M9NVV | M9NV | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PVV | M9PV | ● | ● | ○ | ○ | IC circuit | |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | No | 3-wire (NPN) | 24 V | 5 V, 12 V | 100 V or less | M9NVV | M9NV | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PVV | M9PV | ● | ● | ○ | ○ | IC circuit | |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 2-wire | 24 V | 12 V | 100 V or less | M9BVV | M9BV | ● | ● | ○ | ○ | — | Relay, PLC |
| | | | | 2-wire | | | | M9BVV | M9BV | ● | ● | ○ | ○ | — | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
 3 m.....L (Example) M9NL
 5 m.....Z (Example) M9NZ

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

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.



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) 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} mm | | | | | |
| Rod non-rotating accuracy ⁽²⁾ | ±0.8° | | | ±0.5° | | |

Note 1) ø6: With auto switch, single rubber bumper

Note 2) No load: Rod 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

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

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

| 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 68 to 72.



Made to Order Specifications
(For details, refer to page 43, 44.)

| Symbol | Specifications |
|--------|---|
| -XC22 | Seals made of fluorine rubber |
| -XC34 | Threaded for mounting a work on non-rotating plate (No protrusion from the edge of rod) |

Tightening Torque

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

Theoretical Output

Specifications are the same as single acting, spring return/spring extend type (Series CU). Refer to page 14.

Spring Reaction Force

For the reactive force of spring return, refer to Best Pneumatics catalogue.

Auto Switch Mounting Position

For the auto switch mounting position of CDUK series single acting, spring return/spring extend, refer to page 19 to 20, since specification are the same as standard type, single acting, spring return/spring extend type.

Allowable Rotational Torque

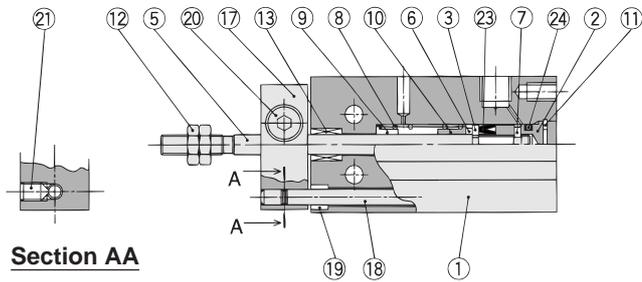
Make sure that rotational torque is not applied to the piston rod of the CUK series single acting type cylinder. If the rotation torque were applied unavoidably, refer to page 22.

Series CUK

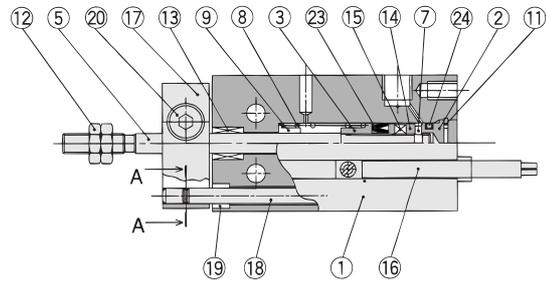
Construction

Single acting, Spring return

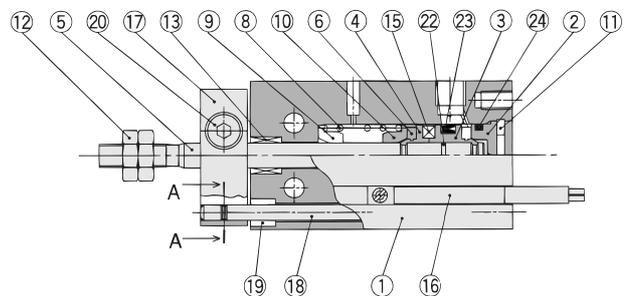
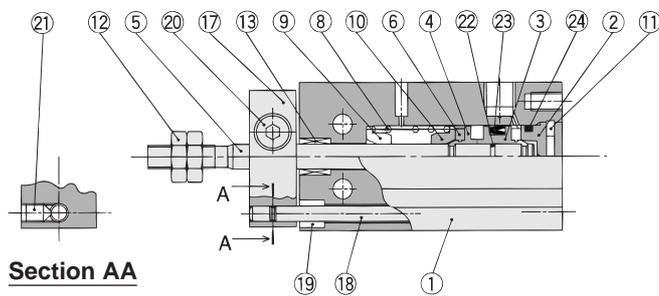
ø6



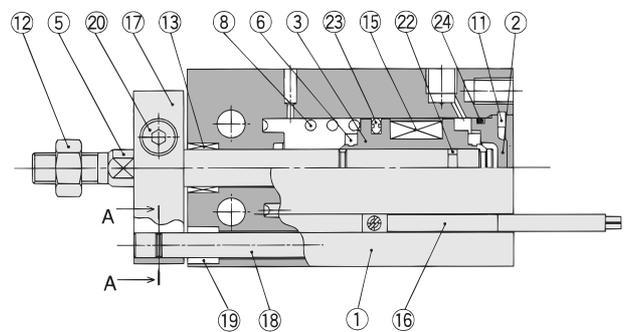
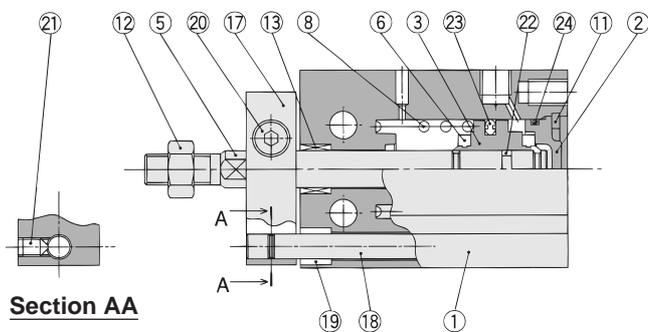
With auto switch



ø10



ø16 to ø32



Component Parts

| No. | Description | Material | Note |
|-----|---------------|-----------------|--------------------------------------|
| 1 | Cylinder tube | Aluminum alloy | Hard anodized |
| 2 | Head cover | Brass | ø6 to ø10, Electroless 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 | |

Component Parts

| 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

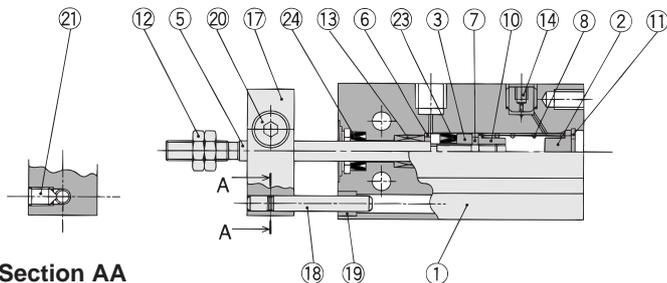
| Kit no. | Bore size (mm) / Part no. | | | | |
|---------|---------------------------|----------|----------|----------|----------|
| | 10 | 16 | 20 | 25 | 32 |
| | CU10S-PS | CU16S-PS | CU20S-PS | CU25S-PS | CU32S-PS |

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

Construction

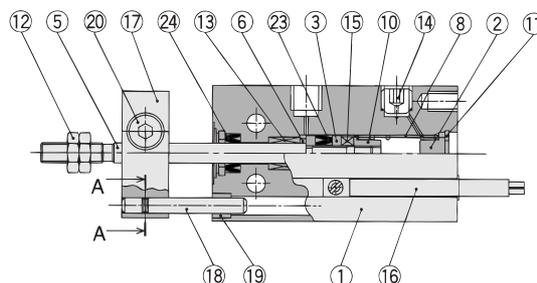
Single acting, Spring extend

ø6

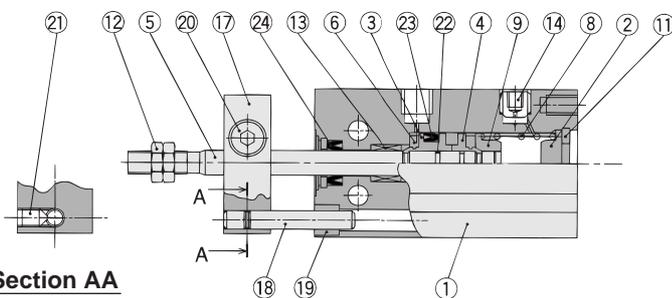


Section AA

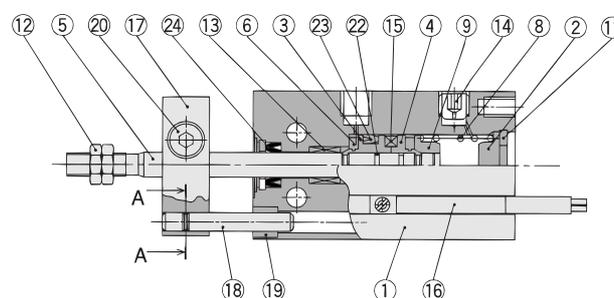
With auto switch



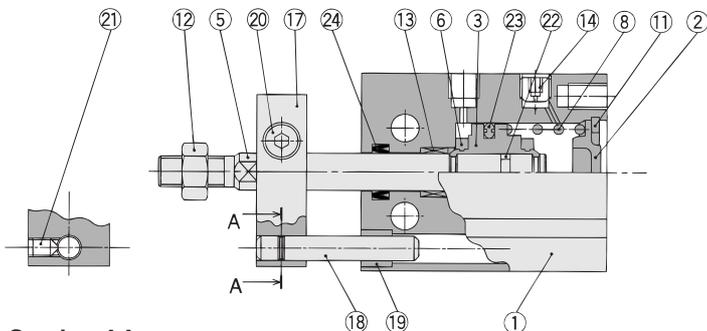
ø10



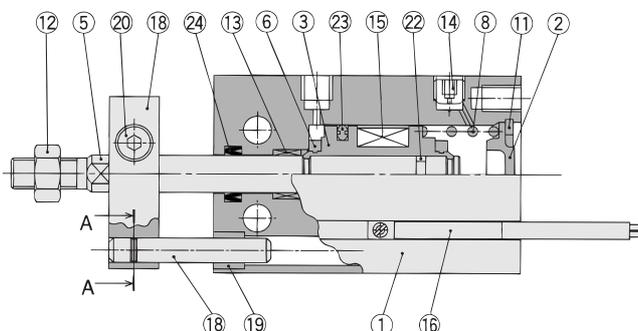
Section AA



ø16 to ø32



Section AA



Component Parts

| No. | Description | Material | Note |
|-----|---------------|-------------------|--------------------------------------|
| 1 | Cylinder tube | Aluminum alloy | Hard anodized |
| 2 | Head cover | Brass | ø6 to ø10, Electroless 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 |

Component Parts

| 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 | | |
| 23* | Piston seal | NBR | |
| 24* | Rod seal | | |

Replacement Parts: Seal Kit

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

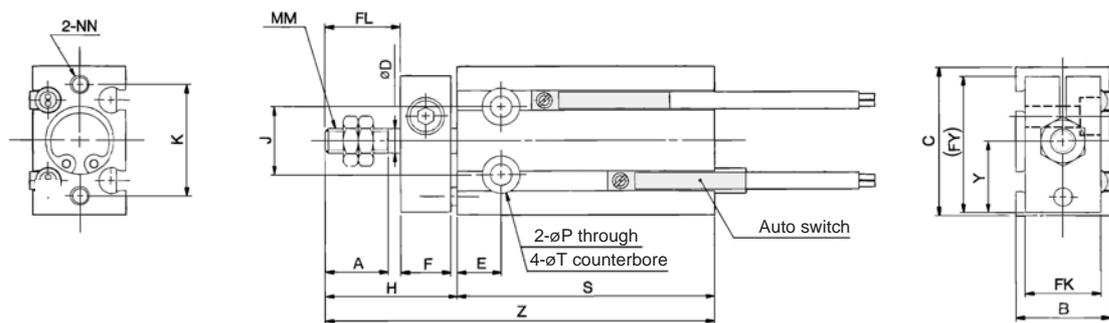


* Seal kit includes 23, 24. Order the seal kit, based on each bore size.

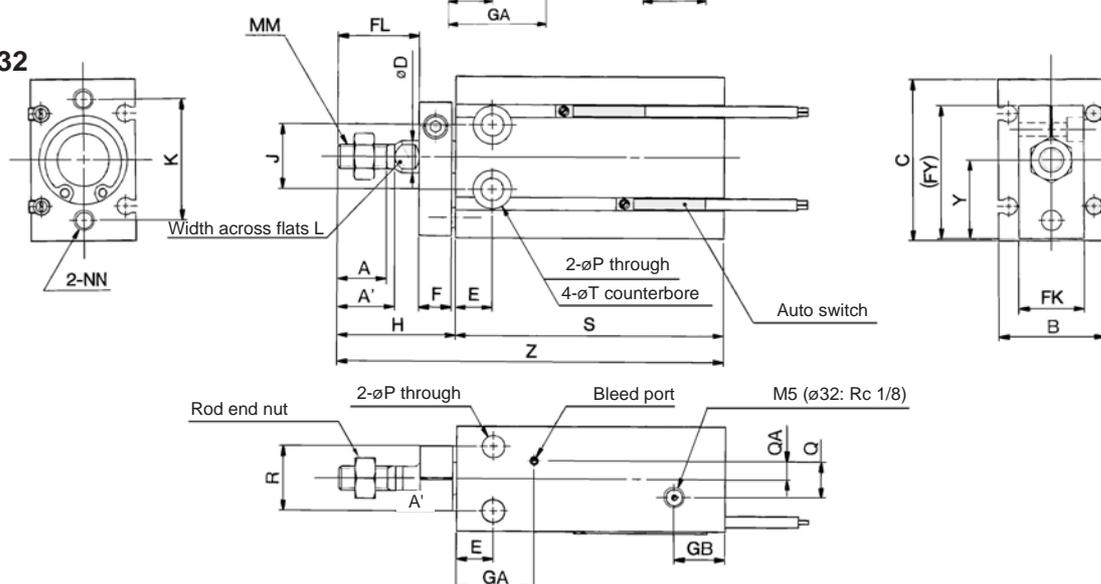
Series CUK

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

ø6, ø10

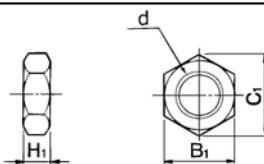


ø16 to ø32



Rod End Nut/Accessory

Material: Carbon steel



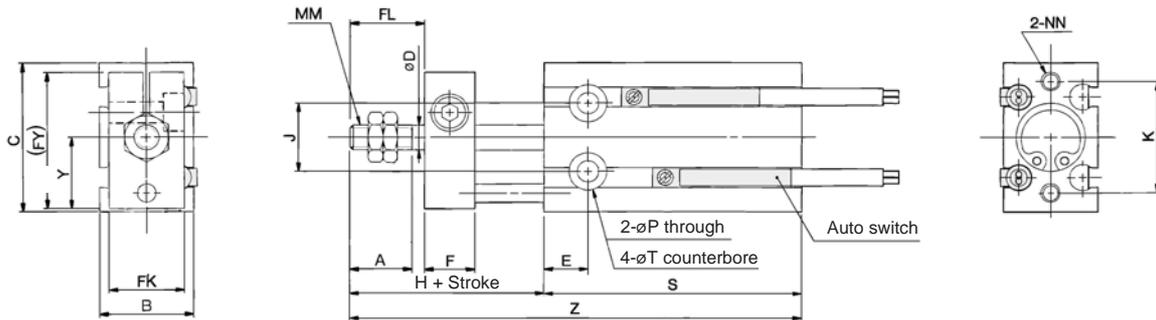
| Part no. | Applicable bore size (mm) | d | H ₁ | B ₁ | C ₁ |
|----------|---------------------------|------------|----------------|----------------|----------------|
| NTP-006 | 6 | M3 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 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 | M3 depth 5 |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 | M3 depth 5 |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 | 11.5 | 26 | 14 | 25 | 5 | M5 | M4 depth 6 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 | M5 depth 8 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 | M5 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 depth 9 |

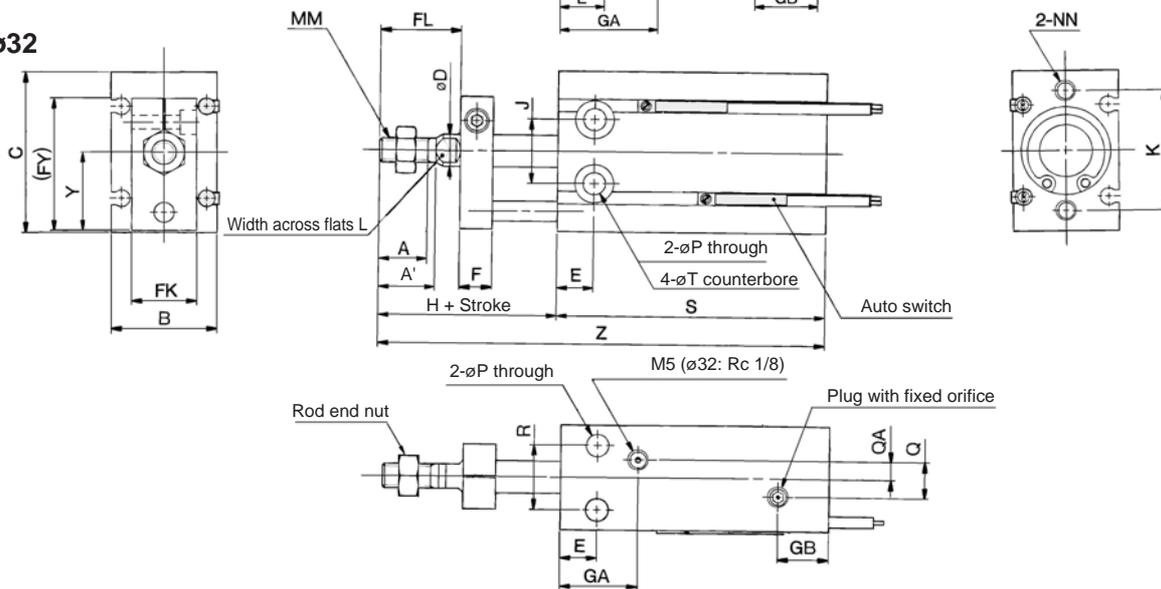
| Bore size (mm) | P | Q | QA | R | T | Y | Without auto switch | | | | | | With auto switch | | | | | |
|----------------|-----|------|-----|----|---------------|------|---------------------|-------|-------|------|-------|-------|------------------|-------|-------|------|-------|-------|
| | | | | | | | 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

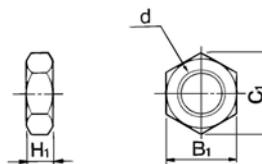


ø16 to ø32



Rod End Nut/Accessory

Material: Carbon steel



| Part no. | Applicable bore size (mm) | d | H ₁ | B ₁ | C ₁ |
|-----------------|---------------------------|------------|----------------|----------------|----------------|
| NTP-006 | 6 | M3 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 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 | M3 depth 5 |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 | M3 depth 5 |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 | 11.5 | 26 | 14 | 25 | 5 | M5 | M4 depth 6 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 | M5 depth 8 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 | M5 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 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 | 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 - M9B []

Built-in magnet

Bore size

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

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| - | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Long stroke (mm)

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

Number of auto switches

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

Auto switch

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

Action

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

**Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.**

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|---------------|-------------------|-----------|-----------------------|------------|-----------------|---------------------|-----------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | Applicable load | | | |
| | | | | | | | | | | | | IC circuit | | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | — |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | — | |
| | | | | 2-wire | M9BV | M9B | ● | ● | ○ | ○ | — | | | | |
| | | | | 3-wire (NPN) | M9NWV | M9NW | ● | ● | ○ | ○ | IC circuit | | | | |
| | | | | 3-wire (PNP) | M9PWV | M9PW | ● | ● | ○ | ○ | IC circuit | | | | |
| | | | | 2-wire | M9BWV | M9BW | ● | ● | ○ | ○ | — | | | | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

* Solid state switches marked with "O" are produced upon receipt of order.

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.



Specifications

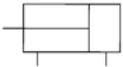
| Bore size (mm) | 6 | 10 | 16 | 20 | 25 | 32 |
|-------------------------------|---|----------|----------|----|----|----|
| Fluid | Air | | | | | |
| Proof pressure | 1.05 MPa | | | | | |
| Maximum operating pressure | 0.7 MPa | | | | | |
| Minimum operating pressure | 0.12 MPa | 0.06 MPa | 0.05 MPa | | | |
| Ambient and fluid temperature | Without auto switch: -10 to 70°C (No freezing) 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



Made to Order Specifications (For details, refer to P.43.)

| Symbol | Specifications |
|--------|--|
| -XB6 | Heat resistant (150°C) |
| -XB7 | Cold resistant (-40°C) |
| -XB9 | Low speed (10 to 50 mm/s) |
| -XB13 | Low speed (5 to 50 mm/s) |
| -XC19 | Intermediate stroke (with a spacer built-in) |
| -XC22 | Seals made of fluorine rubber |

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 68 to 72.

Auto Switch Mounting Position

For the auto switch mounting position of CDU long stroke series, refer to page 6, since specifications are the same as standard type, double acting, single rod type.

Tightening Torque

Refer to page 3 for mounting a long stroke type.

Theoretical Output

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

Series CU

Copper-free

20-CU Bore size — Stroke D

•Copper-free

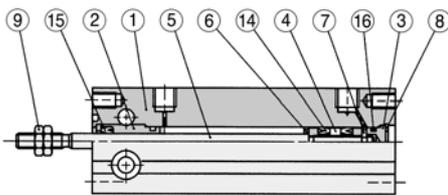
The type which prevents copper based ions from generating by changing the copper based materials into electroless nickel plated treatment or non-copper materials in order to eliminate the effects by copper based ions or fluororesins over the colour cathode ray tube.

