

# Rotary Actuator

ø30, ø50, ø63, ø80, ø100

New

RoHS

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

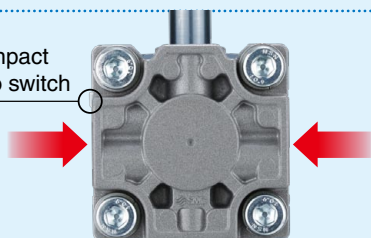
Width reduced by  
up to 14 mm

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



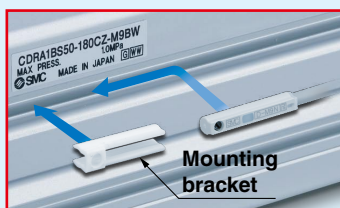
Mountable on  
2 surfaces.

Compact  
auto switch



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.



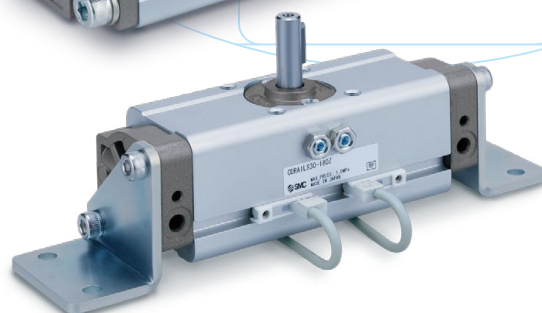
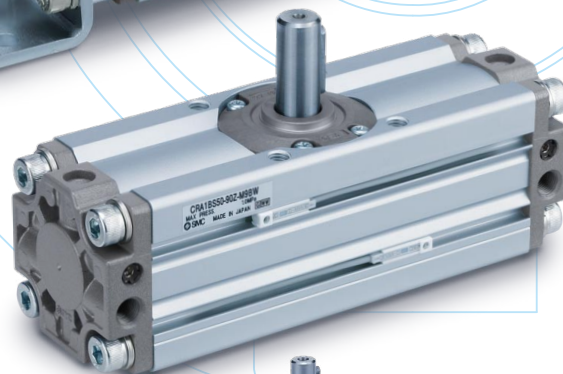
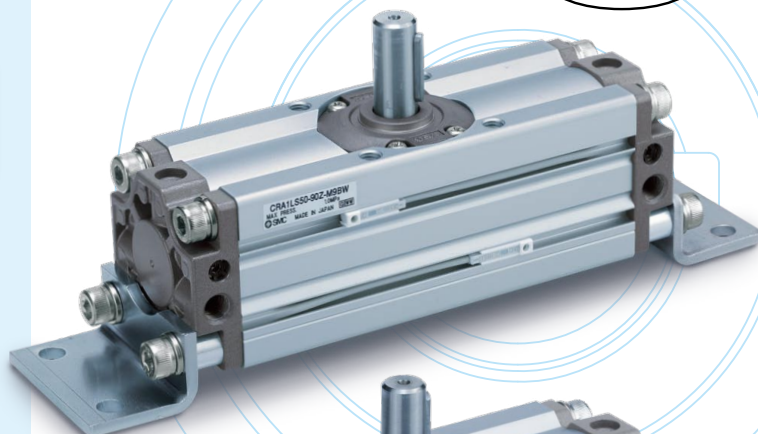
Weight is reduced by up to 14 %.

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

Size	CRA1 [kg]	Current 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

Mounting interchangeable with the current model

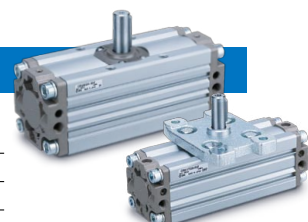
Series **CRA1**



Standard type

Size: 30, 50, 63, 80, 100

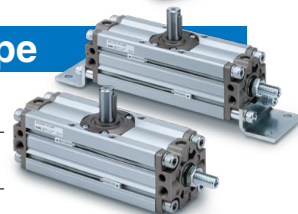
Rotating angle	30	90°, 180°
	50 to 100	90°, 180°, 100°, 190°



Angle adjustable type

Size: 50, 63, 80, 100

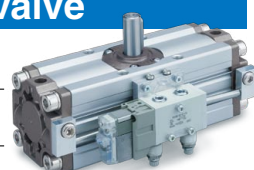
Rotating angle	50 to 100	90°, 180°, 100°, 190°
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New With solenoid valve

Size: 50, 63, 80, 100

Rotating angle	50 to 100	90°, 180°, 100°, 190°
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CAT.ES20-232C

## Standard type

### Cushion seal is replaceable.

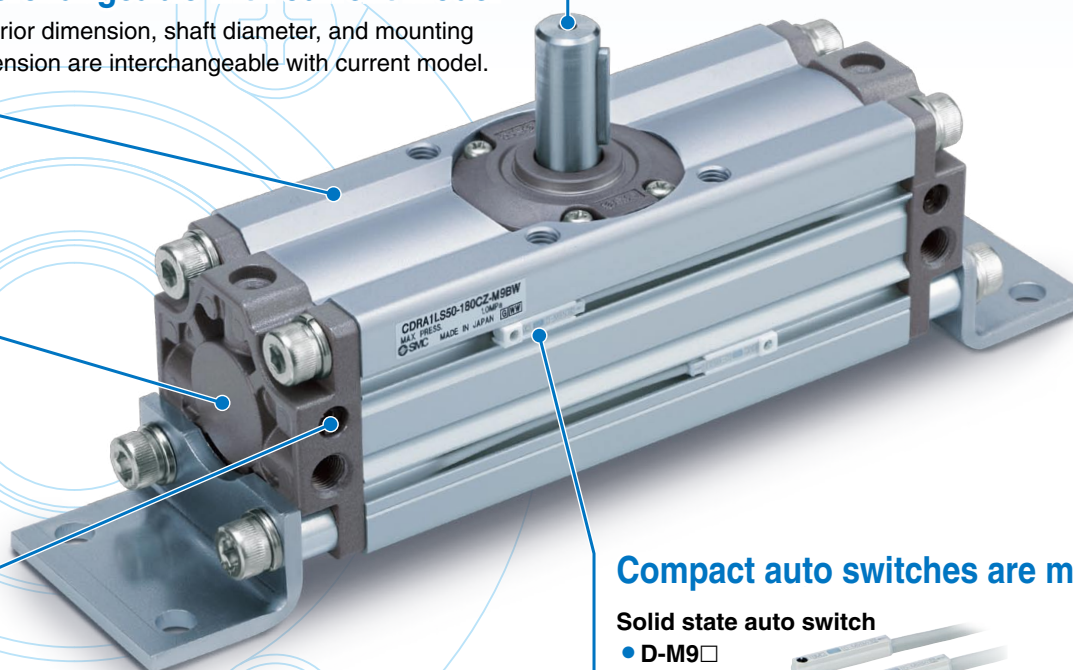
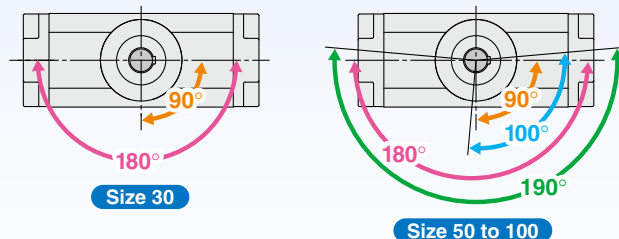
Cushion seal has been made replaceable.  
(Not possible for current model. Cushion seal only)

Replacement parts	• Slider	• Tube gasket
	• Piston seal	• Spring pin
	• Cushion seal (New)	

### Interchangeable with current model

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

### Rotating angle



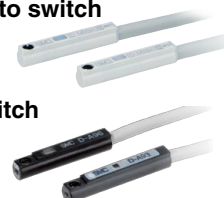
### Compact auto switches are mountable.

#### Solid state auto switch

- D-M9□
- D-M9□W

#### Reed auto switch

- D-A9□



### Easy adjustment of cushion valve

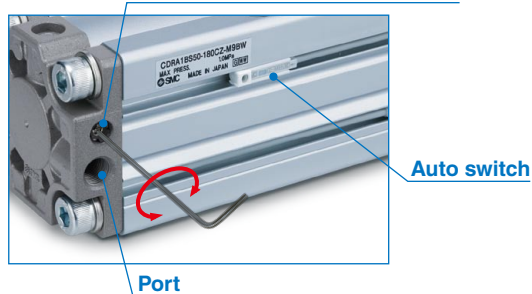
- Cushion valve shape is changed so it can be adjusted using a hexagon wrench only.
- No protrusion from the body.
- Retaining ring is used to prevent drop-out.

### Port, cushion valve and auto switch are on the same surface.

### Easy to handle.

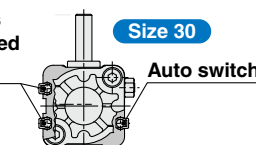
\* Cushion valve cannot be mounted on the air-hydro type.

#### With cushion valve retaining ring



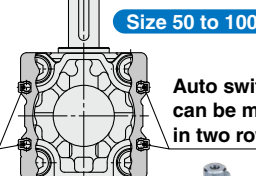
### Mountable on 2 surfaces.

Auto switches can be mounted in two rows.



Auto switches can be mounted in two rows.

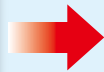
Auto switches can be mounted in two rows.



## Many variations of shaft type

Current model

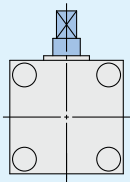
Standard : 2 types  
Semi-standard : 6 types



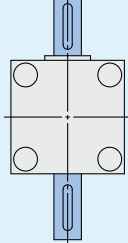
Series **CRA1**  
**Standard: 8 types**

- 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>.

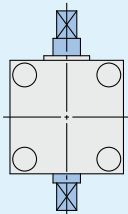
Single shaft with four chamfers:  
**CRA1BX**



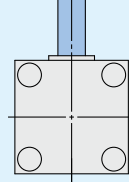
Double shaft with key:  
**CRA1BY**



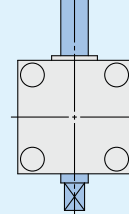
Double shaft with four chamfers:  
**CRA1BZ**



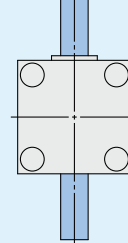
Single round shaft:  
**CRA1BT**



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



Double round shaft:  
**CRA1BK**

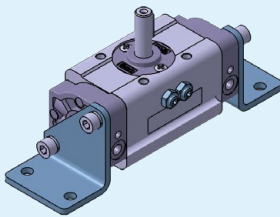


\* Single round shaft, double shaft (round shaft, with four chamfers), double round shaft are made to order.

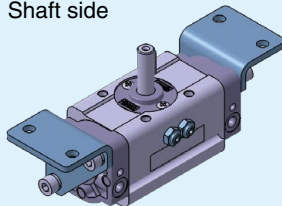
## Mounting suitable for operating conditions is possible.

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

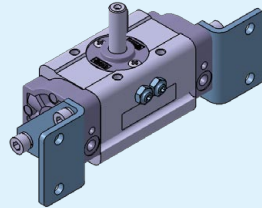
Bottom side



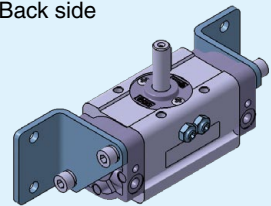
Shaft side



Port side

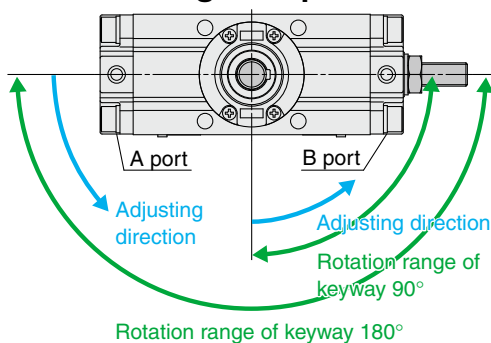


Back side



## Angle adjustable type

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



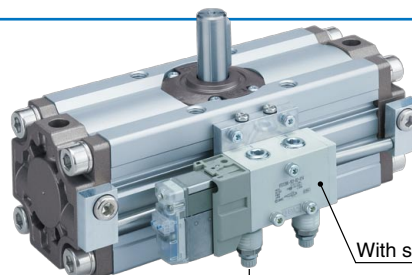
Angle can be adjusted to an appropriate level suitable for applications.

Angle adjusting screw

## With solenoid valve

**New**

- Solenoid valve and rotation speed adjustment function are integrated.
- Part number is set for the angle adjustable type.

