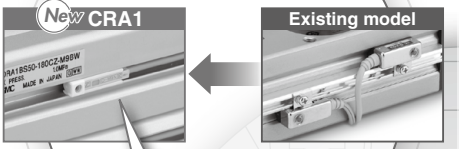
# Rotary Actuator

## ø30, ø50, ø63, ø80, ø100

New

RoHS

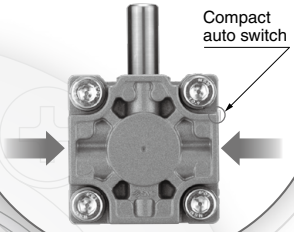
### Compact auto switches are mountable. (D-M9□)



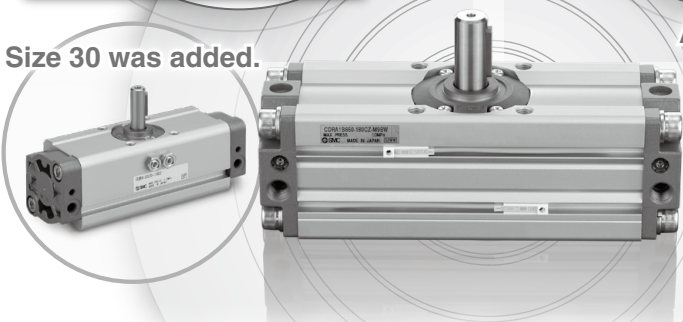

Width reduced by up to **14 mm**

Space saving by changing the auto switch rail mounting to groove mounting.

### Compact auto switches are mountable on 2 surfaces.

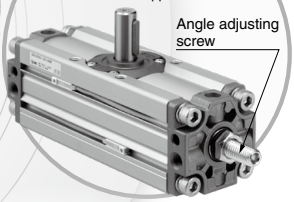



### Size 30 was added.



### Angle adjustable type was added.

Angle can be adjusted to an appropriate level suitable for applications.




## Mounting interchangeable with the existing model

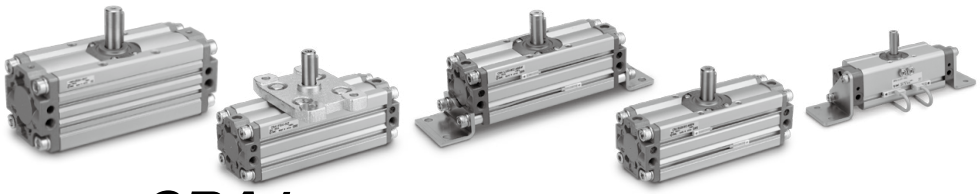
### Weight is reduced by up to 14%.

- Lightweight body by changing the body and the cover shape.

| Size | New CRA1 (kg) | Existing model (kg) | Reduction rate (%) |
|---|---|---|---|
| 30 | 0.27 | 0.3 | 10 |
| 50 | 1.3 | 1.5 | 13 |
| 63 | 2.2 | 2.5 | 12 |
| 80 | 3.9 | 4.3 | 10 |
| 100 | 7.3 | 8.5 | 14 |

### Auto switch can be mounted from the front.

- Auto switch can be mounted from the front at any position on the mounting groove.
- Auto switch can be mounted after installation or when installation condition is changed.

## *Series CRA1*

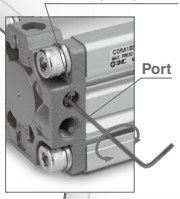
## *Series* CRA1 ø30, ø50, ø63, ø80, ø100

### Easy adjustment of cushion valve

- Cushion valve shape is changed so it can be adjusted using a hexagon wrench only.
- No protrusion from the body
- Retaining ring is used to prevent drop-out.

With cushion valve retaining ring

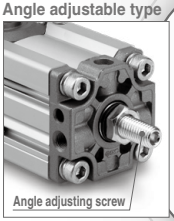
Port



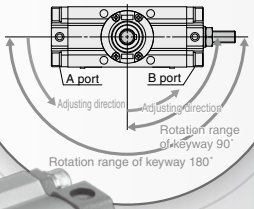
### Port, cushion and auto switch are on the same surface. Easy to handle.

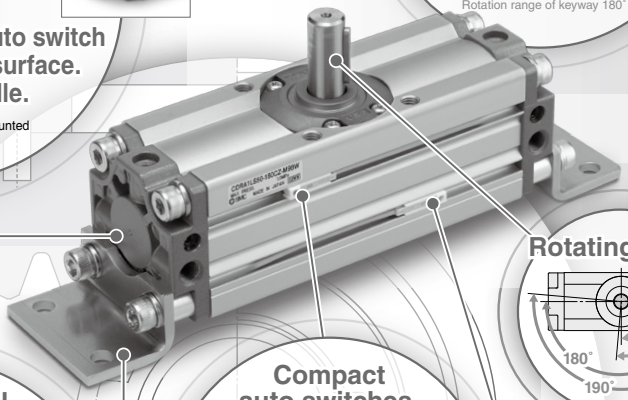
∗ Cushion valve cannot be mounted on the air-hydro type.

Angle adjustable type

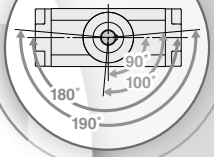



### Angle can be adjusted to a desired level in a range of up to 90°.



### Rotating angle




### Cushion seal is replaceable.

Cushion seal has been made replaceable.
(Not possible for existing model. Cushion seal only)

| Replacement parts | | |
|---|---|---|
| | ● Slider | ● Tube gasket |
| | ● Piston seal | ● Spring pin |
| | ● Cushion seal (New) | |

### Interchangeable with existing model

Exterior dimension, shaft diameter, and mounting dimension are interchangeable with existing model.

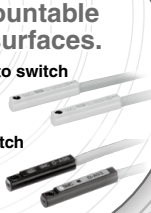
### Compact auto switches are mountable on 2 surfaces.

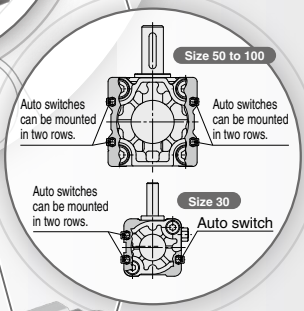
**Solid state auto switch**

- **D-M9□**
- **D-M9□W**

**Reed auto switch**

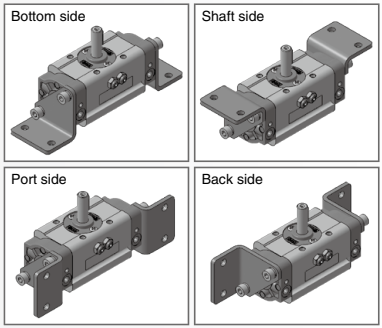
- **D-A9□**



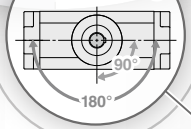


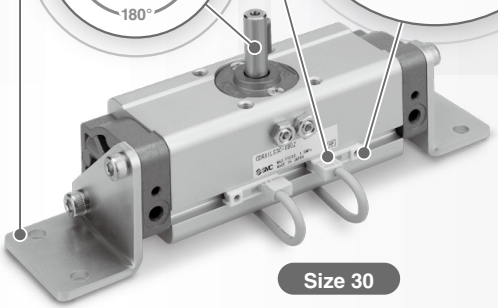

### Mounting suitable for operating conditions is possible.

Foot bracket can be mounted at a desired position.
(Foot bracket is included in the rotary actuator at shipment.)




### Rotating angle






SMC

# Many variations of shaft type

**New Series CRA1**

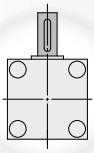
**Standard: 8 types**

Existing model

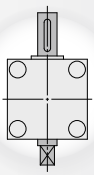
Standard : 2 types

Semi-standard : 6 types

Single shaft: **CRA1BS**

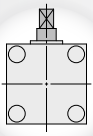


Double shaft: **CRA1BW**

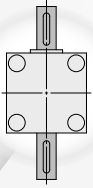


- Shaft type can be selected to suit the specification.
- Part number is assigned for shaft types
  <single round shaft, double shaft (round shaft, with four chamfers), double round shaft>.

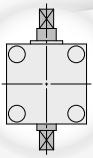
Single shaft with four chamfers: **CRA1BX**



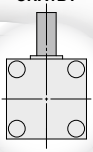
Double shaft with key: **CRA1BY**



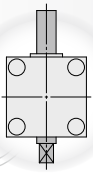
Double shaft with four chamfers: **CRA1BZ**



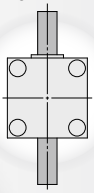
Single round shaft: **CRA1BT**



Double shaft (round shaft, with four chamfers): **CRA1BJ**



Double round shaft: **CRA1BK**



∗ Single round shaft, double shaft (round shaft, with four chamfers), double round shaft are made to order.

## Series Variations

| | Type | | | Pneumatic | | | | | Air-hydro | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Size | | | 30 | 50 | 63 | 80 | 100 | 50 | 63 | 80 | 100 |
| Standard | Rotating angle | 90° | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 100° | | | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 180° | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | 190° | | | ● | ● | ● | ● | ● | ● | ● | ● |
| | Shaft type | Single shaft | S | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Double shaft | W | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Single shaft with four chamfers | X | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Double shaft with key | Y | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Double shaft with four chamfers | Z | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Single round shaft | T | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Double shaft (round shaft, with four chamfers) | J | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Double round shaft | K | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Cushion | None | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Air cushion | | ● | ● | ● | ● | ● | | | | |
| | Variations | With auto switch | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Angle adjustable type | | | ● | ● | ● | ● | | | | |
| | | Clean series Note) | 11- | ● | ● | | | | | | | |
| Made to Order | Mounting bracket | Flange | F | | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Foot | L | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Pattern | Shaft type pattern | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Rotation range | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | Port location | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | Stainless steel shaft/bolt/parallel key | | -X6 | ● | ● | ● | ● | ● | | | | |
| | Operating temperature | Heat resistant 100°C | -X7 | ● | ● | ● | ● | ● | | | | |
| | Both sides angle adjustable | | -X10 | | ● | ● | ● | ● | | | | |
| | One side angle adjustable, One side with cushion | | -X11 | | ● | ● | ● | ● | | | | |
| | Fluororubber seal | | -X16 | ● | ● | ● | ● | ● | | | | |

Note) For further specifications, refer to “Pneumatic Clean Series” catalog.

# Rotary Actuator

# *Series CRA1*

RoHS

## Rack & Pinion Type/Size: 30, 50, 63, 80, 100

## How to Order

**CRA1 B S □ 50 □ – 90 □ Z – □**

**With auto switch CDRA1 B S □ 50 □ – 90 □ Z – M9BW □ – □**

**Built-in magnet**

**Mounting**

| | |
|---|---|
| B | Basic type |
| L | Foot type |
| F* | Flange type |

* For foot bracket and part number, refer to page 1418.
* Foot bracket is included in the same package, (but not assembled).
* Except size 30

**Shaft type**

| | |
|---|---|
| S | Single shaft |
| W | Double shaft |
| X | Single shaft with four chamfers |
| Y | Double shaft with key |
| Z | Double shaft with four chamfers |
| T | Single round shaft |
| J | Double shaft (round shaft, with four chamfers) |
| K | Double round shaft |

* Flange type is not available for T, J, K.
* T, J, K are made to order.

**Size**

| |
|---|
| 30 |
| 50 |
| 63 |
| 80 |
| 100 |

**Type**

| | |
|---|---|
| Nil | Pneumatic |
| H* | Air-hydro |

* Except size 30

**Rotating angle**

| | |
|---|---|
| 90 | 90° |
| 180 | 180° |
| 100* | 100° |
| 190* | 190° |

* Except size 30

**Air cushion**

| | |
|---|---|
| Nil | None |
| C* | With air cushion |

* Except air-hydro type

**Port type**

| Size | | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|
| Nil | M thread | M5 | — | — | — | — |
| | Rc | — | 1/8 | 1/8 | 1/4 | 3/8 |
| TF | G | — | | | | |
| TN | NPT | — | | | | |
| TT | NPTF | — | | | | |

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch (Built-in magnet) |

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

**Number of auto switches**

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

* Up to two auto switches are mountable.

**Made to Order**
Refer to page 1418.

### Applicable Auto Switches/Refer to Best Pneumatics No.4 for further information on auto switches.

| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | | Load voltage AC | Auto switch model: Perpendicular | Auto switch model: In-line | Lead wire length (m): 0.5 (Nil) | 1 (M) | 3 (L) | 5 (Z) | Pre-wired connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solid state auto switch | —— | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | M9NV | M9N | ● | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (NPN) | | | | M9PV | M9P | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | M9BV | M9B | ● | ● | ● | ○ | ○ | — | |
| | Diagnosis indication (2-color indication) | | | 3-wire (NPN) | | 5 V, 12 V | | M9NWV | M9NW | ● | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (NPN) | | | | M9PWV | M9PW | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | M9BWV | M9BW | ● | ● | ● | ○ | ○ | — | |
| | Water resistant (2-color indication) | | | 3-wire (NPN) | | 5 V, 12 V | | M9NAV** | M9NA** | ○ | ○ | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (NPN) | | | | M9PAV** | M9PA** | ○ | ○ | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | M9BAV** | M9BA** | ○ | ○ | ● | ○ | ○ | — | |
| Reed auto switch | —— | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | A96V | A96 | ● | — | ● | — | — | IC circuit | — |
| | | | No | 2-wire | 24 V | 12 V | 100 V | A93V | A93 | ● | — | ● | ● | — | — | Relay, PLC |
| | | | | | | | 100 V or less | A90V | A90 | ● | — | ● | — | — | IC circuit | |

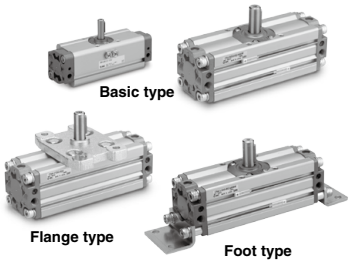
** Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

* Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ
* Auto switches marked with "○" are produced upon receipt of order.
* Auto switches are shipped together, (but not assembled).

Made to Order — Refer to Best Pneumatics No.4 for detailed solid state auto switches with pre-wired connectors.



SMC




**Symbol**

Made to Order

## Made to Order

**(For details, refer to pages 1433 to 1452.)**

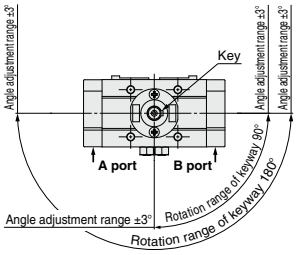
| Symbol | Description | Applicable shaft type |
|---|---|---|
| -XA1 to -XA24 | Shaft pattern sequencing Ⅰ | S, W, Y |
| -XA33 to -XA59 | Shaft pattern sequencing Ⅱ | X, Z, T, J, K |
| -XC7 | Reversed shaft | S, W, X, T, J |
| -XC8 to -XC11 | Change of rotation range | S, W, Y |
| -XC30 | Changed to fluorine grease | S, W, X, Y, Z, T, J, K |
| -XC31 to -XC36 | Change of rotation range and shaft rotation direction | S, W, Y |
| -XC59 to -XC61 | Change of port direction | S, W, X, Y, Z, T, J, K |
| -XC63, -XC64 | One side air-hydro, One side air | S, W, X, Y, Z, T, J, K |
| -X6 | Stainless steel shaft/ bolt, etc. | S, W, X, Y, Z, T, J, K |
| -X7* | Heat resistant (100°C) | S, W, X, Y, Z, T, J, K |
| -X16 | Fluororubber seal | S, W, X, Y, Z, T, J, K |

* X7: Not available for the built-in magnet type

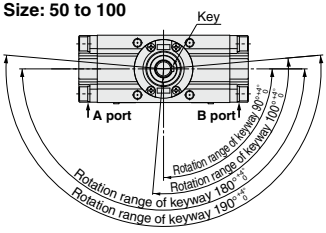
## Rotation Range of Keyway

The shaft rotates clockwise when the pressure is applied from the A port while it rotates counterclockwise when the pressure is applied from the B port.

**Size: 30**




**Size: 50 to 100**




## Specifications

| Type | Pneumatic | | | | | Air-hydro | | | |
|---|---|---|---|---|---|---|---|---|---|
| Size | 30 | 50 | 63 | 80 | 100 | 50 | 63 | 80 | 100 |
| **Fluid** | Air (Non-lube) | | | | | Turbine oil | | | |
| **Max. operating pressure** | 1.0 MPa | | | | | | | | |
| **Min. operating pressure** | 0.1 MPa | | | | | | | | |
| **Ambient and fluid temperature** | 0 to 60°C (No freezing) | | | | | | | | |
| **Cushion** | Not attached, Air cushion | | | | | None | | | |
| **Backlash** | None* | Within 1° | | | | | | | |
| **Tolerance in rotating angle** | — | 0 to +4° | | | | | | | |

* Since the CRA1□30 has a stopper installed, there is no backlash produced under pressure.

## Effective Torque

(N·m)

| Size | Operating pressure (MPa) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| **30** | 0.38 | 0.76 | 1.14 | 1.53 | 1.91 | 2.29 | 2.67 | 3.05 | 3.44 | 3.82 |
| **50** | 1.85 | 3.71 | 5.57 | 7.43 | 9.27 | 11.2 | 13.0 | 14.9 | 16.7 | 18.5 |
| **63** | 3.44 | 6.88 | 10.4 | 13.8 | 17.2 | 20.6 | 24.0 | 27.5 | 31.0 | 34.4 |
| **80** | 6.34 | 12.7 | 19.0 | 25.3 | 31.7 | 38.0 | 44.4 | 50.7 | 57.0 | 63.4 |
| **100** | 14.9 | 29.7 | 44.6 | 59.4 | 74.3 | 89.1 | 104 | 119 | 133 | 149 |

## Allowable Kinetic Energy/Adjustable Range of Rotation Time Safe in Operation

| Size | Allowable kinetic energy (J) | | | Adjustable range of rotation time safe in operation (s/90°) |
|---|---|---|---|---|
| | Without air cushion | With air cushion* | | |
| **30** | 0.01 | 0.12 | Cushion angle 35° | 0.2 to 1 |
| **50** | 0.05 | 0.98 | | 0.2 to 2 |
| **63** | 0.12 | 1.50 | | 0.2 to 3 |
| **80** | 0.16 | 2.00 | | 0.2 to 4 |
| **100** | 0.54 | 2.90 | | 0.2 to 5 |

* Allowable kinetic energy of the product with air cushion is the maximum absorbed energy when the cushion valve adjustment is optimized.