Minimum Operating Pressure (MPa)

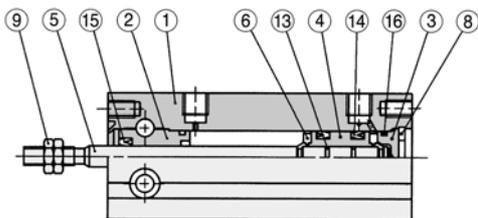
| Bore size (mm) | 6 | 10, 16 | 20, 25, 32 |
|----------------------------|------|--------|------------|
| Minimum operating pressure | 0.12 | 0.12 | 0.05 |

Construction

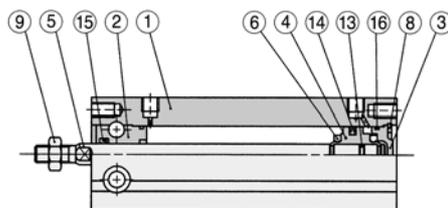
ø6



ø10



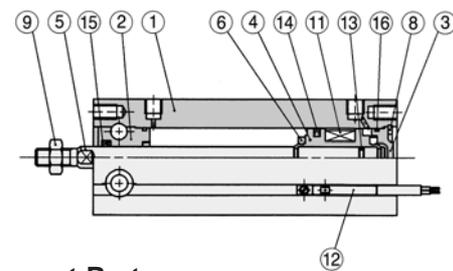
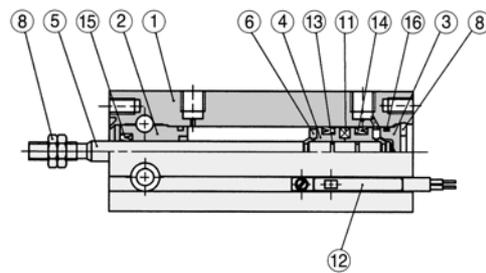
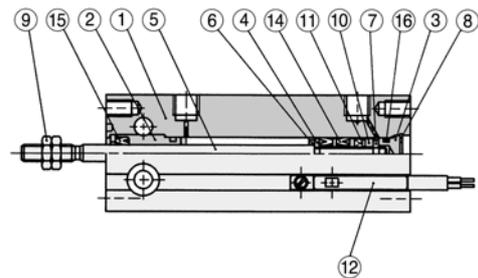
ø16 to ø32



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 type (Refer to page 3.) |
| Auto switch | Mountable |

With auto switch



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, Electroless 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 | |

Component Parts

| 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 | | |

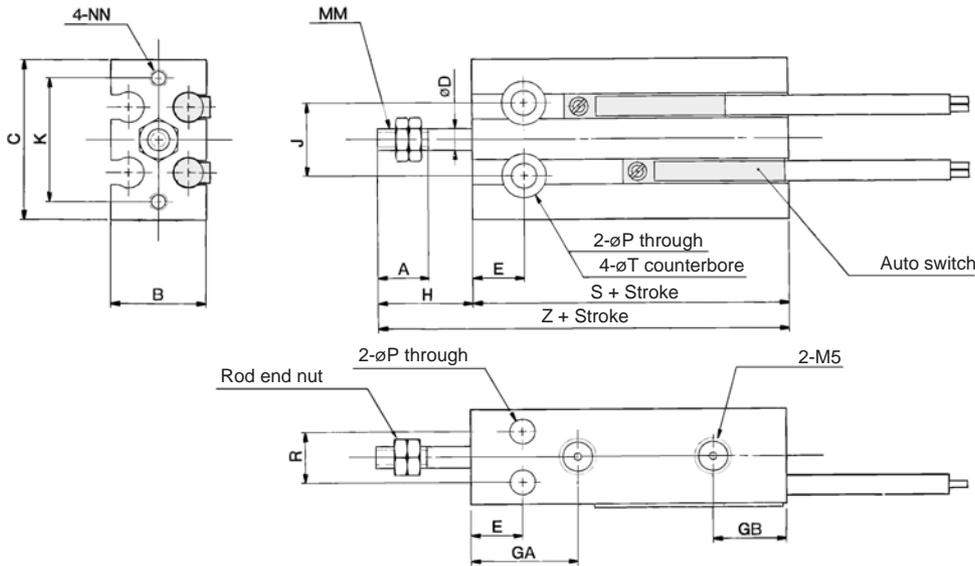
Replacement Parts: Seal Kit

| 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 | |

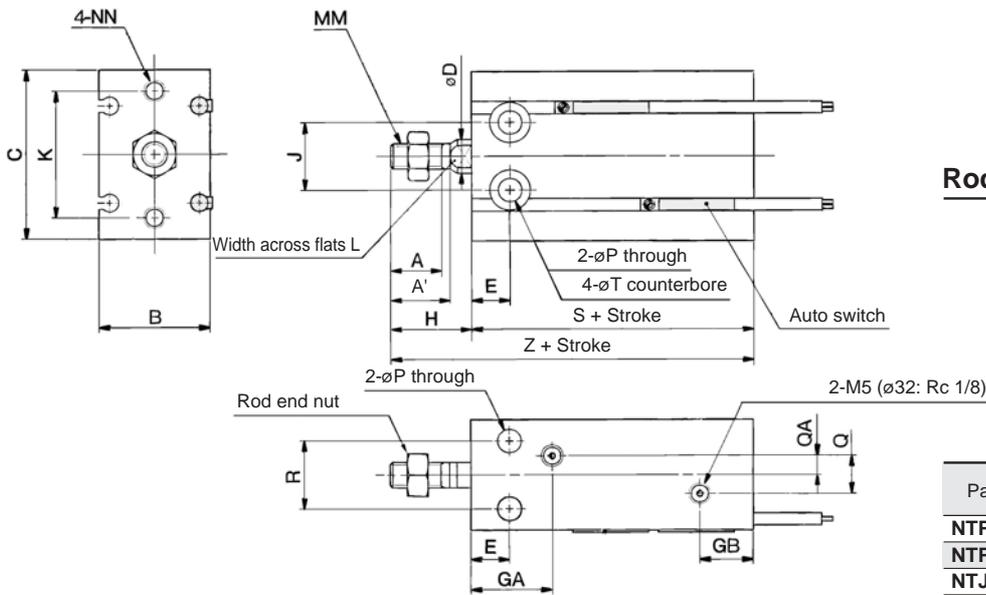
* Seal kit includes 14, 15, 16. Order the seal kit, based on each bore size.

Dimensions: Double Acting, Single Rod

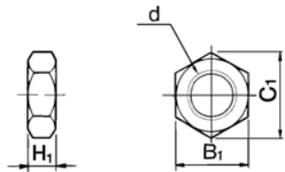
ø6, ø10



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 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 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 | M3 depth 5 | 3.2 | — | — |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 16.5 | 10 | 16 | 11 | 18 | — | M4 | M3 depth 5 | 3.2 | — | — |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 16.5 | 11.5 | 16 | 14 | 25 | 5 | M5 | M4 depth 6 | 4.5 | 4 | 2 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 19 | 12.5 | 19 | 16 | 30 | 6 | M6 | M5 depth 8 | 5.5 | 9 | 4.5 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 21.5 | 13 | 23 | 20 | 38 | 8 | M8 | M5 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 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** **M9B**

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 |

Port thread type

| Symbol | Type | Bore size |
|--------|--------|------------------------|
| - | M5 | ø6, ø10, ø16, ø20, ø25 |
| | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Action

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

Cylinder stroke (mm)

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

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|---------------|-------------------|-------------|-----------------------|-------|-----------------|---------------------|-----------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | Applicable load | | | |
| | | | | | | | | | | | | IC circuit | | Relay, PLC | |
| Reed switch | - | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 5 V, 12 V | 100 V or less | A93V | A93 | ● | ● | — | — | IC circuit | Relay, PLC |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | IC circuit | |
| | | | | 2-wire | | | | M9BV | M9B | ● | ● | ○ | ○ | — | |
| | | | | 3-wire (NPN) | | | | M9NVV | M9NV | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | M9PVV | M9PV | ● | ● | ○ | ○ | IC circuit | |
| | | | | 2-wire | | | | M9BVV | M9BV | ● | ● | ○ | ○ | — | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

* Solid state switches marked with "O" are produced upon receipt of order.

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.

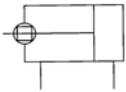


Specifications

| 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) 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 <small>Note)</small> | $\pm 0.8^\circ$ | | | $\pm 0.5^\circ$ | | |

Note) No load: Rod retracted

JIS Symbol
Double acting,
Single rod



Standard Stroke

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

Made to Order
Made to Order Specifications
(For details, refer to page 43.)

| Symbol | Specifications |
|--------|--|
| -XB9 | Low speed (10 to 50 mm/s) |
| -XB13 | Low speed (5 to 50 mm/s) |
| -XC19 | Intermediate stroke (with a spacer built-in) |

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

| 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 68 to 72.

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 22 for details.

Tightening Torque

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

Theoretical Output

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

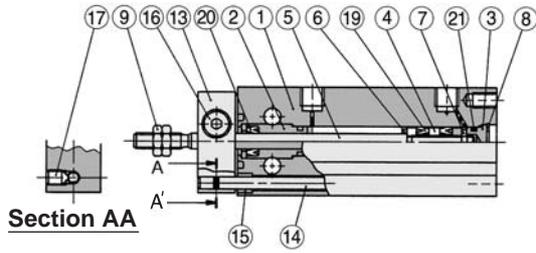
Auto Switch Mounting Position

For the auto switch mounting position of C(D)UK long stroke series, refer to page 6, since specifications are the same as standard type, double acting, single rod type.

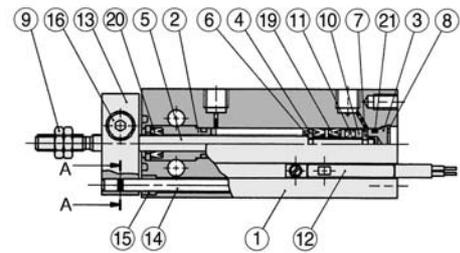
Series CUK

Construction

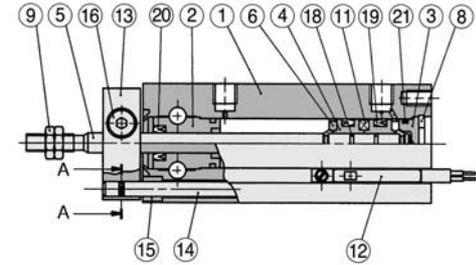
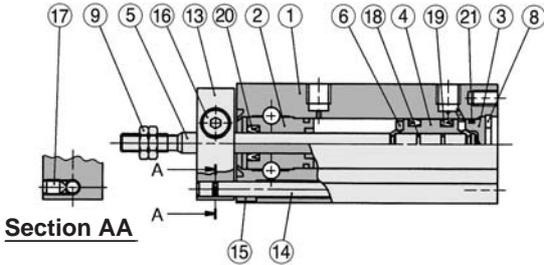
ø6



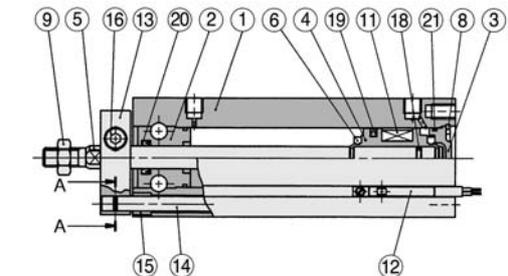
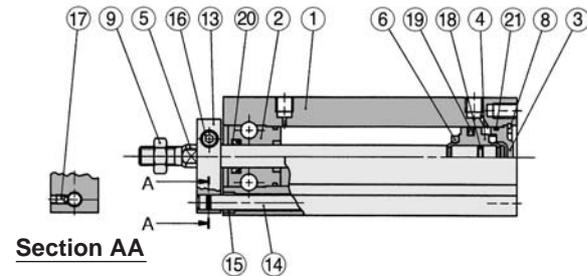
With auto switch



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, Electroless 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 |

Component Parts

| 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 | | |

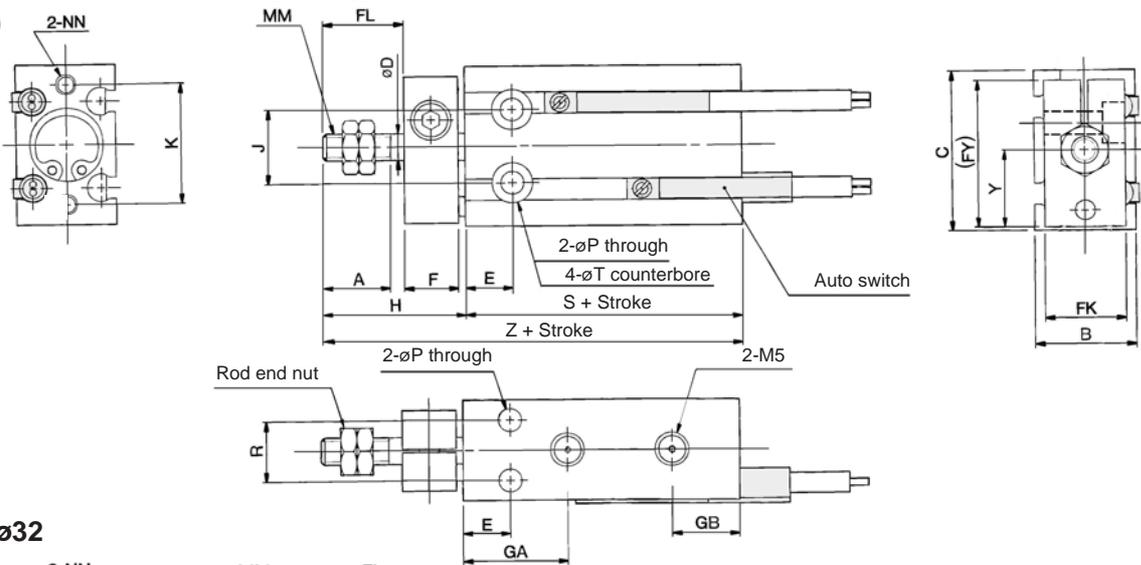
Replacement Parts: Seal Kit

| Bore size (mm) | Kit no. | Contents |
|----------------|----------|----------------------------|
| 10 | CU10D-PS | Set of nos. above ⑱, ⑳, ㉑. |
| 16 | CU16D-PS | |
| 20 | CU20D-PS | |
| 25 | CU25D-PS | |
| 32 | CU32D-PS | |

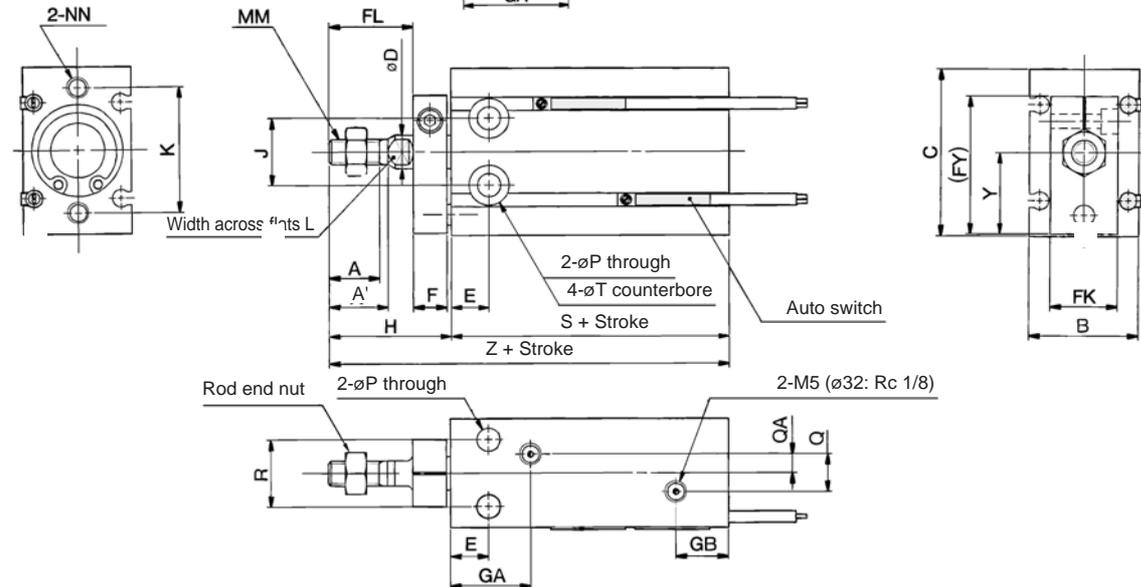
* Seal kit includes ⑱, ⑳, ㉑. Order the seal kit, based on each bore size.

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

ø6, ø10

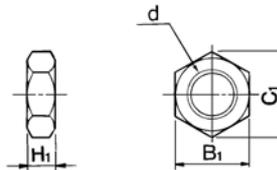


ø16 to ø32



Rod End Nut/Accessory

Material: Carbon steel



| Part no. | Applicable bore size (mm) | d | H ₁ | B ₁ | C ₁ |
|----------|---------------------------|------------|----------------|----------------|----------------|
| NTP-006 | 6 | M3 | 1.8 | 5.5 | 6.4 |
| NTP-010 | 10 | M4 | 2.4 | 7 | 8.1 |
| NTJ-015A | 16 | M5 | 4 | 8 | 9.2 |
| NT-015A | 20 | M6 | 5 | 10 | 11.5 |
| NT-02 | 25 | M8 | 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 |
| 10 | 10 | — | 15 | 24 | 4 | 7 | 8 | 12 | 12 | 22 | 16.5 | 10 | 21 | 11 | 18 | — | M4 |
| 16 | 11 | 12.5 | 20 | 32 | 6 | 7 | 8 | 17 | 13 | 28 | 16.5 | 11.5 | 26 | 14 | 25 | 5 | M5 |
| 20 | 12 | 14 | 26 | 40 | 8 | 9 | 8 | 20 | 16 | 33 | 19 | 12.5 | 29 | 16 | 30 | 6 | M6 |
| 25 | 15.5 | 18 | 32 | 50 | 10 | 10 | 10 | 22 | 20 | 43.5 | 21.5 | 13 | 33 | 20 | 38 | 8 | M8 |
| 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 depth 5 | 3.2 | — | — | 7 | 6 depth 4.8 | 10.5 | 33 | 51 | 33 | 51 |
| 10 | M3 depth 5 | 3.2 | — | — | 9 | 6 depth 5 | 11.5 | 36 | 57 | 36 | 57 |
| 16 | M4 depth 6 | 4.5 | 4 | 2 | 12 | 7.6 depth 6.5 | 15.5 | 30 | 56 | 40 | 66 |
| 20 | M5 depth 8 | 5.5 | 9 | 4.5 | 16 | 9.3 depth 8 | 19.5 | 36 | 65 | 46 | 75 |
| 25 | M5 depth 8 | 5.5 | 9 | 4.5 | 20 | 9.3 depth 9 | 24.5 | 40 | 73 | 50 | 83 |
| 32 | M6 depth 9 | 6.6 | 13.5 | 4.5 | 24 | 11 depth 11.5 | 30.5 | 42 | 84 | 52 | 94 |

Series CU

Made to Order Specification



-XB6 Heat resistant (150°C)

Enter the applicable model number. —XB6

Applicable Model

| | |
|-----|---|
| CU | Standard, Double acting, Single rod |
| CUK | Non-rotating rod, Double acting, Single rod |
| CU | Long stroke, Double acting, Single rod |
| CUK | Non-rotating rod/Long stroke, Double acting, Single rod |

Specifications

| | |
|---------------------------|-----------------------|
| Ambient temperature range | -10 to 150°C |
| Auto switch | Not mountable |
| Seal material | Fluorine rubber |
| Grease in use | Heat resistant grease |

Specifications other than described above and dimensions are identical to those of standard products.

-XB7 Cold resistant (-40°C)

Enter the applicable model number. —XB7

Applicable Model

| | |
|-----|---|
| CU | Standard, Double acting, Single rod |
| CUK | Non-rotating rod, Double acting, Single rod |
| CU | Long stroke, Double acting, Single rod |
| CUK | Non-rotating rod/Long stroke, Double acting, Single rod |

Specifications

| | |
|---------------------------|-----------------------|
| Ambient temperature range | -40 to 70°C |
| Auto switch | Not mountable |
| Seal material | Low nitrile rubber |
| Grease in use | Cold resistant grease |

Specifications other than described above and dimensions are identical to those of standard products.

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

Enter the applicable model number. —XB9

Applicable Model

| | |
|--------|---|
| C(D)U | Standard, Double acting, Single rod |
| C(D)UK | Non-rotating rod, Double acting, Single rod |
| C(D)U | Long stroke, Double acting, Single rod |
| C(D)UK | Non-rotating rod/Long stroke, Double acting, Single rod |

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

Enter the applicable model number. —XB13

Applicable Model

| | |
|--------|---|
| C(D)U | Standard, Double acting, Single rod |
| C(D)UK | Non-rotating rod, Double acting, Single rod |
| C(D)U | Long stroke, Double acting, Single rod |
| C(D)UK | Non-rotating rod/Long stroke, Double acting, Single rod |

-XC19 Intermediate stroke (with a spacer built-in)

Intermediate strokes are available by installing a spacer with 5 mm in width in the standard stroke cylinder.

Enter the applicable model number. —XC19

Applicable Model

| | |
|--------|---|
| C(D)U | Standard, Double acting, Single rod |
| C(D)UK | Non-rotating rod, Double acting, Single rod |
| C(D)U | Long stroke, Double acting, Single rod |
| C(D)UK | Non-rotating rod/Long stroke, Double acting, Single rod |

Applicable Stroke

| Bore size | Stroke (mm) |
|------------|----------------------------|
| 6, 10, 16 | 35, 45, 55 |
| 20, 25, 32 | 35, 45, 55, 65, 75, 85, 95 |

The external dimensions are the same as that of standard products with 5 mm added to strokes above.

Consult with SMC when stroke other than applicable stroke is required.

-XC22 Seals made of fluorine rubber

Seal materials are changed to the fluorine rubber.

Enter the applicable model number. —XC22

Applicable Model

| | |
|--------|--|
| C(D)U | Standard, Double acting, Single rod |
| | Standard Single acting, Single rod (Retracted/Extended) |
| C(D)UK | Non-rotating rod, Double acting, Single rod |
| | Non-rotating rod, Single acting, Single rod (Retracted/Extended) |
| C(D)U | Long stroke, Double acting, Single rod |
| C(D)UK | Non-rotating rod/Long stroke, Double acting, Single rod |

The other specifications and dimensions are the same as those of standard products.

Series CU



Made to Order Specification

-XC34 Threaded for mounting a work on non-rotating plate (No protrusion from the rod end)

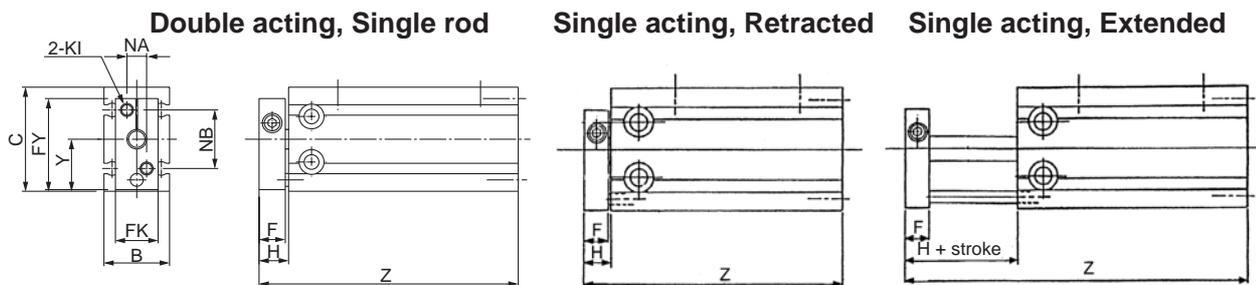
- * Threaded for mounting a work on the plate.
- * "FL" dimension across the non-rotating plate and the piston rod end is removed. The piston rod does not stick out of the plate.