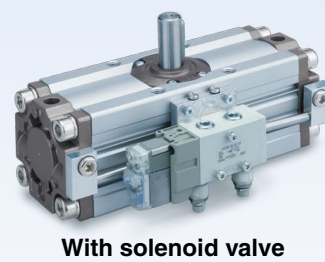
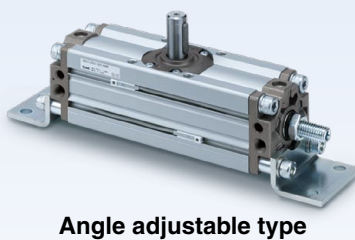
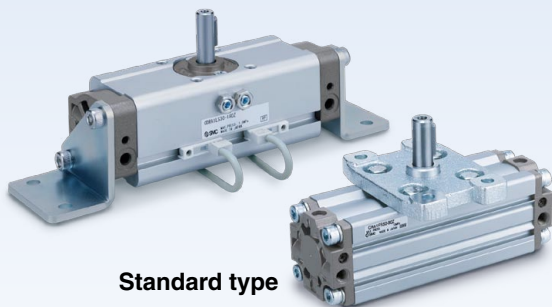


With solenoid valve



























































































































































































Rotation speed adjustment function



# Rotary Actuator Series **CRA1** $\varnothing 30, \varnothing 50, \varnothing 63, \varnothing 80, \varnothing 100$



## Series Variations

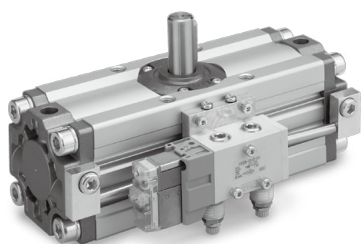
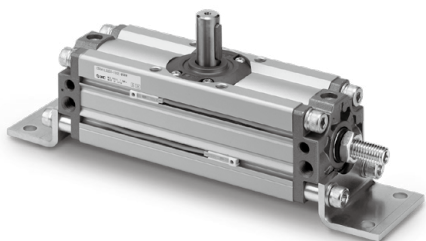
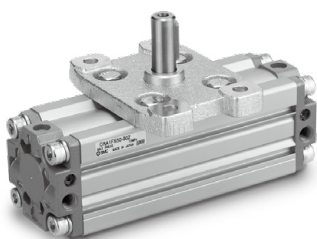
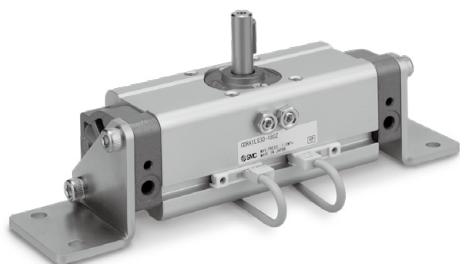
	Type		Pneumatic					Air-hydro			
	Size		30	50	63	80	100	50	63	80	100
Standard	Rotating angle	90°									
		100°									
		180°									
		190°									
	Shaft type	Single shaft	S								
		Double shaft	W								
		Single shaft with four chamfers	X								
		Double shaft with key	Y								
		Double 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									
		With solenoid valve									
		Clean series <small>Note)</small>	11-								
	Mounting bracket	Flange	F								
Foot		L									
Made to Order	Pattern	Shaft type pattern									
		Rotation range									
		Port location									
	Stainless steel shaft/bolt/parallel key		-X 6								
	Operating temperature	Heat resistant 100°C	-X 7								
	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.



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CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

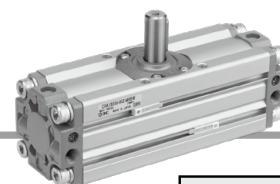
Made to Order

# 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**

**Mounting**

<b>B</b>	Basic type
<b>L</b>	Foot type*
<b>F</b> (Note)	Flange type

\* For foot bracket and part number, refer to page 6.  
\* Foot bracket is included in the same package, (but not assembled).  
Note) Except size 30

**Built-in magnet**

**Shaft type**

<b>S</b>	Single shaft
<b>W</b>	Double shaft
<b>X</b>	Single shaft with four chamfers
<b>Y</b>	Double shaft with key
<b>Z</b>	Double shaft with four chamfers
<b>T</b>	Single round shaft
<b>J</b>	Double shaft (round shaft, with four chamfers)
<b>K</b>	Double round shaft

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

**Type**

<b>Nil</b>	Pneumatic
<b>H*</b>	Air-hydro

\* Except size 30. Refer to page 49 for handling precautions.

**Size**

<b>30</b>
<b>50</b>
<b>63</b>
<b>80</b>
<b>100</b>

**Air cushion**

<b>Nil</b>	None
<b>C*</b>	With air cushion

\* Except air-hydro type

**Rotating angle**

<b>90</b>	90°
<b>180</b>	180°
<b>100*</b>	100°
<b>190*</b>	190°

\* Except size 30

**Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.

\* Up to two auto switches are mountable.

**Auto switch**

<b>Nil</b>	Without auto switch (Built-in magnet)
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\* For applicable auto switch model, refer to the table below.

**Port type**

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

**Made to Order**  
Refer to page 6.

**Applicable Auto Switches**/Refer to the **WEB catalog** or the Best Pneumatics No.4 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length [m]				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)		12 V		M9PV	M9P	●	●	●	○	○		
				2-wire		5 V, 12 V		M9BV	M9B	●	●	●	○	○		
	Diagnosis indication (2-color indication)			3-wire (NPN)	5 V, 12 V	M9NWV		M9NW	●	●	●	○	○	IC circuit		
				3-wire (PNP)	12 V	M9PWV		M9PW	●	●	●	○	○			
	Water resistant (2-color indication)			2-wire	5 V, 12 V	M9BWV		M9BW	●	●	●	○	○	IC circuit		
				3-wire (NPN)	5 V, 12 V	M9NAV*1		M9NA*1	○	○	●	○	○			
				3-wire (PNP)	12 V	M9PAV*1		M9PA*1	○	○	●	○	○			
		2-wire	12 V	M9BAV*1	M9BA*1	○	○	●	○	○						
	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*2	A93	●	●	●	●	—	—
				100 V or less			A90V	A90	●	—	●	—	—	—	IC circuit	—

\*1 Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

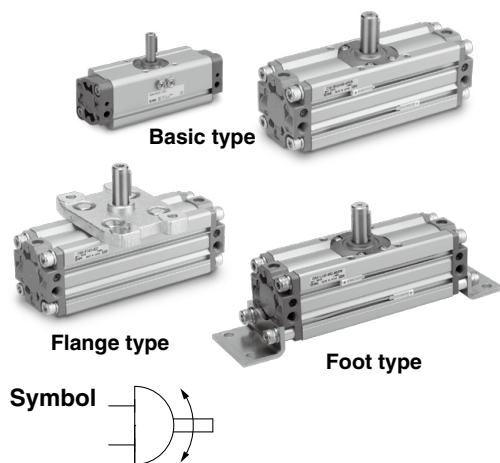
\*2 1 m type lead wire is only applicable to D-A93.

\* Lead wire length symbols: 0.5 m ..... Nil (Example) M9NW  
1 m ..... M (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).

Refer to the **WEB catalog** or the Best Pneumatics No.4 for detailed solid state auto switches with pre-wired connectors.



**Made to Order**  
(For details, refer to pages 28 to 48.)

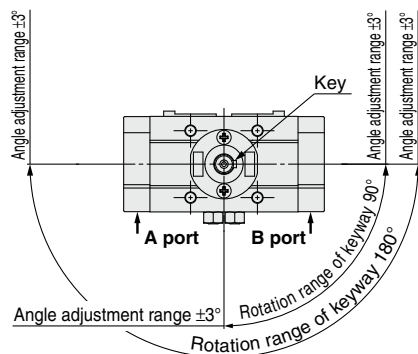
Symbol	Description	Applicable shaft type
-XA1 to -XA24	Shaft pattern sequencing I	S, W, Y
-XA33 to -XA59	Shaft pattern sequencing II	X, Z, T, J, K
-XC7	Reversed shaft	S, W, X, T, J
-XC8 to -XC11	Change of rotation range	S, W, Y
-XC30	Changed to fluorine grease	S, W, X, Y, Z, T, J, K
-XC31 to -XC36	Change 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

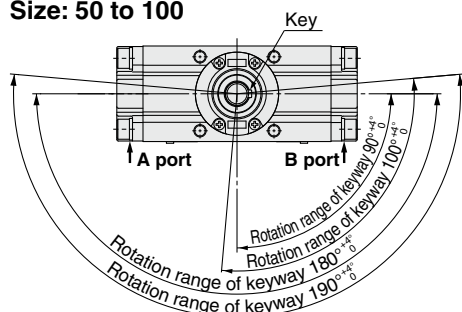
## Rotation Range of Keyway

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

Size	Operating pressure [MPa]										[N·m]
	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	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

Size	Standard weight		Additional weight			[kg]
	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. Mounting screw: 4 pcs. 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.

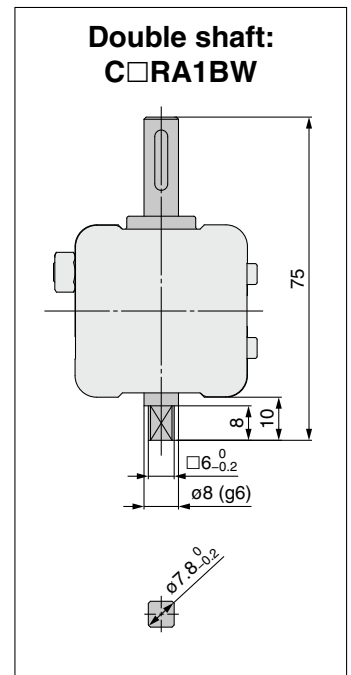
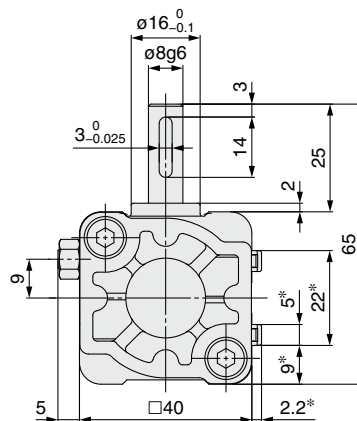
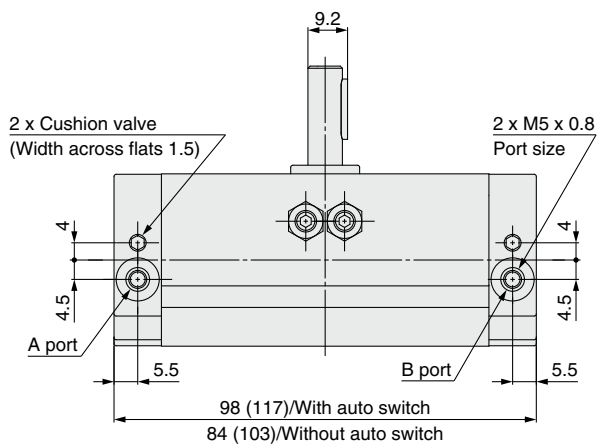
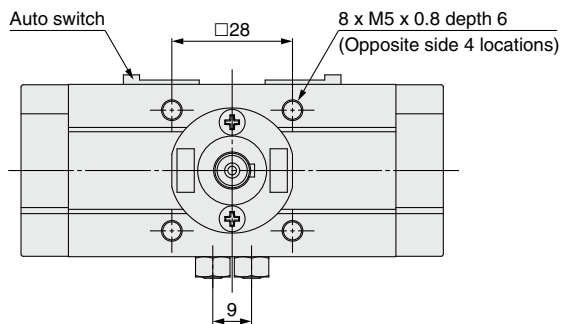
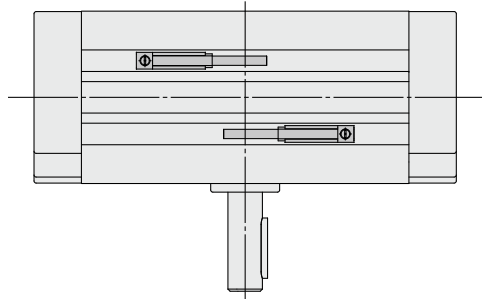


# Series CRA1

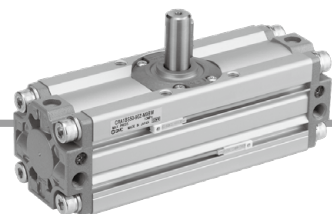
## Dimensions/Basic Type: C□RA1BS

Size: 30

Single shaft: C□RA1BS



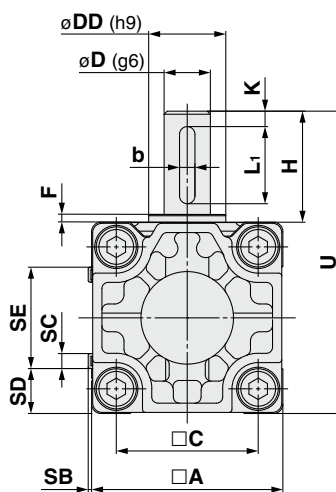
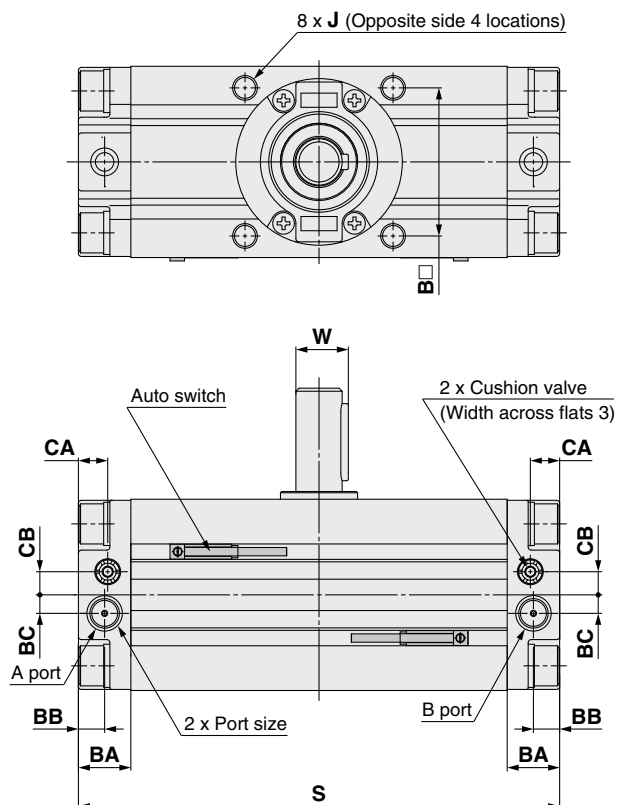
- Drawing shows the appearance for rotation of 90°.
  - Dimensions show pressurization to B port.
  - Drawing shows that the auto switch is mounted on the side opposite to the port side. (Dimensions with an asterisk mark (\*) are not required for actuators without the auto switch.)
- \* ( ) are the dimensions for rotation of 180°.
- Note) A parallel key is included in the same package, (but not assembled).