## Weight

(kg)

| Size | Standard weight | | Additional weight | | |
|---|---|---|---|---|---|
| | 90° | 180° | With auto switch* | Foot bracket | Flange bracket |
| **30** | 0.27 | 0.36 | 0.1 | 0.1 | — |
| **50** | 1.3 | 1.5 | 0.2 | 0.3 | 0.5 |
| **63** | 2.2 | 2.6 | 0.4 | 0.5 | 0.9 |
| **80** | 3.9 | 4.4 | 0.6 | 0.9 | 1.5 |
| **100** | 7.3 | 8.3 | 0.9 | 1.2 | 2.0 |

* With 2 auto switches

## Foot Bracket/Part No.

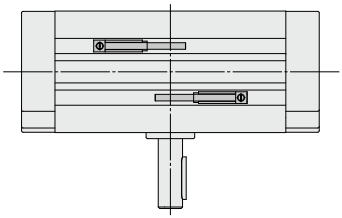
| Size | Foot bracket | Contents | Mounting screw size included in foot bracket |
|---|---|---|---|
| **30** | CRA1L 30-Y-1Z | Foot bracket : 2 pcs.<br>Mounting screw: 4 pcs.<br>Collar* : 4 pcs. | M 5 x 0.8 x 25 |
| **50** | CRA1L 50-Y-1Z | | M 8 x 1.25 x 35 |
| **63** | CRA1L 63-Y-1Z | | M10 x 1.5 x 40 |
| **80** | CRA1L 80-Y-1Z | | M12 x 1.75 x 50 |
| **100** | CRA1L100-Y-1Z | | M12 x 1.75 x 50 |

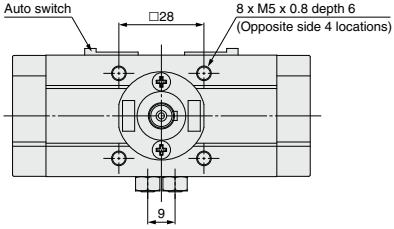
* Size 30 does not include collars.
* Remove the basic type mounting screws and use the mounting screws included in the foot bracket to secure the foot bracket to the cover. Use the collar as a spacer for the cover counterbore part and secure it together with the foot.
* For size 30, be careful not to drop the cover when removing the basic type mounting screws. Additionally, do not mount the foot bracket with the pressure applied to the port.

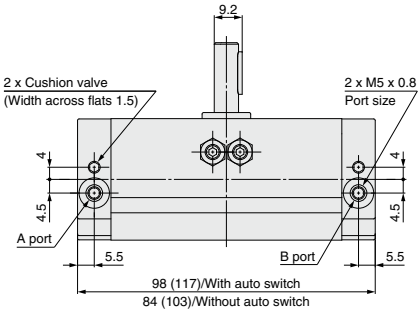
## Dimensions/Basic Type: C□RA1BS

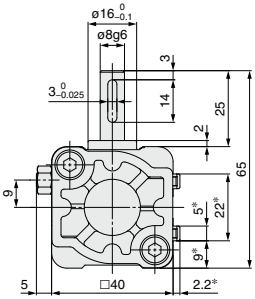
**Size: 30**

**Single shaft: C□RA1BS**

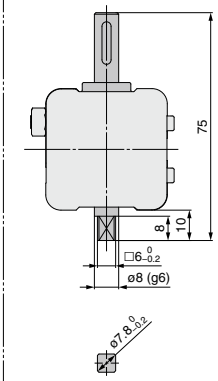





**Double shaft: C□RA1BW**




- Drawing shows the appearance for rotation of 90°.
- Dimensions show pressurization to B port.
- Drawing shows that the auto switch is mounted on the side opposite to the port side. (Dimensions with an asterisk mark (*) are not required for actuators without the auto switch.)

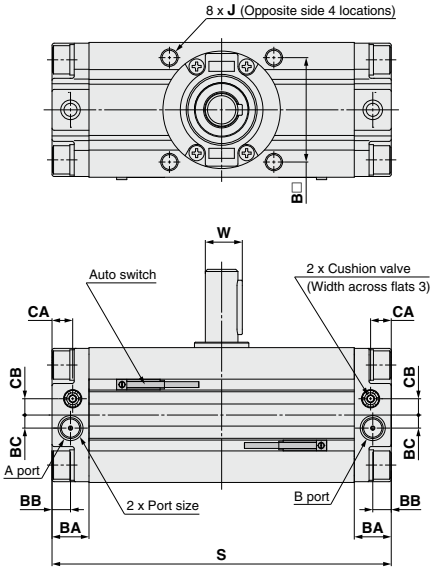
∗ ( ) are the dimensions for rotation of 180°.

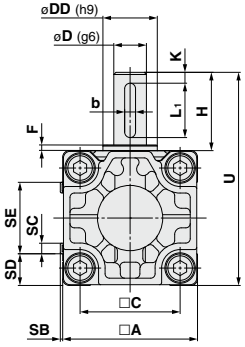
Note) A parallel key is included in the same package, (but not assembled).

## Dimensions/Basic Type: C□RA1BS

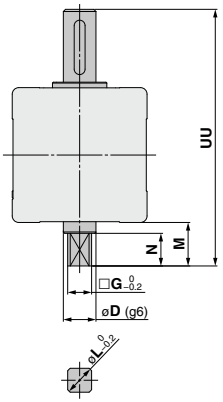
**Size: 50/63/80/100**

**Single shaft: C□RA1BS**




**Double shaft: C□RA1BW**




øD is the shaft dimension.

Note) Other dimensions are the same as the single shaft type.

| Size | D (g6) | G | M | N | UU | L |
|---|---|---|---|---|---|---|
| **50** | 15 | 11 | 20 | 15 | 118 | 14 |
| **63** | 17 | 13 | 22 | 17 | 139 | 16 |
| **80** | 20 | 15 | 25 | 20 | 167 | 19 |
| **100** | 25 | 19 | 30 | 25 | 202 | 24 |

- Drawing shows the appearance for rotation of 90° and 100°.
- Dimensions show pressurization to B port.
- Drawing shows the auto switch mounted on the port side.

∗ ( ) are the dimensions for rotation of 180° and 190°.

| Size | Note 1) Port size | A | B | C | D (g6) | DD (h9) | F | H | J | K | With auto switch | | | | | Without auto switch | U | W | BA | BB | BC | ★ CA | ★ CB | Note 2) Key dimensions | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | S | SB | SC | SD | SE | S | | | | | | | | b | L1 |
| **50** | Rc1/8 | 62 | 48 | 46 | 15 | 25 | 2.5 | 36 | M8 x 1.25 depth 8 | 5 | 156 (189) | 1.5 | 5 | 14.5 | 33 | 144 (177) | 98 | 17 | 17 | 8.5 | 6 | 9.5 | 7.5 | $5^{0}_{-0.030}$ | 25 |
| **63** | Rc1/8 | 76 | 60 | 57 | 17 | 30 | 2.5 | 41 | M10 x 1.5 depth 12 | 5 | 175 (213.5) | 1.5 | 5 | 21.5 | 33 | 163 (201.5) | 117 | 19.5 | 20 | 10 | 7 | 11 | 8 | $6^{0}_{-0.030}$ | 30 |
| **80** | Rc1/4 | 92 | 72 | 70 | 20 | 35 | 3 | 50 | M12 x 1.75 depth 13 | 5 | 199 (243) | 1.5 | 5 | 29.5 | 33 | 186 (230) | 142 | 22.5 | 23.5 | 12 | 8 | 13 | 9 | $6^{0}_{-0.030}$ | 40 |
| **100** | Rc3/8 | 112 | 85 | 85 | 25 | 40 | 4 | 60 | M12 x 1.75 depth 14 | 5 | 259 (325) | 1.5 | 5 | 39.5 | 33 | 245 (311) | 172 | 28 | 25 | 12.5 | 8 | 14 | 10 | $8^{0}_{-0.036}$ | 45 |

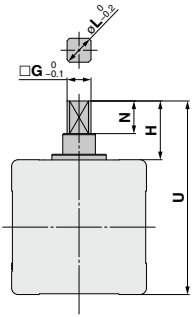
Note 1) In addition to Rc, G, NPT and NPTF are also available.
Note 2) A parallel key is included in the same package, (but not assembled).

★ For model with air cushion

## Dimensions/Basic Type: C□RA1B□

### Size: 30/50/63/80/100

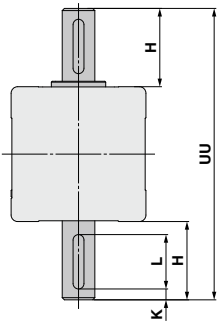
**Single shaft with four chamfers: C□RA1BX**




Note) Other dimensions are the same as the single shaft type.

| Size | G | H | N | U | L |
|---|---|---|---|---|---|
| **30** | 6 | 13 | 8 | 53 | 7.8 |
| **50** | 11 | 27 | 15 | 89 | 14 |
| **63** | 13 | 29 | 17 | 105 | 16 |
| **80** | 15 | 38 | 20 | 130 | 19 |
| **100** | 19 | 44 | 25 | 156 | 24 |

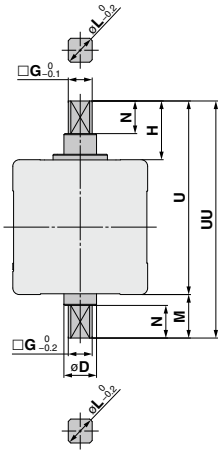
**Double shaft with key: C□RA1BY**




Note) Other dimensions are the same as the single shaft type.

| Size | H | K | UU | L |
|---|---|---|---|---|
| **30** | 25 | 3 | 90 | 14 |
| **50** | 36 | 5 | 134 | 25 |
| **63** | 41 | 5 | 158 | 30 |
| **80** | 50 | 5 | 192 | 40 |
| **100** | 60 | 5 | 232 | 45 |

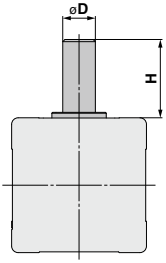
**Double shaft with four chamfers: C□RA1BZ**




Note) Other dimensions are the same as the single shaft type.

| Size | D (g6) | G | H | M | N | U | UU | L |
|---|---|---|---|---|---|---|---|---|
| **30** | 8 | 6 | 13 | 10 | 8 | 53 | 63 | 7.8 |
| **50** | 15 | 11 | 27 | 20 | 15 | 89 | 109 | 14 |
| **63** | 17 | 13 | 29 | 22 | 17 | 105 | 127 | 16 |
| **80** | 20 | 15 | 38 | 25 | 20 | 130 | 155 | 19 |
| **100** | 25 | 19 | 44 | 30 | 25 | 156 | 186 | 24 |

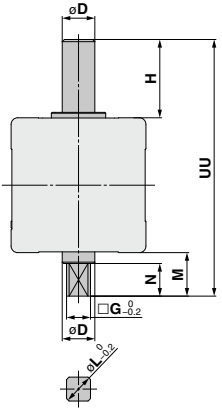
**Single round shaft: C□RA1BT**




Note) Other dimensions are the same as the single shaft type.

| Size | D (g6) | H |
|---|---|---|
| **30** | 8 | 25 |
| **50** | 15 | 36 |
| **63** | 17 | 41 |
| **80** | 20 | 50 |
| **100** | 25 | 60 |

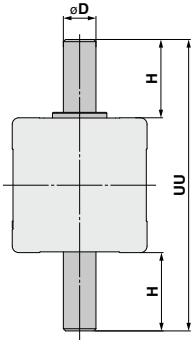
**Double shaft (round shaft, with four chamfers): C□RA1BJ**




Note) Other dimensions are the same as the single shaft type.

| Size | D (g6) | G | H | M | N | UU | L |
|---|---|---|---|---|---|---|---|
| **30** | 8 | 6 | 25 | 10 | 8 | 75 | 7.8 |
| **50** | 15 | 11 | 36 | 20 | 15 | 118 | 14 |
| **63** | 17 | 13 | 41 | 22 | 17 | 139 | 16 |
| **80** | 20 | 15 | 50 | 25 | 20 | 167 | 19 |
| **100** | 25 | 19 | 60 | 30 | 25 | 202 | 24 |

**Double round shaft: C□RA1BK**

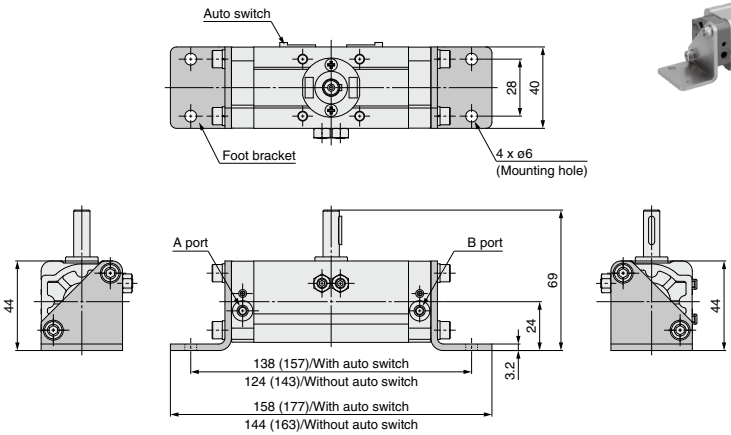



Note) Other dimensions are the same as the single shaft type.

| Size | D (g6) | H | UU |
|---|---|---|---|
| **30** | 8 | 25 | 90 |
| **50** | 15 | 36 | 134 |
| **63** | 17 | 41 | 158 |
| **80** | 20 | 50 | 192 |
| **100** | 25 | 60 | 232 |

## Dimensions/Foot Type: C□RA1LS

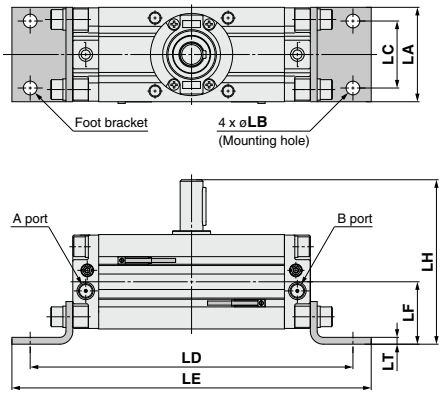
### Size: 30




- Drawing shows the appearance for rotation of 90°.
- Dimensions show pressurization to B port.
- Drawing shows that the auto switch is mounted on the side opposite to the port side.

∗ ( ) are the dimensions for rotation of 180°.

### Size: 50/63/80/100



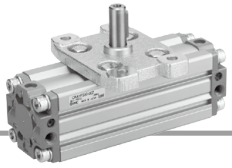

- Drawing shows the appearance for rotation of 90° and 100°.
- Dimensions show pressurization to B port.
- Drawing shows the auto switch mounted on the port side.

∗ ( ) are the dimensions for rotation of 180° and 190°.