Enter the applicable model number. —XC34

Applicable Model

| | |
|--------|--|
| C(D)UK | Non-rotating rod, Double acting, Single rod |
| | Non-rotating rod, Single acting, Single rod (Retracted/Extended) |
| | Non-rotating rod/Long stroke, Double acting, Single rod |

Dimensions



(mm)

| Bore size (mm) | B | C | FK | FY | KI | NA | NB | Y |
|----------------|----|----|----|------|----|----|----|------|
| 6 | 13 | 22 | 11 | 20.5 | M3 | 6 | 14 | 10.5 |
| 10 | 15 | 24 | 12 | 22 | M3 | 7 | 15 | 11.5 |
| 16 | 20 | 32 | 13 | 28 | M4 | 6 | 18 | 15.5 |
| 20 | 26 | 40 | 16 | 33 | M4 | 8 | 20 | 19.5 |
| 25 | 32 | 50 | 20 | 43.5 | M5 | 10 | 28 | 24.5 |
| 32 | 40 | 62 | 24 | 51.5 | M5 | 12 | 32 | 30.5 |

(mm)

| Bore size (mm) | Action | F | H | Double acting | | Single acting, Retracted | | | | | | Single acting, Extended | | | | | |
|----------------|--------|----|----|---------------------|------------------|--------------------------|----|----|------------------|----|----|-------------------------|----|----|------------------|----|-----|
| | | | | Z | | Z | | | | | | Z | | | | | |
| | | | | Without auto switch | With auto switch | Without auto switch | | | With auto switch | | | Without auto switch | | | With auto switch | | |
| | | | | | | 5 | 10 | 15 | 5 | 10 | 15 | 5 | 10 | 15 | 5 | 10 | 15 |
| 6 | | 8 | 9 | 42 | 42 | 47 | 52 | 57 | 47 | 52 | 57 | 52 | 62 | 67 | 52 | 62 | 67 |
| 10 | | 8 | 9 | 45 | 45 | 50 | 55 | 65 | 50 | 55 | 65 | 55 | 65 | 80 | 55 | 65 | 80 |
| 16 | | 8 | 9 | 39 | 49 | 44 | 49 | 59 | 54 | 59 | 69 | 59 | 69 | 84 | 69 | 79 | 94 |
| 20 | | 8 | 9 | 45 | 55 | 50 | 55 | 65 | 60 | 65 | 75 | 55 | 65 | 80 | 65 | 75 | 90 |
| 25 | | 10 | 11 | 51 | 61 | 56 | 61 | 71 | 66 | 71 | 81 | 61 | 71 | 86 | 71 | 81 | 96 |
| 32 | | 12 | 13 | 55 | 65 | 60 | 65 | 75 | 70 | 75 | 85 | 65 | 75 | 90 | 75 | 85 | 100 |

* The dimensions other than the table above are the same as those of standard type.

Related Products

For details, refer to the respective catalogue.

Clean Series

10-CDU
11-CDU

Compliant with clean environment



Specifications

| | | | |
|-------------------------------------|---|----------|----------|
| Model | 10-CDU (Relief type) 11-CDU (Vacuum type) | | |
| Bore size (mm) | 6 | 10, 16 | 20, 25 |
| Proof pressure | 1.05 MPa | | |
| Max. operating pressure | 0.7 MPa | | |
| Min. operating pressure | 0.12 MPa | 0.06 MPa | 0.05 MPa |
| Ambient and fluid temperature | Without auto switch: -10 to 70°C With auto switch: -10 to 60°C (with no freezing) | | |
| Operating piston speed | 50 to 400mm/s | | |
| Allowable margin of stroke length | $^{+1.0}_0$ | | |
| Grease in use | Fluoro grease | | |
| Grade of particle generation amount | 10-: Grade 2 11-: Grade 1 | | |

Copper/Fluorine/Silicon-based free + Low Particle Generation

21-CDU
22-CDU

Compliant with the environment where no copper, fluorine and silicon are allowed and with clean environment.



Specifications

| | | | |
|-------------------------------------|---|----------|----------|
| Model | 21-CDU (Relief type) 22-CDU (Vacuum type) | | |
| Bore size (mm) | 6 | 10, 16 | 20, 25 |
| Proof pressure | 1.05 MPa | | |
| Max. operating pressure | 0.7 MPa | | |
| Min. operating pressure | 0.12 MPa | 0.06 MPa | 0.05 MPa |
| Ambient and fluid temperature | Without auto switch: -10 to 70°C With auto switch: -10 to 60°C (with no freezing) | | |
| Operating piston speed | 50 to 400 mm/s | | |
| Allowable margin of stroke length | $^{+1.0}_0$ | | |
| Grease in use | Lithium soap-based grease | | |
| Grade of particle generation amount | 21-: Grade3 22-: Grade1 | | |

Low Speed

C(D)UX

Stable low speed actuation even at 0.5 mm/s (ø16 or less: 1 mm/s)



Specifications

| | | | |
|-----------------------------------|---|--|--|
| Proof pressure | 1.05MPa | | |
| Max. operating pressure | 0.7MPa | | |
| Ambient and fluid temperature | Without auto switch: -10 to 70°C With auto switch: -10 to 60°C (with no freezing) | | |
| Lubrication | Not required (Non-lube) | | |
| Operating piston speed | ø10, ø16: 1 to 300mm/s ø20 to ø32: 0.5 to 300mm/s | | |
| Cushion | Rubber bumper on both ends | | |
| Rod end thread | Male thread | | |
| Thread tolerance | JIS Class 2 | | |
| Allowable margin of stroke length | $^{+1.0}_0$ (Note) | | |
| Mounting | Basic style | | |

Note) Tolerance $^{+1.0}_0$

Minimum Operating Pressure

Unit: MPa

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

Free Mount Cylinder with Air Cushion

Series CU



New air cushion mechanism

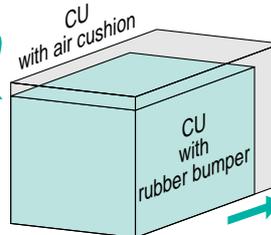


Free mount cylinder *Series CU* now employs an air cushion mechanism.

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



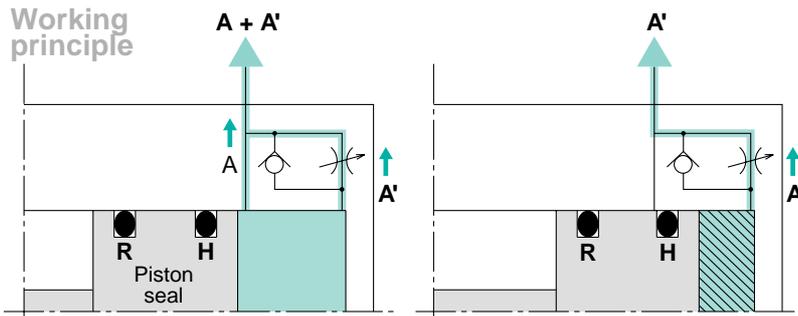
| Bore size | Extended dimensions (mm) | |
|-----------|--------------------------|--------|
| | Length | Height |
| ø20 | 7 | 2 |
| ø25 | 1.5 | 0 |
| ø32 | 4 | 0 |



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

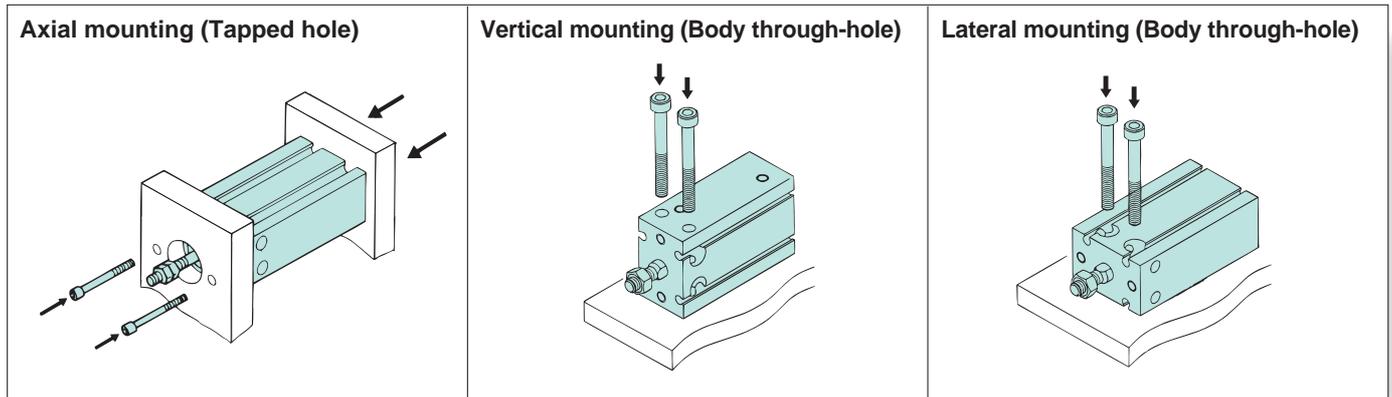


- ① When the piston is retracting, air is exhausted through both A and A' until piston seal H passes air passage A.
- ② After piston seal H has passed air passage A, air is exhausted only through A'. The section marked with slanted lines becomes a cushion chamber, and an air cushion effect is achieved.
- 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

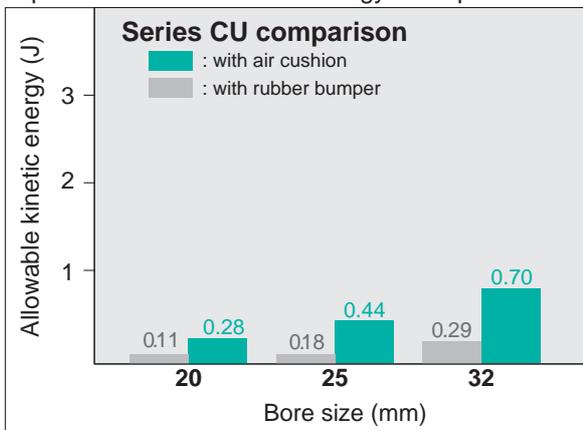
3 types of mounting orientations can be accommodated depending on the installation conditions.



Approximately 2.4 times of allowable kinetic energy

(Compared to the old Series CU with rubber bumper)

Improved allowable kinetic energy absorption.

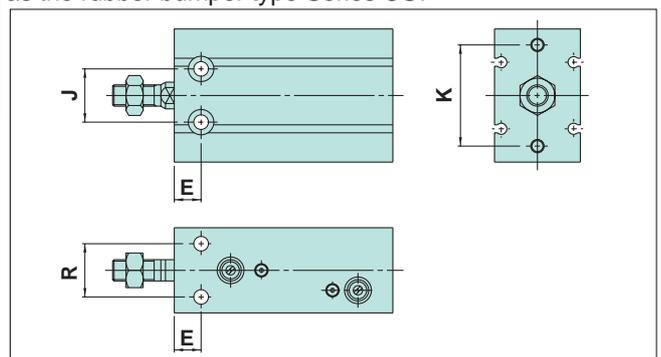


Improved sound insulation (Reduced impact noise at the stroke end)

- 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.



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.

Size Variations

| Model | Standard stroke | | | | | | | | | Auto switch |
|---------|-----------------|----|----|----|----|----|----|----|-----|---|
| | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| C(D)U20 | ● | ● | ● | ● | ● | ● | ● | ● | ● | • $\varnothing 20$ to $\varnothing 32$ 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 M9B []

Built-in magnet

Bore size

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

Thread type

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

Number of auto switches

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

Auto switch

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

* Refer to the table below for applicable auto switches.
* Auto switches are shipped together but not assembled.

Air cushion

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

Cylinder stroke (mm)

Refer to next page for "Standard Stroke".

Applicable Auto Switches/Refer to page 68 to 72 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-wired connector | Applicable load | | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|------|-------------------|---------|-----------------------|-------|-------|---------------------|-----------------|------------|-----------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | IC circuit | Relay PLC | |
| | | | | | | | | | | | | | | | 5 V |
| 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 | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire(NPN) | 5 V, 12 V | — | 100 V or less | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay PLC |
| | | | | 3-wire(PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | | |
| | | | | 2-wire | M9BV | | | M9B | ● | ● | ○ | ○ | — | | |
| | | | | 3-wire(NPN) | M9NVV | | | M9NV | ● | ● | ○ | ○ | IC circuit | | |
| | | | | 3-wire(PNP) | M9PVV | | | M9PV | ● | ● | ○ | ○ | IC circuit | | |
| | | | | 2-wire | M9BVV | | | M9BV | ● | ● | ○ | ○ | — | | |
| | | | | 2-wire | M9N | | | M9N | ● | ● | ○ | ○ | — | | |
| | | | | 2-wire | M9L | | | M9L | ● | ● | ○ | ○ | — | | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
3 m.....L (Example) M9NL
5 m.....Z (Example) M9NZ

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

* Normally closed (NC=b contact), solid state switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.

Series CU



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) 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.

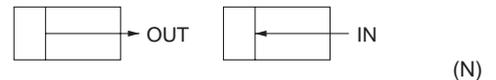
When mounting Series CU refer to the table below.

| 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 P.54 regarding allowable kinetic energy.

Theoretical Output



| 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

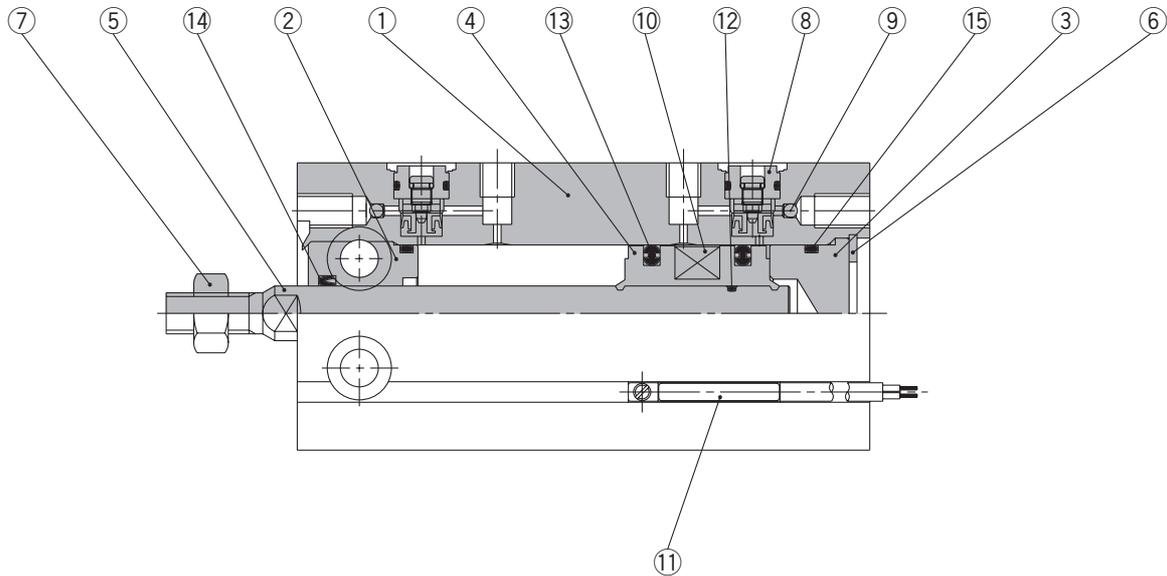
Basic Weight (g)

| 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

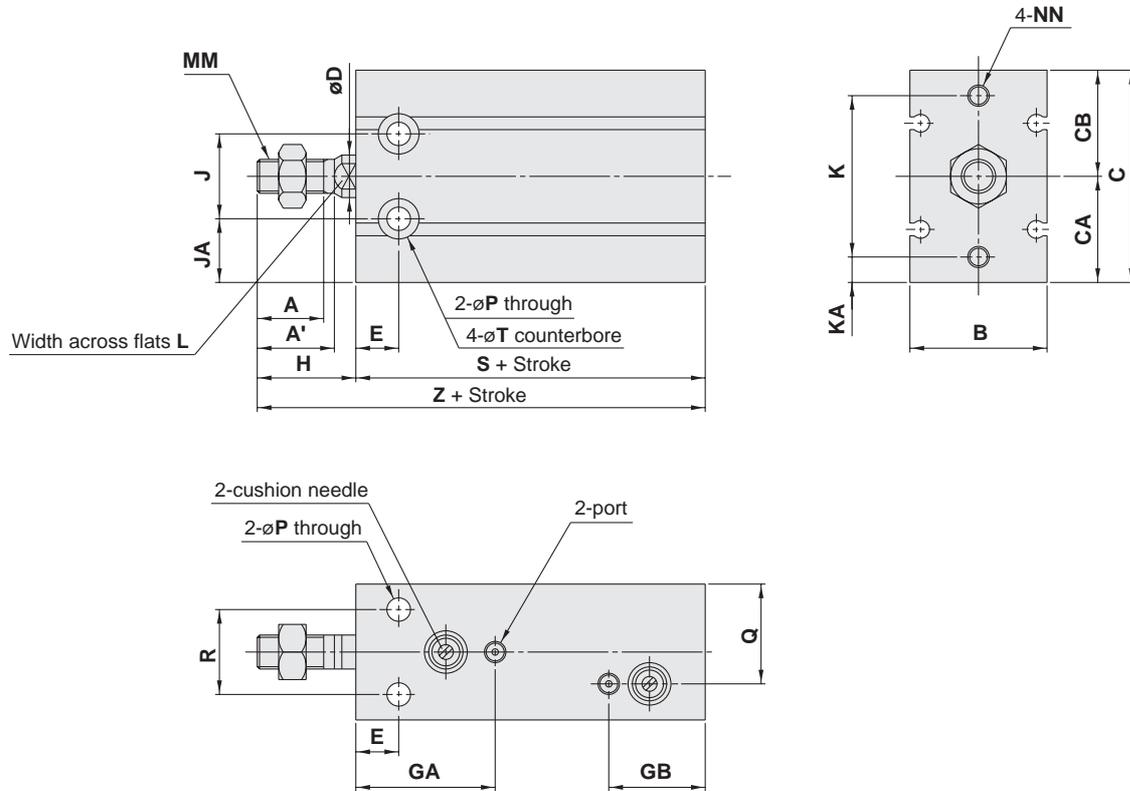
| No. | Description | Material | No. of pcs. | Note |
|-----|-------------------------|------------------------|-------------|------------------------|
| 1 | Cylinder tube | Aluminum alloy | 1 | Hard anodized |
| 2 | Rod cover/Bearing | Aluminum bearing alloy | 1 | Hard anodized |
| 3 | Head cover | 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- $\frac{9}{16}$ 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 |
|------------------|----------|----------------|
| $\varnothing 20$ | CU20A-PS | 13, 14, and 15 |
| $\varnothing 25$ | CU25A-PS | |
| $\varnothing 32$ | CU32A-PS | |

Series CU

Dimensions

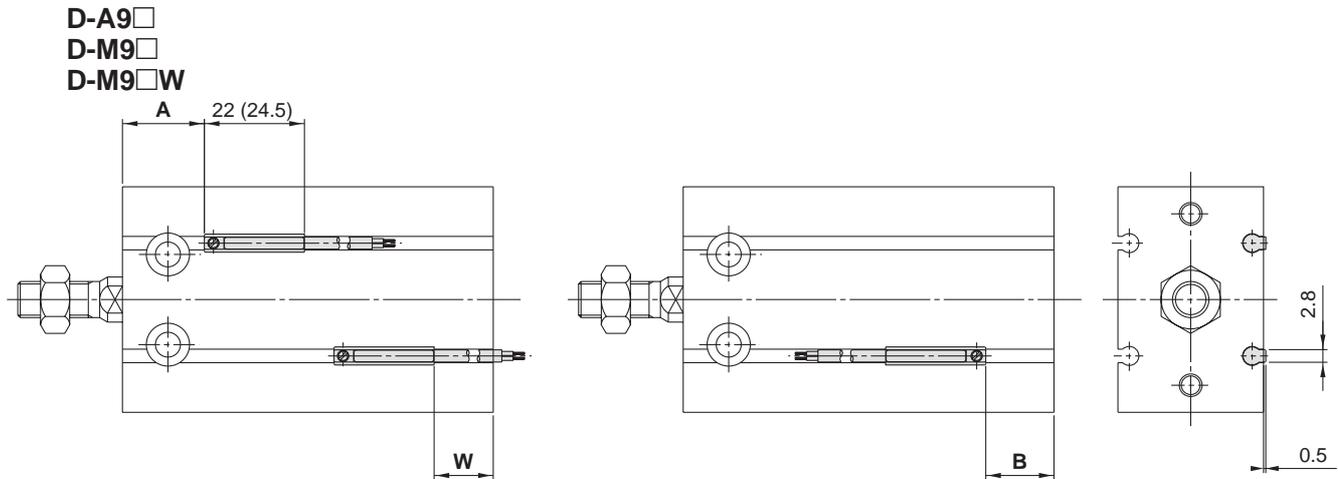


(mm)

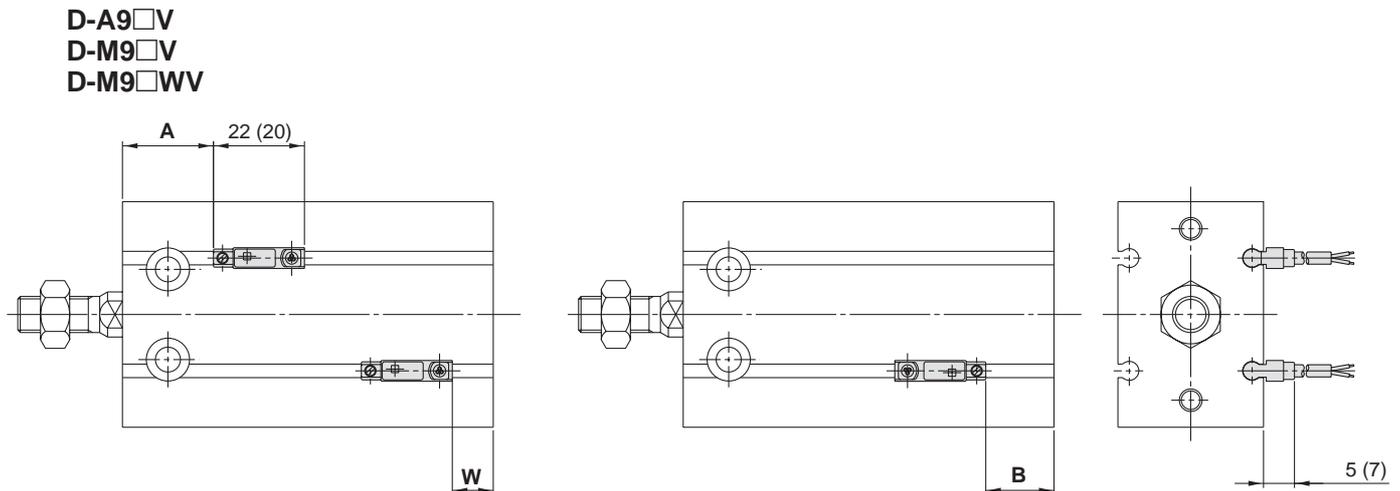
| Bore size (mm) | Port size | A | A' | B | C | CA | CB | D | E | GA | GB | H | J | JA |
|----------------|-----------|------|----|----|----|----|----|----|----|------|------|----|----|----|
| 20 | M5 | 12 | 14 | 26 | 42 | 20 | 22 | 8 | 9 | 29 | 27 | 19 | 16 | 12 |
| 25 | M5 | 15.5 | 18 | 32 | 50 | 25 | 25 | 10 | 10 | 32.5 | 22.5 | 23 | 20 | 15 |
| 32 | 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 | 6 | M6 | M5 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 | 8 | M8 | M5 with depth 8 | 5.5 | 23.5 | 20 | 9.3 with depth 9 | 51.5 | 74.5 | |
| 32 | 48 | 7 | 10 | M10 x 1.25 | M6 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 Mounting Height



(): Denotes the values of D-A93.