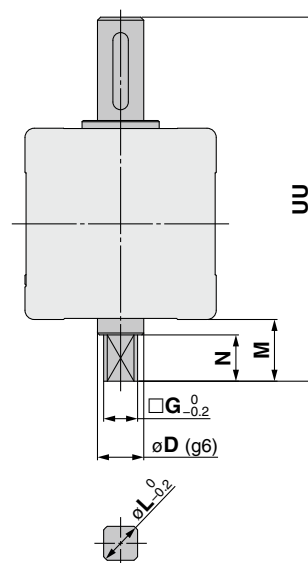
## Dimensions/Basic Type: C□RA1BS

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.

[mm]

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°.

* ( ) are the dimensions for rotation of 180° and 190°.																							[mm]		
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 × 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 <sup>0</sup> <sub>-0.030</sub>	25
63	Rc1/8	76	60	57	17	30	2.5	41	M10 × 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 <sup>0</sup> <sub>-0.030</sub>	30
80	Rc1/4	92	72	70	20	35	3	50	M12 × 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 <sup>0</sup> <sub>-0.030</sub>	40
100	Rc3/8	112	85	85	25	40	4	60	M12 × 1.75 depth 14	5	259 (325)	1.5	5	39.5	33	245 (311)	172	28	25	12.5	8	14	10	8 <sup>0</sup> <sub>-0.036</sub>	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

# Series CRA1

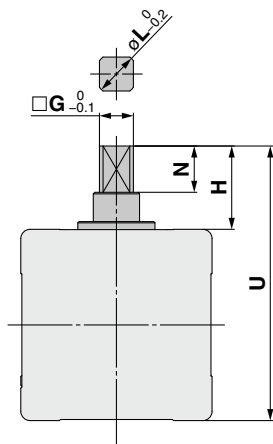
## Dimensions/Basic Type: C□RA1B□

Size: 30/50/63/80/100

Single shaft with four chamfers: C□RA1BX

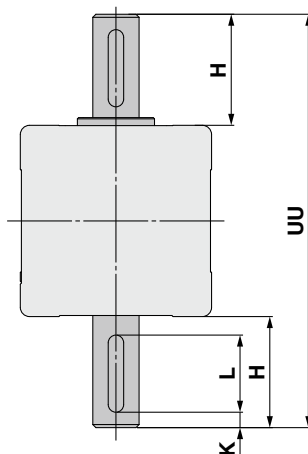
Double shaft with key: C□RA1BY

Double shaft with four chamfers: C□RA1BZ



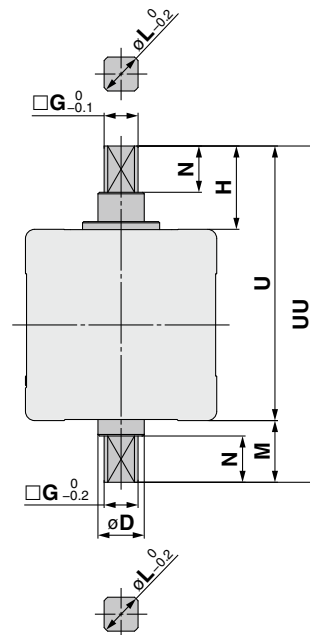
Note) Other dimensions are the same as the single shaft type. [mm]

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



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

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



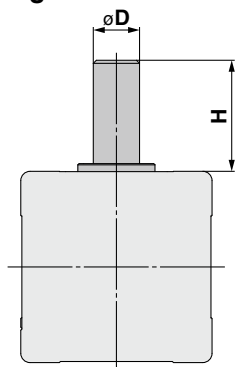
Note) Other dimensions are the same as the single shaft type. [mm]

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

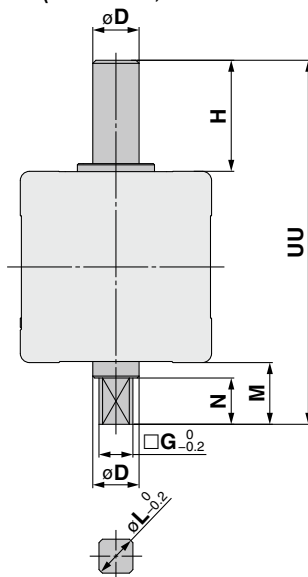
Double shaft (round shaft, with four chamfers): C□RA1BJ

Double round shaft: C□RA1BK



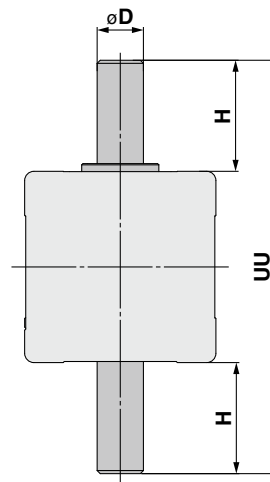
Note) Other dimensions are the same as the single shaft type. [mm]

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



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

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



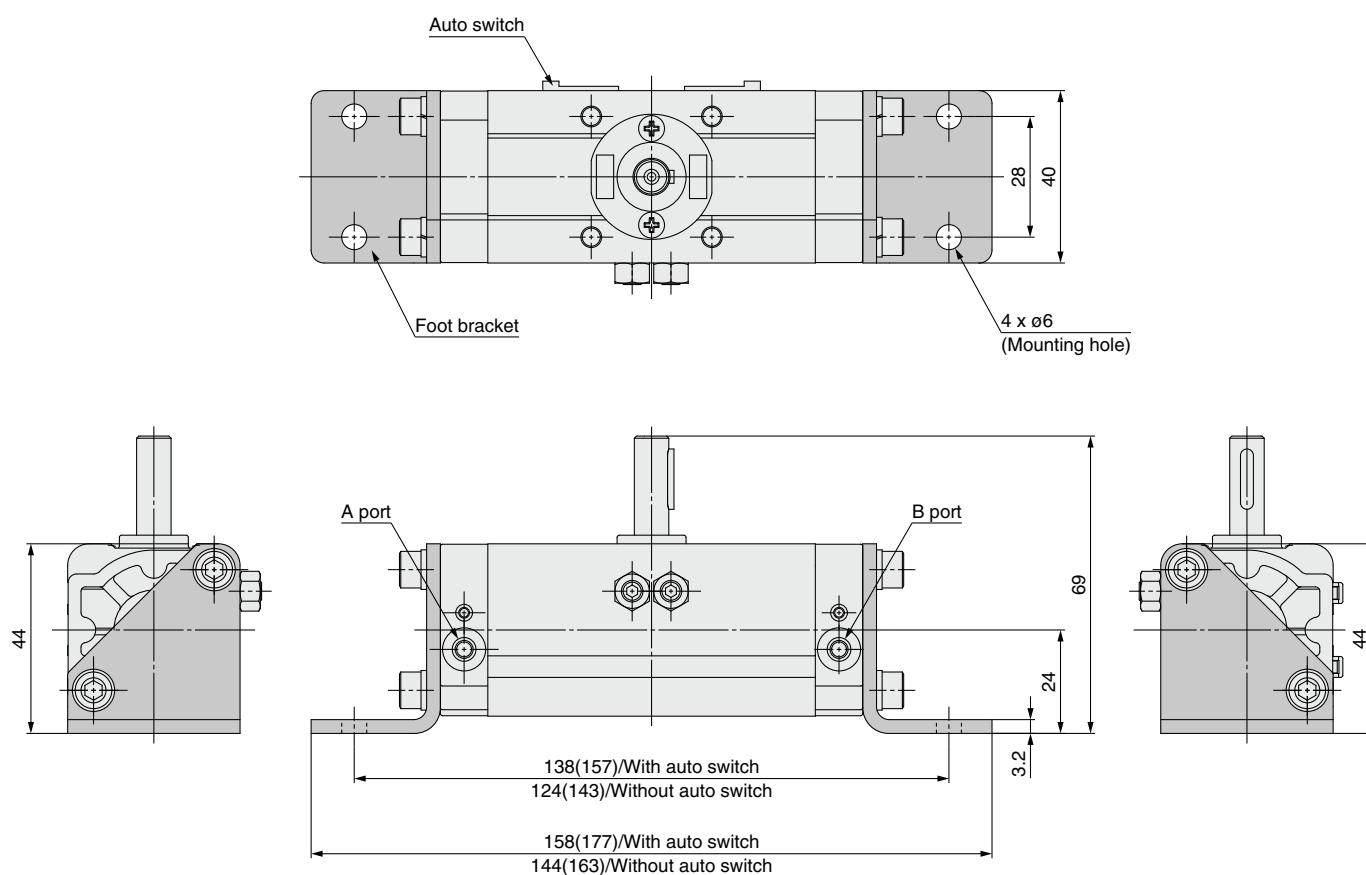
Note) Other dimensions are the same as the single shaft type. [mm]

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°.

**CRA1**

**CRA1□□U**

**CVRA1**

**Auto Switch Mounting**

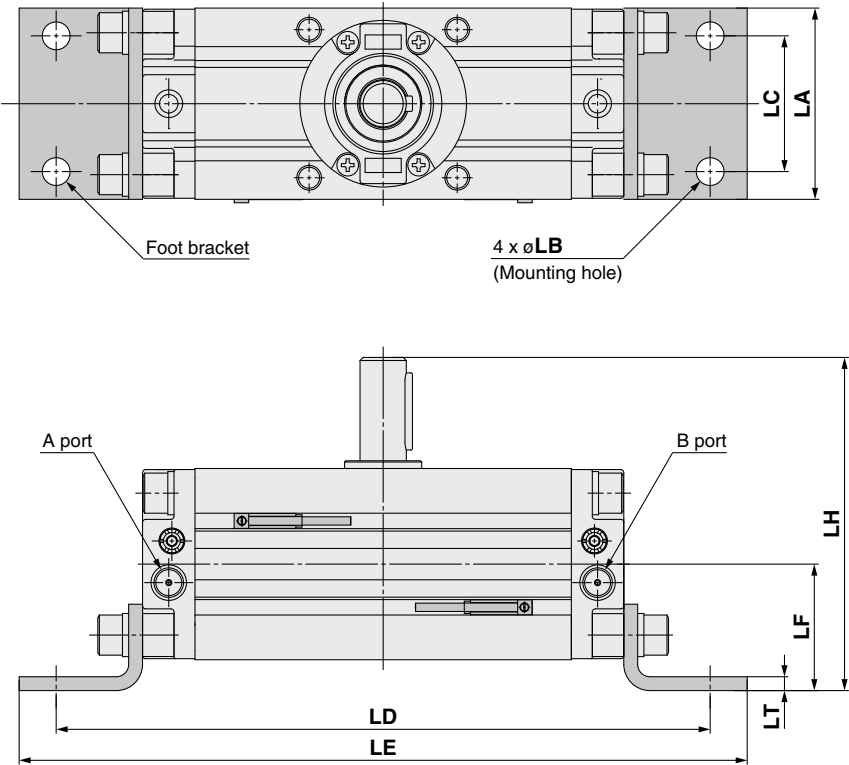
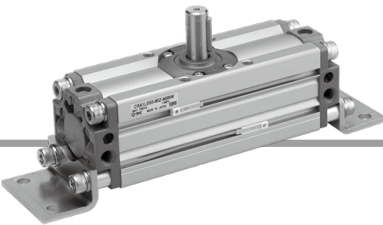
**Simple Specials**