Note) Other dimensions are the same as the basic type.

| Size | LA | LB | LC | With auto switch | | Without auto switch | |
|---|---|---|---|---|---|---|---|
| | | | | LD | LE | LD | LE |
| **50** | 62 | 9 | 44 | 212 (245) | 236 (269) | 200 (233) | 224 (257) |
| **63** | 76 | 11 | 55 | 247 (285.5) | 275 (313.5) | 235 (273.5) | 263 (301.5) |
| **80** | 92 | 13 | 67 | 287 (331) | 329 (373) | 274 (318) | 316 (360) |
| **100** | 112 | 13 | 87 | 347 (413) | 389 (455) | 333 (399) | 375 (441) |

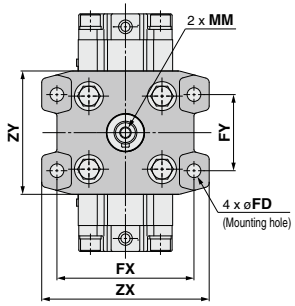
| Size | LF | LH | LT |
|---|---|---|---|
| **50** | 41 | 108 | 4.5 |
| **63** | 48 | 127 | 5 |
| **80** | 58 | 154 | 6 |
| **100** | 73.5 | 189.5 | 6 |

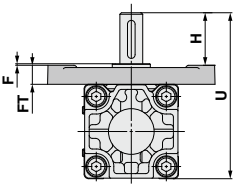


## Dimensions/Flange Type: C□RA1F□

**Size: 50/63/80/100**

### Single shaft: C□RA1FS



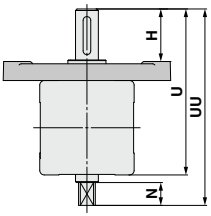




Note) Other dimensions are the same as the basic type.

| Size | F | H | MM | U | FD |
|---|---|---|---|---|---|
| **50** | 4 | 39 | M6 x 1.0 depth 12 | 114 | 9 |
| **63** | 5 | 45 | M6 x 1.0 depth 12 | 136 | 11.5 |
| **80** | 5 | 55 | M8 x 1.25 depth 16 | 165 | 13.5 |
| **100** | 5 | 60 | M10 x 1.5 depth 20 | 190 | 13.5 |

| Size | FT | FX | FY | ZX | ZY |
|---|---|---|---|---|---|
| **50** | 13 | 90 | 50 | 110 | 81 |
| **63** | 15 | 105 | 59 | 130 | 101 |
| **80** | 18 | 130 | 76 | 160 | 119 |
| **100** | 18 | 150 | 92 | 180 | 133 |

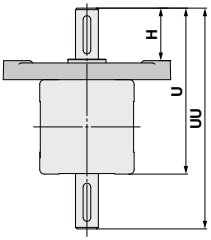
### Double shaft: C□RA1FW




Note) Other dimensions are the same as the single shaft type.

| Size | H | N | U | UU |
|---|---|---|---|---|
| **50** | 39 | 15 | 114 | 134 |
| **63** | 45 | 17 | 136 | 158 |
| **80** | 55 | 20 | 165 | 190 |
| **100** | 60 | 25 | 190 | 220 |

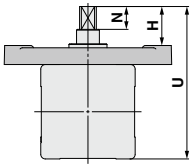
### Double shaft with key: C□RA1FY




Note) Other dimensions are the same as the single shaft type.

| Size | H | U | UU |
|---|---|---|---|
| **50** | 39 | 114 | 150 |
| **63** | 45 | 136 | 177 |
| **80** | 55 | 165 | 215 |
| **100** | 60 | 190 | 250 |

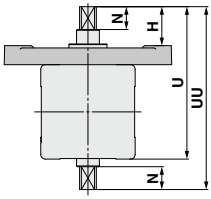
### Single shaft with four chamfers: C□RA1FX




Note) Other dimensions are the same as the single shaft type.

| Size | H | N | U |
|---|---|---|---|
| **50** | 30 | 15 | 105 |
| **63** | 33 | 17 | 124 |
| **80** | 43 | 20 | 153 |
| **100** | 44 | 25 | 174 |

### Double shaft with four chamfers: C□RA1FZ

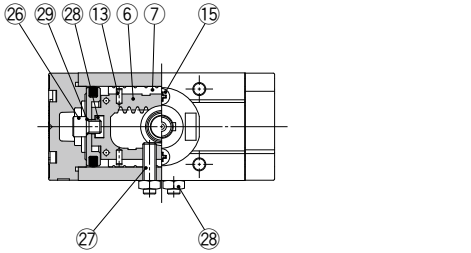



Note) Other dimensions are the same as the single shaft type. The dimensions of shaft key and four chamfers are the same as the basic type.

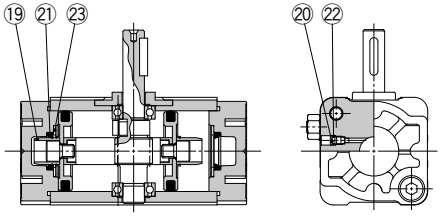
| Size | H | N | U | UU |
|---|---|---|---|---|
| **50** | 30 | 15 | 105 | 125 |
| **63** | 33 | 17 | 124 | 146 |
| **80** | 43 | 20 | 153 | 178 |
| **100** | 44 | 25 | 174 | 204 |

## Construction: Size 30

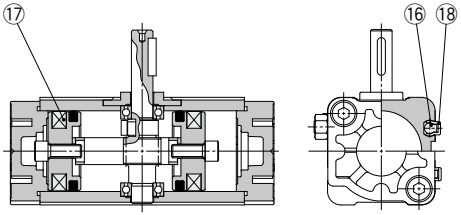
### Without air cushion




### With air cushion




### Without air cushion With auto switch




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Body** | Aluminum alloy | Anodized |
| 2 | **Right cover** | Aluminum alloy | Metallic coating |
| 3 | **Left cover** | Aluminum alloy | Metallic coating |
| 4 | **Piston** | Aluminum alloy | |
| 5 | **Shaft** | Alloy steel | |
| 6 | **Rack** | Carbon steel | Nitrided |
| 7 | **Slider** | Resin | |
| 8 | **Bearing retainer** | Zinc alloy | Chromated |
| 9 | **Tube gasket** | NBR | |
| 10 | **Piston seal** | NBR | |
| 11 | **Bearing** | High carbon chrome bearing steel | |
| 12 | Hexagon socket head cap screw with washer | Alloy steel | Zinc chromated |
| 13 | **Spring pin** | Steel | Zinc chromated |
| 14 | **Parallel key** | Carbon steel | |
| 15 | Cross-recessed pan head tapping screw | Steel | Zinc chromated |
| 16 | **Auto switch** | — | |
| 17 | **Magnet** | — | |
| 18 | **Switch spacer** | Resin | |
| 19 | **Cushion ring** | Aluminum alloy | Anodized |
| 20 | **Cushion valve** | Steel | Nickel plated |
| 21 | **Cushion seal** | Urethane | |
| 22 | **O-ring** | NBR | |

| No. | Description | Material | Note |
|---|---|---|---|
| 23 | **Seal retainer** | Steel | |
| 24 | **Parallel key** | Carbon steel | |
| 25 | **Stopper** | Alloy steel | |
| 26 | **Piston holding bolt** | Alloy steel | Zinc chromated |
| 27 | **Hexagon socket head set screw** | Alloy steel | Zinc chromated |
| 28 | **Hexagon nut** | Steel | Zinc chromated |
| 29 | **O-ring** | NBR | |

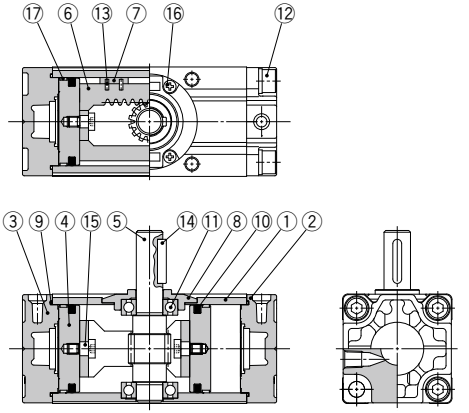
### Replacement Parts

| Size | | Part no. | | | Corresponding parts |
|---|---|---|---|---|---|
| | | Without air cushion | With air cushion | Air-hydro | |
| Note 2) **30** | **90°** | P694010-20 | P694010-22 | — | ⑦, ⑨, ⑩, ⑬, ㉓ are included as a set. |
| | **180°** | P694010-21 | P694010-23 | — | |

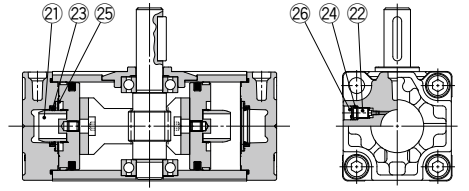
Note 1) When ordering replacement parts, write "1" for one set of the parts per actuator.
Note 2) Replacement parts for different rotation angles are set only for size 30.
A grease pack (10 g) is included.
If an additional grease pack is needed, order with the following part number.
**Grease pack part number: GR-S-010** (10 g)

## Construction: Size 50 to 100

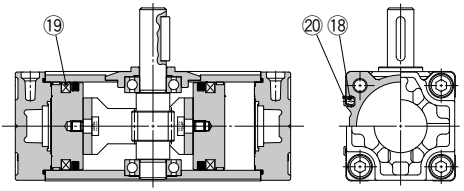
### Without air cushion




### With air cushion




### Without air cushion With auto switch




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Body** | Aluminum alloy | Anodized |
| 2 | **Right cover** | Aluminum alloy | Metallic coating |
| 3 | **Left cover** | Aluminum alloy | Metallic coating |
| 4 | **Piston** | Aluminum alloy | |
| 5 | **Shaft** | Alloy steel | |
| 6 | **Rack** | Carbon steel | Nitrided |
| 7 | **Slider** | Resin | |
| 8 | **Bearing retainer** | Aluminum alloy | Chromated |
| 9 | **Tube gasket** | NBR | |
| 10 | **Piston seal** | NBR | |
| 11 | **Bearing** | High carbon chrome bearing steel | |
| 12 | Hexagon socket head cap screw with washer | Alloy steel | Zinc chromated |
| 13 | **Spring pin** | Steel | Zinc chromated |
| 14 | **Parallel key** | Carbon steel | |
| 15 | **Connecting screw** | Carbon steel | Zinc chromated |
| 16 | Cross-recessed pan head tapping screw | Steel | Zinc chromated |
| 17 | **Wear ring** | Resin | |
| 18 | **Auto switch** | — | |
| 19 | **Magnet** | — | |
| 20 | **Switch spacer** | Resin | |
| 21 | **Cushion ring** | Aluminum alloy | Anodized |
| 22 | **Cushion valve** | Steel | Zinc chromated |
| 23 | **Cushion seal** | Urethane | |
| 24 | **O-ring** | NBR | |
| 25 | **Seal retainer** | Steel | |
| 26 | **Retaining ring** | Steel | |

### Replacement Parts

| Size | Part no. | | | Corresponding parts |
|---|---|---|---|---|
| | Without air cushion | With air cushion | Air-hydro | |
| **50** | P694020-20 | P694020-21 | P694020-23 | ⑦, ⑨, ⑩, ⑬, ㉓ are included as a set. |
| **63** | P694030-20 | P694030-21 | P694030-23 | |
| **80** | P694040-20 | P694040-21 | P694040-23 | |
| **100** | P694050-20 | P694050-21 | P694050-23 | |

Note) When ordering replacement parts, write "1" for one set of the parts per actuator.
A grease pack (10 g) is included.
If an additional grease pack is needed, order with the following part number.
**Grease pack part number: GR-S-010** (10 g)

# Series CRA1
# Specific Product Precautions

**Be sure to read before handling. Refer to page 1574 for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and Operation Manual for Rotary Actuator Precautions and Auto Switch Precautions. Please download it via our website, http://www.smcworld.com**

## How to Use the Air-hydro Type

### Caution on Design

## ⚠ Warning

**1. Do not use a rotary actuator of the air-hydro type near flames, or in equipment or machinery that exceeds an ambient temperatures of 60°C.**

There is a danger of causing a fire because the rotary actuator of the air-hydro type uses a flammable hydraulic fluid.

## ⚠ Caution

**1. Do not use in an environment, equipment, or machine that is not compatible with oil mist.**

Rotary actuators of the air-hydro types generate an oil mist during operation which may affect the environment.

**2. Be sure to install an exhaust cleaner on the directional control valve for the rotary actuator of the air-hydro type.**

A very small amount of hydraulic fluid is discharged from the exhaust port of the rotary actuator of the air-hydro type's directional control valve, which may contaminate the surrounding area.

**3. Install a rotary actuator of the air-hydro type in locations where it can be serviced easily.**

Since the rotary actuator of the air-hydro type requires maintenance, such as refilling of hydraulic fluid and bleeding of air, ensure sufficient space for these activities.

**4. Do not use in cases where external leakage of hydraulic oil may adversely affect equipment or machinery.**

Although it only occurs in minute amounts, a certain amount of sliding leakage from the piston seal is unavoidable with the rotary actuator of the air-hydro type. Because of the construction of the rotary actuator of the air-hydro type, hydraulic oil may leak into the outside due to sliding leakage.

### Selection

## ⚠ Caution

**1. Select the rotary actuator of the air-hydro type based on the combination with the air-hydro unit.**

Select a proper air-hydro unit that is necessary for good operation of the rotary actuator of the air-hydro type.

### Piping

## ⚠ Caution

**1. Use self-align fittings in conjunction with the piping for the rotary actuator of the air-hydro type.**

Do not use a one-touch fitting with the piping for the rotary actuator of the air-hydro type, as this may result in oil leakage.

### Piping

## ⚠ Caution

**2. For rotary actuator of the air-hydro type piping, use hard nylon tubing or copper piping.**

As in the case of hydraulic circuits, surge pressures greater than the operating pressure may occur in a rotary actuator of the air-hydro type's piping, making it necessary to use safer piping materials.

### Lubrication

## ⚠ Warning

**1. Make sure to completely discharge the compressed air in the system before filling the air-hydro unit with hydraulic oil.**

When supplying hydraulic fluid to the air-hydro unit, first confirm that safety measures are implemented to prevent dropping of objects and the release of clamped objects, etc. Then, shut off the air supply and the equipment's electric power and exhaust the compressed air in the system.

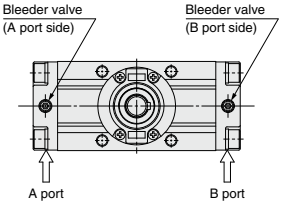
If the air-hydro unit's supply port is opened with compressed air still remaining in the system, there is a danger of hydraulic fluid being blown out.

### Maintenance

## ⚠ Caution

**1. Bleed air from the rotary actuator of the air-hydro type on a regular basis.**

Since air may accumulate inside a rotary actuator of the air-hydro type, bleed air from it, for example before starting work. Bleed air from a bleeder valve provided on the rotary actuator of the air-hydro type or the piping.




**2. Verify the oil level of the air-hydro system on a regular basis.**

Since a very small amount of hydraulic fluid is discharged from the rotary actuator of the air-hydro type and air-hydro unit circuit, the fluid will gradually decrease. Therefore, check the fluid regularly and refill as necessary.

The oil level can be checked with a level gauge in the air-hydro converter.

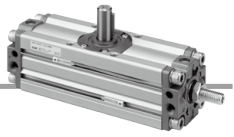
# Rotary Actuator: Angle Adjustable Type

**(Angle adjustment mechanism is provided as standard.)**

# *Series CRA1□□U*

RoHS

## Rack & Pinion Type/Size: 50, 63, 80, 100



## How to Order

**CRA1 B S U 50 □ – 90 Z – □**

**With auto switch CDRA1 B S U 50 □ – 90 Z – M9BW □ – □**

**Built-in magnet**

**Mounting**

| | |
|---|---|
| **B** | Basic type |
| **L** | Foot type* |
| **F** | Flange type |

* For foot bracket and part number, refer to page 1428.
* Foot bracket is included in the same package, (but not assembled).

**Shaft type**

| | |
|---|---|
| **S** | Single shaft |
| **W** | Double shaft |
| **X** | Single shaft with four chamfers |
| **Y** | Double shaft with key |
| **Z** | Double shaft with four chamfers |
| **T** | Single round shaft |
| **J** | Double shaft (round shaft, with four chamfers) |
| **K** | Double round shaft |

* Flange type is not available for T, J, K.
* T, J, K are made to order.

**Angle adjustable type**

**Size**

| |
|---|
| **50** |
| **63** |
| **80** |
| **100** |

**Port type**

| Size | | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|
| **Nil** | Rc | 1/8 | | 1/4 | 3/8 |
| **TF** | G | | | | |
| **TN** | NPT | | | | |
| **TT** | NPTF | | | | |

**Rotating angle**

| | |
|---|---|
| **90** | 90° |
| **180** | 180° |
| **100** | 100° |
| **190** | 190° |

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch (Built-in magnet) |

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

**Number of auto switches**

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

Note) Up to two auto switches are mountable.

**Made to Order**
Refer to page 1428.

### Applicable Auto Switches/Refer to Best Pneumatics No.4 for further information on auto switches.

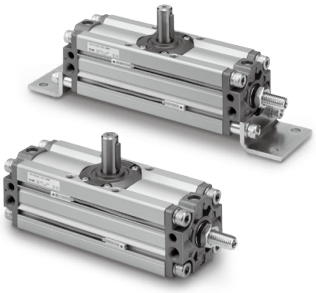
| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | Load voltage AC | Auto switch model: Perpendicular | Auto switch model: In-line | Lead wire length (m): 0.5 (Nil) | 1 (M) | 3 (L) | 5 (Z) | Pre-wired connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solid state auto switch | —— | Grommet | Yes | 3-wire (NPN) | 5 V, 12 V | — | **M9NV** | **M9N** | ● | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (NPN) | | | **M9PV** | **M9P** | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | 12 V | | **M9BV** | **M9B** | ● | ● | ● | ○ | ○ | — | |
| | Diagnosis indication (2-color indication) | | | 3-wire (NPN) | 5 V, 12 V | | **M9NWV** | **M9NW** | ● | ● | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (NPN) | | | **M9PWV** | **M9PW** | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | 12 V | | **M9BWV** | **M9BW** | ● | ● | ● | ○ | ○ | — | |
| | Water resistant (2-color indication) | | | 3-wire (NPN) | 5 V, 12 V | | **M9NAV**** | **M9NA**** | ○ | ○ | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (NPN) | | | **M9PAV**** | **M9PA**** | ○ | ○ | ● | ○ | ○ | | |
| | | | | 2-wire | 12 V | | **M9BAV**** | **M9BA**** | ○ | ○ | ● | ○ | ○ | — | |
| Reed auto switch | —— | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | | **A96V** | **A96** | ● | — | ● | — | — | IC circuit | — |
| | | | No | 2-wire | 24 V | 12 V | 100 V | **A93V** | **A93** | ● | — | ● | ● | — | — | Relay, PLC |
| | | | | | | | 100 V or less | **A90V** | **A90** | ● | — | ● | — | — | IC circuit | |

** Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

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

* Auto switches marked with "○" are produced upon receipt of order.
* Auto switches are shipped together, (but not assembled).

Made to Order — Refer to Best Pneumatics No.4 for detailed solid state auto switches with pre-wired connectors.



## Specifications

| Type | Pneumatic | | | |
|---|---|---|---|---|
| Size | 50 | 63 | 80 | 100 |
| **Fluid** | Air (Non-lube) | | | |
| **Max. operating pressure** | 1.0 MPa | | | |
| **Min. operating pressure** | 0.1 MPa | | | |
| **Ambient and fluid temperature** | 0 to 60°C (No freezing) | | | |
| **Cushion** | None | | | |
| **Backlash** | Within 1° | | | |
| **Angle adjustment range** | Max. 90° | | | |

∗ For details about the effective torque, allowable kinetic energy, and adjustable range of rotation time safe in operation, refer to page 1418.