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

(mm)

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-M9□W | | | D-M9□V, D-M9□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 |

Note 1) Figures in the table above are used as a reference when mounting the auto switches for stroke end detection. In the case of actually setting the auto switches, adjust them after confirming their operation.

Note 2) Values in () are dimensions for D-A93 type.

Operating Range

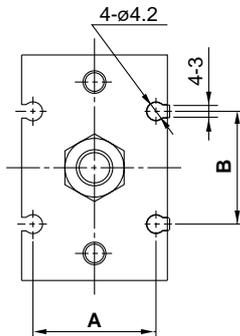
(mm)

| 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-M9□W, D-M9□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.

Series CU

Auto Switch Rail Position

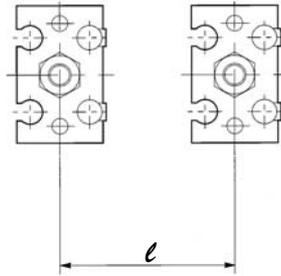


| Bore size (mm) | A | B |
|----------------|----|----|
| 20 | 21 | 23 |
| 25 | 27 | 25 |
| 32 | 35 | 27 |

(mm)

Caution on Proximity Installation

When free mounting cylinders equipped with 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.) Auto switches may malfunction if a shield plate is not used.



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



Series CU

Specific Product Precautions 1

Be sure to read before handling. Refer to back page 1 through to 6 for Safety Instructions, Actuator Precautions, and Auto Switch Precautions.

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% |

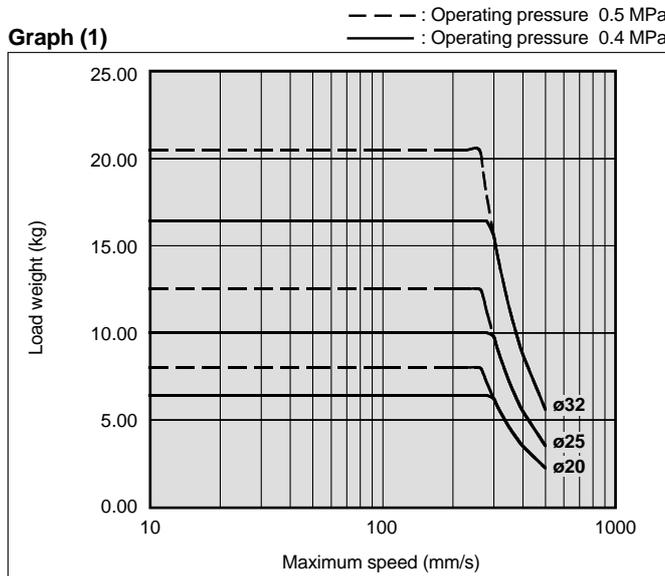
Selection

⚠ 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.

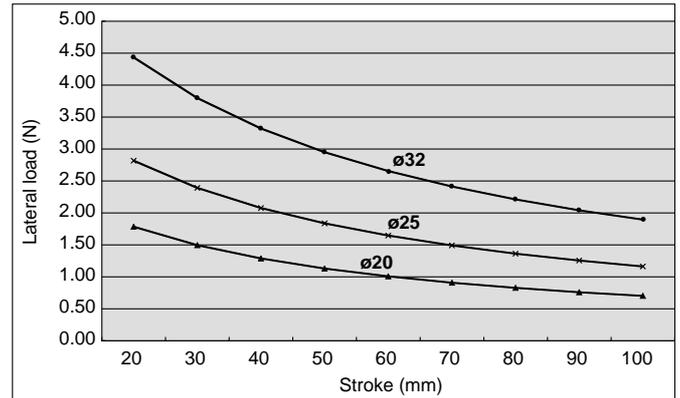
Table (1) Allowable Kinetic Energy at Piston Impact (J)

| | 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))



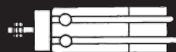
Cushion Needle Adjustment

⚠ 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.



Free Mount Cylinder for Vacuum

Series ZCUK

A free mount cylinder with a vacuum passage in the rod to meet the requirements for

Air cylinder + Vacuum pad.

A vacuum passage has been provided in the rod of the CUK cylinder to enable a vacuum pad to be installed on the end of the rod.



Not necessary to provide vacuum tubing space at the end of the rod.

The area around the vacuum pad is uncluttered.

● **Non-rotating rod** ●

A guide is provided as standard equipment

Non-rotating rod accuracy (no load: when the rod is retracted on the detent plate side):
 $\phi 10, \phi 16$ ————— $\pm 0.8^\circ$
 $\phi 20, \phi 25, \phi 32$ ————— $\pm 0.5^\circ$

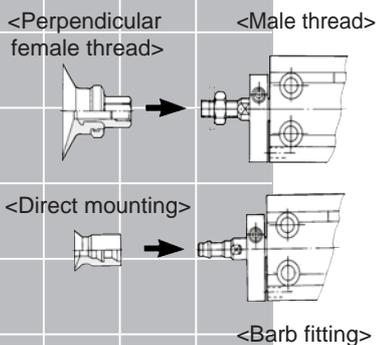
Do not apply a lateral load to the piston rod. Because the piston rod is a hollow rod, a lateral load can cause the piston rod to bend or break.

● **Auto switch**

Reed switch:
 D-A9□ (Heavy-duty cord, in-line entry)
 D-A9□V (Heavy-duty cord, perpendicular entry)

Solid state switch:
 D-M9□, D-M9□W (Heavy-duty cord, in-line entry)
 D-M9□V, D-M9□WV (Heavy-duty cord, perpendicular entry)

● **Vacuum pad (Pad diameter: $\phi 2$ to $\phi 50$)** ●



● **How to provide piping to the vacuum side**

Cap piping

The piston rod of the vacuum side does not protrude. Also, the vacuum outlet tube does not move when the piston is operating.

Vacuum port pressure range: -101 kPa to 0.6 MPa
 Pressurise only when releasing the vacuum. At that time, use it under the cylinder operating pressure.

Rod piping

Lighter weight than the cap piping.
 Can also be used for air blowing.
 Vacuum port pressure range: -101 kPa to 0.6 MPa



Free Mount Cylinder for Vacuum Series ZCUK



How to Order

Without auto switch ZCUK C 16 [] 20 D

With auto switch ZC DUK C 16 [] 20 D - M9B S

Number of auto switches
 - — 2 pcs.
 S — 1 pc.

Built-in magnet (Rod end shape)
 C — Cap piping/Male thread
 D — Cap piping/Pad direct mounting
 Q — Rod piping/Male thread
 R — Rod piping/Pad direct mounting

Bore size
 10 — 10 mm
 16 — 16 mm
 20 — 20 mm
 25 — 25 mm
 32 — 32 mm

Port thread type

| Symbol | Type | Bore size |
|--------|--------|--------------------|
| - | M5 | ø10, ø16, ø20, ø25 |
| - | Rc1/8 | ø32 |
| TN | NPT1/8 | ø32 |
| TF | G1/8 | ø32 |

Auto switch
 - Without auto switch

Acting
 D — Double acting

Bore size – Stroke (mm)
 10, 16 — 5, 10, 15, 20, 25, 30
 20, 25, 32 — 5, 10, 15, 20, 25, 30, 40, 50

Note) In the case of rod piping (Q, R), TF (G1/8) is not available.

Applicable Auto Switch/Refer to page 68 to 72 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-wired connector | Applicable load | | |
|--------------------|---|------------------|-----------------|-------------------------|--------------|-----------|-------------------|---------|-----------------------|-------|-------|---------------------|-----------------|------------|------------|
| | | | | | DC | AC | Perpendicular | In-line | 0.5 (Nil) | 3 (L) | 5 (Z) | | IC circuit | Relay, PLC | |
| Reed switch | — | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | ● | — | — | IC circuit | — |
| | | | | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | ● | — | — | — | IC circuit |
| Solid state switch | Diagnostic indication (2-colour indication) | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | M9PV | M9P | ● | ● | ○ | ○ | IC circuit | |
| | | | | 2-wire | M9BV | M9B | | ● | ● | ○ | ○ | — | | | |
| | | | | 3-wire (NPN) | M9NVV | M9NV | | ● | ● | ○ | ○ | IC circuit | | | |
| | | | | 3-wire (PNP) | M9PVV | M9PV | | ● | ● | ○ | ○ | IC circuit | | | |
| | | | | 2-wire | M9BVV | M9BV | | ● | ● | ○ | ○ | — | | | |

* Lead wire length symbols: 0.5 m.....Nil (Example) M9N
 3 m.....L (Example) M9NL
 5 m.....Z (Example) M9NZ

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

* Normally closed (NC=b contact), solid states switches (Model D-F9G, F9H) are also available. For detail, refer to Best Pneumatics catalogue.

* For detail about auto switches with pre-wired connector, refer to Best Pneumatics catalogue.

How to Order Vacuum Pad Note) Refer to page 58 for combination of cylinder and pad.

<In the case of rod end male>

ZPT 02 U N - B4

Dia. (mm)
 02 — ø2
 04 — ø4
 06 — ø6
 08 — ø8
 10 — ø10
 13 — ø13
 16 — ø16
 20 — ø20
 25 — ø25
 32 — ø32
 40 — ø40
 50 — ø50

Pad type
 U — Flat
 C — Flat with ribs
 D — Deep
 B — Bellows

Vacuum entry (Mounting thread diameter)

| Symbol | Thread dia. | ø2 to ø8 | ø10 to ø16 | ø20 to ø32 | ø40, ø50 |
|--------|-------------|----------|------------|------------|----------|
| B4 | M4 x 0.7 | ● | — | — | — |
| B5 | M5 x 0.8 | ● | ● | — | — |
| B6 | M6 x 1 | — | ● | ● | — |
| B8 | M8 x 1.25 | — | — | ● | ● |
| B10 | M10 x 1.25 | — | — | ● | ● |

Material
 N — NBR
 S — Silicon rubber
 U — Urethane rubber
 F — Fluoro rubber
 GN — Conductive NBR (ø2 to ø16 only)
 GS — Conductive silicon rubber (ø2 to ø16 only)

Table (1) Pad Dia./Pad Type

| Dia. (mm) Type | 2 | 4 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 |
|----------------|---|---|---|---|----|----|----|----|----|----|----|----|
| Flat | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Flat with ribs | — | — | — | — | ● | ● | ● | ● | ● | ● | ● | ● |
| Deep | — | — | — | — | ● | — | — | — | — | — | — | — |
| Bellows | — | — | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

<In the case of pad direct mounting>

ZP 04 U N - X11

Dia. (mm)
 02 — ø2
 04 — ø4
 06 — ø6
 08 — ø8
 10 — ø10
 13 — ø13
 16 — ø16
 20 — ø20
 25 — ø25
 32 — ø32
 40 — ø40
 50 — ø50

Pressure gauge position

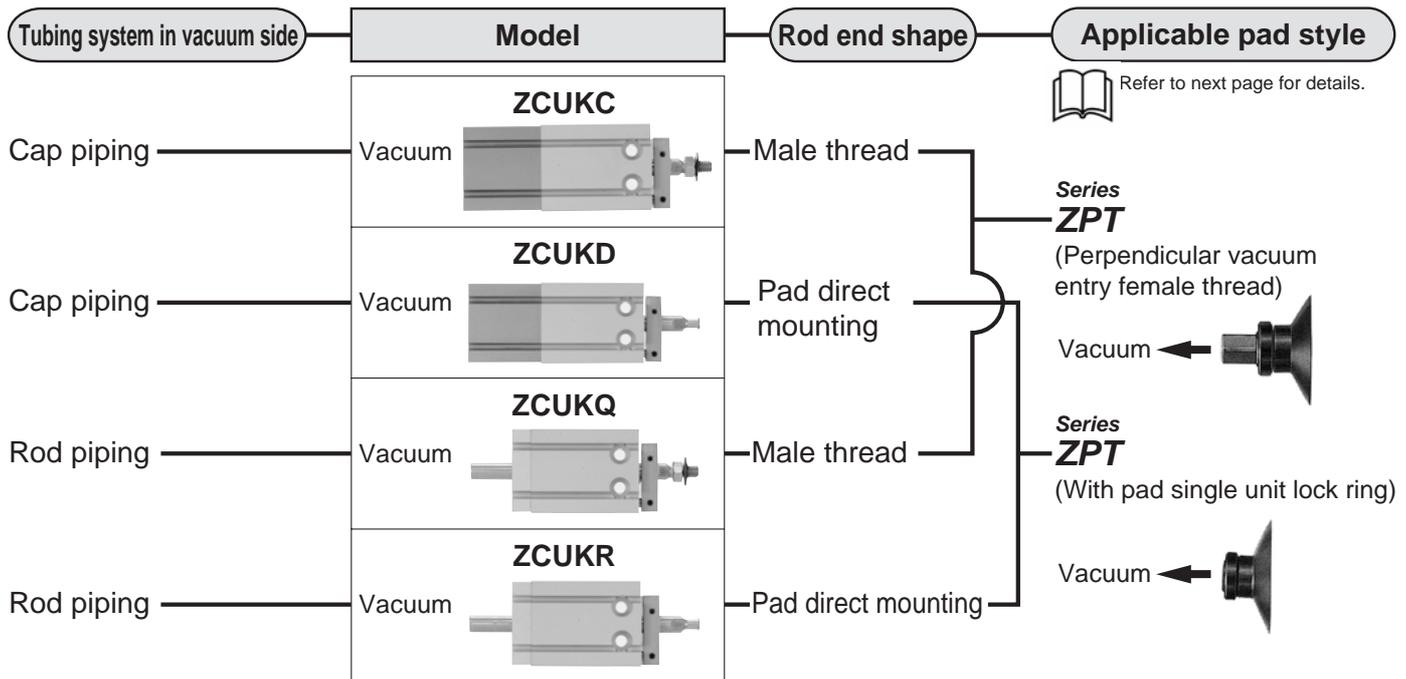
| Symbol | Applicable cylinder model |
|--------|----------------------------|
| X11 | ZC(D)UK _R 10 |
| - | ZC(D)UK _R 16/32 |

Note) "X11" Pad: ø2 to ø8 diameter and flat style only available.

Material
 N — NBR
 S — Silicon rubber
 U — Urethane rubber
 F — Fluoro rubber
 GN — Conductive NBR (ø2 to ø16 only)
 GS — Conductive silicon rubber (ø2 to ø16 only)

Pad type
 U — Flat
 C — Flat with ribs
 D — Deep
 B — Bellows (Except "-X11")

Series ZCUK



⚠ Precautions

Be sure to read before handling. Refer to back page 1 through to 6 for Safety Instructions, Actuator Precautions and Auto Switch Precautions. Also see pages for Vacuum Equipment Precautions in Best Pneumatics catalogue.

⚠ Caution

1. Do not place your finger in the clearance between the detent plate and the cylinder tube.

Never put your finger between the non-rotating plate and cylinder tube. Your finger may be pinched when the piston rod retracts.

If your finger is caught, it could injure your finger because the cylinder outputs a considerable amount of force.

2. Make sure that rotational torque is not applied to the piston rod. If this is unavoidable, operate the cylinder within the allowable rotational torque listed in the table below.

Allowable Rotational Torque

| Bore size (mm) | ø10 | ø16 | ø20 | ø25 | ø32 |
|-----------------------------------|------|------|------|------|------|
| Allowable rotational torque (N-m) | 0.02 | 0.04 | 0.10 | 0.15 | 0.20 |

3. To secure a workpiece to the end of the piston rod, tighten the workpiece onto the piston rod with the piston rod fully retracted so that torque is not applied to the piston rod.
4. To install a cylinder, tighten it within the torque values indicated in the table below.

Proper Tightening Torque

| Bore size (mm) | Hexagon socket head bolt diameter (mm) | Proper tightening torque (N-m) |
|----------------|--|--------------------------------|
| ø10 | M3 | 1.08 ±10% |
| ø16 | M4 | 2.45 ±10% |
| ø20, ø25 | M5 | 5.10 ±10% |
| ø32 | M6 | 8.04 ±10% |

Specifications

| | |
|-------------------------------|---|
| Fluid | Air |
| Proof pressure | 1.05 MPa |
| Maximum operating pressure | 0.7 MPa |
| Vacuum port pressure | -101 kPa to 0.6 MPa (At vacuum release 0 to 0.6 MPa) ^{Note} |
| Ambient and fluid temperature | Without auto-switch: -10 to +70°C (No freezing) With auto-switch: -10 to +60°C (No freezing) |
| Lubrication | Not required |
| Piston speed | 50 to 500mm/s |
| Cushion | Rubber bumper on both sides |
| Stroke allowance | +1.0 0 |
| Thread tolerance | JIS Class 2 |
| Rod tip screw | With or without (Pad direct mounting) |
| Mounting | Basic style |
| Applicable pad | Refer to next page for details. |



Note) For a cap style, supply pressure only when vacuum is released. That pressure should be less than the cylinder pressure.

Non-rotating Rod Accuracy (No load/At retraction of the rod at the locking plateside)

| Bore size (mm) | ø10 | ø16 | ø20 | ø25 | ø32 |
|---------------------------|-------|-----|-----|-------|-----|
| Non-rotating rod accuracy | ±0.8° | | | ±0.5° | |

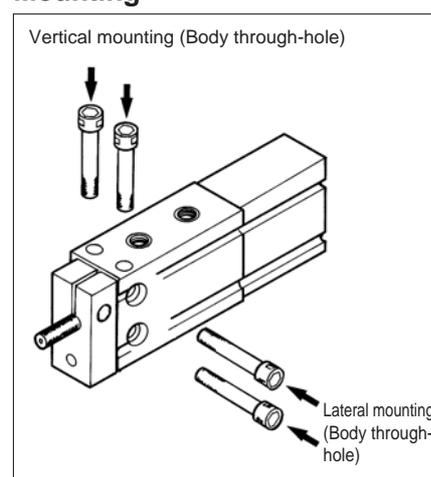
Minimum Operating Pressure

| Bore size (mm) | ø10 | ø16 | ø20 | ø25 | ø32 |
|-------------------------------|------|------|------|------|------|
| Min. Operating Pressure (MPa) | 0.13 | 0.13 | 0.11 | 0.11 | 0.11 |

Standard Stroke

| Applicable cylinder Stroke (mm) | Double acting style/Single rod type/Non-rotating rod | | | | | | | |
|------------------------------------|--|----|----|----|----|----|----|----|
| | Stroke (mm) | | | | | | | |
| Bore size (mm) | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| 10 | ● | ● | ● | ● | ● | ● | — | — |
| 16 | ● | ● | ● | ● | ● | ● | — | — |
| 20 | ● | ● | ● | ● | ● | ● | ● | ● |
| 25 | ● | ● | ● | ● | ● | ● | ● | ● |
| 32 | ● | ● | ● | ● | ● | ● | ● | ● |

Mounting



Theoretical Output/Double Acting Type

(N)

| Bore size (mm) | Rod dia. (mm) | Piston area (mm ²) | Operating pressure (MPa) | | |
|----------------|---------------|--------------------------------|--------------------------|-----|------|
| | | | 0.3 | 0.5 | 0.7 |
| 10 | 4 | 66.0 | 19.8 | 33 | 46.2 |
| 16 | 6 | 172 | 51.6 | 86 | 121 |
| 20 | 8 | 264 | 79.2 | 132 | 185 |
| 25 | 10 | 412 | 124 | 206 | 289 |
| 32 | 12 | 691 | 207 | 346 | 484 |

Minimum Stroke for Mounting Auto Switch

| Number of auto switches | Applicable auto switch | | |
|-------------------------|------------------------|---------------|-----------------|
| | D-A9□, D-A9□V | D-M9□, D-M9□V | D-M9□W, D-M9□WV |
| 1 pc. | 5 | 5 | 5 |
| 2 pcs. | 10 | 5 | 10 |

Cylinder/Applicable Pad

• In the case of rod end male thread

Use series ZPT pad (perpendicular vacuum entry/female thread mounting).

| Cylinder Model | Bore size (mm) | Pad (ZPT02 to 50□□-B4 to 10) | | | | | | | | | | | Thread dia. | |
|----------------|----------------|------------------------------|---|---|---|----|----|----|----|----|----|----|-------------|------------|
| | | Rod dia. (mm) | | | | | | | | | | | | |
| | | 2 | 4 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 | |
| ZCUKC | 10 | ● | ● | ● | ● | — | — | — | — | — | — | — | — | M4 x 0.7 |
| ZCUKQ | 16 | ● | ● | ● | ● | ● | ● | — | — | — | — | — | — | M5 x 0.8 |
| ZCDUKC | 20 | — | — | — | — | ● | ● | ● | ● | ● | — | — | — | M6 x 1.0 |
| ZCDUKQ | 25 | — | — | — | — | — | — | ● | ● | ● | ● | ● | — | M8 x 1.25 |
| | 32 | — | — | — | — | — | — | ● | ● | ● | ● | ● | ● | M10 x 1.25 |

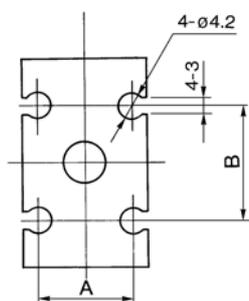
• In the case of pad direct mounting

Use series ZP pad (single unit).

| Cylinder Model | Bore size (mm) | Pad (ZP02 to 50□□) | | | | | | | | | | | |
|----------------|----------------|--------------------|---|---|---|----|----|----|----|----|----|----|----|
| | | Rod dia. (mm) | | | | | | | | | | | |
| | | 2 | 4 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 |
| ZCUKD | 10 (Note) | ● | ● | ● | ● | — | — | — | — | — | — | — | — |
| ZCUKR | 16 | ● | ● | ● | ● | — | — | — | — | — | — | — | — |
| ZCDUKD | 20 | — | — | — | — | ● | ● | ● | — | — | — | — | — |
| ZCDUKR | 25 | — | — | — | — | — | — | — | ● | ● | ● | — | — |
| | 32 | — | — | — | — | — | — | — | — | — | — | ● | ● |

Note) When using "ZC(D)UK 10", use ZP02 to 08U□-X11. Pad shape is flat only.