**Made to Order**

# Series CRA1

## Dimensions/Foot Type: C□RA1LS

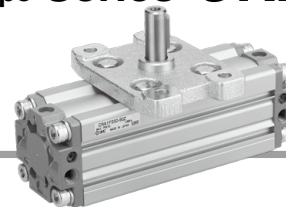
Size: 50/63/80/100



- Drawing shows the appearance for rotation of 90° and 100°.
  - Dimensions show pressurization to B port.
  - Drawing shows that 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. [mm]

Size	LA	LB	LC	With auto switch		Without auto switch		LF	LH	LT
				LD	LE	LD	LE			
50	62	9	44	212 (245)	236 (269)	200 (233)	224 (257)	41	108	4.5
63	76	11	55	247 (285.5)	275 (313.5)	235 (273.5)	263 (301.5)	48	127	5
80	92	13	67	287 (331)	329 (373)	274 (318)	316 (360)	58	154	6
100	112	13	87	347 (413)	389 (455)	333 (399)	375 (441)	73.5	189.5	6



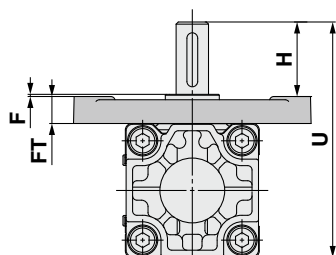
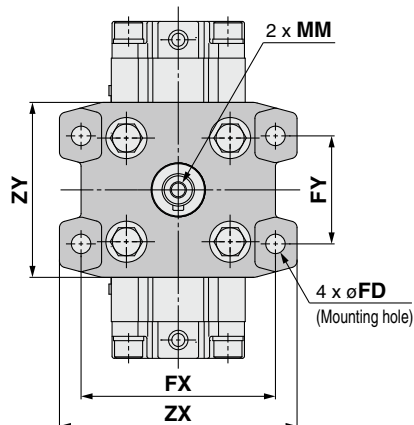
## Dimensions/Flange Type: C□RA1F□

Size: 50/63/80/100

Single shaft: C□RA1FS

Double shaft: C□RA1FW

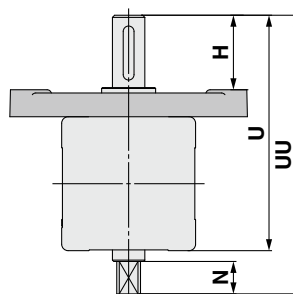
Single shaft with four chamfers: C□RA1FX



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

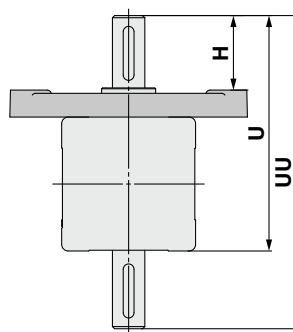
Size	FT	FX	FY	ZX	ZY
50	13	90	50	110	81
63	15	105	59	130	101
80	18	130	76	160	119
100	18	150	92	180	133



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

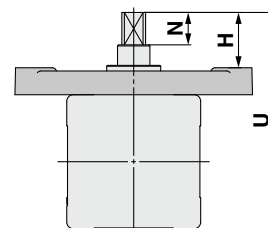
Size	H	N	U	UU
50	39	15	114	134
63	45	17	136	158
80	55	20	165	190
100	60	25	190	220

Double shaft with key: C□RA1FY



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

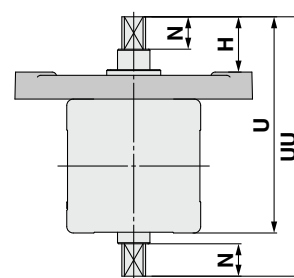
Size	H	U	UU
50	39	114	150
63	45	136	177
80	55	165	215
100	60	190	250



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

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. [mm]

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

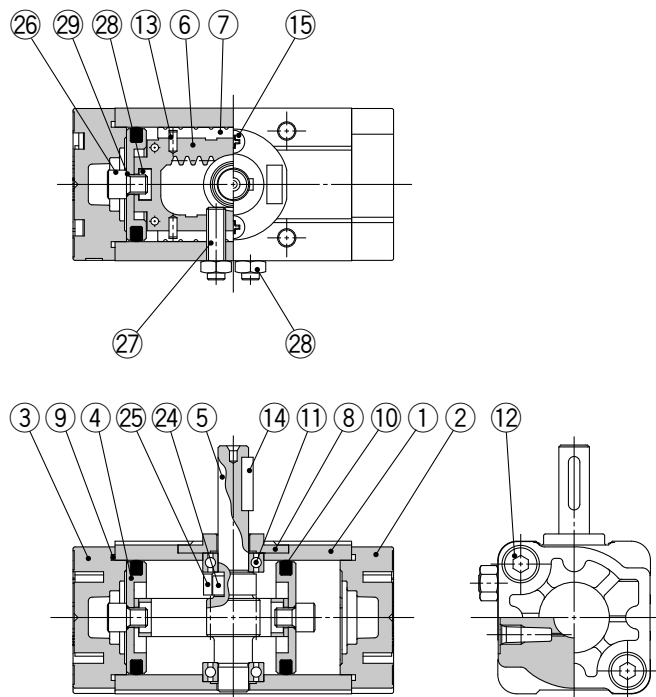
The dimensions of shaft key and four chamfers are the same as the basic type. For details, refer to page 9.



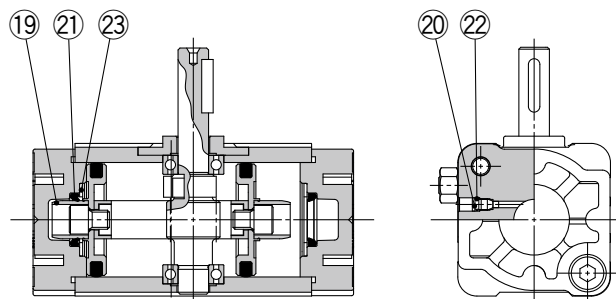
# Series CRA1

## Construction: Size 30

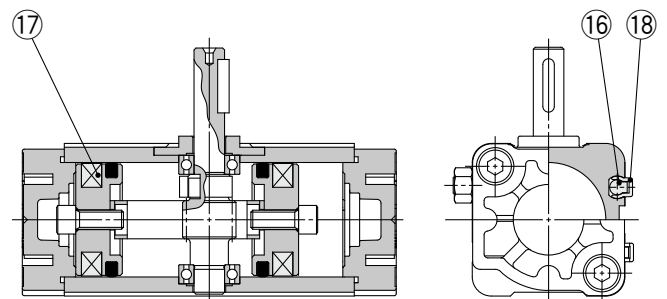
### Without air cushion



### 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	

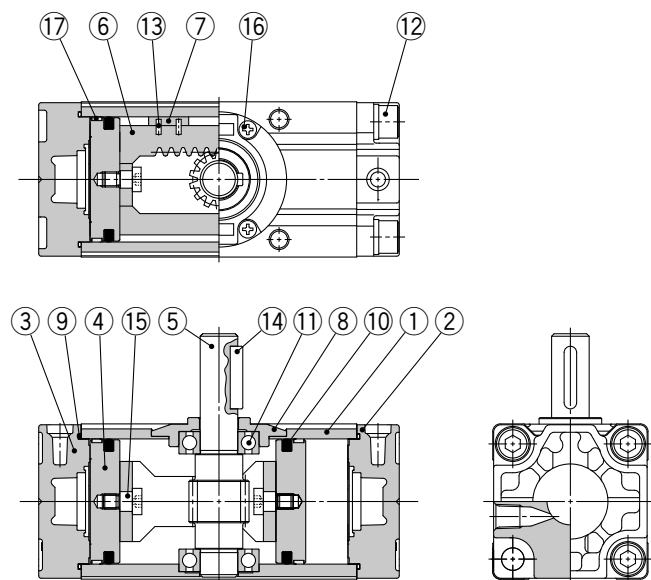
### Replacement Parts

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

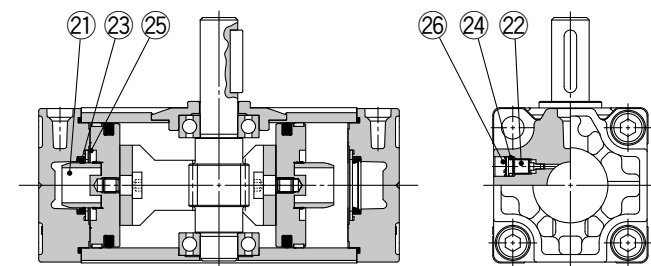
Note 1) When ordering replacement parts, write "1" for one set of the parts per actuator.  
 Note 2) Replacement parts for different rotation angles are set.  
 A grease pack (10 g) is included.  
 If an additional grease pack is needed, order with the following part number.  
**Grease pack part number: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

## Construction: Size 50 to 100

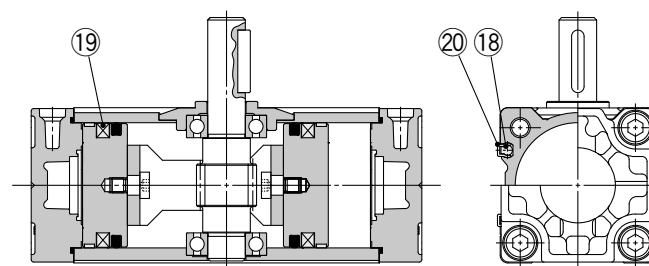
### Without air cushion



### 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.		
	Without air cushion	With air cushion	Air-hydro
50	P694020-20	P694020-21	P694020-23
63	P694030-20	P694030-21	P694030-23
80	P694040-20	P694040-21	P694040-23
100	P694050-20	P694050-21	P694050-23
Corresponding parts	⑦, ⑨, ⑩, ⑬ are included as a set.	⑦, ⑨, ⑩, ⑬, ⑳ are included as a set.	⑦, ⑨, ⑩, ⑬ are included as a set.

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)**

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

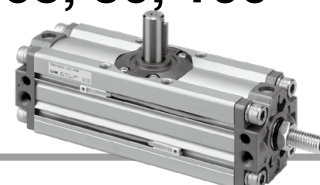
# Rotary Actuator: Angle Adjustable Type

(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**

**Mounting**

<b>B</b>	Basic type
<b>L</b>	Foot type*
<b>F</b>	Flange type

\* For foot bracket and part number, refer to page 16.  
\* Foot bracket is included in the same package, (but not assembled).

**Built-in magnet**

**Shaft type**

<b>S</b>	Single shaft
<b>W</b>	Double shaft
<b>X</b>	Single shaft with four chamfers
<b>Y</b>	Double shaft with key
<b>Z</b>	Double shaft with four chamfers
<b>T</b>	Single round shaft
<b>J</b>	Double shaft (round shaft, with four chamfers)
<b>K</b>	Double round shaft

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

**Rotating angle**

<b>90</b>	90°
<b>180</b>	180°
<b>100</b>	100°
<b>190</b>	190°

**Auto switch**

<b>Nil</b>	Without auto switch (Built-in magnet)
------------	---------------------------------------

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

**Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.

Note) Up to two auto switches are mountable.

**Made to Order**  
Refer to page 16.

**Angle adjustable type**

**Size**

<b>50</b>
<b>63</b>
<b>80</b>
<b>100</b>

**Port type**

Size		50	63	80	100
<b>Nil</b>	Rc	1/8	1/4	3/8	
<b>TF</b>	G				
<b>TN</b>	NPT				
<b>TT</b>	NPTF				

**Applicable Auto Switches**/Refer to the **WEB catalog** or the Best Pneumatics No.4 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length [m]				Pre-wired connector	Applicable load			
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)					
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC	
	3-wire (PNP)			12 V		M9PV		M9P	●	●	●	○	○				
	2-wire			12 V		M9BV		M9B	●	●	●	○	○				
	Diagnosis indication (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit		
	Water resistant (2-color indication)			3-wire (PNP)		12 V		M9PWV	M9PW	●	●	●	○	○			—
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	○			
				3-wire (NPN)		5 V, 12 V		M9NAV*1	M9NA*1	○	○	●	○	○	IC circuit		
				3-wire (PNP)		12 V		M9PAV*1	M9PA*1	○	○	●	○	○			
				2-wire		12 V		M9BAV*1	M9BA*1	○	○	●	○	○			—
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*2	A93	●	●	●	●	—		—
100 V or less	A90V	A90	●					—	●	—	—	—	IC circuit				

\*1 Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

\*2 1 m type lead wire is only applicable to D-A93.

\* Lead wire length symbols: 0.5 m ..... Nil (Example) M9NW  
1 m ..... M (Example) M9NWM  
3 m ..... L (Example) M9NWL  
5 m ..... Z (Example) M9NWX

\* Auto switches marked with "○" are produced upon receipt of order.

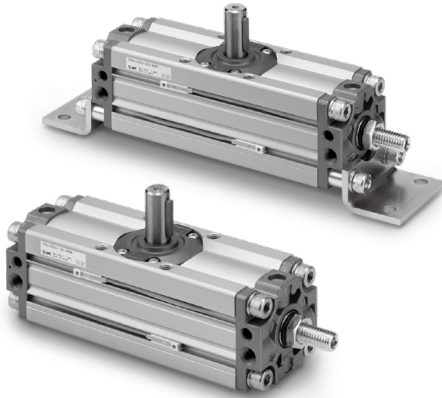
\* Auto switches are shipped together, (but not assembled).