## Weight

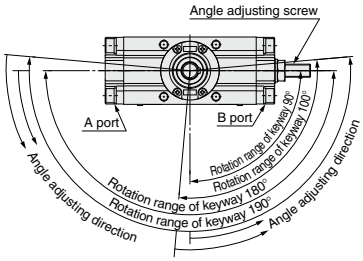
(kg)

| Size | Standard weight | | Additional weight | | |
|---|---|---|---|---|---|
| | 90° | 180° | With auto switch∗ | Foot bracket | Flange bracket |
| **50** | 1.4 | 1.6 | 0.2 | 0.3 | 0.5 |
| **63** | 2.4 | 2.8 | 0.4 | 0.5 | 0.9 |
| **80** | 4.2 | 4.7 | 0.6 | 0.9 | 1.5 |
| **100** | 7.8 | 8.8 | 0.9 | 1.2 | 2.0 |

∗ With 2 auto switches

## Rotation Range of Keyway/Angle Adjustment

The shaft rotates clockwise when the pressure is applied from the A port.
The clockwise rotation end position is adjusted using the angle adjusting screw.
Note) Take appropriate measures so that no excessive external impact or vibration is applied to the angle adjusting screw.
Failure to do so may cause the angle adjusting screw to become loose or drop.




### Adjustment angle per rotation of angle adjusting screw

| Size | 50 | 63 | 80 | 100 |
|---|---|---|---|---|
| Adjusting angle | 9.5° | 9.4° | 8.2° | 6.8° |

## Foot Bracket/Part No.

| Size | Foot bracket | Contents | Mounting screw size included in foot bracket |
|---|---|---|---|
| **50** | CRA1L 50-Y-1Z | Foot bracket : 2 pcs.<br>Mounting screw: 4 pcs.<br>Collar∗ : 4 pcs. | M 8 x 1.25 x 35 |
| **63** | CRA1L 63-Y-1Z | | M10 x 1.5 x 40 |
| **80** | CRA1L 80-Y-1Z | | M12 x 1.75 x 50 |
| **100** | CRA1L100-Y-1Z | | M12 x 1.75 x 50 |

∗ Remove the basic type mounting screws and use the mounting screws included in the foot bracket to secure the foot bracket to the cover. Use the collar as a spacer for the cover counterbore part and secure it together with the foot.

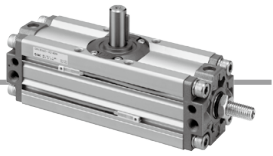
Made to Order

### Made to Order

**(For details, refer to pages 1433 to 1452.)**

| Symbol | Description | Applicable shaft type |
|---|---|---|
| **-XA1 to -XA24** | Shaft pattern sequencing Ⅰ | S, W, Y |
| **-XA33 to -XA59** | Shaft pattern sequencing Ⅱ | X, Z, T, J, K |
| **-XC7** | Reversed shaft | S, W, X, T, J |
| **-XC30** | Changed to fluorine grease | S, W, X, Y<br>Z, T, J, K |
| **-XC37 to -XC46** | Change of rotation range and angle adjusting direction | S, W, Y |
| **-XC47 to -XC58** | Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.) | S, W, Y |
| **-XC59 to -XC61** | Change of port direction | S, W, X, Y<br>Z, T, J, K |
| **-X7**∗ | Heat resistant type (100°C) | S, W, X, Y<br>Z, T, J, K |
| **-X16** | Fluororubber seal | S, W, X, Y<br>Z, T, J, K |
| **-X10** | Both sides angle adjustable | S, W, X, Y<br>Z, T, J, K |
| **-X11** | One side angle adjustable,<br>One side with cushion | S, W, X, Y<br>Z, T, J, K |

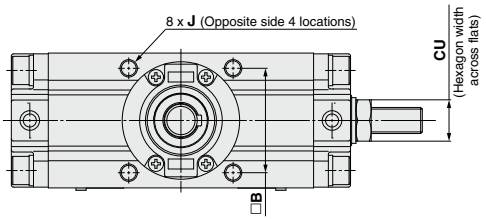
∗ -X7: Not available for the built-in magnet type.

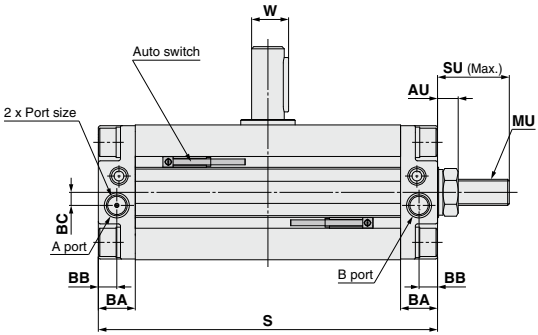


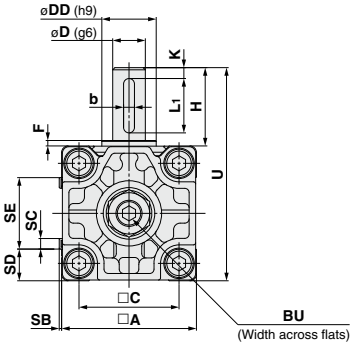
## Dimensions/Basic Type: C□RA1BSU

**Size: 50/63/80/100**

**Single shaft: C□RA1BSU**




- Drawing shows the appearance for rotation of 90° and 100°.
- Dimensions show pressurization to B port.
- Drawing shows the auto switch mounted on the port side.

∗ ( ) are the dimensions for rotation of 180° and 190°.

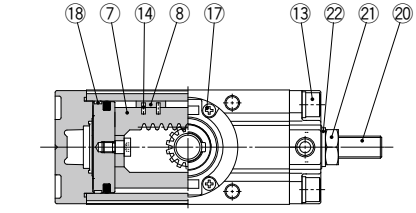
| Size | Port size Note 1) | A | B | C | D (g6) | DD (h9) | F | H | J | K | With auto switch | | | | | Without auto switch | U | W | BA | BB | BC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | S | SB | SC | SD | SE | S | | | | | |
| **50** | Rc1/8 | 62 | 48 | 46 | 15 | 25 | 2.5 | 36 | M8 x 1.25 depth 8 | 5 | 156 (189) | 1.5 | 5 | 14.5 | 33 | 144 (177) | 98 | 17 | 17 | 8.5 | 6 |
| **63** | Rc1/8 | 76 | 60 | 57 | 17 | 30 | 2.5 | 41 | M10 x 1.5 depth 12 | 5 | 175 (213.5) | 1.5 | 5 | 21.5 | 33 | 163 (201.5) | 117 | 19.5 | 20 | 10 | 7 |
| **80** | Rc1/4 | 92 | 72 | 70 | 20 | 35 | 3 | 50 | M12 x 1.75 depth 13 | 5 | 199 (243) | 1.5 | 5 | 29.5 | 33 | 186 (230) | 142 | 22.5 | 23.5 | 12 | 8 |
| **100** | Rc3/8 | 112 | 85 | 85 | 25 | 40 | 4 | 60 | M12 x 1.75 depth 14 | 5 | 259 (325) | 1.5 | 5 | 39.5 | 33 | 245 (311) | 172 | 28 | 25 | 12.5 | 8 |

| Size | AU | BU | CU | SU | MU | Key dimensions Note 2) | |
|---|---|---|---|---|---|---|---|
| | | | | | | b | L1 |
| **50** | 9.5 | 6 | 19 | 33 | M12 x 1.75 | $5^{0}_{-0.030}$ | 25 |
| **63** | 10.5 | 6 | 22 | 35.5 | M14 x 2 | $6^{0}_{-0.030}$ | 30 |
| **80** | 12.5 | 8 | 24 | 44 | M16 x 2 | $6^{0}_{-0.030}$ | 40 |
| **100** | 14.5 | 10 | 30 | 56 | M20 x 2.5 | $8^{0}_{-0.036}$ | 45 |

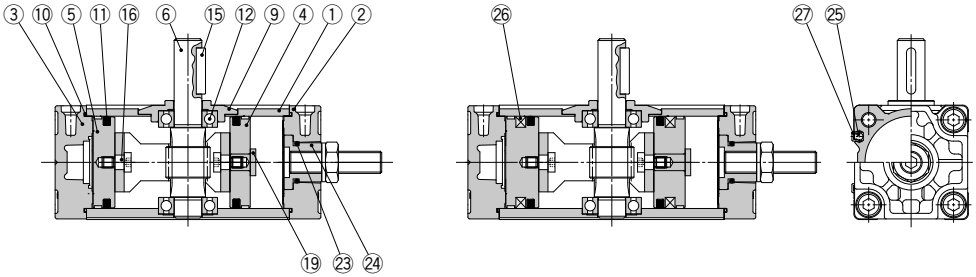
Note 1) In addition to Rc, G, NPT and NPTF are also available.
Note 2) A parallel key is included in the same package, (but not assembled).

The dimensions of the shaft type (W: Double shaft, X: Single shaft with four chamfers, Y: Double shaft with key, Z: Double shaft with four chamfers, T: Single round shaft, J: Double shaft (round shaft, with four chamfers, K: Double round shaft), foot type, and flange type are the same as the standard type. For details, refer to pages 1420 to 1423.

## Construction




**With auto switch**






### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Body** | Aluminum alloy | Anodized |
| 2 | **Right cover** | Aluminum alloy | Metallic coating |
| 3 | **Left cover** | Aluminum alloy | Metallic coating |
| 4 | **Right piston** | Aluminum alloy | |
| 5 | **Left piston** | Aluminum alloy | |
| 6 | **Shaft** | Alloy steel | |
| 7 | **Rack** | Carbon steel | Nitrided |
| 8 | **Slider** | Resin | |
| 9 | **Bearing retainer** | Aluminum alloy | Chromated |
| 10 | **Tube gasket** | NBR | |
| 11 | **Piston seal** | NBR | |
| 12 | **Bearing** | High carbon chrome bearing steel | |
| 13 | Hexagon socket head cap screw with washer | Alloy steel | Zinc chromated |
| 14 | **Spring pin** | Steel | Zinc chromated |

| No. | Description | Material | Note |
|---|---|---|---|
| 15 | **Parallel key** | Carbon steel | |
| 16 | **Connecting screw** | Carbon steel | Zinc chromated |
| 17 | Cross-recessed pan head tapping screw | Steel | Zinc chromated |
| 18 | **Wear ring** | Resin | |
| 19 | **Stopper** | Carbon steel | Zinc chromated |
| 20 | Hexagon socket head set screw (flat point) | Alloy steel | Zinc chromated |
| 21 | **Hexagon nut** | Steel | Zinc chromated |
| 22 | **Seal washer** | NBR | |
| 23 | **O-ring** | NBR | |
| 24 | **Angle adjusting collar** | Carbon steel | Zinc chromated |
| 25 | **Auto switch** | — | |
| 26 | **Magnet** | — | |
| 27 | **Switch spacer** | Resin | |

### Replacement Parts

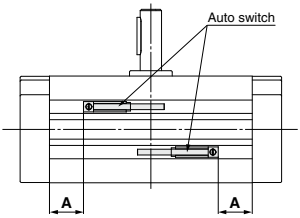
| Size | Part no. | Corresponding parts |
|---|---|---|
| **50** | P694020-22 | ⑧, ⑩, ⑪, ⑭, ㉒ are included as a set. |
| **63** | P694030-22 | |
| **80** | P694040-22 | |
| **100** | P694050-22 | |

Note) When ordering replacement parts, write "1" for one set of the parts per actuator.
A grease pack (10 g) is included.
If an additional grease pack is needed, order with the following part number. **Grease pack part number: GR-S-010** (10 g)

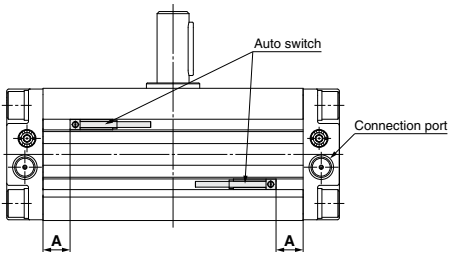
# Auto Switch Mounting

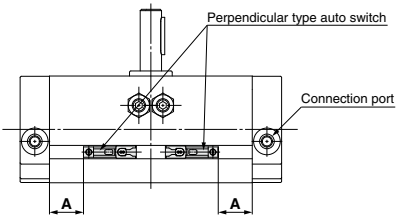
## Auto Switch Proper Mounting Position at Rotation End

**Size: 30**

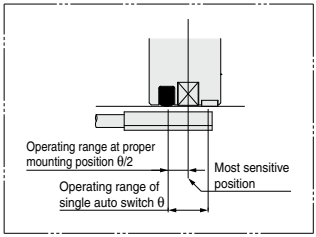



**Size: 50 to 100**




For size 30, only the perpendicular type auto switch can be mounted since two auto switches are mounted in the same switch groove when mounting the switch on the connection port side.




| Size | Rotating angle | D-M9□/M9□V<br>D-M9□W/M9□WV<br>D-M9□A/M9□AV | | D-A9□/A9□V | |
|---|---|---|---|---|---|
| | | Proper mounting position **A** (mm) | Operating range θ (°) | Proper mounting position **A** (mm) | Operating range θ (°) |
| **30** | 90 | 13 | 42° | 9 | 81° |
| | 180 | 22 | | 18 | |
| **50** | 90 | 22.5 | 30° | 18.5 | 44° |
| | 180 | 39 | | 35 | |
| **63** | 90 | 25 | 28° | 21 | 49° |
| | 180 | 44.5 | | 40.5 | |
| **80** | 90 | 27.5 | 23° | 23.5 | 41° |
| | 180 | 49.5 | | 45.5 | |
| **100** | 90 | 42.5 | 15° | 38.5 | 29° |
| | 180 | 75.5 | | 71.5 | |

∗ Values which include hysteresis are for guideline purposes only, they are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment. Adjust the auto switch after confirming the operating conditions in the actual setting.

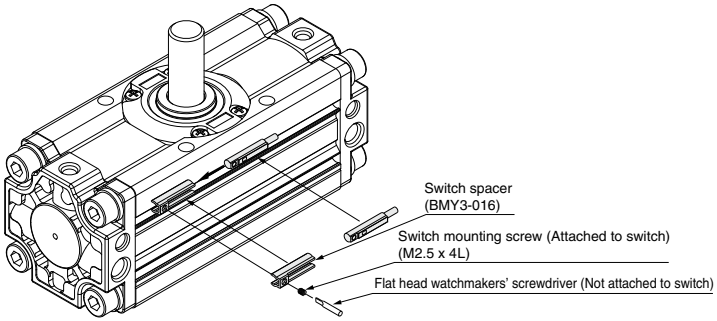
### Switch Spacer/Part No.

| Size | **30** | **50** | **63** | **80** | **100** |
|---|---|---|---|---|---|
| Switch spacer part no. | BMY3-016 | | | | |

∗ The above part number includes one switch spacer.
∗ Two switch spacers are included with the product with built-in magnet.

## Auto Switch Mounting

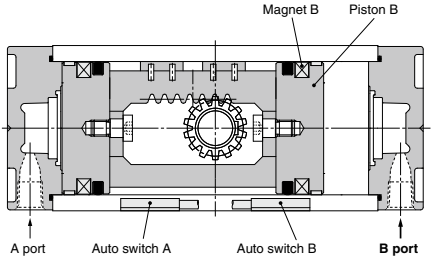
To fix the auto switch, hold the switch spacer, and insert into the groove. Make sure that the switch spacer is in the right position or correct the position if necessary, then slide the auto switch in the groove so that it goes into the spacer. Confirm where the mounting position is, and tighten the auto switch mounting screw using a flat head screwdriver.



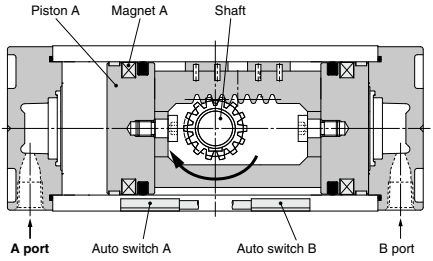

Note) When tightening an auto switch mounting screw, use a watchmakers' screwdriver with a handle of approximately 5 to 6 mm in diameter.
Also, tighten with a torque of about 0.1 to 0.15 N·m.
As a guide, turn about 90° past the point at which tightening can first be felt.

## Auto Switch Working Principle

**[Pressure is applied from the B port.]**
The auto switch B is turned ON by the magnet B in the state that the pressure is applied from the B port and the piston B moves to the left side. At this time, the auto switch A turns OFF.




**[Pressure is applied from the A port.]**
When the pressure is applied from the A port, the piston A moves to the right side and the shaft rotates clockwise. The auto switch B turns OFF and the auto switch A is turned ON by the magnet A at the rotation end.



# *Series CRA1*
# Simple Specials

Shaft shape pattern is dealt with simple made-to-order system. A specification sheet is available for ordering. Please access SMC website, or consult your nearest sales branch.

Made to Order

## Shaft Pattern Sequencing I

Symbol
**-XA1 to -XA24**

**Applicable shaft type: S, W, Y**

### How to Order

C | D | RA1 | B | S | | 50 | | – | 90 | | Z – | M9BW | | – X | A1 | A2 | C8 | C59

**Magnet**

| | |
|---|---|
| Nil | None |
| D | Built-in magnet |

**Mounting**

| | |
|---|---|
| B | Basic type |
| L | Foot type |

**Shaft type**

| | |
|---|---|
| S | Single shaft |
| W | Double shaft |
| Y | Double shaft with key |

**Variation**

| | |
|---|---|
| Nil | Without angle adjustment |
| U* | Angle adjustable type |
| H* | Air-hydro type |

* Except size 30

**Size**

| |
|---|
| 30 |
| 50 |
| 63 |
| 80 |
| 100 |

**Port type**

| Size | | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|
| Nil | M thread | M5 | — | — | — | — |
| | Rc | — | 1/8 | 1/8 | 1/4 | 3/8 |
| TF | G | — | | | | |
| TN | NPT | — | | | | |
| TT | NPTF | — | | | | |

**Rotating angle**

| | |
|---|---|
| 90 | 90° |
| 180 | 180° |
| 100* | 100° |
| 190* | 190° |

* Except size 30

**Cushion**

| | |
|---|---|
| Nil | Without air cushion |
| C* | With air cushion |

* Except angle adjustable type, air-hydro type

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch (Built-in magnet) |

* For applicable auto switch model, refer to page 1417.
* Auto switches are shipped together, (but not assembled).