Auto Switch Groove

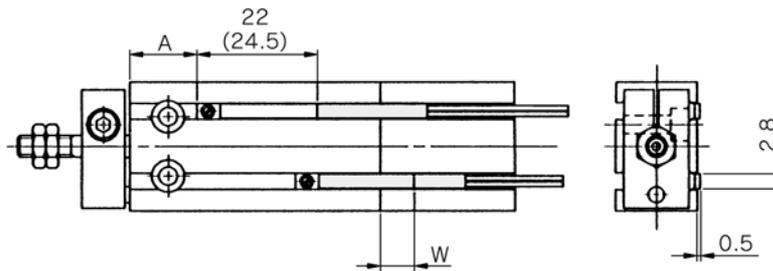


| Bore size (mm) | A | B |
|----------------|------|----|
| 10 | 10.3 | 13 |
| 16 | 15 | 18 |
| 20 | 21 | 23 |
| 25 | 27 | 25 |
| 32 | 35 | 27 |

Series ZCDUK

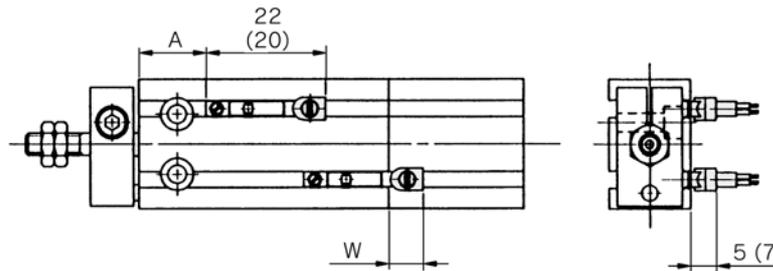
Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

D-A9□
D-M9□
D-M9□W



(): Denotes the values of D-A93.

D-A9□V
D-M9□V
D-M9□WV



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

| Bore size (mm) | D-A9□, D-A9□V | | | D-M9□, D-M9□W | | | D-M9□V, D-M9□WV | | |
|----------------|---------------|---|-----------|---------------|------|------|-----------------|------|------|
| | A | B | W | A | B | W | A | B | W |
| 10 | 12.5 | 3 | -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 |
| 20 | 20 | 6 | -4 (-1.5) | 24 | 10 | 0 | 24 | 10 | -2 |
| 25 | 22.5 | 7 | -5.5 (-3) | 26.5 | 11.5 | -1.5 | 26.5 | 11.5 | -3.5 |
| 32 | 23.5 | 8 | -6.5 (-4) | 27.5 | 12.5 | -2.5 | 27.5 | 12.5 | -4.5 |



Note 1) Figures in the table above are used as a reference when mounting the auto switches for stroke end detection. In the case of actually setting the auto switches, adjust them after confirming their operation.

Note 2) Negative figures in the table show dimensions mounted inside cylinder body.

Note 3) In the case of 5 mm stroke or the 10 mm 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 4) Figures in () in the table W are D-A93.

Operation Range

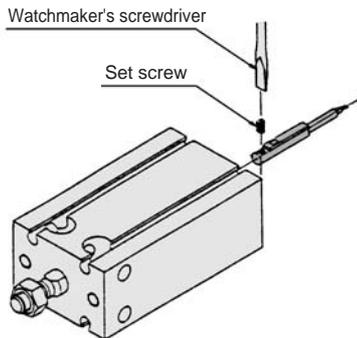
| Auto switch model | Bore size (mm) | | | | |
|-------------------|----------------|-----|-----|------|----|
| | 10 | 16 | 20 | 25 | 32 |
| D-A9□/A9□V | 6 | 9 | 11 | 12.5 | 14 |
| D-M9□/M9□V | 2.5 | 3.5 | 5 | 5 | 5 |
| D-M9□W/M9□WV | 3.5 | 5.5 | 6.5 | 7 | 7 |

* Since this is the average value at a normal temperature including hysteresis (tolerance ±30%), it is not guaranteed.

Auto Switch Specifications

Mounting of Auto Switch

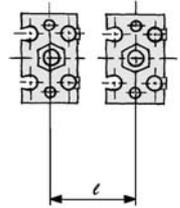
Mounting



- To tighten the auto switch mounting screws, use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm.
- Tighten the screws to a torque of approximately 0.10 to 0.20 N·m.

Cautions on Proximity Installation

When free mounting cylinders equipped with 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.) Auto switches may malfunction if a shield plate is not used.



| Bore size (mm) | Mounting pitch l (mm) |
|----------------|-------------------------|
| 10 | 20 |
| 16 | 30 |
| 20 | 40 |
| 25 | 46 |
| 32 | 56 |

Weight

Basic Style/With Auto Switch

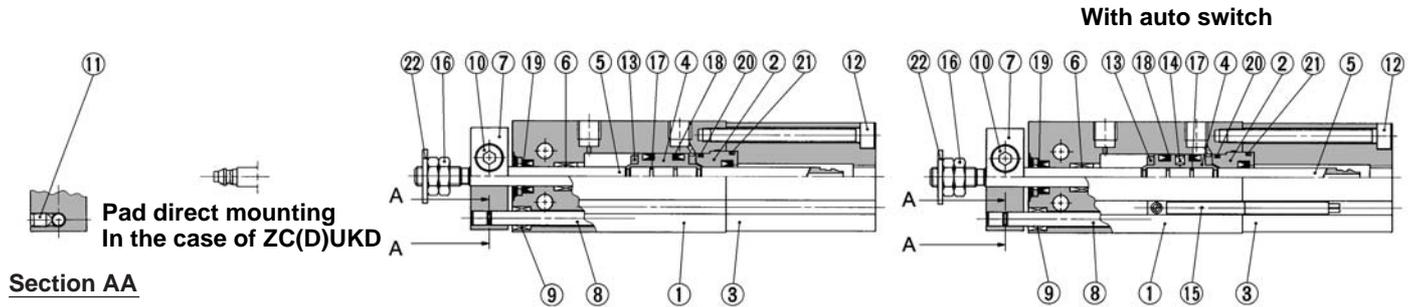
(): Denotes the values with D-A93. (g)

| Model | Bore size (mm) | Cylinder stroke (mm) | | | | | | | |
|----------|----------------|----------------------|--------------|--------------|--------------|--------------|--------------|---------------|----------------|
| | | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| ZC(D)UKC | 10 | 63 (68) | 69 (79) | 75 (85) | 81 (91) | 87 (97) | 93 (103) | — | — |
| | 16 | 103 (128) | 115 (145) | 127 (157) | 139 (169) | 151 (181) | 163 (193) | — | — |
| | 20 | 180 (214) | 204 (244) | 228 (267) | 252 (292) | 276 (316) | 300 (340) | 348 (388) | 396 (436) |
| | 25 | 304 (358) | 343 (402) | 382 (441) | 421 (480) | 460 (519) | 499 (558) | 577 (636) | 655 (714) |
| | 32 | 514 (587) | 574 (652) | 634 (712) | 694 (772) | 754 (832) | 814 (892) | 934 (1012) | 1054 (1132) |
| ZC(D)UKQ | 10 | 49 (54) | 53 (63) | 57 (67) | 61 (71) | 65 (75) | 69 (79) | — | — |
| | 16 | 79 (104) | 86 (116) | 93 (123) | 100 (130) | 107 (137) | 114 (144) | — | — |
| | 20 | 145 (179) | 159 (198) | 173 (212) | 187 (226) | 201 (240) | 215 (254) | 243 (282) | 271 (310) |
| | 25 | 259 (313) | 279 (338) | 299 (358) | 319 (378) | 339 (398) | 359 (418) | 399 (458) | 439 (498) |
| | 32 | 421 (494) | 451 (529) | 481 (559) | 511 (589) | 541 (619) | 571 (649) | 631 (709) | 691 (769) |

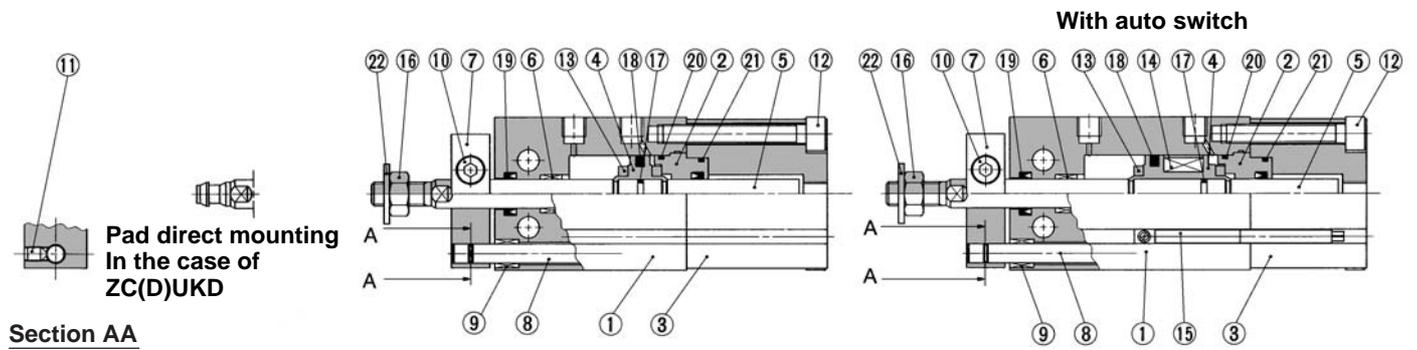
Series ZCUK

Construction

Cap piping/Male thread: ZC(D)UKC
 $\varnothing 10$



$\varnothing 16$ to $\varnothing 32$



Component Parts

| No. | Description | Material | Note |
|-----|-------------------------------|--------------------------------|----------------------|
| 1 | Cylinder tubing | Aluminum alloy | Hard anodized |
| 2 | Rod cover B | Aluminum bearing alloy | Chromated |
| 3 | Cap | Aluminum alloy | Hard anodized |
| 4 | Piston | Aluminum alloy | Chromated |
| 5 | Piston rod | Stainless steel | |
| 6 | Bush | Oil impregnated sintered metal | |
| 7 | Plate | Aluminum alloy | Nickel plated |
| 8 | Guide rod | Stainless steel | |
| 9 | Bush | Oil impregnated sintered metal | |
| 10 | Hexagon set screw | Carbon steel | Black zinc chromated |
| 11 | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| 12 | Hexagon set screw | Carbon steel | Nickel plated |

Component Parts

| No. | Description | Material | Note |
|-----|----------------|-------------------|---------------|
| 13 | Damper | Urethane | |
| 14 | Magnet | Magnetic material | |
| 15 | Auto switch | — | |
| 16 | Rod end nut | Carbon steel | Nickel plated |
| 17 | Piston gasket | NBR | |
| 18* | Piston seal | NBR | |
| 19* | Rod seal | | |
| 20* | Gasket | | |
| 21* | Gasket for cap | | |
| 22 | Seal washer | Rolled steel/NBR | |

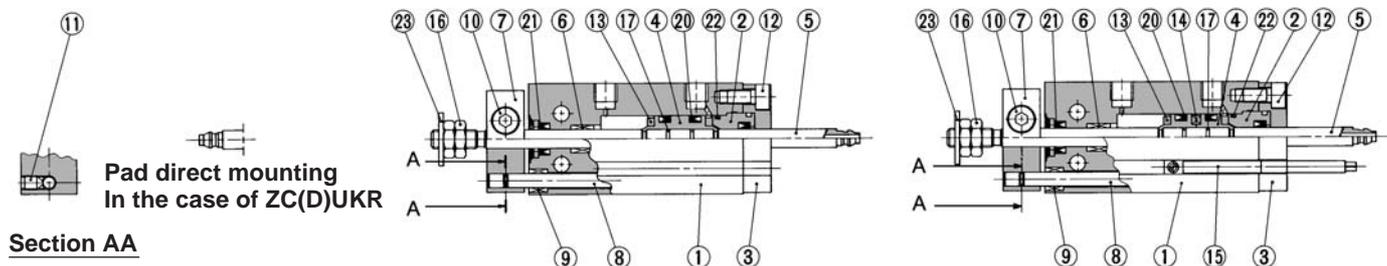
Replacement Parts: Seal Kit (Cap piping)

| Kit no. | Bore size / Part no. | | | | |
|---------|----------------------|------------------|------------------|------------------|------------------|
| | $\varnothing 10$ | $\varnothing 16$ | $\varnothing 20$ | $\varnothing 25$ | $\varnothing 32$ |
| | ZCU10-PS | ZCU16-PS | ZCU20-PS | ZCU25-PS | ZCU32-PS |

Seal kit consist of item (18), (19), (20), (21) contained in one kit, and can be ordered using the order number for each respective tubing bore size.

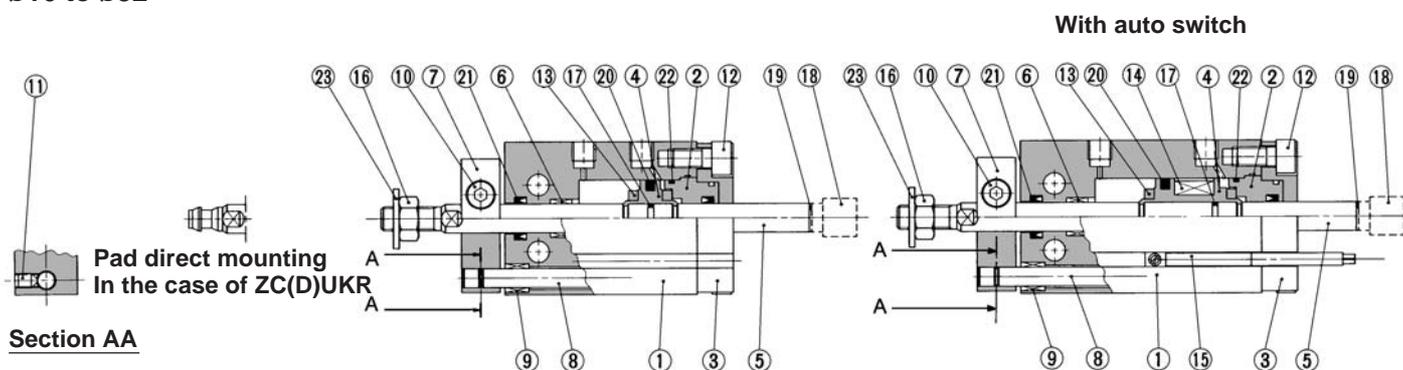
Construction

Rod piping-Male thread: ZC(D)UKQ
 $\varnothing 10$



Section AA

$\varnothing 16$ to $\varnothing 32$



Section AA

Component Parts

| No. | Description | Material | Note |
|-----|-------------------------------|--------------------------------|----------------------|
| 1 | Cylinder tubing | Aluminum alloy | Hard anodized |
| 2 | Rod cover B | Aluminum bearing alloy | Chromated |
| 3 | Rod cover retainer plate | Aluminum alloy | Hard anodized |
| 4 | Piston | Aluminum alloy | Chromated |
| 5 | Piston rod | Stainless steel | |
| 6 | Bush | Oil impregnated sintered metal | |
| 7 | Plate | Aluminum alloy | Nickel plated |
| 8 | Guide rod | Stainless steel | |
| 9 | Bush | Oil impregnated sintered metal | |
| 10 | Hexagon set screw | Carbon steel | Black zinc chromated |
| 11 | Hexagon socket head cap screw | Carbon steel | Black zinc chromated |
| 12 | Hexagon set screw | Carbon steel | Nickel plated |

Component Parts

| No. | Description | Material | Note |
|-----|---------------|-------------------|-----------------------|
| 13 | Damper | Urethane | |
| 14 | Magnet | Magnetic material | |
| 15 | auto switch | — | |
| 16 | Rod end nut | Carbon steel | Nickel plated |
| 17 | Piston gasket | NBR | |
| 18 | Socket | Carbon steel | $\varnothing 16$ only |
| 19 | Gasket | | $\varnothing 16$ only |
| 20 | Piston seal | NBR | |
| 21* | Rod seal | | |
| 22* | Gasket | | |
| 23* | Seal washer | Rolled steel/NBR | |

Replacement Parts: Seal Kit (Rod piping)

| Kit no. | Bore size / Part no. | | | | |
|---------|----------------------|------------------|------------------|------------------|------------------|
| | $\varnothing 10$ | $\varnothing 16$ | $\varnothing 20$ | $\varnothing 25$ | $\varnothing 32$ |
| | CUW10-PS | CUW16-PS | CUW20-PS | CUW25-PS | CUW32-PS |

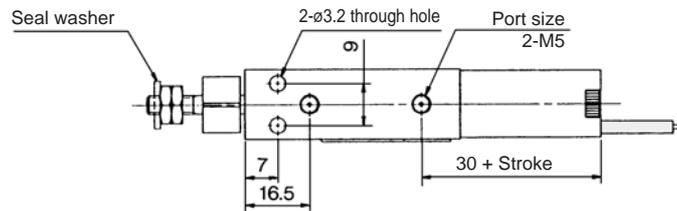
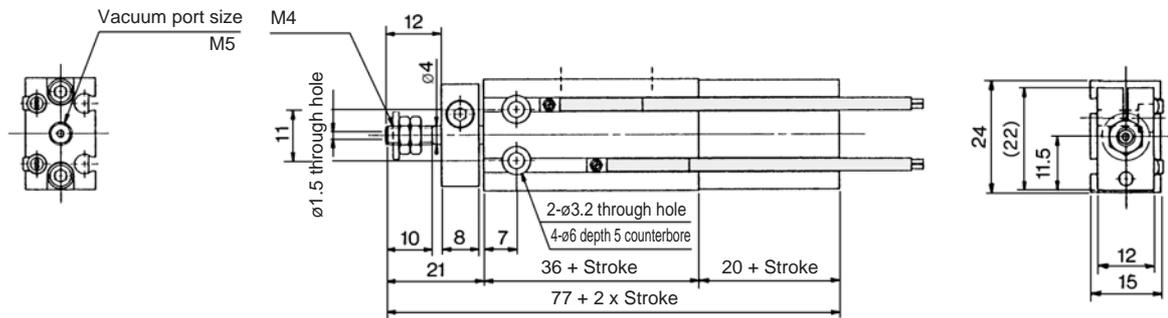
Seal kit consist of item 20, 21, 22 contained in one kit, and can be ordered using the order number for each respective tubing bore size.

Series ZCUK

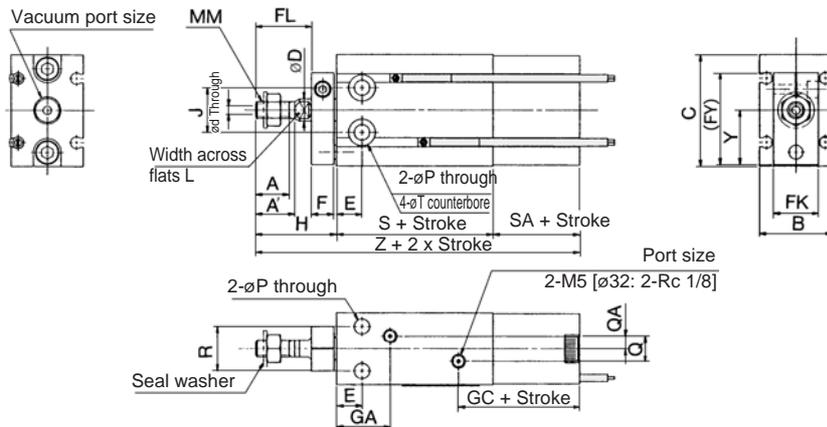
Vacuum Piping: Cap Piping/Rod End Shape: Male Thread

ZC(D)UKC Cylinder bore — Stroke D

ø10



ø16 to ø32



| Model | Port size | | Stroke range (mm) | A | A' | B | C | ød | øD | E | F | FK | FL | FY | GA | GC |
|------------|-----------|-------------|-------------------|------|------|----|----|----|----|----|----|----|----|------|-----------------------|------|
| | Air port | Vacuum port | | | | | | | | | | | | | | |
| ZC(D)UKC16 | M5 | M5 | 5 to 30 | 11 | 12.5 | 20 | 32 | 2 | 6 | 7 | 8 | 13 | 17 | 28 | 16.5 ^{Note)} | 31 |
| ZC(D)UKC20 | M5 | 1/8 | 5 to 50 | 12 | 14 | 26 | 40 | 3 | 8 | 9 | 8 | 16 | 20 | 33 | 19 | 33.5 |
| ZC(D)UKC25 | M5 | 1/8 | 5 to 50 | 15.5 | 18 | 32 | 50 | 4 | 10 | 10 | 10 | 20 | 22 | 43.5 | 21.5 | 34 |
| ZC(D)UKC32 | 1/8 | 1/8 | 5 to 50 | 19.5 | 22 | 40 | 62 | 5 | 12 | 11 | 12 | 24 | 29 | 51.5 | 23 | 34.5 |

| Model | H | J | L | MM | øP | Q | QA | R | S | SA | øT | Y | Z |
|------------|----|----|----|------------|-----|------|-----|----|---------|------|---------------|------|-------------|
| ZC(D)UKC16 | 26 | 14 | 5 | M5 | 4.5 | 4 | 2 | 12 | 30 (40) | 19.5 | 7.6 depth 6.5 | 15.5 | 75.5 (85.5) |
| ZC(D)UKC20 | 29 | 16 | 6 | M6 | 5.5 | 9 | 4.5 | 16 | 36 (46) | 21 | 9.3 depth 9 | 19.5 | 86 (96) |
| ZC(D)UKC25 | 33 | 20 | 8 | M8 | 5.5 | 9 | 4.5 | 20 | 40 (50) | 21 | 9.3 depth 8 | 24.5 | 94 (104) |
| ZC(D)UKC32 | 42 | 24 | 10 | M10 x 1.25 | 6.6 | 13.5 | 4.5 | 24 | 42 (52) | 22 | 11 depth 11.5 | 30.5 | 106 (116) |

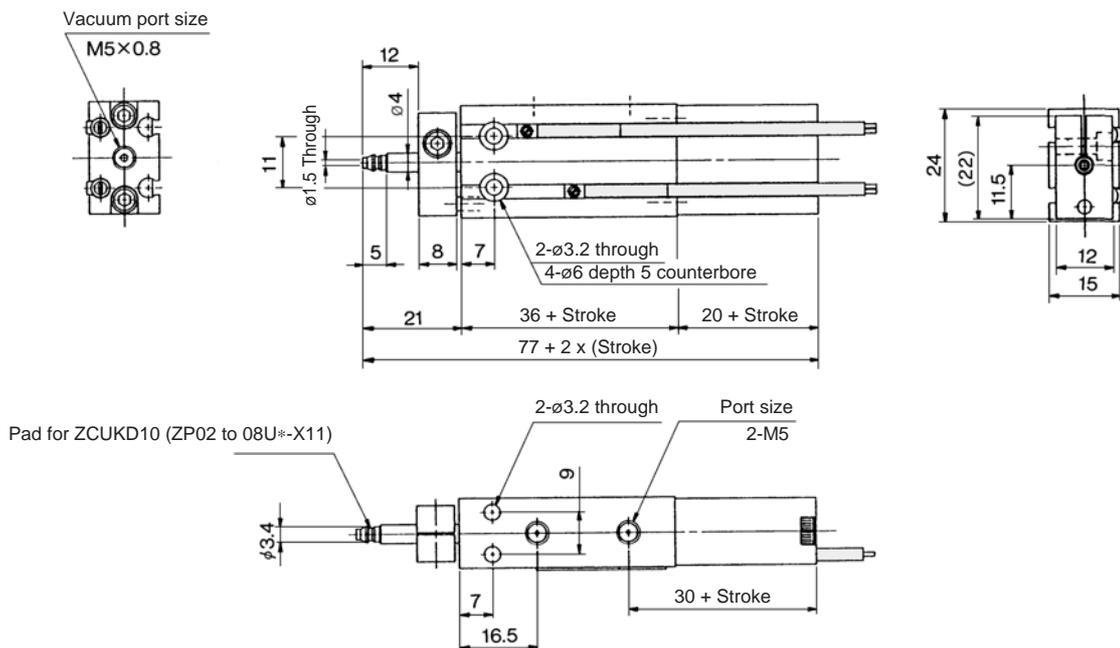
(): In the case of a mounted auto switch.