Refer to the **WEB catalog** or the Best Pneumatics No.4 for detailed solid state auto switches with pre-wired connectors.



# Rotary Actuator: Angle Adjustable Type Rack & Pinion Type **Series CRA1□□U**



Made to Order

## Made to Order

(For details, refer to pages 28 to 48.)

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 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 Z, T, J, K
-X7*	Heat resistant type (100°C)	S, W, X, Y Z, T, J, K
-X16	Fluororubber seal	S, W, X, Y Z, T, J, K
-X10	Both sides angle adjustable	S, W, X, Y Z, T, J, K
-X11	One side angle adjustable, One side with cushion	S, W, X, Y Z, T, J, K

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

## 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 6.

## Weight

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

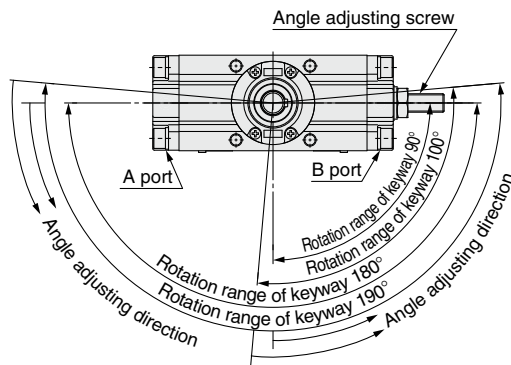
\* With 2 auto switches

## 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. Mounting screw: 4 pcs. 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

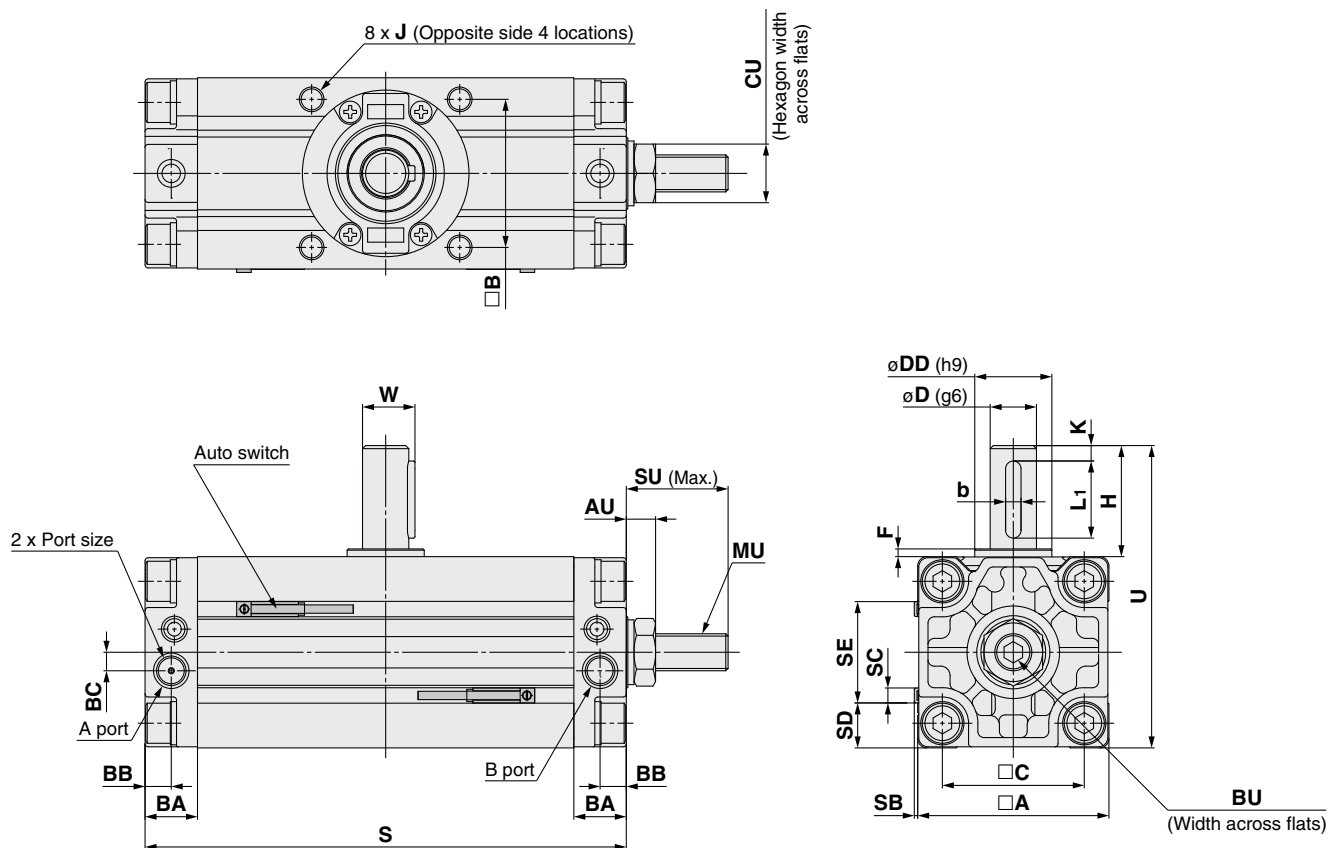
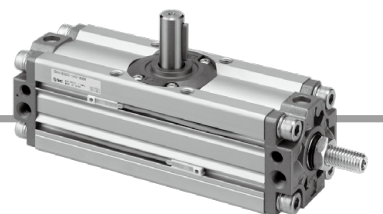
\* Remove the basic type mounting screws and use the mounting screws included in the foot bracket to secure the foot bracket to the cover. Use the collar as a spacer for the cover counterbore part and secure it together with the foot.

# Series CRA1□□U

## 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	Note 1) Port size	A	B	C	D (g6)	DD (h9)	F	H	J	K	With auto switch					Without auto switch S	U	W	BA	BB	BC
											S	SB	SC	SD	SE						
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

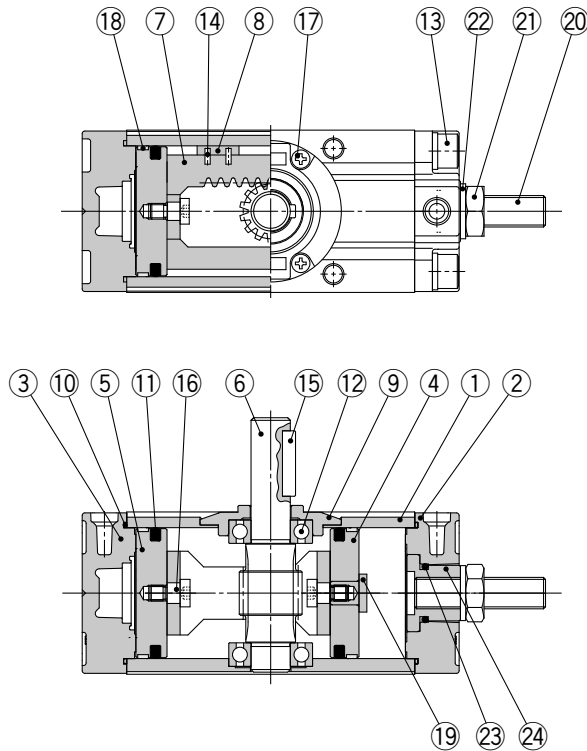
Size	AU	BU	CU	SU	MU	Key Note 2) dimensions	
						b	L1
50	9.5	6	19	33	M12 x 1.75	5 <sup>0</sup> <sub>-0.030</sub>	25
63	10.5	6	22	35.5	M14 x 2	6 <sup>0</sup> <sub>-0.030</sub>	30
80	12.5	8	24	44	M16 x 2	6 <sup>0</sup> <sub>-0.030</sub>	40
100	14.5	10	30	56	M20 x 2.5	8 <sup>0</sup> <sub>-0.036</sub>	45

Note 1) In addition to Rc, G, NPT and NPTF are also available.

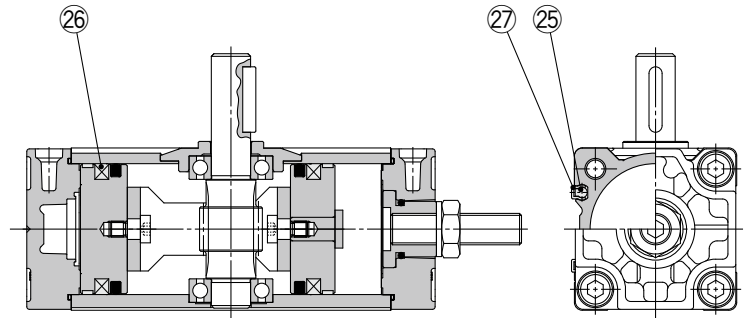
Note 2) A parallel key is included in the same package, (but not assembled).

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 9 to 12.

## 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, ⑳ 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)

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

# Rotary Actuator with Solenoid Valve

## Series CVRA1

RoHS

Rack & Pinion Style/Size: 50, 63, 80, 100

### How to Order

**CVRA1** **B** **S** **50** **-90** **Z** **1** **1** **G** **-** **-**

**With auto switch** **CDVRA1** **B** **S** **50** **-90** **Z** **1** **1** **G** **-** **-** **M9BW** **-** **-**

**Built-in magnet** •

**With solenoid valve** •

**Mounting** •

<b>B</b>	Basic type
<b>L</b>	Foot type

Note) Flange type "F" is not available.

**Shaft type** •

<b>S</b>	Single shaft
<b>W</b>	Double shaft
<b>X</b>	Single shaft with four chamfers
<b>Y</b>	Double shaft with key
<b>Z</b>	Double shaft with four chamfers
<b>T</b>	Single round shaft
<b>J</b>	Double shaft (round shaft, with four chamfers)
<b>K</b>	Double round shaft

\* T, J, K are made to order.

**Auto switch** •

<b>Nil</b>	Without auto switch (Built-in magnet)
------------	---------------------------------------

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

**Air cushion** •

<b>Nil</b>	None
<b>C</b>	With air cushion

\* Except angle adjustable type "U".

**Number of auto switches** •

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.

\* Up to two auto switches are mountable.

**Rotating angle** •

<b>90</b>	90°
<b>180</b>	180°
<b>100</b>	100°
<b>190</b>	190°

**Size** •

<b>50</b>
<b>63</b>
<b>80</b>
<b>100</b>

**Type** •

<b>Nil</b>	Standard
<b>U</b>	Angle adjustable

**Made to Order** •  
Refer to page 21.

**Applicable Auto Switches**/Refer to the **WEB catalog** or the Best Pneumatics No.4 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length [m]				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
	Diagnosis indication (2-color indication)			3-wire (PNP)		12 V		M9PV	M9P	●	●	●	○	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	○		
				3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	○		
				3-wire (PNP)		12 V		M9PWV	M9PW	●	●	●	○	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	○		
				3-wire (NPN)		5 V, 12 V		M9NAV*1	M9NA*1	○	○	●	○	○		
	Water resistant (2-color indication)			3-wire (PNP)		12 V		M9PAV*1	M9PA*1	○	○	●	○	○		
				2-wire		12 V		M9BAV*1	M9BA*1	○	○	●	○	○		
	Reed auto switch			—		Grommet		Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96		
24 V		12 V	100 V		A93V*2		A93			●	●	●	●	—	—	
		100 V or less	A90V		A90		●			—	●	—	—	—	IC circuit	

\*1 Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.

\*2 1 m type lead wire is only applicable to D-A93.

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

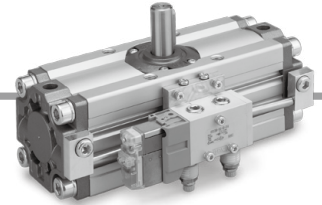
\* Auto switches marked with "○" are produced upon receipt of order.

\* Auto switches are shipped together, (but not assembled).



Refer to the **WEB catalog** or the Best Pneumatics No.4 for detailed solid state auto switches with pre-wired connectors.

# Rotary Actuator with Solenoid Valve Rack & Pinion Style **Series CVRA1**



## 1 Type of actuation

1	2 position single
2	2 position double
3	3 position closed center
4	3 position exhaust center
5	3 position pressure center

## 2 Rated voltage

Symbol	AC specification [50/60 Hz]	Symbol	DC specification
1	100 AC	5	24 VDC
2	200 AC	6	12 VDC
3	110 VAC [115 VAC]		
4	220 VAC [230 VAC]		
7	240 VAC		
B	24 VAC		

## 3 Electrical entry

Grommet	L-type plug connector	M-type plug connector	DIN terminal	DIN (EN175301-803) terminal	Conduit terminal
 G: Lead wire length 300 mm H: Lead wire length 600 mm	 L: With lead wire (length 300 mm)	 M: With lead wire (length 300 mm)	 D: With connector [IP65 compatible]	 Y: With connector [IP65 compatible]	 T: Conduit terminal [IP65 compatible]
 G: Lead wire length 300 mm H: Lead wire length 600 mm DC Without light/surge voltage suppressor	 LN: Without lead wire	 MN: Without lead wire	 DO: Without connector	 YO: Without connector	
CE DC compliant AC <sup>Note 2)</sup>	CE	CE	CE	CE	CE
	—	—	—	—	—

## 4 Light/Surge voltage suppressor

Symbol	Light/Surge voltage suppressor	DC	AC
Nil	Without light/surge voltage suppressor	○	○
S	With surge voltage suppressor	○	— <sup>Note)</sup>
Z	With light/surge voltage suppressor	○	○
R	With surge voltage suppressor (Non-polar)	○	—
U	With light/surge voltage suppressor (Non-polar)	○	—

Note) S type is not available with AC mode, since a rectifier prevents surge voltage generation.