**Number of auto switches**

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

**Symbol for simple specials, made-to-order products**

* Combination of XA is possible for up to 2 types.

**• Combination 3 types** / **• Combination of applicable chart**

| | | | | |
|---|---|---|---|---|
| A | 1 | A24 | C59 | → Chart 1, 2 |
| A13 | C | 8 | C59 | → Chart 2, 7 |

Combination is available only when all the conditions are fulfilled in the combination chart.

**• Combination 4 types** / **• Combination of applicable chart**

| | | | | | |
|---|---|---|---|---|---|
| A | 1 | A | 2 | C 8 C59 | → Chart 1, 2, 7 |
| A | 2 | A24 | C10 | C60 | → Chart 1, 2, 7 |

Combination is available only when all the conditions are fulfilled in the combination chart.

* Combination of simple special and made-to-order is possible for up to 4 types.
* Above is the typical example of combination.

Symbol

## Shaft Pattern Sequencing I

**-XA1 to -XA24**

**Applicable shaft type: S, W, Y**

### Combination Chart of Simple Specials for Shaft Shape

**Chart 1. Combination between -XA□ and -XA□ (S, W, Y shaft)**

| Symbol | Description | Axial direction | | Applicable shaft type | | | Combination | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Top | Bottom | S | W | Y | -XA1 | -XA2 | -XA13 | -XA24 |
| **-XA1** | Shaft-end female thread | ● | — | ● | ● | ● | — | ● | — | ● |
| **-XA2** | Shaft-end female thread | — | ● | ● | ● | ● | ● | — | — | ● |
| **-XA13** | Shaft through-hole | ● | ● | ● | ● | ● | — | — | — | ● |
| **-XA14** | Shaft through-hole + Shaft-end female thread | ● | — | ● | ● | ● | — | — | — | ● |
| **-XA15** | Shaft through-hole + Shaft-end female thread | — | ● | ● | ● | ● | — | — | — | ● |
| **-XA16** | Shaft through-hole + Double shaft-end female thread | ● | ● | ● | ● | ● | — | — | — | ● |
| **-XA17** | Shorted shaft (Long shaft with key) | ● | — | ● | ● | ● | — | ● | ● | — |
| **-XA18** | Shorted shaft (Short shaft and with four sided chamfer) | — | ● | — | ● | ● | W, Y* | — | W, Y* | — |
| **-XA19** | Shorted shaft (Double shaft) | ● | ● | — | ● | ● | — | — | W, Y* | — |
| **-XA20** | Reverse shaft, Shorted shaft | ● | ● | — | ● | ● | — | — | S, W* | — |
| **-XA24** | Double key | ● | — | ● | ● | ● | — | — | — | — |

∗ Corresponding shafts type available for combination

### Combination Chart of Made to Order

**Chart 2. Combination between -XA□ and -XC□**

| Symbol | Description | Applicable shaft type | | | Applicable size | Combination | |
|---|---|---|---|---|---|---|---|
| | | S | W | Y | | -XA1, 2, 13 to 19 | -XA20, 24 |
| **-XC7** | Reversed shaft | ● | ● | — | 50, 63, 80, 100 | — | — |
| **-XC8 to -XC11** | Change of rotation range | ● | ● | ● | | ● | — |
| **-XC30** | Changed to fluorine grease | ● | ● | ● | 30 to 100 | ● | ● |
| **-XC31 to -XC36** | Change of rotation range and shaft rotation direction | ● | ● | ● | 50, 63, 80, 100 | ● | — |
| **-XC37 to -XC46** | Change of rotation range and angle adjusting direction | ● | ● | ● | | ● | — |
| **-XC47 to -XC58** | Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.) | ● | ● | ● | | ● | — |
| **-XC59 to -XC61** | Change of port location | ● | ● | ● | 30 to 100 | ● | ● |
| **-XC63** | One side air-hydro, One side air | ● | ● | ● | 50, 63, 80, 100 | ● | ● |
| **-XC64** | One side air-hydro, One side air | ● | ● | ● | | ● | ● |

∗ -XC8 to -XC11 and -XC31 to -XC36 are only the standard type.
∗ -XC37 to -XC46 and -XC47 to -XC58 are only the angle adjustable type.
∗ -XC63 and -XC64 are only the air-hydro type.

**Chart 3. Combination between -X□ and -XC□**

| Symbol | Description | Applicable shaft type | | | Applicable size | Combination | |
|---|---|---|---|---|---|---|---|
| | | S | W | X | | -XA1, 2, 13 to 19 | -XA20, 24 |
| **-X6** | Stainless steel shaft/bolt, etc. | ● | ● | ● | 30 to 100 | ● | ● |
| **-X7** | Heat resistant (100°C) | ● | ● | ● | | ● | ● |
| **-X10** | Both sides angle adjustable | ● | ● | ● | 50 to 100 | ● | ● |
| **-X11** | One side angle adjustable, One side with cushion | ● | ● | ● | | ● | ● |
| **-X16** | Fluororubber seal | ● | ● | ● | 30 to 100 | ● | ● |

∗ -X10 and -X11 are only the angle adjustable type.

Symbol

## Shaft Pattern Sequencing I

**-XA1 to -XA17**

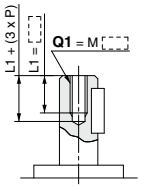
### Applicable shaft type: S, W, Y

#### Additional Reminders

1. Enter the dimensions within a range that allows for additional machining.
2. SMC will make appropriate arrangements if no dimensional, tolerance, or finish instructions are given in the diagram.
3. The length of the unthreaded portion is 2 to 3 pitches.
4. Unless specified otherwise, the thread pitch is based on coarse metric threads.
   P = Thread pitch
   M4 x 0.7, M5 x 0.8, M6 x 1,
   M8 x 1.25, M10 x 1.5
5. Enter the desired figures in the ☐ portion of the diagram.
6. Chamfer face of the parts machining additionally is C0.5.

**Symbol: A1** Machine female threads into the long shaft. Note) Except flange type

The maximum dimension L1 is, as a rule, twice the thread size.
(Example) For M4: L1 = 8
· Applicable shaft types: S, W, Y

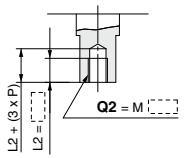



(mm)

| Size | Q1 |
|---|---|
| 30 | M3 |
| 50 | M4, M5, M6 |
| 63 | M4, M5, M6 |
| 80 | M4, M5, M6, M8 |
| 100 | M5, M6, M8, M10 |

**Symbol: A2** Machine female threads into the short shaft. Note) Except flange type

The maximum dimension L2 is, as a rule, twice the thread size.
(Example) For M4: L2 = 8
· Applicable shaft types: S, W, Y

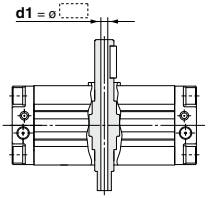



(mm)

| Size | Q2 |
|---|---|
| 30 | M3, M4 |
| 50 | M4, M5, M6 |
| 63 | M4, M5, M6 |
| 80 | M4, M5, M6, M8 |
| 100 | M5, M6, M8, M10 |

**Symbol: A13** Shaft through-hole Note) Except flange type

Minimum machining diameter for d1 is 0.1.
· Applicable shaft types: S, W, Y

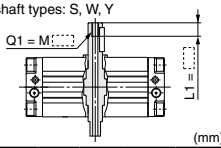



(mm)

| Size | d1 |
|---|---|
| 30 | ø2.5 |
| 50 | ø4 to ø 7 |
| 63 | ø4 to ø 8 |
| 80 | ø6.8 to ø11 |
| 100 | ø6.8 to ø13 |

**Symbol: A14** Note) Except flange type

A special end is machined onto the long shaft, and a through-hole is drilled into it. Female threads are machined into the throughhole, whose diameter is equivalent to the pilot hole diameter.
The maximum dimension L1 is, as a rule, twice the thread size.
(Example) For M5: L1 = 10
· Applicable shaft types: S, W, Y

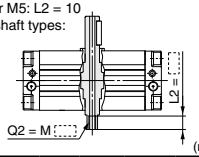



(mm)

| Thread \ Size | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|
| M3 x 0.5 | ø2.5 | — | — | — | — |
| M5 x 0.8 | — | ø4 | ø4 | — | — |
| M6 x 1 | — | ø5 | ø5 | — | — |
| M8 x 1.25 | — | — | ø6.8 | ø 6.8 | ø 6.8 |
| M10 x 1.5 | — | — | — | ø 8.5 | ø 8.5 |
| M12 x 1.75 | — | — | — | ø10.3 | ø10.3 |
| Rc1/8 | — | — | — | ø 8 | ø 8 |
| Rc1/4 | — | — | — | — | ø11 |

**Symbol: A15** Note) Except flange type

A special end is machined onto the short shaft, and a through-hole is drilled into it. Female threads are machined into the through-hole, whose diameter is equivalent to the pilot hole diameter.
The maximum dimension L2 is, as a rule, twice the thread size.
(Example) For M5: L2 = 10
· Applicable shaft types:
S, W, Y

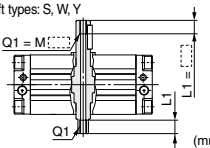



(mm)

| Thread \ Size | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|
| M3 x 0.5 | ø2.5 | — | — | — | — |
| M5 x 0.8 | — | ø4 | ø4 | — | — |
| M6 x 1 | — | ø5 | ø5 | — | — |
| M8 x 1.25 | — | — | ø6.8 | ø 6.8 | ø 6.8 |
| M10 x 1.5 | — | — | — | ø 8.5 | ø 8.5 |
| M12 x 1.75 | — | — | — | ø10.3 | ø10.3 |
| Rc1/8 | — | — | — | ø 8 | ø 8 |
| Rc1/4 | — | — | — | — | ø11 |

**Symbol: A16** Note) Except flange type

A special end is machined onto both the long and short shafts, and a through-hole is drilled into both shafts. Female threads are machined into the through-holes, whose diameter is equivalent to the diameter of the pilot holes.
The maximum dimension L1 is, as a rule, twice the thread size.
(Example) For M5: L1 = 10
· Applicable shaft types: S, W, Y
· Equal dimensions are indicated by the same marker.

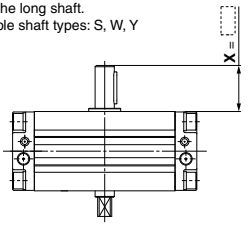



(mm)

| Thread \ Size | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|
| M3 x 0.5 | ø2.5 | — | — | — | — |
| M5 x 0.8 | — | ø4 | ø4 | — | — |
| M6 x 1 | — | ø5 | ø5 | — | — |
| M8 x 1.25 | — | — | ø6.8 | ø 6.8 | ø 6.8 |
| M10 x 1.5 | — | — | — | ø 8.5 | ø 8.5 |
| M12 x 1.75 | — | — | — | ø10.3 | ø10.3 |
| Rc1/8 | — | — | — | ø 8 | ø 8 |
| Rc1/4 | — | — | — | — | ø11 |

**Symbol: A17** Note) Except flange type

Shorten the long shaft.
· Applicable shaft types: S, W, Y




(mm)

| Size | X |
|---|---|
| 30 | 15 to 25 |
| 50 | 18.5 to 36 |
| 63 | 21 to 41 |
| 80 | 25 to 50 |
| 100 | 32.5 to 60 |

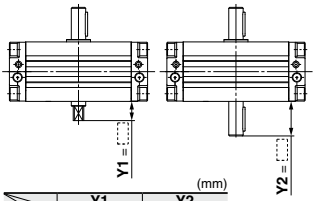
Symbol
**-XA18 to -XA24**

## Shaft Pattern Sequencing I

### Applicable shaft type: S, W, Y

**Symbol: A18** Note) Except flange type

Shorten the short shaft.
· Applicable shaft types: W, Y

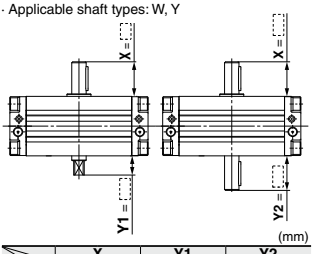



(mm)

| Size \ Shaft type | Y1 W | Y2 Y |
|---|---|---|
| 30 | 3 to 8 | 15 to 25 |
| 50 | 1 to 20 | 18.5 to 36 |
| 63 | 1 to 22 | 21 to 41 |
| 80 | 1 to 25 | 25 to 50 |
| 100 | 1 to 30 | 32.5 to 60 |

**Symbol: A19** Note) Except flange type

Both the long shaft and short shaft are shortened.
· Applicable shaft types: W, Y

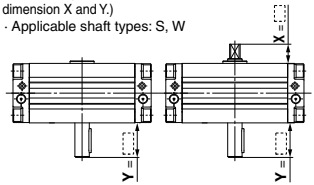



(mm)

| Size \ Shaft type | X W | X Y | Y1 W | Y2 Y |
|---|---|---|---|---|
| 30 | 15 to 25 | | 3 to 8 | 15 to 25 |
| 50 | 18.5 to 36 | | 1 to 20 | 18.5 to 36 |
| 63 | 21 to 41 | | 1 to 22 | 21 to 41 |
| 80 | 25 to 50 | | 1 to 25 | 25 to 50 |
| 100 | 32.5 to 60 | | 1 to 30 | 32.5 to 60 |

**Symbol: A20** Note) Except flange type

Reverse the assembly of the shaft. (Thus shortening the long end and the short end of the shaft.)
(If shortening the shaft is not required, indicate "∗" for dimension X and Y.)
· Applicable shaft types: S, W

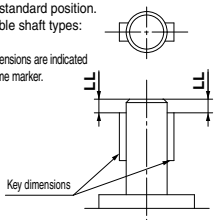



(mm)

| Size \ Shaft type | X W | X S | Y W |
|---|---|---|---|
| 50 | 2 to 11 | | 18.5 to 36 |
| 63 | 2.5 to 16.5 | | 21 to 41 |
| 80 | 3 to 20 | | 25 to 50 |
| 100 | 3 to 22 | | 32.5 to 60 |

**Symbol: A24**

Double key
Keys and keyways are machined additionally at 180° from the standard position.
· Applicable shaft types: S, W, Y
· Equal dimensions are indicated by the same marker.




(mm)

| Size | Key dimensions | LL |
|---|---|---|
| 30 | 3 x 3 x 14 | 3 |
| 50 | 5 x 5 x 25 | 5 |
| 63 | 6 x 6 x 30 | 5 |
| 80 | 6 x 6 x 40 | 5 |
| 100 | 8 x 7 x 45 | 5 |

## Shaft Pattern Sequencing Ⅱ

Symbol
**-XA33 to -XA59**

**Applicable shaft type: X, Z, T, J, K**

### How to Order

**C D RA1 B J [ ] 50 [ ] – 90 [ ] Z – M9BW [ ] – X A33 A34 C8 C30**

**Magnet**

| | |
|---|---|
| Nil | None |
| D | Built-in magnet |

**Mounting**

| | |
|---|---|
| B | Basic type |
| L | Foot type |

**Shaft type**

| | |
|---|---|
| X | Single shaft with four chamfers |
| Z | Double shaft with four chamfers |
| T | Single round shaft |
| J | Double shaft (round shaft, with four chamfers) |
| K | Double round shaft |

**Variation**

| | |
|---|---|
| Nil | Without angle adjustment |
| U* | Angle adjustable type |
| H* | Air-hydro type |

* Except size 30

**Size**

| |
|---|
| 30 |
| 50 |
| 63 |
| 80 |
| 100 |

**Port type**

| Size | | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|
| Nil | M thread | M5 | — | — | — | — |
| | Rc | — | 1/8 | 1/8 | 1/4 | 3/8 |
| TF | G | — | | | | |
| TN | NPT | — | | | | |
| TT | NPTF | — | | | | |

**Rotating angle**

| | |
|---|---|
| 90 | 90° |
| 180 | 180° |
| 100* | 100° |
| 190* | 190° |

* Except size 30

**Cushion**

| | |
|---|---|
| Nil | Without air cushion |
| C* | With air cushion |

* Except angle adjustable type, air-hydro type

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch (Built-in magnet) |

* For applicable auto switch model, refer to page 1417.
* Auto switches are shipped together, (but not assembled).

**Number of auto switches**

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

**Symbol for simple specials, made-to-order products**

* Combination of XA is possible for up to 2 types.

**• Combination 3 types** / **• Combination of applicable chart**

| | |
|---|---|
| A33 A34 C30 | Chart 4, 5 |
| A35 C 9 C59 | Chart 5, 7 |

Combination is available only when all the conditions are fulfilled in the combination chart.

**• Combination 4 types** / **• Combination of applicable chart**

| | |
|---|---|
| A33 A34 C30 C59 | Chart 4, 5, 7 |
| A45 A46 C30 C61 | Chart 4, 5, 7 |

Combination is available only when all the conditions are fulfilled in the combination chart.

* Combination of simple special and made-to-order is possible for up to 4 types.
* Above is the typical example of combination.