Note) In the case of ZCUK16-5D: 14.5 mm.

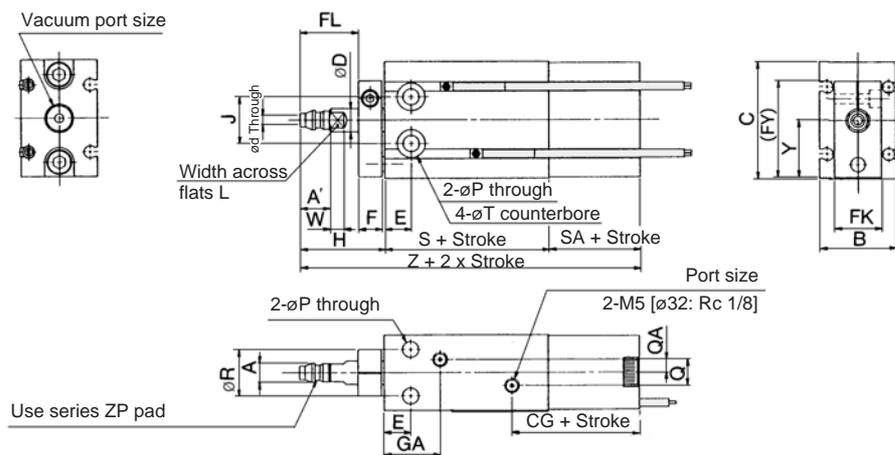
Vacuum Piping: Cap Piping/Rod End Shape: Pad Direct Mounting

ZC(D)UKD Cylinder bore — Stroke D

ø10



ø16 to ø32



| Model | Port size | | Stroke range (mm) | øA | A' | B | C | ød | øD | E | F | FK | FL | FY | GA | GC |
|------------|-----------|-------------|-------------------|------|------|----|----|----|----|----|----|----|----|------|-----------------------|------|
| | Air port | Vacuum port | | | | | | | | | | | | | | |
| ZC(D)UKD16 | M5 | M5 | 5 to 30 | 5 | 7 | 20 | 32 | 2 | 6 | 7 | 8 | 13 | 17 | 28 | 16.5 ^{Note)} | 31 |
| ZC(D)UKD20 | M5 | 1/8 | 5 to 50 | 6.6 | 8 | 26 | 40 | 3 | 8 | 9 | 8 | 16 | 20 | 33 | 19 | 33.5 |
| ZC(D)UKD25 | M5 | 1/8 | 5 to 50 | 8 | 9 | 32 | 50 | 4 | 10 | 10 | 10 | 20 | 22 | 43.5 | 21.5 | 34 |
| ZC(D)UKD32 | 1/8 | 1/8 | 5 to 50 | 11.5 | 10.5 | 40 | 62 | 5 | 12 | 11 | 12 | 24 | 29 | 51.5 | 23 | 34.5 |

| Model | H | J | L | øP | Q | QA | R | S | SA | øT | W | Y | Z |
|------------|----|----|----|-----|------|-----|----|---------|------|---------------|-----|------|-------------|
| ZC(D)UKD16 | 26 | 14 | 5 | 4.5 | 4 | 2 | 12 | 30 (40) | 19.5 | 7.6 depth 6.5 | 3.5 | 15.5 | 75.5 (85.5) |
| ZC(D)UKD20 | 29 | 16 | 6 | 5.5 | 9 | 4.5 | 16 | 36 (46) | 21 | 9.3 depth 8 | 5 | 19.5 | 86 (96) |
| ZC(D)UKD25 | 33 | 20 | 8 | 5.5 | 9 | 4.5 | 20 | 40 (50) | 21 | 9.3 depth 9 | 5 | 24.5 | 94 (104) |
| ZC(D)UKD32 | 42 | 24 | 10 | 6.6 | 13.5 | 4.5 | 24 | 42 (52) | 22 | 11 depth 11.5 | 5 | 30.5 | 106 (116) |

(): In the case of a mounted auto switch.

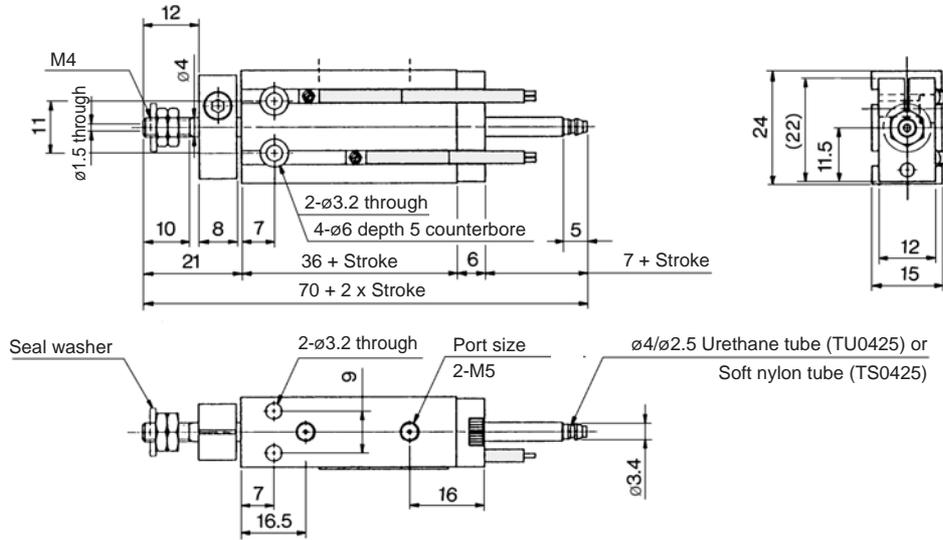
Note) In the case of ZCUK16-5D: 14.5 mm.

Series ZCUK

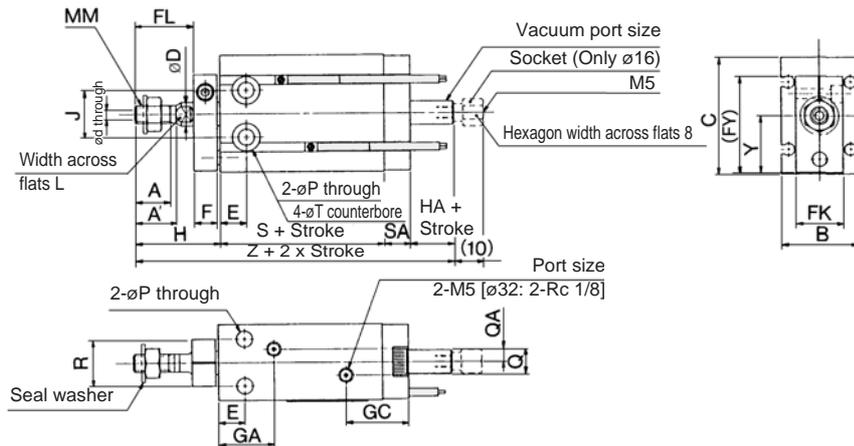
Vacuum Piping: Rod Piping/Rod End Shape: Male Thread

ZC(D)UKQ Cylinder bore Stroke D

ø10



ø16 to ø32



| Model | Port size | | Stroke range (mm) | A | A' | B | C | ød | øD | E | F | FK | FL | FY | GA | GC |
|------------|-----------|-------------------|-------------------|------|------|----|----|----|----|----|----|----|----|------|---------------------|------|
| | Air port | Vacuum port | | | | | | | | | | | | | | |
| ZC(D)UKQ16 | M5 | M5 ⁽²⁾ | 5 to 30 | 11 | 12.5 | 20 | 32 | 2 | 6 | 7 | 8 | 13 | 17 | 28 | 16.5 ⁽¹⁾ | 19 |
| ZC(D)UKQ20 | M5 | M5 | 5 to 50 | 12 | 14 | 26 | 40 | 3 | 8 | 9 | 8 | 16 | 20 | 33 | 19 | 21.5 |
| ZC(D)UKQ25 | M5 | M5 | 5 to 50 | 15.5 | 18 | 32 | 50 | 4 | 10 | 10 | 10 | 20 | 22 | 43.5 | 21.5 | 22 |
| ZC(D)UKQ32 | 1/8 | 1/8 | 5 to 50 | 19.5 | 22 | 40 | 62 | 5 | 12 | 11 | 12 | 24 | 29 | 51.5 | 23 | 22.5 |

| Model | H | HA | J | L | MM | øP | Q | QA | R | S | SA | øT | Y | Z |
|------------|----|----|----|----|------------|-----|------|-----|----|---------|-----|---------------|------|-------------|
| ZC(D)UKQ16 | 26 | 5 | 14 | 5 | M5 | 4.5 | 4 | 2 | 12 | 30 (40) | 7.5 | 7.6 depth 6.5 | 15.5 | 68.5 (78.5) |
| ZC(D)UKQ20 | 29 | 5 | 16 | 6 | M6 | 5.5 | 9 | 4.5 | 16 | 36 (46) | 9 | 9.3 depth 8 | 19.5 | 79 (89) |
| ZC(D)UKQ25 | 33 | 5 | 20 | 8 | M8 | 5.5 | 9 | 4.5 | 20 | 40 (50) | 9 | 9.3 depth 9 | 24.5 | 87 (97) |
| ZC(D)UKQ32 | 42 | 5 | 24 | 10 | M10 x 1.25 | 6.6 | 13.5 | 4.5 | 24 | 42 (52) | 10 | 11 depth 11.5 | 30.5 | 99 (109) |

(1): In the case of a mounted auto switch.

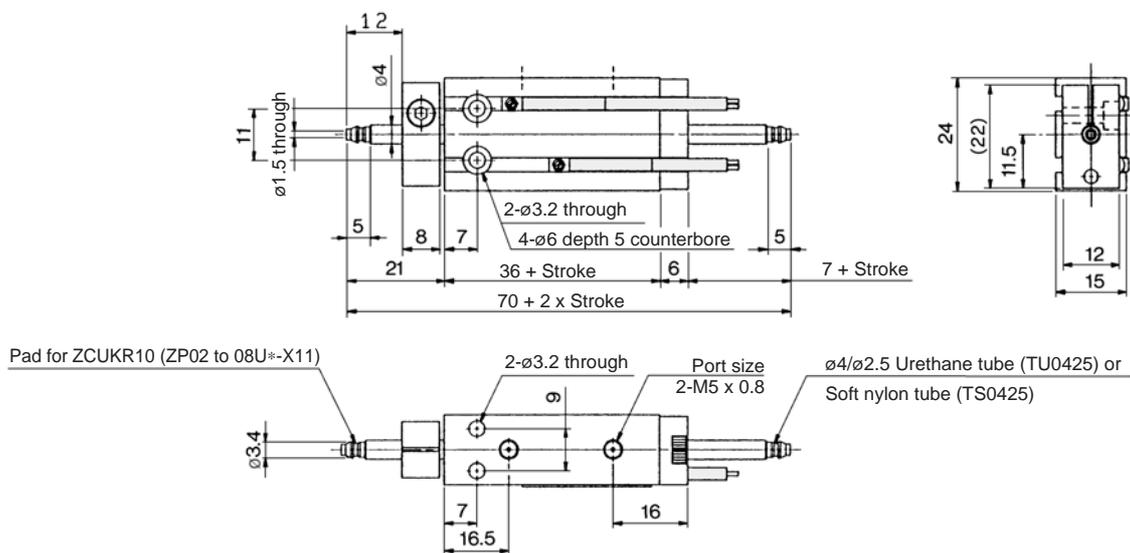
Note 1) In the case of ZCUK16-5D: 14.5 mm.

Note 2) In the case of socket equipped type.

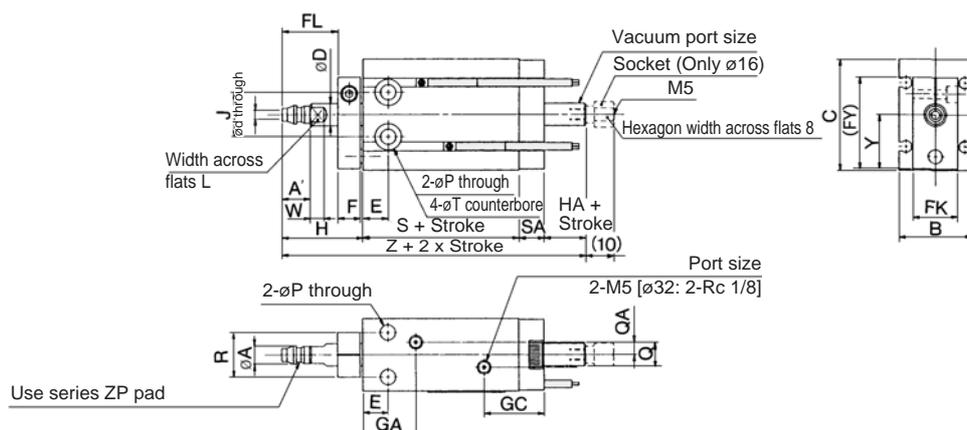
Vacuum Piping: Rod Piping/Rod End Shape: Pad Direct Mounting

ZC(D)UKR Cylinder bore — Stroke D

ø10



ø16 to ø32



| Model | Port size | | Stroke range (mm) | øA | A | B | C | ød | øD | E | F | FK | FL | FY | GA | GC |
|------------|-----------|-------------------|-------------------|------|------|----|----|----|----|----|----|----|----|------|---------------------|------|
| | Air port | Vacuum port | | | | | | | | | | | | | | |
| ZC(D)UKR16 | M5 | M5 ⁽²⁾ | 5 to 30 | 5 | 7 | 20 | 32 | 2 | 6 | 7 | 8 | 13 | 17 | 28 | 16.5 ⁽¹⁾ | 19 |
| ZC(D)UKR20 | M5 | M5 | 5 to 50 | 6.6 | 8 | 26 | 40 | 3 | 8 | 9 | 8 | 16 | 20 | 33 | 19 | 21.5 |
| ZC(D)UKR25 | M5 | M5 | 5 to 50 | 8 | 9 | 32 | 50 | 4 | 10 | 10 | 10 | 20 | 22 | 43.5 | 21.5 | 22 |
| ZC(D)UKR32 | 1/8 | 1/8 | 5 to 50 | 11.5 | 10.5 | 40 | 62 | 5 | 12 | 11 | 12 | 24 | 29 | 51.5 | 23 | 22.5 |

| Model | H | HA | J | L | øP | Q | QA | R | S | SA | øT | W | Y | Z |
|------------|----|----|----|----|-----|------|-----|----|---------|-----|---------------|-----|------|-------------|
| ZC(D)UKR16 | 26 | 5 | 14 | 5 | 4.5 | 4 | 2 | 12 | 30 (40) | 7.5 | 7.6 depth 6.5 | 3.5 | 15.5 | 68.5 (78.5) |
| ZC(D)UKR20 | 29 | 5 | 16 | 6 | 5.5 | 9 | 4.5 | 16 | 36 (46) | 9 | 9.3 depth 8 | 5 | 19.5 | 79 (89) |
| ZC(D)UKR25 | 33 | 5 | 20 | 8 | 5.5 | 9 | 4.5 | 20 | 40 (50) | 9 | 9.3 depth 9 | 5 | 24.5 | 87 (97) |
| ZC(D)UKR32 | 42 | 5 | 24 | 10 | 6.6 | 13.5 | 4.5 | 24 | 42 (52) | 10 | 11 depth 11.5 | 5 | 30.5 | 99 (109) |

(): In the case of a mounted auto switch.

Note 1) In the case of ZCUKQ16-5D: 14.5 mm.

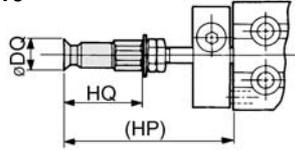
Note 2) In the case of socket equipped type.

Series ZCUK

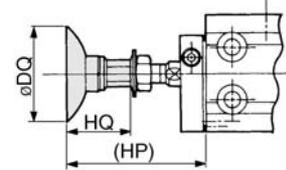
Dimensions of Pad Mounted Model

Rod end shape: Male thread

Tubing bore: $\phi 10$



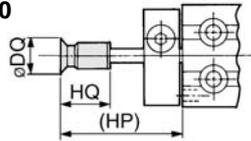
Tubing bore: $\phi 16$ to $\phi 50$



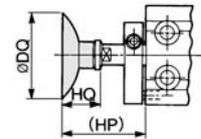
| Model | Dia.(mm) | Flat/Flat with ribs | | | | | | | | | | Deep | | | | Bellows | | | | | | | | | | Applicable pad model | | | |
|--------------------------|-----------|---------------------|------|------|------|----|----|------|----|----|------|------|----|----|----|---------|----|------|------|----|------|----|------|----|----|----------------------|------|----|------------|
| | | 2 | 4 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 | 10 | 16 | 25 | 40 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | | 40 | 50 | |
| ZC(D)UKC10 ZC(D)UKQ10 | ϕ DQ | 2.6 | 4.8 | 7 | 9 | — | — | — | — | — | — | — | — | — | — | — | — | 7 | 9 | — | — | — | — | — | — | — | — | — | ZPT□□□-B4 |
| | HQ | 19.5 | 19.5 | 19.5 | 19.5 | — | — | — | — | — | — | — | — | — | — | — | — | 20.5 | 20.5 | — | — | — | — | — | — | — | — | — | |
| ZC(D)UKC16 ZC(D)UKQ16 | ϕ DQ | 2.6 | 4.8 | 7 | 9 | 12 | 15 | 18 | — | — | — | — | — | 12 | 18 | — | — | 7 | 9 | 12 | 15 | 18 | — | — | — | — | — | — | ZPT□□□-B5 |
| | HQ | 19.5 | 19.5 | 19.5 | 19.5 | 21 | 21 | 21.5 | — | — | — | — | — | 24 | 25 | — | — | 20.5 | 20.5 | 25 | 27.5 | 29 | — | — | — | — | — | — | |
| ZC(D)UKC20 ZC(D)UKQ20 | ϕ DQ | — | — | — | — | 12 | 15 | 18 | 23 | 28 | 35 | — | — | 12 | 18 | 28 | — | — | — | 12 | 15 | 18 | 22 | 27 | 34 | — | — | — | ZPT□□□-B6 |
| | HQ | — | — | — | — | 21 | 21 | 21.5 | 23 | 23 | 23.5 | — | — | 24 | 25 | 29 | — | — | — | 25 | 27.5 | 29 | 32.5 | 33 | 38 | — | — | — | |
| ZC(D)UKC25 ZC(D)UKQ25 | ϕ DQ | — | — | — | — | — | — | — | 23 | 28 | 35 | 43 | 53 | — | 28 | 43 | — | — | — | — | — | — | 22 | 27 | 34 | 43 | 53 | — | ZPT□□□-B8 |
| | HQ | — | — | — | — | — | — | — | 29 | 29 | 29.5 | 32 | 33 | — | 35 | 42.5 | — | — | — | — | — | — | 38.5 | 39 | 44 | 47.5 | 51.5 | — | |
| ZC(D)UKC32 ZC(D)UKQ32 | ϕ DQ | — | — | — | — | — | — | — | 32 | 32 | 32.5 | 35 | 36 | — | 28 | 43 | — | — | — | — | — | — | 22 | 27 | 34 | 43 | 76.5 | — | ZPT□□□-B10 |
| | HQ | — | — | — | — | — | — | — | 32 | 32 | 32.5 | 35 | 36 | — | 38 | 45.5 | — | — | — | — | — | — | 41.5 | 42 | 47 | 50.5 | 54.5 | — | |
| | HP | — | — | — | — | — | — | — | 64 | 64 | 64.5 | 67 | 68 | — | 70 | 77.5 | — | — | — | — | — | — | 73.5 | 74 | 79 | 82.5 | 86.5 | — | |

Rod end shape: Pad direct mounting

Tubing bore: $\phi 10$



Tubing bore: $\phi 16$ to $\phi 50$

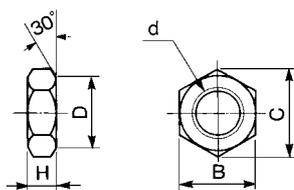


| Model | Dia.(mm) | Flat/Flat with ribs | | | | | | | | | | Deep | | | | Bellows | | | | | | | | | | Applicable pad model | | | |
|--------------------------|-----------|---------------------|-----|----|----|----|----|------|----|----|------|------|----|------|------|---------|----|----|----|----|------|----|------|----|----|----------------------|------|----|--------------------|
| | | 2 | 4 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | 40 | 50 | 10 | 16 | 25 | 40 | 6 | 8 | 10 | 13 | 16 | 20 | 25 | 32 | | 40 | 50 | |
| ZC(D)UKD10 ZC(D)UKR10 | ϕ DQ | 2.6 | 4.8 | 7 | 9 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | Note) ZP□U□-X11 |
| | HQ | 10 | 10 | 10 | 10 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | |
| | HP | 26 | 26 | 26 | 26 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | |
| ZC(D)UKD16 ZC(D)UKR16 | ϕ DQ | 2.6 | 4.8 | 7 | 9 | — | — | — | — | — | — | — | — | — | — | — | — | 7 | 9 | — | — | — | — | — | — | — | — | — | ZP□□□ |
| | HQ | 12 | 12 | 12 | 12 | — | — | — | — | — | — | — | — | — | — | — | — | 13 | 13 | — | — | — | — | — | — | — | — | — | |
| | HP | 31 | 31 | 31 | 31 | — | — | — | — | — | — | — | — | — | — | — | — | 32 | 32 | — | — | — | — | — | — | — | — | — | |
| ZC(D)UKD20 ZC(D)UKR20 | ϕ DQ | — | — | — | — | 12 | 15 | 18 | — | — | — | — | — | 12 | 18 | — | — | — | — | 12 | 15 | 18 | — | — | — | — | — | — | ZP□□□ |
| | HQ | — | — | — | — | 12 | 12 | 12.5 | — | — | — | — | — | 15 | 16 | — | — | — | — | 16 | 18.5 | 20 | — | — | — | — | — | — | |
| | HP | — | — | — | — | 33 | 33 | 33.5 | — | — | — | — | — | 36 | 37 | — | — | — | — | 37 | 39.5 | 41 | — | — | — | — | — | — | |
| ZC(D)UKD25 ZC(D)UKR25 | ϕ DQ | — | — | — | — | — | — | — | 23 | 28 | 35 | — | — | — | — | 28 | — | — | — | — | — | — | 22 | 27 | 34 | — | — | — | ZP□□□ |
| | HQ | — | — | — | — | — | — | — | 14 | 14 | 14.5 | — | — | — | — | 20 | — | — | — | — | — | — | 23.5 | 24 | 29 | — | — | — | |
| | HP | — | — | — | — | — | — | — | 38 | 38 | 38.5 | — | — | — | — | 44 | — | — | — | — | — | — | 47.5 | 48 | 53 | — | — | — | |
| ZC(D)UKD32 ZC(D)UKR32 | ϕ DQ | — | — | — | — | — | — | — | — | — | — | — | — | 43 | 53 | — | — | — | — | — | — | — | — | — | — | 43 | 53 | — | ZP□□□ |
| | HQ | — | — | — | — | — | — | — | — | — | — | — | — | 18.5 | 19.5 | — | — | — | — | — | — | — | — | — | — | 34 | 38 | — | |
| | HP | — | — | — | — | — | — | — | — | — | — | — | — | 50 | 51 | — | — | — | — | — | — | — | — | — | — | 65.5 | 69.5 | — | |

Note) ZP□U□-X11: Flat type only.