\* In the DIN terminal type, since a light is installed in the connector, DOZ, DOU, YOZ, YOU are not available.

## 5 Manual override

Nil: Non-locking push type	D: Push-turn locking slotted type	E: Push-turn locking lever type

\* LN and MN types are with 2 sockets.

\* Refer to the **WEB catalog** or the Best Pneumatics No. 1 when different length of lead wire for L/M-type plug connector is required.

\* Refer to the **WEB catalog** or the Best Pneumatics No. 1 for details on the DIN (EN175301-803) terminal.

Note 1) When using IP65, select the main/pilot valve common exhaust type or pilot valve base exhaust type. (Except VF1000)

Note 2) With the same specifications as the DC type, all electrical entries for the 24 VAC type are CE marking compliant.

CRA1

CRA1□□U

CVRA1

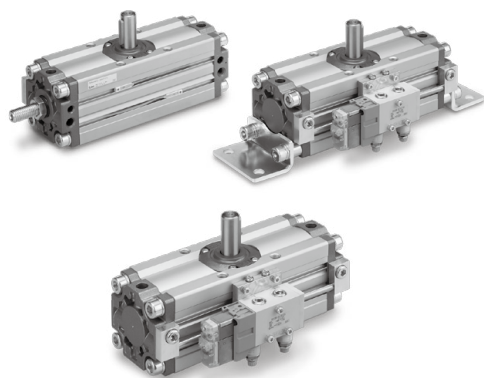
Auto Switch Mounting

Simple Specials

Made to Order



# Series CVRA1

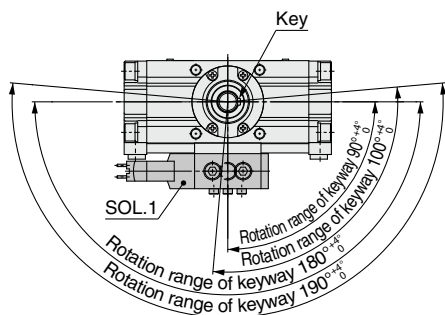


## Made to Order

(Refer to pages 28 to 48 for details.)

Symbol	Specifications/Description	Applicable shaft type
—	Shaft type variations	S, X, Y, Z, T, J, K
XA1 to XA24	Shaft pattern sequencing I	S, W, Y
XA33 to XA46	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	Fluorine grease	S, W, X, Y, Z, T, J, K
XC31 to XC36	Change of rotation range and rotation direction of shaft	S, W, Y
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
X6	Stainless steel specifications for main parts	S, W, X, Y, Z, T, J, K
X10	Both sides angle adjustable type	S, W, X, Y, Z, T, J, K
X11	One side angle adjustable, One side cushion	S, W, X, Y, Z, T, J, K

## Rotation Range of Keyway Solenoid Valve Mounting Positions



## Specifications

### Rotary Actuator

Type	Pneumatic			
Size	50	63	80	100
Fluid	Air (Non-lube)			
Max. operating pressure	1.0 MPa			
Min. operating pressure	0.15 MPa			
Ambient and fluid temperature	0 to 50°C (No freezing)			
Cushion	Not attached, Air cushion			
Backlash	Within 1°			
Tolerance in rotating angle	0 to +4°			
Mounting	Basic style, Foot style			

### Solenoid Valve

Electrical entry			Grommet (G), (H) L plug connector (L) M plug connector (M)	DIN terminal (D) DIN (EN175301-803) terminal (Y) Conduit terminal (T)
Coil rated voltage V	AC (50/60 Hz)		24, 100, 110, 200, 220, 240	
	DC		12, 24	
Allowable voltage change			-10 to +10% of the rated voltage	
Apparent power VA	AC	24 V	1.5 (With light 1.55)	1.5 (With light 1.75)
		100 V	1.55 (With light 1.65)	1.55 (With light 1.7)
		110 V [115 V]		
		200 V		
		220 V [230 V]		
		240 V		
Power consumption W	DC	Standard	1.5 (With light 1.55)	1.5 (With light 1.75)

\* In common between 110 VAC and 115 VAC, and between 220 VAC and 230 VAC.

\* For 115 VAC and 230 VAC, the allowable voltage is -15% to +5% of rated voltage.

\* Since voltage drops due to the internal circuit in S and Z types, the allowable voltage fluctuation should be within the following range.

24 VDC: -7% to +10% 12 VDC: -4% to +10%

## Solenoid Valve Weight

Size	Type of actuation				
	Single solenoid	Double solenoid	Closed center	Exhaust center	Pressure center
50 to 100	0.4	0.5	0.6	0.6	0.6

How to calculate weight

Weight = Basic weight \* + Solenoid valve weight

\* Refer to page 6 for basic weight.

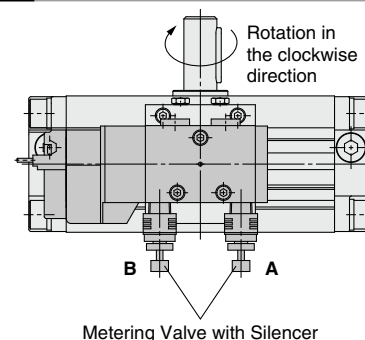
## How to Adjust the Rotation Speed

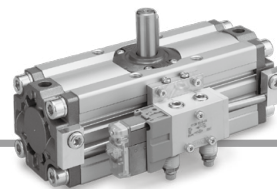
### Rotation direction

When current is applied to SOL.1, the shaft rotates clockwise.

### How to adjust the rotation speed:

Turn the needle valve of the metering valve clockwise to reduce the exhaust flow volume, thus slowing the rotation speed. Metering valve A regulates the clockwise rotation speed of the shaft and throttle valve B regulates the counterclockwise speed to the shaft.

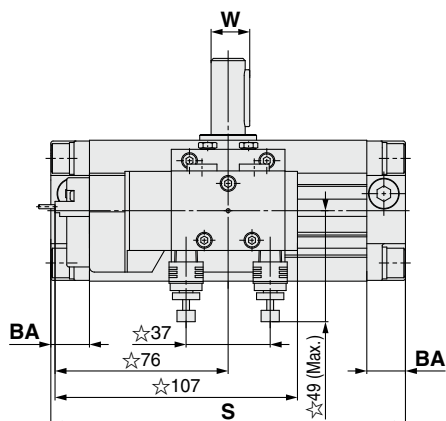
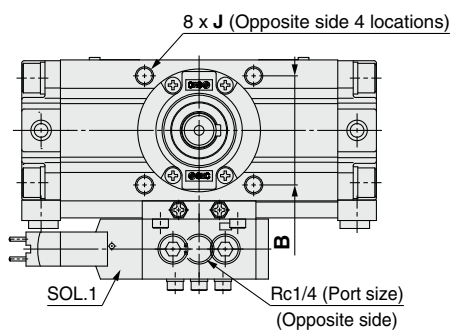
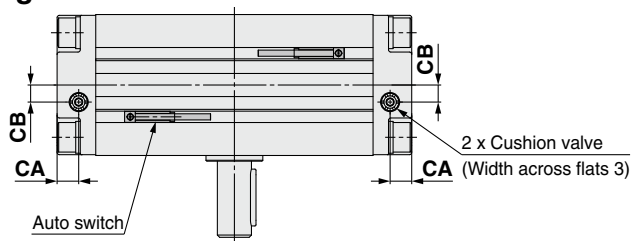




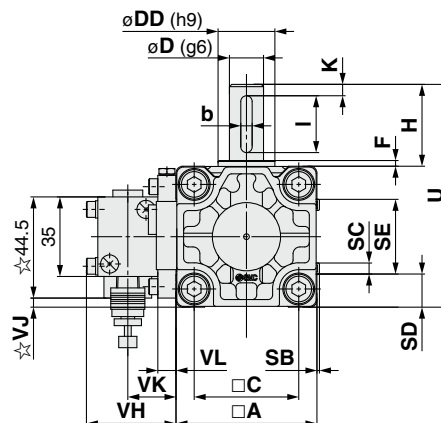
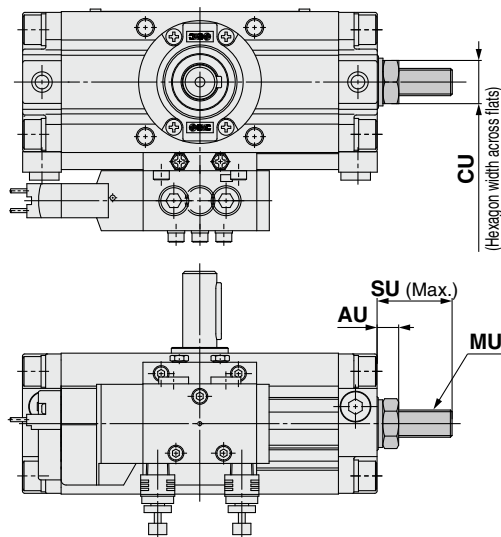
## Dimensions/Basic Type: C□VRA1BS

Size: 50/63/80/100

Single shaft/C□VRA1BS



## Angle adjustable type/C□VRA1BS



- Drawing shows the appearance for rotation of 90° and 100°.
- Drawing shows that SOL.1 is in the de-energized state.
- Drawing shows the auto switch mounted on the port side.

\* ( ) are the dimensions for rotation of 180° and 190°.  
☆ mark shows the dimensions of the solenoid valve VF3120K-1G1-02-X14.

Size	A	B	C	D (g6)	DD (h9)	F	H	J	K	With auto switch					Without auto switch	U	W	BA	★ CA	★ CB	Valve dimensions				Key dimensions <sup>(Note)</sup>	
										S	SB	SC	SD	SE	S						VH	VJ	VK	VL	b	I
50	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	9.5	7.5	39.5	4	21	8	5 <sup>0</sup> <sub>-0.030</sub>	25
63	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	11	8	39.5	11	21	8	6 <sup>0</sup> <sub>-0.030</sub>	30
80	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	13	9	43.5	19	25	12	6 <sup>0</sup> <sub>-0.030</sub>	40
100	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	14	10	43.5	29	25	12	8 <sup>0</sup> <sub>-0.036</sub>	45

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

★For model with air cushion

### Angle adjustable

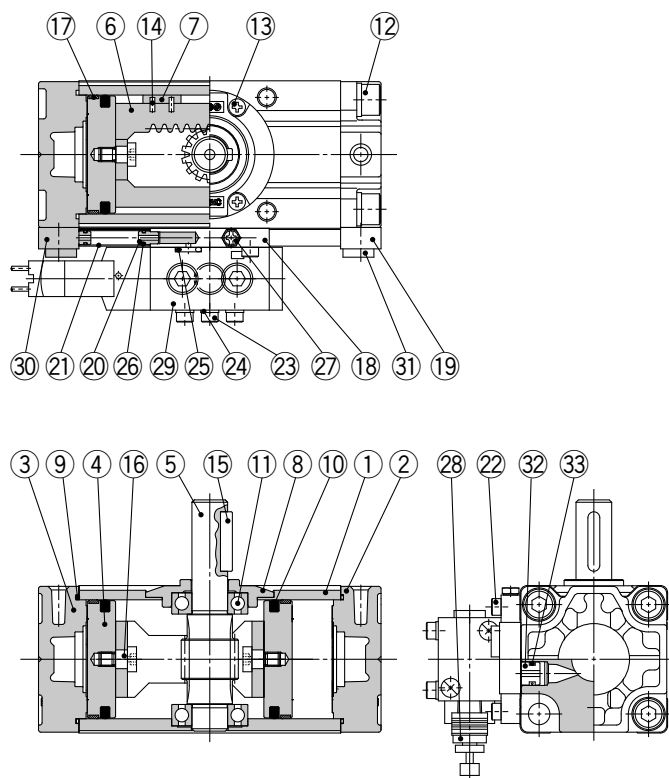
Size	AU	CU	SU	MU
50	9.5	19	33	M12 x 1.75
63	10.5	22	35.5	M14 x 2
80	12.5	24	44	M16 x 2
100	14.5	30	56	M20 x 2.5

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 9 to 11.