Symbol
**-XA33 to -XA59**

## Shaft Pattern Sequencing Ⅱ

**Applicable shaft type: X, Z, T, J, K**

## Combination Chart of Simple Specials for Shaft Shape

### Chart 4. Combination between -XA□ and -XA□

| Symbol | Description | Axial direction | | Applicable shaft type | | | | | Combination | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Top | Bottom | X | Z | T | J | K | ∗ Corresponding shafts type available for combination | | | | | | | | | |
| **-XA33** | Shaft-end female thread | ● | — | — | — | ● | ● | ● | **-XA33** | | | | | | | | | |
| **-XA34** | Shaft-end female thread | — | ● | — | — | ● | ● | ● | T, J, K∗ | **-XA34** | | | | | | | | |
| **-XA35** | Shaft-end female thread | ● | — | ● | ● | — | — | — | — | — | **-XA35** | | | | | | | |
| **-XA36** | Shaft-end female thread | — | ● | ● | ● | — | — | — | — | — | X, Z∗ | **-XA36** | | | | | | |
| **-XA37** | Stepped round shaft | ● | — | — | — | ● | ● | ● | — | T, J, K∗ | — | — | **-XA37** | | | | | |
| **-XA38** | Stepped round shaft | — | ● | — | — | — | — | ● | K∗ | — | — | — | K∗ | | | | | |
| **-XA40** | Shaft through-hole | ● | ● | — | — | ● | — | ● | — | — | — | — | — | | | | | |
| **-XA41** | Shaft through-hole | ● | ● | ● | ● | — | ● | — | — | — | — | — | — | | | | | |
| **-XA43** | Shaft through-hole + Double shaft-end female thread | ● | ● | — | — | ● | — | ● | — | — | — | — | — | | | | | |
| **-XA44** | Shaft through-hole + Double shaft-end female thread | ● | ● | ● | ● | — | ● | — | — | — | — | — | — | **-XA38** | | | | |
| **-XA45** | Middle-cut chamfer | ● | — | — | — | ● | ● | ● | — | T, J, K∗ | — | — | — | K∗ | **-XA40** | **-XA41** | **-XA45** | |
| **-XA46** | Middle-cut chamfer | — | ● | — | — | — | — | ● | K∗ | — | — | — | K∗ | — | — | — | K∗ | **-XA46** |
| **-XA51** | Change of long shaft length (Without keyway) | ● | — | — | — | ● | ● | ● | — | T, J, K∗ | — | — | — | K∗ | T, K∗ | J∗ | — | K∗ |
| **-XA52** | Change of short shaft length (Without keyway) | — | ● | — | — | — | — | ● | K∗ | — | — | — | — | — | K∗ | — | K∗ | — |
| **-XA53** | Change of double shaft length (Both without keyway) | ● | ● | — | — | — | — | ● | — | — | — | — | — | — | K∗ | — | — | — |
| **-XA54** | Change of long shaft length (With four chamfers) | ● | — | ● | ● | — | — | — | — | — | — | X, Z∗ | — | — | — | X, Z∗ | — | — |
| **-XA55** | Change of short shaft length (With four chamfers) | — | ● | — | ● | — | ● | — | J∗ | — | Z∗ | — | J∗ | — | — | J, Z∗ | J∗ | — |
| **-XA56** | Change of double shaft length (Both with four chamfers) | ● | ● | — | ● | — | — | — | — | — | — | — | — | — | — | Z∗ | — | — |
| **-XA57** | Change of double shaft length (Without keyway, With four chamfers) | ● | ● | — | — | — | ● | — | — | — | — | — | — | — | — | J∗ | — | — |
| **-XA58** | Reversed shaft, Change of shaft length (With four chamfers, Without keyway) | ● | ● | — | — | ● | ● | — | — | — | — | — | — | — | T∗ | J∗ | — | — |
| **-XA59** | Reversed shaft, Change of shaft length (With four chamfers) | — | ● | ● | — | — | — | — | — | — | — | — | — | — | — | X∗ | — | — |

## Combination Chart of Made to Order

### Chart 5. Combination between -XA□ and -XC□

| Symbol | Description | Applicable shaft type | | | | | Applicable size | Combination |
|---|---|---|---|---|---|---|---|---|
| | | X | Z | T | J | K | | -XA33 to 38, 40 to 46, 51 to 59 |
| **-XC7** | Reversed shaft | ● | — | ● | ● | — | 50, 63, 80, 100 | — |
| **-XC8 to -XC11** | Change of rotation range | — | — | — | — | — | | — |
| **-XC30** | Changed to fluorine grease | ● | ● | ● | ● | ● | 30 to 100 | ● |
| **-XC31 to -XC36** | Change of rotation range and shaft rotation direction | — | — | — | — | — | 50, 63, 80, 100 | — |
| **-XC37 to -XC46** | Change of rotation range and angle adjusting direction | — | — | — | — | — | | — |
| **-XC47 to -XC58** | Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.) | — | — | — | — | — | | — |
| **-XC59 to -XC61** | Change of port location | ● | ● | ● | ● | ● | 30 to 100 | ● |
| **-XC63** | One side air-hydro, One side air | ● | ● | ● | ● | ● | 50, 63, 80, 100 | ● |
| **-XC64** | One side air-hydro, One side air | ● | ● | ● | ● | ● | | ● |

∗ -XC8 to -XC11 and -XC31 to -XC36 are only the standard type.
∗ -XC37 to -XC46 and -XC47 to -XC58 are only the angle adjustable type.
∗ -XC63 and -XC64 are only the air-hydro type.

### Chart 6. Combination between -X□ and -XC□

| Symbol | Description | Applicable shaft type | | | | | Applicable size | Combination |
|---|---|---|---|---|---|---|---|---|
| | | X | Z | T | J | K | | -XA33 to 38, 40 to 46, 51 to 59 |
| **-X6** | Stainless steel shaft/bolt, etc. | ● | ● | ● | ● | ● | 30 to 100 | ● |
| **-X7** | Heat resistant (100°C) | ● | ● | ● | ● | ● | | ● |
| **-X10** | Both sides angle adjustable | ● | ● | ● | ● | ● | 50 to 100 | ● |
| **-X11** | One side angle adjustable, One side with cushion | ● | ● | ● | ● | ● | | ● |
| **-X16** | Fluororubber seal | ● | ● | ● | ● | ● | 30 to 100 | ● |

∗ -X10 and -X11 are only the angle adjustable type.

Symbol

## Shaft Pattern Sequencing Ⅱ

**-XA33 to -XA41**

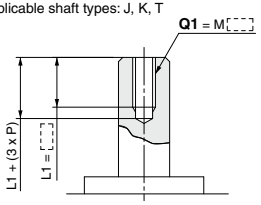
### Applicable shaft type: X, Z, T, J, K

#### Additional Reminders

1. Enter the dimensions within a range that allows for additional machining.
2. SMC will make appropriate arrangements if no dimensional, tolerance, or finish instructions are given in the diagram.
3. The length of the unthreaded portion is 2 to 3 pitches.
4. Unless specified otherwise, the thread pitch is based on coarse metric threads.
   P = Thread pitch
   M4 x 0.7, M5 x 0.8
   M6 x 1, M8 x 1.25, M10 x 1.5
5. Enter the desired figures in the ☐ portion of the diagram.
6. Chamfer face of the parts machining additionally is C0.5.

**Symbol: A33** Machine female threads into the long shaft. Note) Except flange type

The maximum dimension L1 is, as a rule, twice the thread size.
(Example) For M4: L1 = 8
· Applicable shaft types: J, K, T

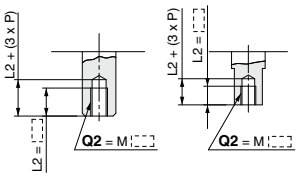



(mm)

| Size | Q1 |
|---|---|
| 30 | M3 |
| 50 | M4, M5, M6, M8 |
| 63 | M4, M5, M6, M8, M10 |
| 80 | M4, M5, M6, M8, M10, M12 |
| 100 | M5, M6, M8, M10, M12 |

**Symbol: A34** Machine female threads into the short shaft. Note) Except flange type

The maximum dimension L2 is, as a rule, twice the thread size.
(Example) For M4: L2 = 8
· Applicable shaft types: J, K, T

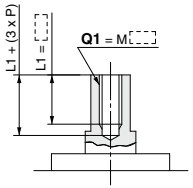



(mm)

| Size | Q2 |
|---|---|
| 30 | M3 |
| 50 | M4, M5, M6, M8 |
| 63 | M4, M5, M6, M8, M10 |
| 80 | M4, M5, M6, M8, M10, M12 |
| 100 | M5, M6, M8, M10, M12 |

**Symbol: A35** Machine female threads into the long shaft. Note) Except flange type

The maximum dimension L1 is, as a rule, twice the thread size.
(Example) For M4: L1 = 8
· Applicable shaft types: X, Z

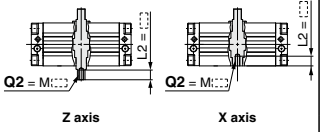



(mm)

| Size | Q1 |
|---|---|
| 30 | M3 |
| 50 | M4, M5, M6, M8 |
| 63 | M4, M5, M6, M8, M10 |
| 80 | M4, M5, M6, M8, M10, M12 |
| 100 | M5, M6, M8, M10, M12 |

**Symbol: A36** Machine female threads into the short shaft. Note) Except flange type

The maximum dimension L2 is, as a rule, twice the thread size.
(Example) For M4: L2 = 8
· Applicable shaft types: X, Z



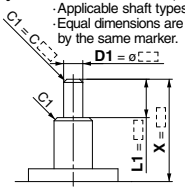

Z axis X axis

(mm)

| Size | Q2 |
|---|---|
| 30 | M3 |
| 50 | M4, M5, M6, M8 |
| 63 | M4, M5, M6, M8, M10 |
| 80 | M4, M5, M6, M8, M10, M12 |
| 100 | M5, M6, M8, M10, M12 |

**Symbol: A37** Note) Except flange type

The long shaft can be further shortened by machining it into a stepped round shaft.
· The minimum unit of the dimensions within a range that allows for machining is 0.1.
(If shortening the shaft is not required, indicate "∗" for dimension X.)
(If not specifying dimension C1, indicate "∗" instead.)
· Applicable shaft types: J, K, T
· Equal dimensions are indicated by the same marker.

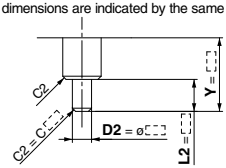



(mm)

| Size | X | L1max | D1 |
|---|---|---|---|
| 30 | 3 to 25 | X-2 | ø5 to ø 7.9 |
| 50 | 3.5 to 36 | X-2.5 | ø5 to ø14.9 |
| 63 | 3.5 to 41 | X-2.5 | ø5 to ø16.9 |
| 80 | 4 to 50 | X-3 | ø8 to ø19.9 |
| 100 | 5 to 60 | X-4 | ø8 to ø24.9 |

**Symbol: A38** Note) Except flange type

The short shaft can be further shortened by machining it into a stepped round shaft.
· The minimum unit of the dimensions within a range that allows for machining is 0.1.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
(If not specifying dimension C2, indicate "∗" instead.)
· Applicable shaft type: K
· Equal dimensions are indicated by the same marker.

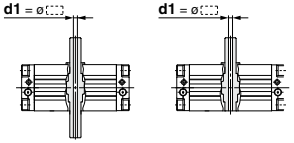



(mm)

| Size | Y | L2max | D2 |
|---|---|---|---|
| 30 | 3 to 25 | Y-2 | ø5 to ø 7.9 |
| 50 | 1 to 36 | Y | ø5 to ø14.9 |
| 63 | 1 to 41 | Y | ø5 to ø16.9 |
| 80 | 1 to 50 | Y | ø8 to ø19.9 |
| 100 | 1 to 60 | Y | ø8 to ø24.9 |

**Symbol: A40** Shaft through-hole Note) Except flange type

· Minimum machining diameter for d1 is 0.1.
· Applicable shaft types: K, T



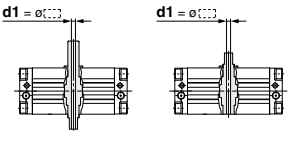

K axis T axis

(mm)

| Size | d1 |
|---|---|
| 30 | ø2.5 |
| 50 | ø4 to ø 7.5 |
| 63 | ø4 to ø 8 |
| 80 | ø6.8 to ø11 |
| 100 | ø6.8 to ø13 |

**Symbol: A41** Shaft through-hole Note) Except flange type

· Minimum machining diameter for d1 is 0.1.
· Applicable shaft types: J, X, Z




J axis X axis

(mm)

| Size | d1 |
|---|---|
| 30 | ø2.5 |
| 50 | ø4 to ø 7.5 |
| 63 | ø4 to ø 8 |
| 80 | ø6.8 to ø11 |
| 100 | ø6.8 to ø13 |

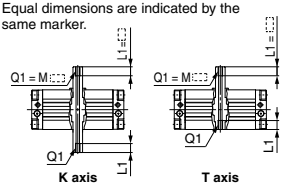
Symbol
**-XA43 to -XA55**

## Shaft Pattern Sequencing Ⅱ

### Applicable shaft type: X, Z, T, J, K

**Symbol: A43** Shaft through-hole and female thread
Note) Except flange type

- Applicable shaft types: K, T
- Equal dimensions are indicated by the same marker.

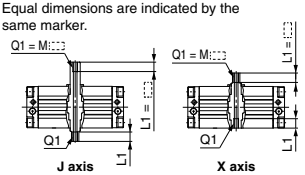



(mm)

| Thread \ Size | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|
| M3 x 0.5 | ø2.5 | — | — | — | — |
| M5 x 0.8 | — | ø4 | ø4 | — | — |
| M6 x 1 | — | ø5 | ø5 | — | — |
| M8 x 1.25 | — | — | ø6.8 | ø 6.8 | ø 6.8 |
| M10 x 1.5 | — | — | — | ø 8.5 | ø 8.5 |
| M12 x 1.75 | — | — | — | ø10.3 | ø10.3 |
| Rc1/8 | — | — | — | ø 8 | ø 8 |
| Rc1/4 | — | — | — | — | ø11 |

**Symbol: A44** Note) Except flange type

Shaft through-hole and female thread machining
- Applicable shaft types: J, X, Z
- Equal dimensions are indicated by the same marker.



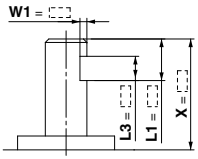

(mm)

| Thread \ Size | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|
| M3 x 0.5 | ø2.5 | — | — | — | — |
| M5 x 0.8 | — | ø4 | ø4 | — | — |
| M6 x 1 | — | ø5 | ø5 | — | — |
| M8 x 1.25 | — | — | ø6.8 | ø 6.8 | ø 6.8 |
| M10 x 1.5 | — | — | — | ø 8.5 | ø 8.5 |
| M12 x 1.75 | — | — | — | ø10.3 | ø10.3 |
| Rc1/8 | — | — | — | ø 8 | ø 8 |
| Rc1/4 | — | — | — | — | ø11 |

**Symbol: A45** Note) Except flange type

The long shaft can be further shortened by machining a middle-cut chamfer into it.
- The minimum unit of the dimensions within a range that allows for machining is 0.1.

(The position is that of the standard flat at the keyway portion.)
(If shortening the shaft is not required, indicate "=" for dimension X.)
- Applicable shaft types: J, K, T



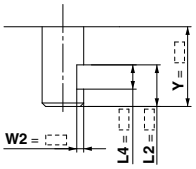

(mm)

| Size | X | W1 | L1max | L3max |
|---|---|---|---|---|
| **30** | 8.5 to 25 | 1 to 2 | X-2 | L1-2 |
| **50** | 12.5 to 36 | 1 to 5.5 | X-2.5 | L1-2 |
| **63** | 13.5 to 41 | 1 to 6.5 | X-2.5 | L1-2 |
| **80** | 16.5 to 50 | 1 to 8 | X-3 | L1-3 |
| **100** | 21 to 60 | 1.5 to 10.5 | X-4 | L1-4 |

**Symbol: A46** Note) Except flange type

The short shaft can be further shortened by machining a middle-cut chamfer into it.
- The minimum unit of the dimensions within a range that allows for machining is 0.1.