Accessory Dimensions (Attached only to a rod end male thread type.)

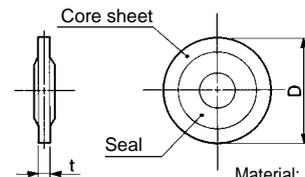
Rod end nut



Material: Carbon steel

| Part no. | Applicable cylinder bore (mm) | d | H | B | C | D |
|----------|-------------------------------|------------|-----|----|------|------|
| NTP-010 | 10 | M4 x 0.7 | 2.4 | 7 | 8.1 | 6.8 |
| NTJ-015A | 16 | M5 x 0.8 | 4 | 8 | 9.2 | 7.8 |
| NT-015A | 20 | M6 x 1.0 | 5 | 10 | 11.5 | 9.8 |
| NT-02 | 25 | M8 x 1.25 | 5 | 13 | 15.0 | 12.5 |
| NT-03 | 32 | M10 x 1.25 | 6 | 17 | 19.6 | 16.5 |

Seal washer



Material: Core sheet — Rolled steel
Seal — NBR

| Part no. | Applicable cylinder bore (mm) | t | D |
|------------|-------------------------------|-----|------|
| WCS4 x 0.7 | 10 | 1.2 | 11.5 |
| WCS5 x 0.8 | 16 | 1.2 | 12.5 |
| WCS6 x 1 | 20 | 1.2 | 14.0 |
| WCS8 x 1 | 25 | 1.6 | 15.5 |
| WCS10 x 1 | 32 | 1.6 | 18.0 |

Series CU

Auto Switch Specifications

Auto Switch Common Specifications

| Type | Reed switch | Solid state switch |
|-----------------------|--|--|
| Leakage current | None | 3-wire: 100 μ A or less 2-wire: 0.8 mA or less |
| Operating time | 1.2 ms | 1 ms or less |
| Impact resistance | 300 m/s ² | 1000 m/s ² |
| Insulation resistance | 50 M Ω or more at 500 VDC Mega (between lead wire and case) | |
| Withstand voltage | 1000 VAC for 1 minute (between lead wire and case) | |
| Ambient temperature | -10 to 60°C | |
| Enclosure | IEC529 standard IP67, JIS C 0920 watertight construction | |

Lead Wire Length

Lead wire length indication

(Example) D-M9P **L**

Lead wire length

| | |
|-----|-------|
| Nil | 0.5 m |
| L | 3 m |
| Z | 5 m |

Note 1) Applicable auto switch with 5 m lead wire "Z"

Solid state switch: Manufactured upon receipt of order as standard.

Note 2) To designate solid state switches with flexible specifications, add "-61" after the lead wire length.

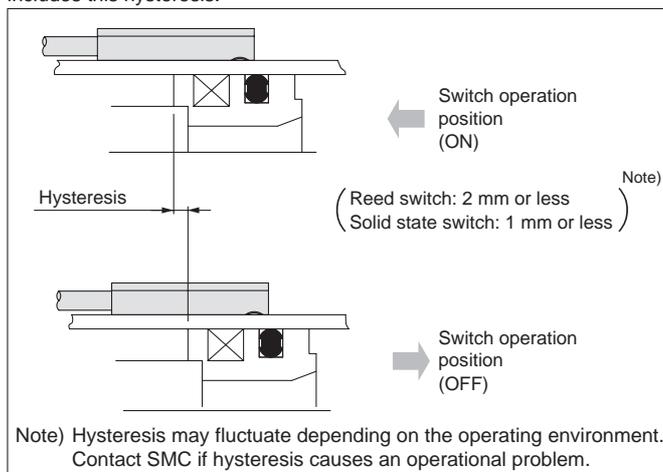
* Oilproof flexible heavy-duty cord is used for D-M9□ as standard. There is no need to suffix -61 to the end of part number.

(Example) D-M9PWVL- **61**

Flexible specification

Auto Switch Hysteresis

The hysteresis is the difference between the position of the auto switch as it turns "on" and as it turns "off". A part of operating range (one side) includes this hysteresis.



Contact Protection Box: CD-P11, CD-P12

<Applicable switch model>

D-A9•A9□V

The auto switches above do not have a built-in contact protection circuit. Therefore, please use a contact protection box with the switch for any of the following cases:

- ① Where the operation load is an inductive load.
- ② Where the wiring length to load is greater than 5 m.
- ③ Where the load voltage is 100 VAC.

The contact life may be shortened. (Due to permanent energising conditions.)

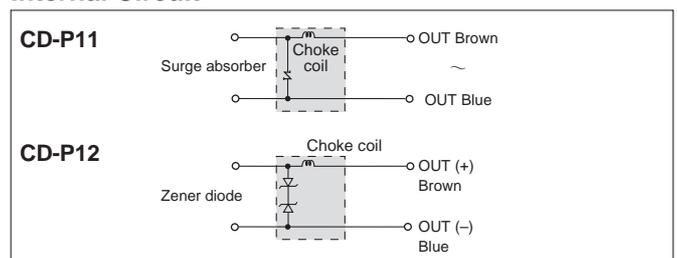
Specifications

| Part No. | CD-P11 | | CD-P12 |
|----------------------|---------|---------|--------|
| Load voltage | 100 VAC | 200 VAC | 24 VDC |
| Maximum load current | 25 mA | 12.5 mA | 50 mA |

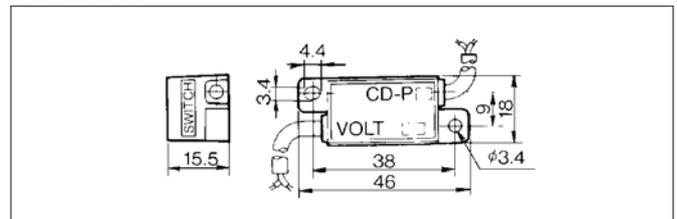
* Lead wire length — Switch connection side 0.5 m
Load connection side 0.5 m



Internal Circuit



Dimension



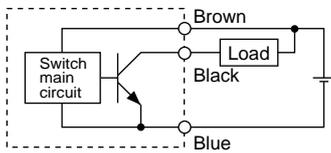
Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 meter.

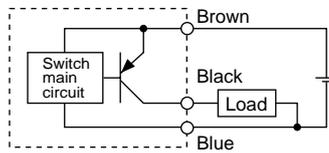
Auto Switch Connections and Examples

Basic Wiring

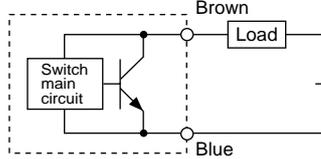
Solid state 3-wire, NPN



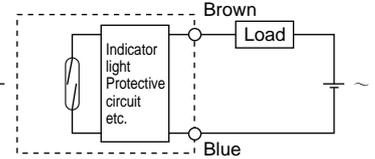
Solid state 3-wire, PNP



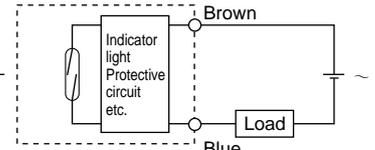
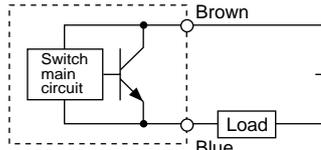
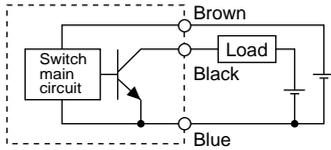
2-wire (Solid state switch)



2-wire (Reed switch)

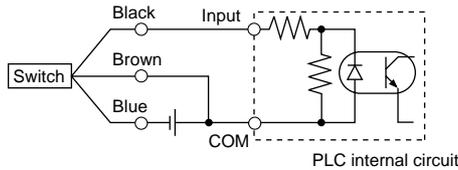


(Power supplies for switch and load are separate.)

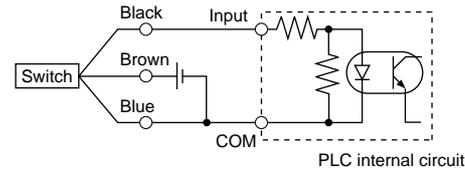


Examples of Connection to PLC (Programmable Logic Controller)

• Sink input specifications 3-wire, NPN

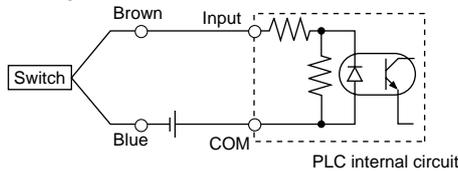


• Source input specifications 3-wire, PNP

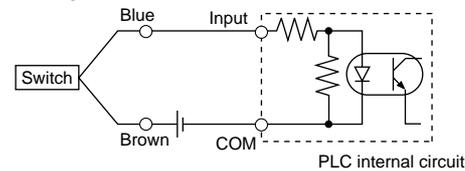


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

2-wire



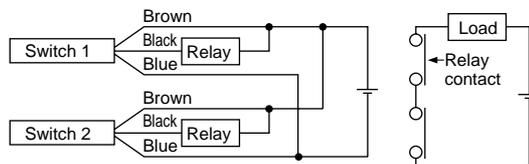
2-wire



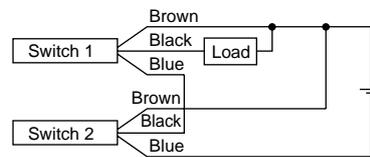
Connection Examples for AND (Serial) and OR (Parallel)

• 3-wire

AND connection for NPN output (using relays)

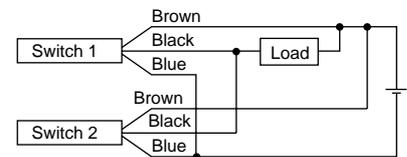


AND connection for NPN output (performed with switches only)

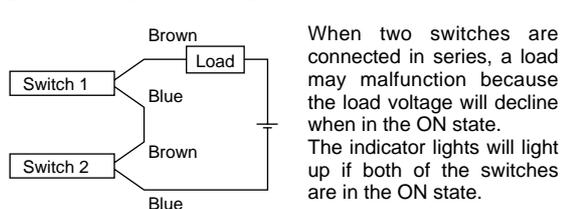


The indicator lights will light up when both switches are turned ON.

OR connection for NPN output



2-wire with 2-switch AND connection

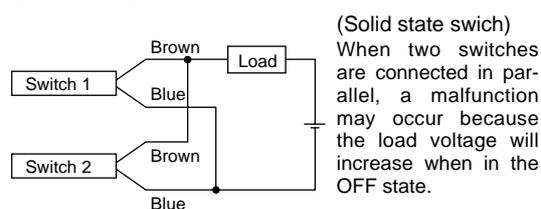


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Internal voltage drop} \times 2 \text{ pcs.} \\ &= 24 \text{ V} - 4 \text{ V} \times 2 \text{ pcs.} \\ &= 16 \text{ V} \end{aligned}$$

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

2-wire with 2-switch OR connection



(Solid state switch) When two switches are connected in parallel, a malfunction may occur because the load voltage will increase when in the OFF state.

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

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \\ &\quad \times \text{Load impedance} \\ &= 1 \text{ mA} \times 2 \text{ pcs.} \times 3 \text{ k}\Omega \\ &= 6 \text{ V} \end{aligned}$$

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

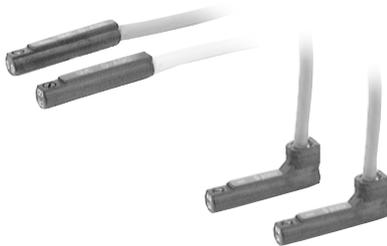
Reed Switch: Direct Mounting Style

D-A90(V)/D-A93(V)/D-A96(V)



For details about certified products conforming to international standards, visit us at www.smcworld.com.

Grommet Electrical entry : In-line



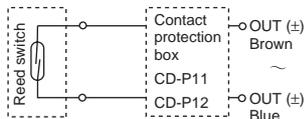
⚠ Caution

Operating Precautions

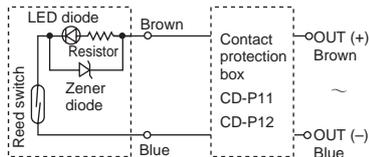
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied, is used.

Auto Switch Internal Circuit

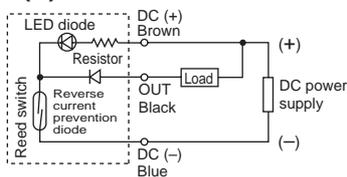
D-A90(V)



D-A93(V)



D-A96(V)



- Note) ① In a case where the operation load is an inductive load.
 ② In a case where the wiring load is greater than 5 m.
 ③ In a case where the load voltage is 100 VAC.

Please use the auto switch with a contact protection box any of the above mentioned cases. (For details about the contact protection box, refer to page 68.)

Auto Switch Specifications

PLC: Abbreviation for Programmable Logic Controller

| D-A90/D-A90V (without indicator light) | | | |
|--|---|--------------------|---------------------|
| Auto switch part no. | D-A90/D-A90V | | |
| Applicable load | IC circuit, Relay, PLC | | |
| Load voltage | 24 V AC/DC or less | 48 V AC/DC or less | 100 V AC/DC or less |
| Maximum load current | 50 mA | 40 mA | 20 mA |
| Contact protection circuit | None | | |
| Internal resistance | 1 Ω or less (including lead wire length of 3 m) | | |
| D-A93/D-A93V/D-A96/D-A96V (with indicator light) | | | |
| Auto switch part no. | D-A93/D-A93V | | D-A96/D-A96V |
| Applicable load | Relay, PLC | | IC circuit |
| Load voltage | 24 VDC | 100 VAC | 4 to 8 VDC |
| Load current range and max. load current | 5 to 40 mA | 5 to 20 mA | 20 mA |
| Contact protection circuit | None | | |
| Internal voltage drop | D-A93 — 2.4 V or less (to 20 mA)/3 V or less (to 40 mA) D-A93V — 2.7 V or less | | 0.8 V or less |
| Indicator light | Red LED lights when ON | | |

● Lead wires

D-A90(V)/D-A93(V) — Oilproof vinyl heavy-duty cord: $\phi 2.7$, 0.18 mm² x 2 cores (Brown, Blue), 0.5 m
 D-A96(V) — Oilproof vinyl heavy-duty cord: $\phi 2.7$, 0.15 mm² x 3 cores (Brown, Black, Blue), 0.5 m

Note 1) Refer to page 68 for reed switch common specifications.

Note 2) Refer to page 68 for lead wire lengths.

Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

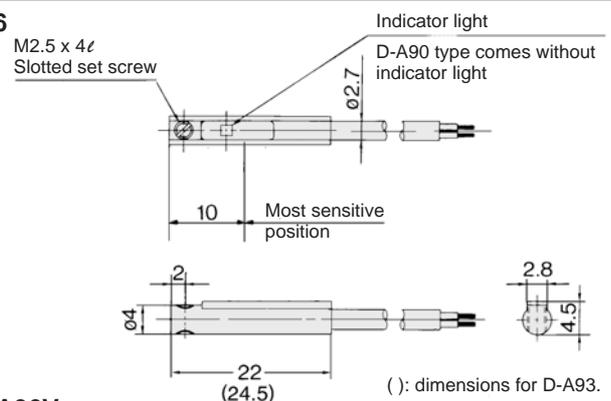
Unit: g

| Auto switch model | D-A90 | D-A90V | D-A93 | D-A93V | D-A96 | D-A96V |
|-------------------------|-------|--------|-------|--------|-------|--------|
| Lead wire length: 0.5 m | 6 | 6 | 6 | 6 | 8 | 8 |
| Lead wire length: 3 m | 30 | 30 | 30 | 30 | 41 | 41 |

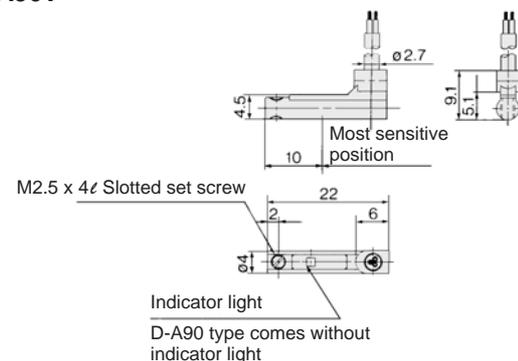
Dimensions

Unit: mm

D-A90/D-A93/D-A96



D-A90V/D-A93V/D-A96V



Solid State Switch: Direct Mounting Style D-M9N(V)/D-M9P(V)/D-M9B(V) C €



For details about certified products conforming to international standards, visit us at www.smcworld.com.

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

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

Lead wires

Oilproof vinyl heavy-duty cord: $\phi 2.7 \times 3.2$ ellipse, 0.15 mm²,

D-M9B(V) 0.15 mm² x 2 cores

D-M9N(V), D-M9P(V) 0.15 mm² x 3 cores

Note 1) Refer to page 68 for solid state switch common specifications.

Note 2) Refer to page 68 for lead wire lengths.

Grommet

- 2-wire load current is reduced (2.5 to 40 mA)
- Lead-free
- UL certified (style 2844) lead cable is used.

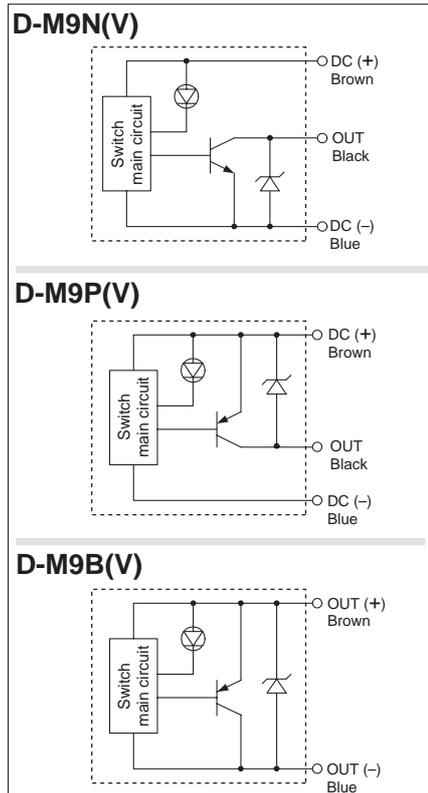


Caution

Operating Precautions

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

Auto Switch Internal Circuit



Weight

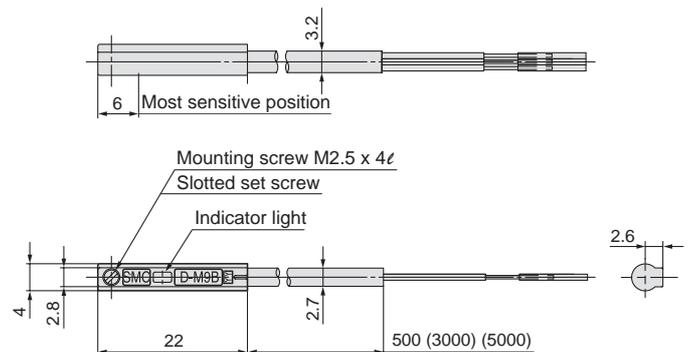
Unit: g

| Auto switch model | D-M9N(V) | D-M9P(V) | D-M9B(V) |
|----------------------|----------|----------|----------|
| Lead wire length (m) | | | |
| 0.5 | 8 | 8 | 7 |
| 3 | 41 | 41 | 38 |
| 5 | 68 | 68 | 63 |

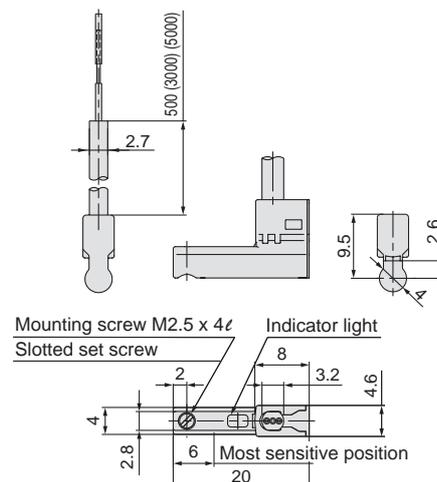
Dimensions

Unit: mm

D-M9□



D-M9□V



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



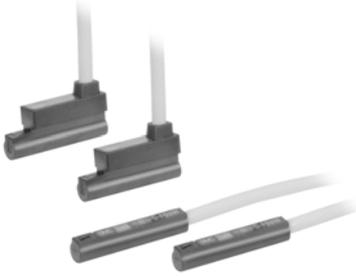
For details about certified products conforming to international standards, visit us at www.smcworld.com.