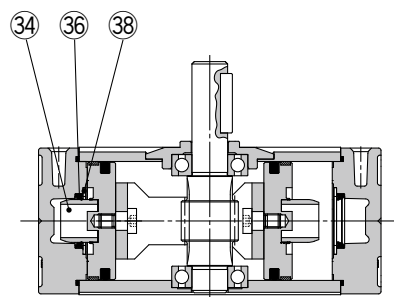
# Series CVRA1

## Construction/With Solenoid Valve

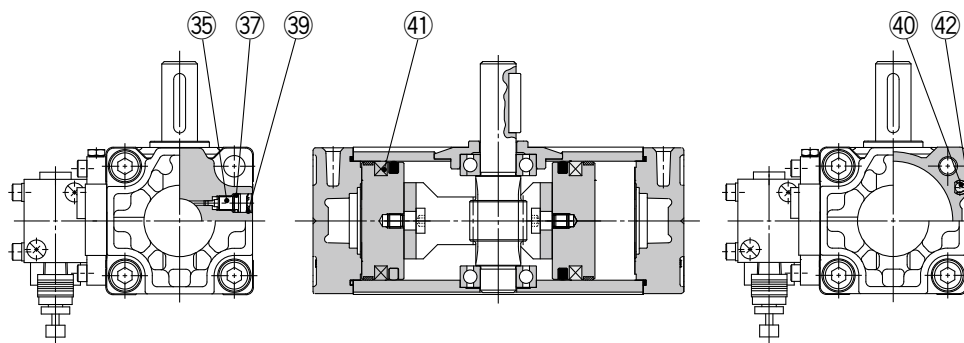
### Without air cushion



### With air cushion



### Without air cushion With auto switch



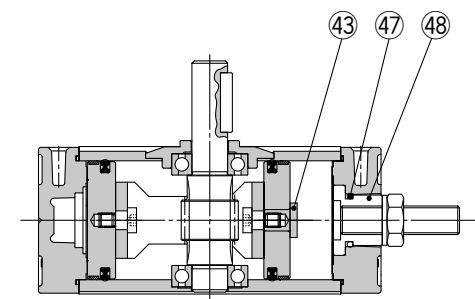
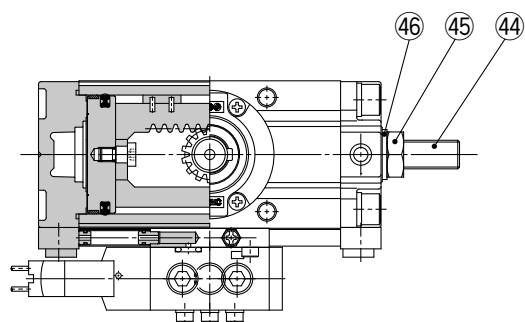
### Component Parts

No.	Description	Material	Note
1	<b>Body</b>	Aluminum alloy	Anodized
2	<b>Right cover</b>	Aluminum alloy	Metallic coating
3	<b>Left cover</b>	Aluminum alloy	Metallic coating
4	<b>Piston</b>	Aluminum alloy	
5	<b>Shaft</b>	Alloy steel	
6	<b>Rack</b>	Carbon steel	Nitrided
7	<b>Slider</b>	Resin	
8	<b>Bearing retainer</b>	Aluminum alloy	Chromated
9	<b>Tube gasket</b>	NBR	
10	<b>Piston seal</b>	NBR	
11	<b>Bearing</b>	High carbon chrome bearing steel	
12	Hexagon socket head cap screw with washer	Alloy steel	Zinc chromated
13	Cross-recessed pan head tapping screw	Steel	Zinc chromated
14	<b>Spring pin</b>	Steel	Zinc chromated
15	<b>Parallel key</b>	Carbon steel	
16	<b>Connecting screw</b>	Carbon steel	Zinc chromated

### Component Parts

No.	Description	Material	Note
17	<b>Wear ring</b>	Resin	
18	<b>Sub-plate</b>	Aluminum alloy	Chromated
19	Sub-plate (Right cover side)	Aluminum alloy	Chromated
20	<b>Guide tube fitting</b>	Aluminum alloy	Chromated
21	<b>Pipe</b>	Stainless steel	
22	Hexagon socket head cap screw	Alloy steel	Zinc chromated
23	Hexagon socket head cap screw	Alloy steel	Zinc chromated
24	<b>Spring washer</b>	Alloy steel	Zinc chromated
25	<b>O-ring</b>	NBR	
26	<b>O-ring</b>	NBR	
27	<b>M5 plug</b>	—	
28	Metering valve with silencer	—	ASN2-□
29	<b>Solenoid valve</b>	—	
30	Sub-plate (Left cover side)	Aluminum alloy	Chromated
31	Hexagon socket head cap screw	Alloy steel	Zinc chromated
32	Guide tube fitting (Cover side)	Aluminum alloy	Chromated

## Construction/Angle Adjustable Type



### Component Parts

No.	Description	Material	Note
33	O-ring	NBR	
34	Cushion ring	Aluminum alloy	Anodized
35	Cushion valve	Steel	Zinc chromated
36	Cushion seal	Urethane	
37	O-ring	NBR	
38	Seal retainer	Steel	
39	Retaining ring	Steel	
40	Auto switch	—	
41	Magnet	—	
42	Switch spacer	Resin	
43	Stopper	Carbon steel	Zinc chromated
44	Hexagon socket head set screw (flat point)	Alloy steel	Zinc chromated
45	Hexagon nut	Steel	Zinc chromated
46	Seal washer	NBR	
47	O-ring	NBR	
48	Angle adjusting collar	Carbon steel	Zinc chromated

### Replacement Parts

Size	Part no.		
	Without air cushion	With air cushion	Angle adjustable type
50	P694020-49	P694020-50	P694020-51
63	P694030-49	P694030-50	P694030-51
80	P694040-49	P694040-50	P694040-51
100	P694050-49	P694050-50	P694050-51
Corresponding parts	⑦, ⑨, ⑩, ⑭, ⑳, ㉔, ㉓ are included as a set.	⑦, ⑨, ⑩, ⑭, ⑳, ㉔, ㉓ are included as a set.	⑦, ⑨, ⑩, ⑭, ⑳, ㉔, ㉓ are included as a set.

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)**

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

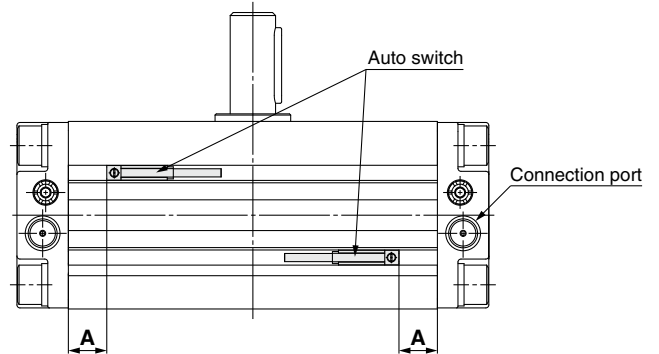
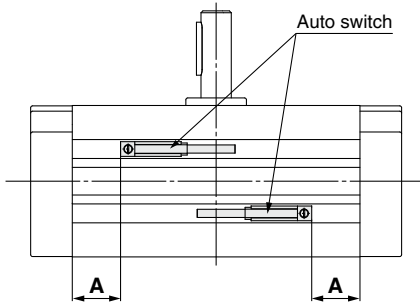
# Series CRA1

## Auto Switch Mounting

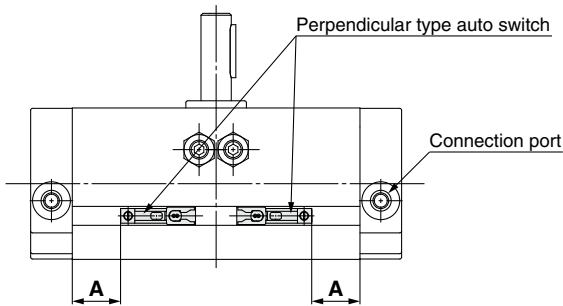
### Auto Switch Proper Mounting Position at Rotation End

Size: 30

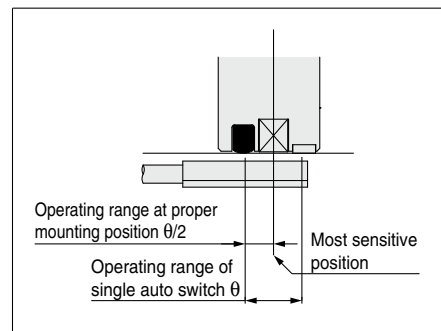
Size: 50 to 100



\* For models with the solenoid valve, the auto switch can be mounted only on the rear side (opposite to the solenoid valve).



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 D-M9□W/M9□WV 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				

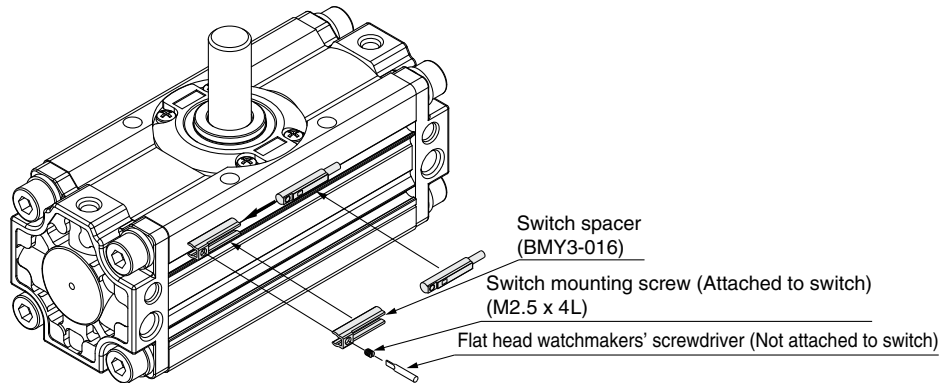
\* The above part number includes one switch spacer.

\* 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.

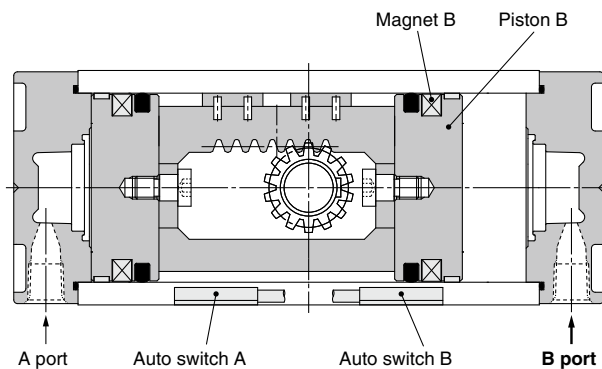


Note) When tightening an auto switch mounting screw, use a watchmakers' screwdriver with a handle of approximately 5 to 6 mm in diameter.  
Also, tighten with a torque of about 0.1 to 0.15 N·m.  
As a guide, turn about 90° past the point at which tightening can first be felt.

## Auto Switch Working Principle

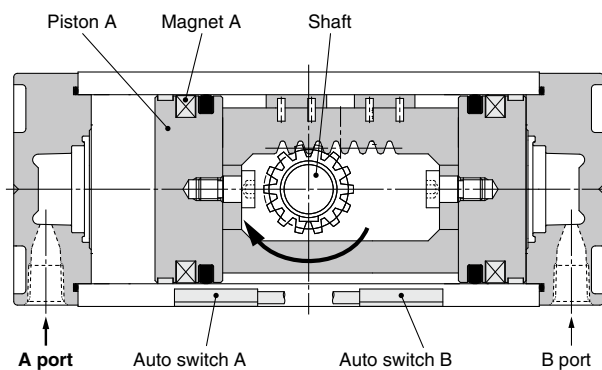
### [Pressure is applied from the B port.]

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.





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## Rotary Actuator Series **CRA1**

### Simple Specials/Made to Order

#### Simple specials

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#### Made to Order

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② Change of rotation range	<b>-XC8 to -XC11</b>	Page 39
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④ Change of rotation range and shaft rotation direction	<b>-XC31 to XC36</b>	Page 40
⑤ Change of rotation range and angle adjusting direction	<b>-XC37 to XC42</b>	Page 41
⑥ Change of rotation range and angle adjusting direction	<b>-XC43 to XC46</b>	Page 42
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Made to Order/-X6 to -X16		Page 48

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

# 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.



Symbol

## Shaft Pattern Sequencing I

-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

• **Solenoid valve**

Nil	None
V*	With solenoid valve

\* Except size 30, air-hydro type

• **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	—	—	—	—
TF	G	—	1/8	1/8	1/4
TN	NPT	—	—	—	3/8
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

• **Model with solenoid valve**

\* Refer to page 19 for model number with solenoid valve.

• **Number of auto switches**

Nil	2 pcs.
S	1 pc.

• **Auto switch**

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

\* For applicable auto switch model, refer to page 5.  
\* Auto switches are shipped together, (but not assembled).