(The position is that of the standard flat at the keyway portion.)
(If shortening the shaft is not required, indicate "=" for dimension Y.)
- Applicable shaft type: K

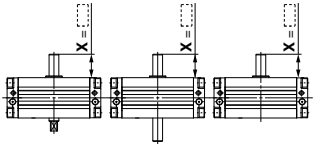



(mm)

| Size | Y | W2 | L2max | L4max |
|---|---|---|---|---|
| **30** | 8.5 to 25 | 1 to 2 | Y-2 | L2-2 |
| **50** | 10 to 36 | 1 to 5.5 | Y | L2-2 |
| **63** | 11 to 41 | 1 to 6.5 | Y | L2-2 |
| **80** | 13.5 to 50 | 1 to 8 | Y | L2-3 |
| **100** | 17 to 60 | 1.5 to 10.5 | Y | L2-4 |

**Symbol: A51** Note) Except flange type

Shorten the long shaft.
- Applicable shaft types: J, K, T

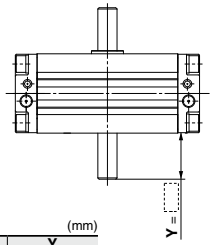



(mm)

| Size | X |
|---|---|
| **30** | 3 to 25 |
| **50** | 3.5 to 36 |
| **63** | 3.5 to 41 |
| **80** | 4 to 50 |
| **100** | 5 to 60 |

**Symbol: A52** Note) Except flange type

Shorten the short shaft.
- Applicable shaft type: K

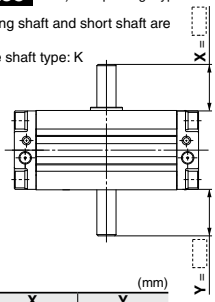



(mm)

| Size | Y |
|---|---|
| **30** | 3 to 25 |
| **50** | 1 to 36 |
| **63** | 1 to 41 |
| **80** | 1 to 50 |
| **100** | 1 to 60 |

**Symbol: A53** Note) Except flange type

Both the long shaft and short shaft are shortened.
- Applicable shaft type: K

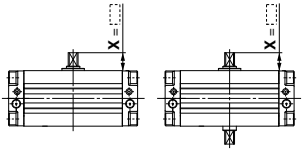



(mm)

| Size | X | Y |
|---|---|---|
| **30** | 3 to 25 | 3 to 25 |
| **50** | 3.5 to 36 | 1 to 36 |
| **63** | 3.5 to 41 | 1 to 41 |
| **80** | 4 to 50 | 1 to 50 |
| **100** | 5 to 60 | 1 to 60 |

**Symbol: A54** Note) Except flange type

Shorten the long shaft.
- Applicable shaft types: X, Z

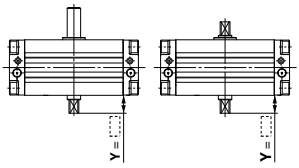



(mm)

| Size | X |
|---|---|
| **30** | 3 to 13 |
| **50** | 3.5 to 27 |
| **63** | 3.5 to 29 |
| **80** | 4 to 38 |
| **100** | 5 to 44 |

**Symbol: A55** Note) Except flange type

Shorten the short shaft.
- Applicable shaft types: J, Z




(mm)

| Size | Y |
|---|---|
| **30** | 3 to 10 |
| **50** | 1 to 20 |
| **63** | 1 to 22 |
| **80** | 1 to 25 |
| **100** | 1 to 30 |

Symbol

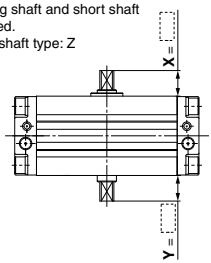
## Shaft Pattern Sequencing Ⅱ

**-XA56 to -XA59**

### Applicable shaft type: X, Z, T, J, K

**Symbol: A56** Note) Except flange type

Both the long shaft and short shaft are shortened.
· Applicable shaft type: Z

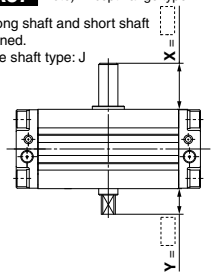



(mm)

| Size | X | Y |
|---|---|---|
| 30 | 3 to 13 | 3 to 10 |
| 50 | 3.5 to 27 | 1 to 20 |
| 63 | 3.5 to 29 | 1 to 22 |
| 80 | 4 to 38 | 1 to 25 |
| 100 | 5 to 44 | 1 to 30 |

**Symbol: A57** Note) Except flange type

Both the long shaft and short shaft are shortened.
· Applicable shaft type: J

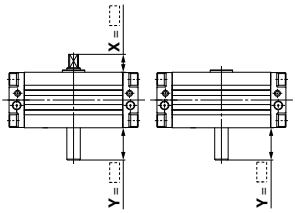



(mm)

| Size | X | Y |
|---|---|---|
| 30 | 3 to 25 | 3 to 10 |
| 50 | 3.5 to 36 | 1 to 20 |
| 63 | 3.5 to 41 | 1 to 22 |
| 80 | 4 to 50 | 1 to 25 |
| 100 | 5 to 60 | 1 to 30 |

**Symbol: A58** Note) Except flange type

The rotation axis is reversed, and then shorten the long and short shafts.
· Applicable shaft types: J, T

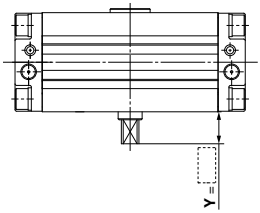



(mm)

| Size | Y |
|---|---|
| 50 | 1 to 36 |
| 63 | 1 to 41 |
| 80 | 1 to 50 |
| 100 | 1 to 60 |

**Symbol: A59** Note) Except flange type

The rotation axis is reversed, and then shorten the long and short shafts.
· Applicable shaft type: X




(mm)

| Size | Y |
|---|---|
| 50 | 1 to 27 |
| 63 | 1 to 29 |
| 80 | 1 to 38 |
| 100 | 1 to 44 |

# Made to Order

Please contact SMC for further details about dimensions, specifications and delivery.

Made to Order

## How to Order

C | D | RA1 | B | S | | 50 | | – | 90 | | Z – | M9BW | | – X | C8 | C30 | C59

**Magnet**

| | |
|---|---|
| Nil | None |
| D | Built-in magnet |

**Mounting**

| | |
|---|---|
| B | Basic type |
| L | Foot type |
| F* | Flange type |

* Except size 30

**Shaft type**

| | |
|---|---|
| S | Single shaft |
| W | Double shaft |
| X | Single shaft with four chamfers |
| Y | Double shaft with key |
| Z | Double shaft with four chamfers |
| T | Single round shaft |
| J | Double shaft (round shaft, with four chamfers) |
| K | Double round shaft |

**Variation**

| | |
|---|---|
| Nil | Without angle adjustment |
| U* | Angle adjustable type |
| H* | Air-hydro type |

* Except size 30

**Size**

| |
|---|
| 30 |
| 50 |
| 63 |
| 80 |
| 100 |

**Port type**

| Size | | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|
| Nil | M thread | M5 | — | — | — | — |
| | Rc | — | 1/8 | 1/8 | 1/4 | 3/8 |
| TF | G | — | | | | |
| TN | NPT | — | | | | |
| TT | NPTF | — | | | | |

**Rotating angle**

| | |
|---|---|
| 90 | 90° |
| 180 | 180° |
| 100* | 100° |
| 190* | 190° |

* Except size 30

**Cushion**

| | |
|---|---|
| Nil | Without air cushion |
| C* | With air cushion |

* Except angle adjustable type, air-hydro type

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch (Built-in magnet) |

* For applicable auto switch model, refer to page 1417.
* Auto switches are shipped together, (but not assembled).

**Number of auto switches**

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

**Symbol for simple specials, made-to-order products**

* Combination of XA is possible for up to 2 types.

• Combination 3 types: C | 7 | C30 | C59 → • Combination of applicable chart: Chart 7

Combination is available only when all the conditions are fulfilled in the combination chart.

* Combination of simple special and made-to-order is possible for up to 3 types.
* Above is the typical example of combination.

## Combination Chart of Made to Order

### Chart 7. Combination between -XC□ and -XC□

| Symbol | Description | Applicable shaft type S | W | X | Y | Z | T | J | K | Applicable size | Combination | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -XC7 | Reversed shaft | ● | ● | ● | — | — | ● | ● | — | 50, 63, 80, 100 | -XC7 | | | | | | | |
| -XC8 to -XC11 | Change of rotation range | ● | ● | — | ● | — | — | — | — | | — | -XC8 to -XC11 | | | | | | |
| -XC30 | Changed to fluorine grease | ● | ● | ● | ● | ● | ● | ● | ● | 30 to 100 | S,W,X,T,J* | S,W,Y* | -XC30 | | | | | |
| -XC31 to -XC36 | Change of rotation range and shaft rotation direction | ● | ● | — | ● | — | — | — | — | 50, 63, 80, 100 | — | — | S,W,Y* | -XC31 to -XC36 | | | | |
| -XC37 to -XC46 | Change of rotation range and angle adjusting direction | ● | ● | — | ● | — | — | — | — | | — | — | S,W,Y* | — | -XC37 to -XC46 | | | |
| -XC47 to -XC58 | Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.) | ● | ● | — | ● | — | — | — | — | | — | — | — | — | — | -XC47 to -XC58 | | |
| -XC59 to -XC61 | Change of port location | ● | ● | ● | ● | ● | ● | ● | ● | 30 to 100 | S,W,Y* | ● | S,W,Y* | S,W,Y* | S,W,Y* | S,W,Y* | -XC59 to -XC61 | |
| -XC63 | One side air-hydro, One side air | ● | ● | ● | ● | ● | ● | ● | ● | 50, 63, 80, 100 | ● | ● | — | ● | — | — | ● | |
| -XC64 | One side air-hydro, One side air | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | — | ● | — | — | ● | |

* -XC8 to -XC11 and -XC31 to -XC36 are only the standard type. * -XC37 to -XC46 and -XC47 to -XC58 are only the angle adjustable type.
* -XC63 and -XC64 are only the air-hydro type.

### Chart 8. Combination between -X□, -XC□

| Symbol | Description | Applicable shaft type S | W | X | Y | Z | T | J | K | Applicable size | Combination -XC7 | -XC8 to -XC11 | -XC30 | -XC31 to -XC36 | -XC37 to -XC58 | -XC59 to -XC61 | -XC63 | -XC64 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -X6 | Stainless steel shaft/bolt, etc. | ● | ● | ● | ● | ● | ● | ● | ● | 30 to 100 | ● | ● | ● | ● | — | ● | ● | ● |
| -X7 | Heat resistant (100°C) | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | — | ● | ● | ● | — | — |
| -X10 | Both sides angle adjustable | ● | ● | ● | ● | ● | ● | ● | ● | 50 to 100 | ● | — | ● | — | — | ● | — | — |
| -X11 | One side angle adjustable, One side with cushion | ● | ● | ● | ● | ● | ● | ● | ● | | ● | — | — | — | — | ● | — | — |
| -X16 | Fluororubber seal | ● | ● | ● | ● | ● | ● | ● | ● | 30 to 100 | ● | ● | ● | ● | ● | ● | — | — |

* -X10 and -X11 are only the angle adjustable type.

## 1 Reversed Shaft

Symbol: -XC7

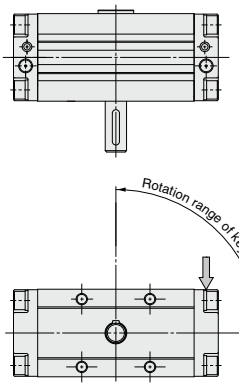
CRA1
CRA1□□U — Standard model no. — -XC7

Reversed shaft (-XC7)

**Specifications**

| | |
|---|---|
| Applicable size | 50, 63, 80, 100 |
| Applicable shaft type | S, W, X, T, J |

**Symbol: C7**




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

## 2 Change of Rotation Range

Symbol: -XC8 to -XC11

CRA1 — Standard model no. — -XC8

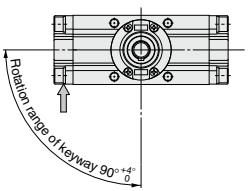
Change of rotation range (-XC8 to -XC11)

**Specifications**

| | |
|---|---|
| Applicable size | 50, 63, 80, 100 |
| Applicable shaft type | S, W, Y |

**Symbol: C8**

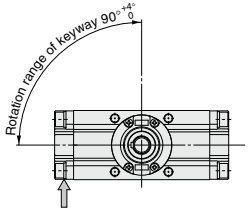
Change of rotation range




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C9**

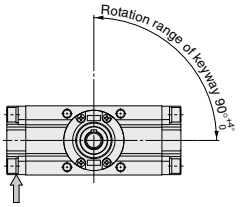
Change of rotation range




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C10**

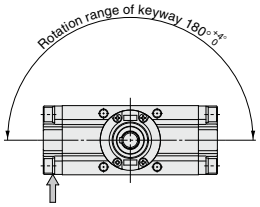
Change of rotation range




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C11**

Change of rotation range




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

## 3 Changed to Fluorine Grease

Symbol: -XC30

CRA1
CRA1□□U — Standard model no. — -XC30

Fluorine grease (-XC30)

Lubricant oil in the seal parts and inner wall of the cylinder is changed to fluorine grease. (Not the low-speed specification)

**Specifications**

| | |
|---|---|
| Applicable size | 30, 50, 63, 80, 100 |
| Applicable shaft type | S, W, X, Y, Z, T, J, K |

∗ Refer to standard type and angle adjustable type for other specifications.

## 4 Change of Rotation Range and Shaft Rotation Direction

Symbol
**-XC31 to -XC36**

**CRA1** | **Standard model no.** | **-XC31**

**Specifications**

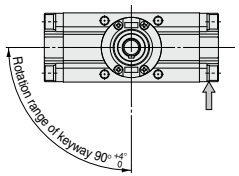
| | |
|---|---|
| Applicable size | **50, 63, 80, 100** |
| Applicable shaft type | S, W, Y |

● **Change of rotation range and shaft rotation direction (-XC31 to -XC36)**



**Symbol: C31**

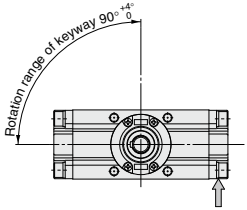
The rotation range is changed and the rotating direction is reversed.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C32**

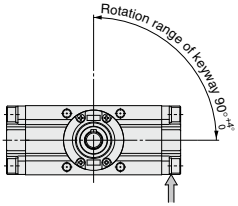
The rotation range is changed and the rotating direction is reversed.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C33**

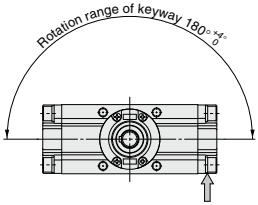
The rotation range is changed and the rotating direction is reversed.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C34**

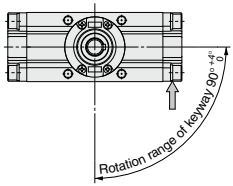
The rotation range is changed and the rotating direction is reversed.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C35**

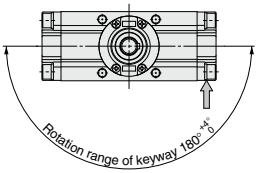
The rotation range is changed and the rotating direction is reversed.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

**Symbol: C36**

The rotation range is changed and the rotating direction is reversed.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

INDEX

Symbol

## 5 Change of Rotation Range and Angle Adjusting Direction -XC37 to -XC42

**CRA1□□U** | **Standard model no.** | **-XC37**

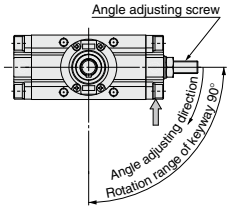
**Specifications**

| | |
|---|---|
| Applicable size | **50, 63, 80, 100** |
| Applicable shaft type | S, W, Y |

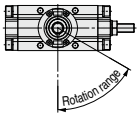
●**Change of rotation range and angle adjusting direction (-XC37 to -XC42)**

### Symbol: C37

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



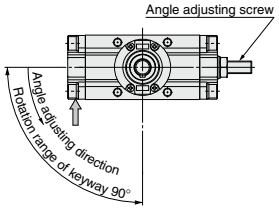

The rotation range under the adjustment of an angle at 60° is indicated below.



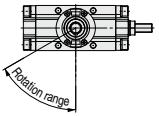

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C38

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



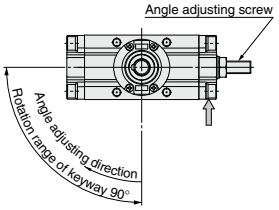

The rotation range under the adjustment of an angle at 60° is indicated below.



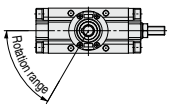

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C39

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



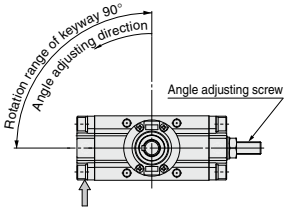

The rotation range under the adjustment of an angle at 60° is indicated below.



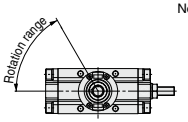

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C40

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



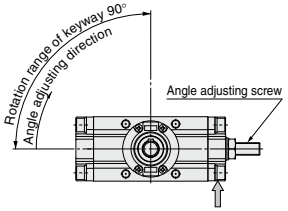

The rotation range under the adjustment of an angle at 60° is indicated below.



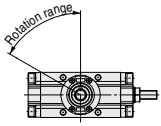

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C41

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



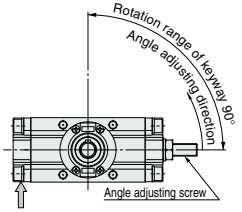

The rotation range under the adjustment of an angle at 60° is indicated below.



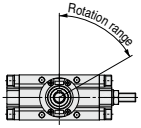

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C42

The rotation range and the angle adjusting direction of the angle adjustable type are changed.




The rotation range under the adjustment of an angle at 60° is indicated below.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

## 6 Change of Rotation Range and Angle Adjusting Direction

Symbol
**-XC43 to -XC46**

**CRA1□□U** | **Standard model no.** | **-XC43**

**Specifications**

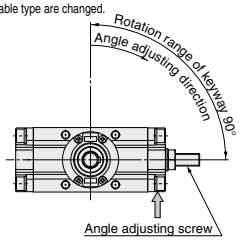
| | |
|---|---|
| Applicable size | **50, 63, 80, 100** |
| Applicable shaft type | S, W, Y |

●**Change of rotation range and angle adjusting direction (-XC43 to -XC46)**

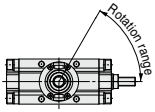


### Symbol: C43

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



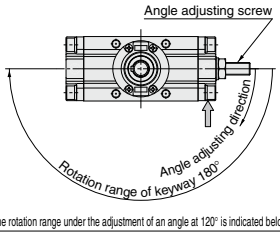

The rotation range under the adjustment of an angle at 60° is indicated below.



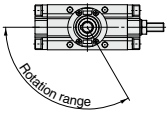

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C44

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



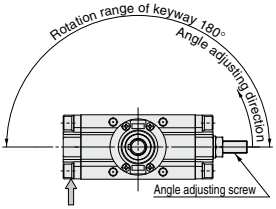

The rotation range under the adjustment of an angle at 120° is indicated below.



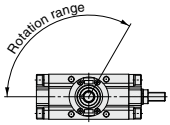

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C45

The rotation range and the angle adjusting direction of the angle adjustable type are changed.



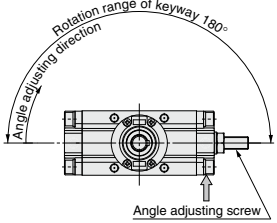

The rotation range under the adjustment of an angle at 120° is indicated below.