Auto Switch Specifications

PLC: Abbreviation for Programmable Logic Controller

| D-F9□W/D-F9□WV (with indicator light) | | | | | | |
|---------------------------------------|--|---------------|---------------|---------------|-----------------------|---------------|
| Auto switch part no. | D-F9NW | D-F9NWV | D-F9PW | D-F9PWV | D-F9BW | D-F9BWV |
| Electrical entry direction | In-line | Perpendicular | In-line | Perpendicular | In-line | Perpendicular |
| Wiring type | 3-wire | | | | 2-wire | |
| Output type | NPN | | PNP | | — | |
| Applicable load | IC circuit, Relay, PLC | | | | 24 VDC relay, PLC | |
| Power supply voltage | 5, 12, 24 VDC (4.5 to 28 VDC) | | | | — | |
| Current consumption | 10 mA or less | | | | — | |
| Load voltage | 28 VDC or less | | — | | 24 VDC (10 to 28 VDC) | |
| Load current | 40 mA or less | | 80 mA or less | | 5 to 40 mA | |
| Internal voltage drop | 1.5 V or less (0.8 V or less at 10 mA load current) | | 0.8 V or less | | 4 V or less | |
| Leakage current | 100 μA or less at 24 VDC | | | | 0.8 mA or less | |
| Indicator light | Operating position Red LED lights up Optimum operating position Green LED lights up | | | | | |

Grommet



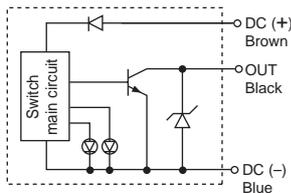
Caution

Operating Precautions

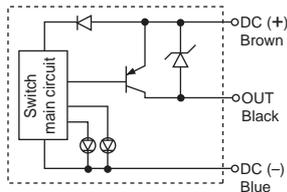
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied, is used.

Auto Switch Internal Circuit

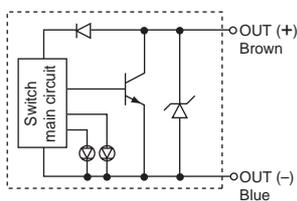
D-F9NW(V)



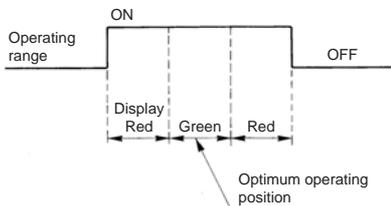
D-F9PW(V)



D-F9BW(V)



Indicator light/Display method



- Lead wires
 - Oilproof vinyl heavy-duty cord: $\phi 2.7$, 0.15 mm² x 3 cores (Brown, Black, Blue), 0.18 mm² x 2 cores (Brown, Blue), 0.5 mm
 - Note 1) Refer to page 68 for solid state switch common specifications.
 - Note 2) Refer to page 68 for lead wire lengths.

Weight

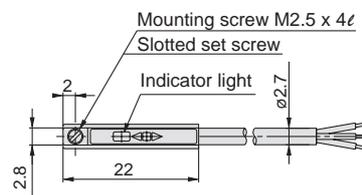
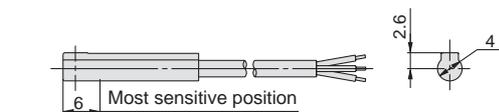
Unit: g

| Auto switch model | D-F9NW(V) | D-F9PW(V) | D-F9BW(V) |
|----------------------|-----------|-----------|-----------|
| Lead wire length (m) | 0.5 | 7 | 7 |
| | 3 | 34 | 32 |
| | 5 | 56 | 52 |

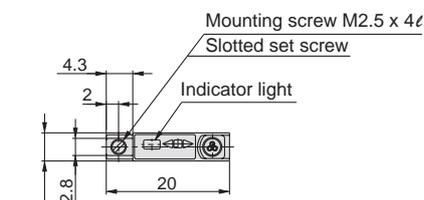
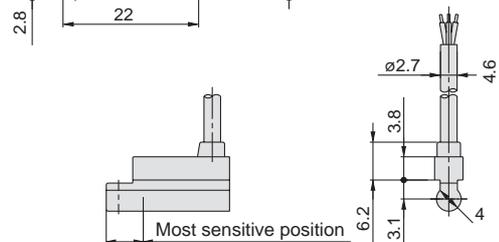
Dimensions

Unit: mm

D-F9□W



D-F9□WV





Series CU

Safety Instructions

The following safety instructions are intended to prevent a hazardous situation and/or equipment damage. The instructions indicate the level of potential hazard by labels of "Caution", "Warning" or "Danger". To ensure safety, please observe all safety practices, including ISO 4414 ^{Note 1)} and JIS B 8370 ^{Note 2)}.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power--General rules relating to systems.

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility with a specific pneumatic system must be based on specifications, post analysis and/or tests to meet a specific requirement. The expected performance and safety assurance is the responsibility of the person who determines the compatibility of the system. This person should continuously review the suitability of all specified items by referring to the latest information in the catalogue and by taking into consideration the possibility of equipment failure when configuring the system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm the all safety precautions have been followed. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before restarting any machinery/equipment, exercise caution to prevent quick extension of a cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having a negative effect on people, property, or animals, requiring special safety analysis.



Series CU Actuator Precautions 1

Be sure to read before handling.

Caution on Design

⚠ Warning

- 1. There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.**

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

- 2. A protective cover is recommended to minimise the risk of personal injury.**

If a stationary object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

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

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

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

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

- 5. Consider a possible drop in circuit pressure due to a power outage, etc.**

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

- 6. Consider a possible loss of power source.**

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

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

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

- 8. Consider emergency stops.**

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

- 9. Consider the action when operation is restarted after an emergency stop or abnormal stop.**

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

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

Selection

⚠ Warning

- 1. Confirm the specifications.**

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

Consult with SMC if you use a fluid other than compressed air.

⚠ Caution

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

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

- 2. Operate the piston within a range such that collision damage will not occur at the stroke end.**

Operate within a range such that damage will not occur when the piston, having inertial force, stops by striking the cover at the stroke end. Refer to the cylinder model selection procedure for the range within which damage will not occur.

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

Mounting

⚠ Caution

- 1. Be certain to match the rod shaft centre with the direction of the load and movement when connecting.**

When not properly matched, problems may arise with the rod and tube, and damage may be caused due to friction on areas such as the inner tube surface, bushings, rod surface and seals.

- 2. When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.**

- 3. Do not scratch or gouge the sliding parts of the cylinder tube or tube rod, etc., by striking or grasping them with other objects.**

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause malfunction. Also, scratches or gouges, etc., in the tube rod may lead to damaged seals and cause air leakage.

- 4. Prevent the seizure of rotating parts.**

Prevent the seizure of rotating parts (pins, etc.) by applying grease.



Series CU Actuator Precautions 2

Be sure to read before handling.

Mounting

⚠ Caution

5. Do not use until you verify that the equipment can operate properly.

After mounting, repairs, or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak tests.

6. Instruction manual

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as neces-

Piping

⚠ Caution

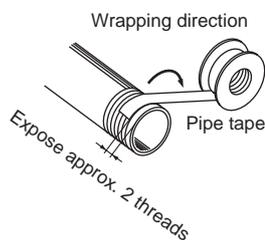
1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of pipe tape

When screwing in pipes and fittings, etc., be certain that chips from the pipe threads and sealing material will not ingress inside the piping.

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



Lubrication

⚠ Caution

1. Lubrication to cylinders

The cylinder has been lubricated at the factory and can be used without any further lubrication.

Air Supply

⚠ Warning

1. Use clean air.

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.

Air Supply

⚠ Caution

1. Install air filters.

Install air filters close to valves at their upstream side. A filtration degree of 5 µm or less should be selected.

2. Install an aftercooler, air dryer, or water separator (Drain Catch).

Air that includes excessive moisture may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or water separator, etc.

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

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

For details on the quality of compressed air mentioned above, refer to SMC's "Best Pneumatics" catalogue.

Operating Environment

⚠ Warning

1. Do not use in atmospheres or locations where corrosion hazards exist.

2. In dusty locations or where water or oil, etc., splash on the equipment, take suitable measures to protect the rod.

3. When using auto switches, do not operate in an environment with strong magnetic fields.

Maintenance

⚠ Warning

1. Perform maintenance procedures as shown in the instruction manual.

If it is handled improperly, malfunction or damage of machinery or equipment may occur.

2. Removal of equipment, and supply/exhaust of compressed air

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

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

⚠ Caution

1. Drain flushing

Remove drainage from air filters regularly.



Series CU Auto Switch Precautions 1

Be sure to read before handling.

Design and Selection

Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside of its specification range (eg. current load, voltage, temperature or impact, etc.).

2. Pay attention to the length of time that a switch is on at an intermediate stroke position.

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

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

3. Keep wiring as short as possible.

<Reed switch>

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

- 1) Use a contact protection box when the wire length is 5 m or longer.

<Solid state switch>

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

4. Take precautions for the internal voltage drop of the switch.

<Reed switch>

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

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

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

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



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

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

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

<Solid state switch>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in item (1) as mentioned above. Also, note that a 12 VDC relay is not applicable.

5. Pay attention to leakage current.

<Solid state switch>

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

$$\text{Current to operate load (Input OFF signal of controller)} > \text{Leakage current}$$

If the condition given in the above formula is not met, internal circuit will not reset correctly (stays ON). Use a 3-wire switch if this specification cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

6. Do not use a load that generates surge voltage.

<Reed switch>

If driving a load such as a relay which generates a surge voltage, use a contact protection box.

<Solid state switch>

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

7. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to safeguard against malfunctions. The double interlock system should provide a mechanical protection function or use another switch (sensor) together with the auto switch. Also perform periodic inspection and confirm proper operation.

8. Ensure sufficient clearance for maintenance activities.

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



Series CU Auto Switch Precautions 2

Be sure to read before handling.

Mounting and Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300m/s² or greater for reed switches and 1000m/s² or greater for solid state switches) while handling.

Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

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

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

3. Mount switches using the proper tightening torque.

When a switch is tightened above the torque specification, the mounting screws, or switch may be damaged. On the other hand, tightening below the torque specification may allow the switch to slip out of position. (Refer to page 7 for switch mounting and tightening torque.)

4. Mount a switch at the centre of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the centre of the operating range (the range in which a switch is ON). If mounted at the end of the operating range (around the borderline of ON and OFF), operation will be unstable.

<D-M9□>

When the D-M9 auto switch is used to replace old series auto switch, it may not activate depending on operating condition because of its shorter operating range.

Such as

- Application where the stop position of actuator may vary and exceed the operating range of the auto switch, for example, pushing, pressing, clamping operation, etc.
- Application where the auto switch is used for detecting an intermediate stop position of the actuator. (In this case the detecting time will be reduced.)

In these applications, please set the auto switch to the centre of the required detecting range.

Caution

1. Fix the switch with the appropriate screw installed on the switch body. The switch may be damaged if other screws are used.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

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

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

<2-wire type>

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

3. Confirm proper insulation of wiring.

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

Wiring

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

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

5. Do not allow short circuit of loads.

<Reed switch>

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

<Solid state switch>

D-M9□ and all models of PNP output type switches do not have built-in short circuit protection circuits. If loads are short circuited, the switches will be instantly damaged, as in the case of reed switches.

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

6. Avoid incorrect wiring.

<Reed switch>

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

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

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

Applicable models: D-A93, A93V

<Solid state switch>

1) Even if connections are reversed on a 2-wire type switch, the switch will not be damaged because it is protected by a protection circuit, but it will remain in a normally ON state. But reverse wiring in a short circuit load condition should be avoided to protect the switch from being damaged.

2) Even if (+) and (-) power supply line connections are reversed on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the (+) power supply line is connected to the blue [black] wire and the (-) power supply line is connected to the black [white] wire, the switch will be damaged.

<D-M9□>

D-M9□ does not have built-in short circuit protection circuit. Be aware that if the power supply connection is reversed (e.g. (+) power supply wire and (-) power supply wire connection is reversed), the switch will be damaged.

* Lead wire colour changes

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

2-wire

| | Old colour | Wire colour after change |
|------------|------------|--------------------------|
| Output (+) | Red | Brown |
| Output (-) | Black | Blue |

3-wire

| | Old colour | Wire colour after change |
|--------------|------------|--------------------------|
| Power supply | Red | Brown |
| GND | Black | Blue |
| Output | White | Black |

Solid state with diagnostic output

| | Old colour | Wire colour after change |
|-------------------|------------|--------------------------|
| Power supply | Red | Brown |
| GND | Black | Blue |
| Output | White | Black |
| Diagnostic output | Yellow | Orange |

Latch type, solid state with diagnostic output

| | Old colour | Wire colour after change |
|------------------------------|------------|--------------------------|
| Power supply | Red | Brown |
| GND | Black | Blue |
| Output | White | Black |
| Latch type Diagnostic output | Yellow | Orange |



Series CU

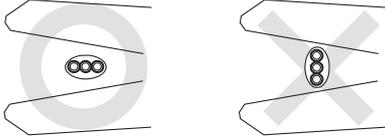
Auto Switch Precautions 3

Be sure to read before handling.

Wiring

⚠ Caution

1. When the cable sheath is stripped, confirm the stripping direction. The insulator may be split or damaged depending on the direction. (D-M9□ only)



Recommended tool

| Manufacturer | Model name | Model no. |
|----------------------|---------------|-----------|
| VESSEL | Wire stripper | No 3000G |
| TOKYO IDEAL CO., LTD | Strip master | 45-089 |

* Stripper for a round cable (ø2.0) can be used for a 2-wire type cable.

Operating Environment

⚠ Warning

1. **Never use in an atmosphere of explosive gases.**
The construction of the auto switch is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.
2. **Do not use in an area where a magnetic field is generated.**
The auto switch will malfunction or the magnets inside of an actuator will become demagnetised. (There may be the case where the magnetic field resistant auto switch is usable. Contact us for further details.)
3. **Do not use in an environment where the auto switch will be continually exposed to water.**
The switch satisfies the IEC standard IP67 construction (JIS C 0920: watertight construction). Nevertheless, it should not be used in applications where it is continually exposed to water splash or spray. This may cause deterioration of the insulation or swelling of the potting resin inside switch causing a malfunction.
4. **Do not use in an environment with oil or chemicals.**
Consult with SMC if the auto switch will be used in an environment laden with coolant, cleaning solvent, various oils or chemicals. If the auto switch is used under these conditions for even a short time, it may be adversely effected by a deterioration of the insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.
5. **Do not use in an environment with temperature cycles.**
Consult with SMC if the switch is used where there are temperature cycles other than normal temperature changes, as they may adversely affected the switch internally.

Operating Environment

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

<Reed switch>

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

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

<Solid state switch>

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

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

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

Maintenance

⚠ Warning

1. **Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.**
 - 1) Securely tighten switch mounting screws.
If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.
 - 2) Confirm that there is no damage to the lead wires.
To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.
 - 3) Confirm that the green light on the 2-colour display type switch lights up.
Confirm that the green LED is ON when stopped at the set position. If the red LED is ON, when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

Other

⚠ Warning

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



EUROPEAN SUBSIDIARIES:



Austria

SMC Pneumatik GmbH (Austria).
Girakstrasse 8, A-2100 Korneuburg
Phone: +43 2262-62280, Fax: +43 2262-62285
E-mail: office@smc.at
http://www.smc.at



France

SMC Pneumatique, S.A.
1, Boulevard de Strasbourg, Parc Gustave Eiffel
Bussy Saint Georges F-77607 Marne La Vallée Cedex 3
Phone: +33 (0)1-6476 1000, Fax: +33 (0)1-6476 1010
E-mail: contact@smc-france.fr
http://www.smc-france.fr



Netherlands

SMC Pneumatics BV
De Ruyterkade 120, NL-1011 AB Amsterdam
Phone: +31 (0)20-5318888, Fax: +31 (0)20-5318880
E-mail: info@smcpneumatics.nl
http://www.smcpneumatics.nl



Spain

SMC España, S.A.
Zuazobidea 14, 01015 Vitoria
Phone: +34 945-184 100, Fax: +34 945-184 124
E-mail: post@smc.smces.es
http://www.smces.es



Belgium

SMC Pneumatics N.V./S.A.
Nijverheidsstraat 20, B-2160 Wommelgem
Phone: +32 (0)3-355-1464, Fax: +32 (0)3-355-1466
E-mail: post@smcpneumatics.be
http://www.smcpneumatics.be



Germany

SMC Pneumatik GmbH
Boschring 13-15, D-63329 Egelsbach
Phone: +49 (0)6103-4020, Fax: +49 (0)6103-402139
E-mail: info@smc-pneumatik.de
http://www.smc-pneumatik.de



Norway

SMC Pneumatics Norway A/S
Vollsvien 13 C, Granfos Næringspark N-1366 Lysaker
Tel: +47 67 12 90 20, Fax: +47 67 12 90 21
E-mail: post@smc-norge.no
http://www.smc-norge.no



Sweden

SMC Pneumatics Sweden AB
Ekhagsvägen 29-31, S-141 71 Huddinge
Phone: +46 (0)8-603 12 00, Fax: +46 (0)8-603 12 90
E-mail: post@smcpneumatics.se
http://www.smc.nu



Bulgaria

SMC Industrial Automation Bulgaria EOOD
16 Kliment Ohridski Blvd., fl.13 BG-1756 Sofia
Phone: +359 2 9744492, Fax: +359 2 9744519
E-mail: office@smc.bg
http://www.smc.bg



Greece

S. Parianopoulos S.A.
7, Konstantinoupoleos Street, GR-11855 Athens
Phone: +30 (0)1-3426076, Fax: +30 (0)1-345578
E-mail: parianos@hol.gr
http://www.smceu.com



Poland

SMC Industrial Automation Polska Sp.z.o.o.
ul. Konstruktorska 11A, PL-02-673 Warszawa
Phone: +48 22 548 5085, Fax: +48 22 548 5087
E-mail: office@smc.pl
http://www.smc.pl



Switzerland

SMC Pneumatik AG
Dorfstrasse 7, CH-8484 Weisslingen
Phone: +41 (0)52-396-3131, Fax: +41 (0)52-396-3191
E-mail: info@smc.ch
http://www.smc.ch



Croatia

SMC Industrijska automatika d.o.o.
Cromerec 12, 10000 ZAGREB
Phone: +385 1 377 66 74, Fax: +385 1 377 66 74
E-mail: office@smc.hr
http://www.smceu.com



Hungary

SMC Hungary Ipari Automatizálási Kft.
Budafoki út 107-113, H-1117 Budapest
Phone: +36 1 371 1343, Fax: +36 1 371 1344
E-mail: office@smc-automation.hu
http://www.smc-automation.hu



Portugal

SMC Sucursal Portugal, S.A.
Rua de Engº Ferreira Dias 452, 4100-246 Porto
Phone: +351 22-610-89-22, Fax: +351 22-610-89-36
E-mail: postpt@smc.smces.es
http://www.smces.es



Turkey

Entek Pnömatik San. ve Tic Ltd. Sti.
Perpa Tic. Merkezi Kat: 11 No: 1625, TR-80270 Okmeydanı Istanbul
Phone: +90 (0)212-221-1512, Fax: +90 (0)212-221-1519
E-mail: smc-entek@entek.com.tr
http://www.entek.com.tr



Czech Republic

SMC Industrial Automation CZ s.r.o.
Hudcova 78a, CZ-61200 Brno
Phone: +420 5 414 24611, Fax: +420 5 412 18034
E-mail: office@smc.cz
http://www.smc.cz



Ireland

SMC Pneumatics (Ireland) Ltd.
2002 Citywest Business Campus, Naas Road, Saggart, Co. Dublin
Phone: +353 (0)1-403 9000, Fax: +353 (0)1-464-0500
E-mail: sales@smcpneumatics.ie
http://www.smcpneumatics.ie



Romania

SMC Romania srl
Str Frunzei 29, Sector 2, Bucharest
Phone: +40 213205111, Fax: +40 213261489
E-mail: smcromania@smcromania.ro
http://www.smcromania.ro



UK

SMC Pneumatics (UK) Ltd
Vincent Avenue, Crownhill, Milton Keynes, MK8 0AN
Phone: +44 (0)800 1382930 Fax: +44 (0)1908-555064
E-mail: sales@smcpneumatics.co.uk
http://www.smcpneumatics.co.uk



Denmark

SMC Pneumatik A/S
Knudsminde 4B, DK-8300 Odder
Phone: +45 70252900, Fax: +45 70252901
E-mail: smc@smc-pneumatik.dk
http://www.smcck.com



Italy

SMC Italia S.p.A
Via Garibaldi 62, I-20061 Carugate, (Milano)
Phone: +39 (0)2-92711, Fax: +39 (0)2-9271365
E-mail: mailbox@smcitalia.it
http://www.smcitalia.it



Russia

SMC Pneumatik LLC.
4B Sverdlovskaja nab, St. Petersburg 195009
Phone: +812 718 5445, Fax: +812 718 5449
E-mail: info@smc-pneumatik.ru
http://www.smc-pneumatik.ru



Estonia

SMC Pneumatics Estonia OÜ
Laki 12-101, 106 21 Tallinn
Phone: +372 (0)6 593540, Fax: +372 (0)6 593541
E-mail: smc@smcpneumatics.ee
http://www.smcpneumatics.ee



Latvia

SMC Pneumatics Latvia SIA
Smerla 1-705, Riga LV-1006, Latvia
Phone: +371 781-77-00, Fax: +371 781-77-01
E-mail: info@smclv.lv
http://www.smclv.lv



Slovakia

SMC Priemyselna Automatizacia, s.r.o.
Námestie Martina Benku 10, SK-81107 Bratislava
Phone: +421 2 444 56725, Fax: +421 2 444 56028
E-mail: office@smc.sk
http://www.smc.sk



Finland

SMC Pneumatics Finland OY
PL72, Tiistinniityntie 4, SF-02031 ESPOO
Phone: +358 207 513513, Fax: +358 207 513595
E-mail: smcfin@smc.fi
http://www.smc.fi



Lithuania

SMC Pneumatics Lietuva, UAB
Savanoriu pr. 180, LT-01354 Vilnius, Lithuania
Phone: +370 5 264 81 26, Fax: +370 5 264 81 26



Slovenia

SMC industrijska Avtomatika d.o.o.
Grajski trg 15, SLO-8360 Zuzemberk
Phone: +386 738 85240 Fax: +386 738 85249
E-mail: office@smc-ind-avtom.si
http://www.smc-ind-avtom.si



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

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