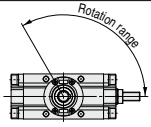

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C46

The rotation range and the angle adjusting direction of the angle adjustable type are changed.




The rotation range under the adjustment of an angle at 120° is indicated below.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

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## 7 Change of Rotation Range and Angle Adjusting Direction (Angle adjusting screw is equipped on the left.)

Symbol
**-XC47 to -XC52**

**CRA1□□U** | **Standard model no.** | **-XC47**

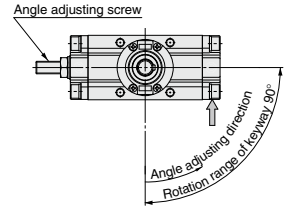
**Specifications**

| | |
|---|---|
| Applicable size | 50, 63, 80, 100 |
| Applicable shaft type | S, W, Y |

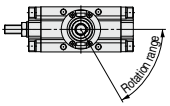
●**Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.) (-XC47 to -XC52)**

### Symbol: C47

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



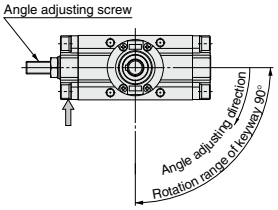

The rotation range under the adjustment of an angle at 60° is indicated below.



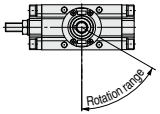

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C48

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



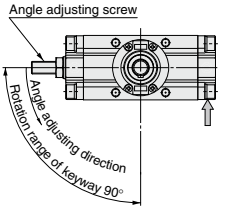

The rotation range under the adjustment of an angle at 60° is indicated below.



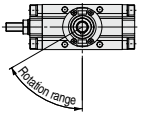

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C49

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



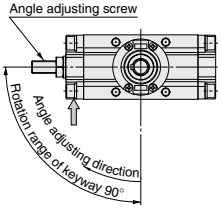

The rotation range under the adjustment of an angle at 60° is indicated below.



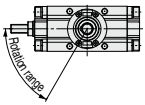

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C50

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



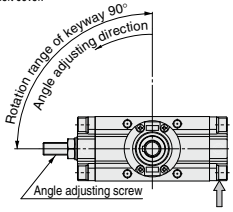

The rotation range under the adjustment of an angle at 60° is indicated below.



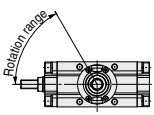

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C51

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



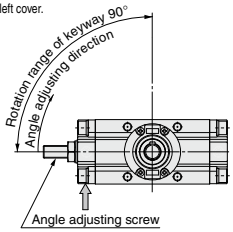

The rotation range under the adjustment of an angle at 60° is indicated below.



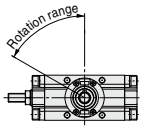

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C52

For the angle adjusting type, angle adjusting screws are mounted to the left cover.




The rotation range under the adjustment of an angle at 60° is indicated below.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

Symbol

## 8 Change of Rotation Range and Angle Adjusting Direction (Angle adjusting screw is equipped on the left.) -XC53 to -XC58

**CRA1□□U** | **Standard model no.** | **-XC53**

**Specifications**

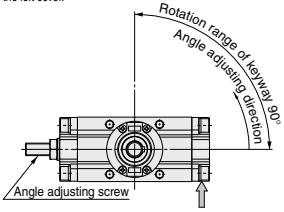
| | |
|---|---|
| Applicable size | **50, 63, 80, 100** |
| Applicable shaft type | S, W, Y |

●**Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.) (-XC53 to -XC58)**

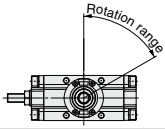


### Symbol: C53

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



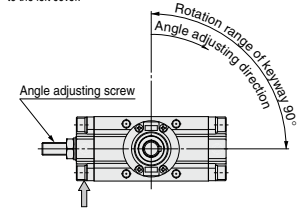

The rotation range under the adjustment of an angle at 60° is indicated below.



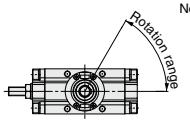

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C54

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



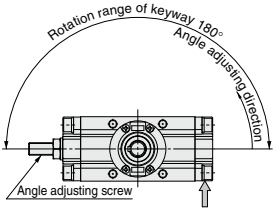

The rotation range under the adjustment of an angle at 60° is indicated below.



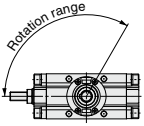

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C55

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



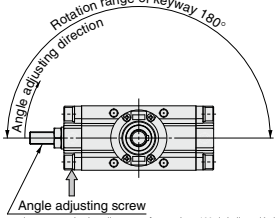

The rotation range under the adjustment of an angle at 120° is indicated below.



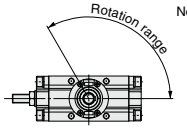

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C56

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



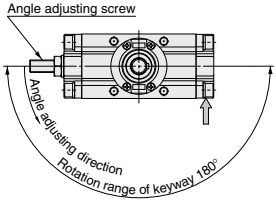

The rotation range under the adjustment of an angle at 120° is indicated below.



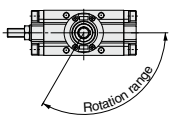

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C57

For the angle adjusting type, angle adjusting screws are mounted to the left cover.



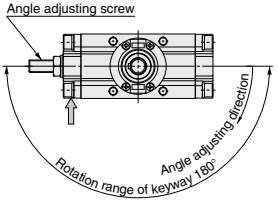

The rotation range under the adjustment of an angle at 120° is indicated below.



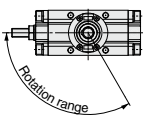

Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

### Symbol: C58

For the angle adjusting type, angle adjusting screws are mounted to the left cover.




The rotation range under the adjustment of an angle at 120° is indicated below.




Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

Symbol

## 9 Change of Port Location (Mounting location of the cover is changed.) -XC59 to -XC61

**CRA1**
**CRA1□□U** | **Standard model no.** | **-XC59**

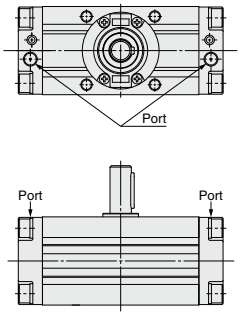
**Specifications**

| Applicable size | 30, 50, 63, 80, 100 |
|---|---|
| Applicable shaft type | S, W, X, Y<br>Z, T, J, K |

●**Change of port location (Mounting location of the cover is changed.)**
**(-XC59 to -XC61)**

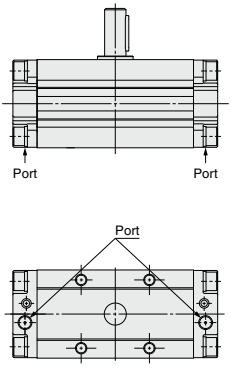
**Symbol: C59**

Direction of the port is changed. (Upward)



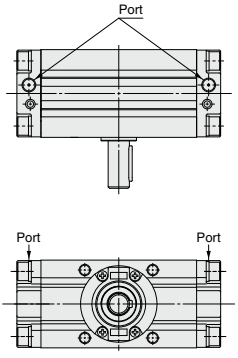

**Symbol: C60**

Direction of the port is changed. (Downward)




**Symbol: C61**

Direction of the port is changed. (Backward)




Symbol

## 10 One Side Air-hydro, One Side Air -XC63, -XC64

**CRA1** | **Standard model no.** | **-XC63**

**Specifications**

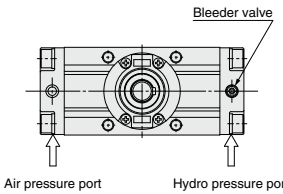
| Applicable size | 50, 63, 80, 100 |
|---|---|
| Applicable shaft type | S, W, X, Y<br>Z, T, J, K |

∗ Except angle adjustable type and air cushion equipped type

●**One side air-hydro, One side air**
**-XC63: Left side air**
**Right side air-hydro**
**-XC64: Left side air-hydro**
**Right side air**

**Symbol: C63**

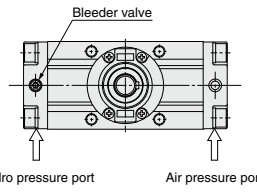
One side air, one side air-hydro specification (Left side air, Right side hydro)




The figure shows the pressurized situation to the hydro pressure port.

**Symbol: C64**

One side air, one side air-hydro specification (Left side hydro, Right side air)




The figure shows the pressurized situation to the air pressure port.

## 11 Stainless Steel Shaft/Bolt/Parallel Key

Symbol: **-X6**

**C□RA1** | **Standard model no.** | **-X6**

**-X6**: Stainless steel for main part

For applications in areas that pose a risk of rust or corrosion, a portion of the materials used in the standard parts has been changed to stainless steel.

### Specifications

| Type | Pneumatic, Air-hydro |
|---|---|
| Size | **30, 50, 63, 80, 100** |
| **Rotating angle** | 90°, 180° (Size 30 to 100)<br>100°, 190° (Size 50 to 100) |
| **Mounting** | Flange, Foot |
| **Shaft type** | Single shaft (S), Double shaft (W), Single shaft with four chamfers (X), Double shaft with key (Y), Double shaft with four chamfers (Z), Single round shaft (T), Double shaft (round shaft, with four chamfers) (J), Double round shaft (K) |
| **Stainless steel part** | Shaft, Bolt, Screw, Parallel key |
| **Cushion** | Not attached, Air cushion<br>(Except air-hydro type) |
| **Auto switch** | Mountable |

∗ Refer to page 1417 for other specifications.
∗∗ Except angle adjustable type

## 12 Heat Resistant

Symbol: **-X7**

**CRA1** | **Standard model no.** | **-X7**

**-X7**: Heat resistant

In this rotary actuator, the material of the seals has been changed to the heat resistant type (to withstand up to 100°C), for applications in environments that exceed the standard specification temperatures of 0 to 60°C.

### Specifications

| Type | Pneumatic |
|---|---|
| Size | **30, 50, 63, 80, 100** |
| **Rotating angle** | 90°, 180° (Size 30 to 100)<br>100°, 190° (Size 50 to 100) |
| **Ambient and fluid temperature** | 0 to 100°C |
| **Mounting** | Flange, Foot |
| **Shaft type** | Single shaft (S), Double shaft (W), Single shaft with four chamfers (X), Double shaft with key (Y), Double shaft with four chamfers (Z), Single round shaft (T), Double shaft (round shaft, with four chamfers) (J), Double round shaft (K) |
| **Seal material** | FKM |
| **Cushion** | Size 30: None<br>Size 50 to 100: Not attached, Air cushion |
| **Auto switch** | Not mountable |

∗ Refer to page 1417 for other specifications.

## 13 Both Sides Angle Adjustable

Symbol: **-X10**

**CRA1□□U** | **Standard model no.** | **-X10**

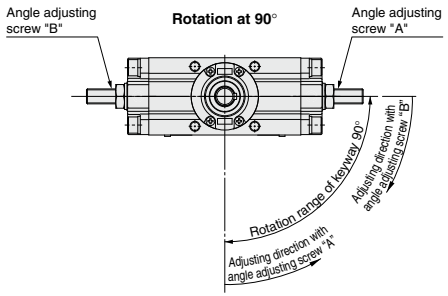
**-X10**: Both sides angle adjustable

### Specifications

| Type | Pneumatic |
|---|---|
| Size | **50, 63, 80, 100** |
| **Rotating angle** | 90°, 180°, 100°, 190° |
| **Mounting** | Flange, Foot |
| **Shaft type** | Single shaft (S), Double shaft (W), Single shaft with four chamfers (X), Double shaft with key (Y), Double shaft with four chamfers (Z), Single round shaft (T), Double shaft (round shaft, with four chamfers) (J), Double round shaft (K) |
| **Cushion** | None |
| **Angle adjustment range** | Max. 90° (One side) |

∗ Refer to page 1427 for other specifications.

**Adjusting direction** Adjusting direction "A": When angle adjusting screw on "A" side is screwed into the right direction.
Adjusting direction "B": When angle adjusting screw on "B" side is screwed into the right direction.



## 14 One Side Angle Adjustable, One Side with Cushion

Symbol: -X11

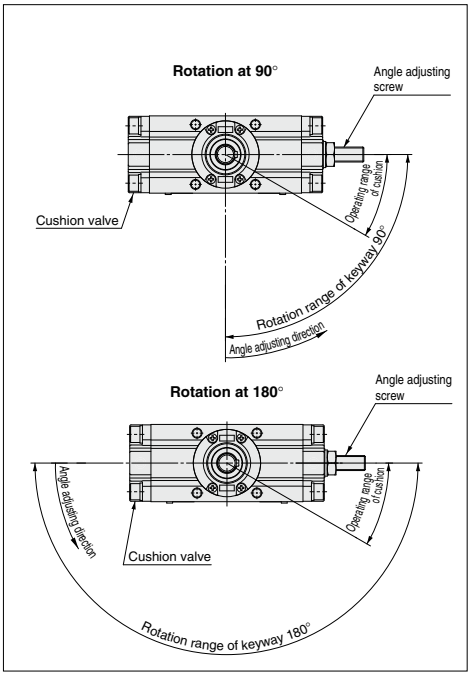
**CRA1□□U** | **Standard model no.** | **-X11**

**One side angle adjustable**
**One side with cushion**

### Specifications

| Type | Pneumatic |
|---|---|
| Size | **50, 63, 80, 100** |
| **Rotating angle** | 90°, 180°, 100°, 190° |
| **Mounting** | Flange, Foot |
| **Shaft type** | Single shaft (S), Double shaft (W), Single shaft with four chamfers (X), Double shaft with key (Y), Double shaft with four chamfers (Z), Single round shaft (T), Double shaft (round shaft, with four chamfers) (J), Double round shaft (K) |
| **Cushion** | With cushion on one side |
| **Angle adjustment range** | Max. 90° |

∗ Refer to page 1427 for other specifications.




∗ Refer to page 1429 for dimensions.

## 15 Fluororubber Seal

Symbol: -X16

**CDRA1** | **Standard model no.** | **-X16**

**Fluororubber seal**

Seal is now changed to fluororubber.

### Specifications

| Type | Pneumatic |
|---|---|
| Size | **30, 50, 63, 80, 100** |
| **Rotating angle** | 90°, 180° (Size 30 to 100)<br>100°, 190° (Size 50 to 100) |
| **Ambient and fluid temperature** | 0 to 60°C (No freezing) |
| **Mounting** | Flange, Foot |
| **Shaft type** | Single shaft (S), Double shaft (W), Single shaft with four chamfers (X), Double shaft with key (Y), Double shaft with four chamfers (Z), Single round shaft (T), Double shaft (round shaft, with four chamfers) (J), Double round shaft (K) |
| **Seal material** | FKM |
| **Cushion** | Not attached, Air cushion |
| **Auto switch** | Mountable |

∗ Refer to page 1417 for other specifications.

# Made to Order: -X6 to -X16

Made to Order

## How to Order

C D RA1 B S ☐ 50 ☐ – 90 ☐ Z – M9BW ☐ – X6 – X16

**Magnet**

| | |
|---|---|
| Nil | None |
| D | Built-in magnet |

**Mounting**

| | |
|---|---|
| B | Basic type |
| L | Foot type |
| F* | Flange type |

* Except size 30

**Shaft type**

| | |
|---|---|
| S | Single shaft |
| W | Double shaft |
| X | Single shaft with four chamfers |
| Y | Double shaft with key |
| Z | Double shaft with four chamfers |
| T | Single round shaft |
| J | Double shaft (round shaft, with four chamfers) |
| K | Double round shaft |

**Variation**

| | |
|---|---|
| Nil | Without angle adjustment |
| U* | Angle adjustable type |
| H* | Air-hydro type |

* Except size 30

**Size**

| |
|---|
| 30 |
| 50 |
| 63 |
| 80 |
| 100 |

**Port type**

| Size | | 30 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|
| Nil | M thread | M5 | — | — | — | — |
| | Rc | — | 1/8 | 1/8 | 1/4 | 3/8 |
| TF | G | — | | | | |
| TN | NPT | — | | | | |
| TT | NPTF | — | | | | |

**Rotating angle**

| | |
|---|---|
| 90 | 90° |
| 180 | 180° |
| 100* | 100° |
| 190* | 190° |

* Except size 30

**Cushion**

| | |
|---|---|
| Nil | Without air cushion |
| C* | With air cushion |

* Except angle adjustable type, air-hydro type

**Auto switch**

| | |
|---|---|
| Nil | Without auto switch (Built-in magnet) |

* For applicable auto switch model, refer to page 1417.
* Auto switches are shipped together, (but not assembled).

**Number of auto switches**

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

**Made to Order**

• Combination is available only when all the conditions are fulfilled in the combination chart 9.

* Combination of made-to-order -X is possible for up to 2 types.
* Above is the typical example of combination.

## Combination Chart of Made to Order

### Chart 9. Combination between -X☐ and -X☐ (S, W, X, Y, Z, T, J, K shaft)

| Symbol | Description | Applicable shaft type | | | | | | | | Applicable size | Combination | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S | W | X | Y | Z | T | J | K | | | | |
| -X6 | Stainless steel shaft/bolt/parallel key | ● | ● | ● | ● | ● | ● | ● | ● | 30 to 100 | -X6 | | |
| -X7* | Heat resistant (100°C) | ● | ● | ● | ● | ● | ● | ● | ● | | ● | -X7 | |
| -X10 | Both sides angle adjustable | ● | ● | ● | ● | ● | ● | ● | ● | 50 to 100 | — | ● | |
| -X11 | One side angle adjustable, One side with cushion | ● | ● | ● | ● | ● | ● | ● | ● | | — | ● | -X10 to -X11 |
| -X16 | Fluororubber seal | ● | ● | ● | ● | ● | ● | ● | ● | 30 to 100 | ● | — | ● |

* X7: Not available for the built-in magnet type.