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

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

• **Combination 3 types**

A 1	A24	C59
A13	C 8	C59

• **Combination of applicable chart**

Chart 1, 2
Chart 2, 7

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

• **Combination 4 types**

A 1	A 2	C 8	C59
A 2	A24	C10	C60

• **Combination of applicable chart**

Chart 1, 2, 7
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
<b>-XA1</b>	Shaft-end female thread	●	—	●	●	●	—	●	—	●
<b>-XA2</b>	Shaft-end female thread	—	●	●	●	●	●	—	—	●
<b>-XA13</b>	Shaft through-hole	●	●	●	●	●	—	—	—	●
<b>-XA14</b>	Shaft through-hole + Shaft-end female thread	●	—	●	●	●	—	—	—	●
<b>-XA15</b>	Shaft through-hole + Shaft-end female thread	—	●	●	●	●	—	—	—	●
<b>-XA16</b>	Shaft through-hole + Double shaft-end female thread	●	●	●	●	●	—	—	—	●
<b>-XA17</b>	Shorted shaft (Long shaft with key)	●	—	●	●	●	—	●	●	—
<b>-XA18</b>	Shorted shaft (Short shaft and with four sided chamfer)	—	●	—	●	●	W, Y*	—	W, Y*	—
<b>-XA19</b>	Shorted shaft (Double shaft)	●	●	—	●	●	—	—	W, Y*	—
<b>-XA20</b>	Reverse shaft, Shorted shaft	●	●	—	●	●	—	—	S, W*	—
<b>-XA24</b>	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
<b>-XC7</b>	Reversed shaft	●	●	—	50, 63, 80, 100	—	—
<b>-XC8 to -XC11</b>	Change of rotation range	●	●	●		●	—
<b>-XC30</b>	Changed to fluorine grease	●	●	●	30 to 100	●	●
<b>-XC31 to -XC36</b>	Change of rotation range and shaft rotation direction	●	●	●	50, 63, 80, 100	●	—
<b>-XC37 to -XC46</b>	Change of rotation range and angle adjusting direction	●	●	●		●	—
<b>-XC47 to -XC58</b>	Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.)	●	●	●	30 to 100	●	—
<b>-XC59 to -XC61</b>	Change of port location	●	●	●		●	●
<b>-XC63</b>	One side air-hydro, One side air	●	●	●	50, 63, 80, 100	●	●
<b>-XC64</b>	One side air-hydro, One side air	●	●	●		●	●

\* -XC8 to -XC11 and -XC31 to -XC36 do not include the angle adjustable type.

\* -XC37 to -XC46 and -XC47 to -XC58 are only the angle adjustable type.

\* -XC59 to -XC61 do not include the model with solenoid valve.

\* -XC63 and -XC64 are only the air-hydro type.

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

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

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

\* -X7 and -X16 do not include the model with solenoid valve.

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order



## Shaft Pattern Sequencing I

Symbol

-XA1 to -XA17

Applicable shaft type: S, W, Y

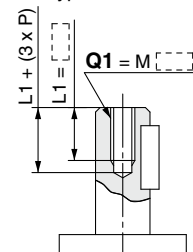
### Additional Reminders

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



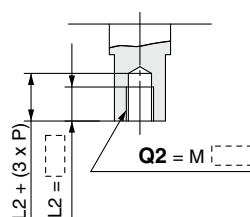
[mm]

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



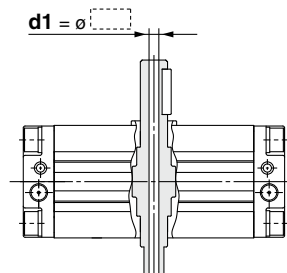
[mm]

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

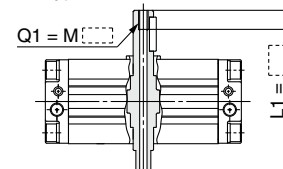
**Symbol: A14** Note) Except flange type

A special end is machined onto the long shaft, and a through-hole is drilled into it. Female threads are machined into the through-hole, 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

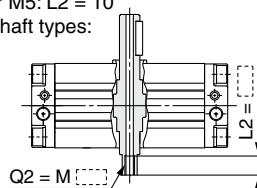
A special end is machined onto the short shaft, and a through-hole is drilled into it. Female threads are machined into the through-hole, whose diameter is equivalent to the pilot hole diameter.

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.

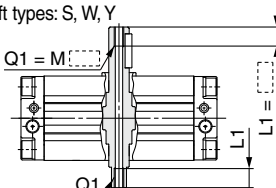
The maximum dimension L1 is, as a rule, twice the thread size.

(Example) For M5: L1 = 10

· Applicable shaft types: S, W, Y

· Equal dimensions

are indicated by the same marker.



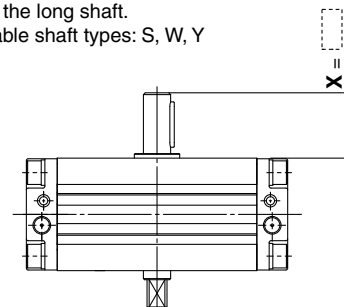
[mm]

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**

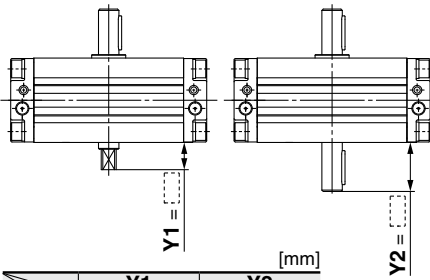
# Shaft Pattern Sequencing I

Applicable shaft type: S, W, Y

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

Shorten the short shaft.

· Applicable shaft types: W, Y

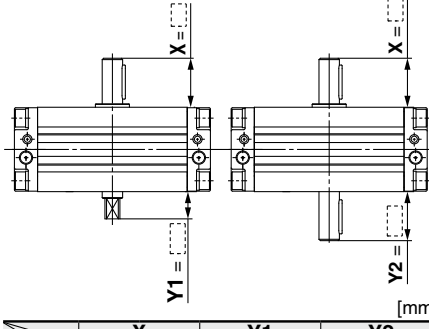


Size	Y1	Y2
Shaft type	W	Y
30	3 to 8	15 to 25
50	1 to 20	18.5 to 36
63	1 to 22	21 to 41
80	1 to 25	25 to 50
100	1 to 30	32.5 to 60

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

Both the long shaft and short shaft are shortened.

· Applicable shaft types: W, Y

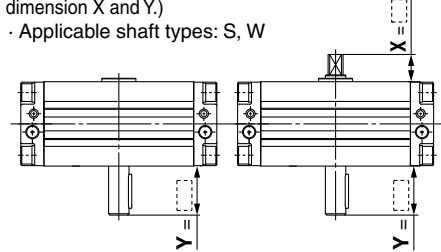


Shaft type		X		Y1		Y2	
Size		W	Y	W		Y	
30		15	to 25	3	to 8	15	to 25
50		18.5	to 36	1	to 20	18.5	to 36
63		21	to 41	1	to 22	21	to 41
80		25	to 50	1	to 25	25	to 50
100		32.5	to 60	1	to 30	32.5	to 60

**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	Y	
		W	S	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**

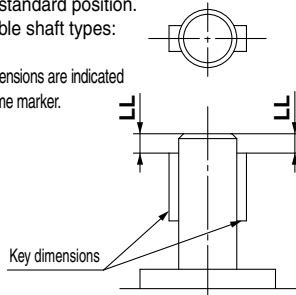
Double key

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.



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

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

## Shaft Pattern Sequencing II

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

Symbol

-XA33 to -XA59

### How to Order

C D RA1 B J 50 - 90 Z - M9BW - X A33 A34 C8 C30

#### • Magnet

Nil	None
D	Built-in magnet

#### • Solenoid valve

Nil	None
V*	With solenoid valve

\* Except size 30, air-hydro type

#### • 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	—	—	—	—
TF	G	—	1/8	1/8	1/4
TN	NPT	—	—	—	3/8
TT	NPTF	—	—	—	—

#### • Number of auto switches

Nil	2 pcs.
S	1 pc.

#### • Auto switch

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

\* For applicable auto switch model, refer to page 5.

\* Auto switches are shipped together, (but not assembled).

#### • Model with solenoid valve

\* Refer to page 19 for model number with solenoid valve.

#### • Cushion

Nil	Without air cushion
C*	With air cushion

\* Except angle adjustable type, air-hydro type

#### • Rotating angle

90	90°
180	180°
100*	100°
190*	190°

\* Except size 30

#### • Symbol for simple specials, made-to-order products

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

#### • Combination 3 types

A33	A34	C30
A35	C 9	C59

#### • Combination of applicable chart

Chart 4, 5
Chart 5, 7

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

#### • Combination 4 types

A33	A34	C30	C59
A45	A46	C30	C61

#### • Combination of applicable chart

Chart 4, 5, 7
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			
<b>-XA33</b>	Shaft-end female thread	●	—	—	—	●	●	●	<b>-XA33</b>			
<b>-XA34</b>	Shaft-end female thread	—	●	—	—	●	●	●	T, J, K*	<b>-XA34</b>		
<b>-XA35</b>	Shaft-end female thread	●	—	●	●	—	—	—	—		<b>-XA35</b>	
<b>-XA36</b>	Shaft-end female thread	—	●	●	●	—	—	—	—	X, Z*	<b>-XA36</b>	
<b>-XA37</b>	Stepped round shaft	●	—	—	—	●	●	●	T, J, K*	—	—	<b>-XA37</b>
<b>-XA38</b>	Stepped round shaft	—	●	—	—	—	—	●	K*	—	—	K*
<b>-XA40</b>	Shaft through-hole	●	●	—	—	●	—	●	—	—	—	—
<b>-XA41</b>	Shaft through-hole	●	●	●	●	—	●	—	—	—	—	—
<b>-XA43</b>	Shaft through-hole + Double shaft-end female thread	●	●	—	—	●	—	●	—	—	—	—
<b>-XA44</b>	Shaft through-hole + Double shaft-end female thread	●	●	●	●	—	●	—	—	—	—	—
<b>-XA45</b>	Middle-cut chamfer	●	—	—	—	●	●	●	T, J, K*	—	—	K*
<b>-XA46</b>	Middle-cut chamfer	—	●	—	—	—	—	●	K*	—	—	K*
<b>-XA51</b>	Change of long shaft length (Without keyway)	●	—	—	—	●	●	●	T, J, K*	—	—	K*
<b>-XA52</b>	Change of short shaft length (Without keyway)	—	●	—	—	—	—	●	K*	—	—	K*
<b>-XA53</b>	Change of double shaft length (Both without keyway)	●	●	—	—	—	—	●	—	—	—	K*
<b>-XA54</b>	Change of long shaft length (With four chamfers)	●	—	●	●	—	—	—	—	X, Z*	—	X, Z*
<b>-XA55</b>	Change of short shaft length (With four chamfers)	—	●	—	●	—	●	—	J*	Z*	J*	J*
<b>-XA56</b>	Change of double shaft length (Both with four chamfers)	●	●	—	●	—	—	—	—	—	—	Z*
<b>-XA57</b>	Change of double shaft length (Without keyway, With four chamfers)	●	●	—	—	—	●	—	—	—	—	J*
<b>-XA58</b>	Reversed shaft, Change of shaft length (With four chamfers, Without keyway)	●	●	—	—	●	●	—	—	—	—	T*
<b>-XA59</b>	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
<b>-XC7</b>	Reversed shaft	●	—	●	●	—	50, 63, 80, 100	—
<b>-XC8 to -XC11</b>	Change of rotation range	—	—	—	—	—	50, 63, 80, 100	—
<b>-XC30</b>	Changed to fluorine grease	●	●	●	●	●	30 to 100	●
<b>-XC31 to -XC36</b>	Change of rotation range and shaft rotation direction	—	—	—	—	—	50, 63, 80, 100	—
<b>-XC37 to -XC46</b>	Change of rotation range and angle adjusting direction	—	—	—	—	—		—
<b>-XC47 to -XC58</b>	Change of rotation range and angle adjusting direction (Angle adjusting screw is equipped on the left.)	—	—	—	—	—	30 to 100	—
<b>-XC59 to -XC61</b>	Change of port location	●	●	●	●	●	30 to 100	●
<b>-XC63</b>	One side air-hydro, One side air	●	●	●	●	●	50, 63, 80, 100	●
<b>-XC64</b>	One side air-hydro, One side air	●	●	●	●	●	50, 63, 80, 100	●

\* -XC8 to -XC11 and -XC31 to -XC36 do not include the angle adjustable type.

\* -XC37 to -XC46 and -XC47 to -XC58 are only the angle adjustable type.

\* -XC59 to -XC61 do not include the model with solenoid valve.

\* -XC63 and -XC64 are only the air-hydro type.

**Chart 6. Combination between -X□ and -XA□**

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

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

\* -X7 and -X16 do not include the model with solenoid valve.

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

## Shaft Pattern Sequencing II

Symbol  
-XA33 to -XA41

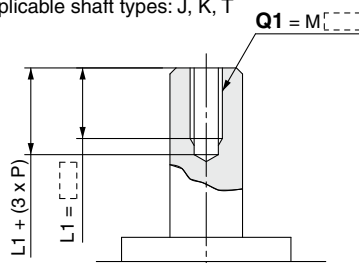
Applicable shaft type: X, Z, T, J, K

### 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

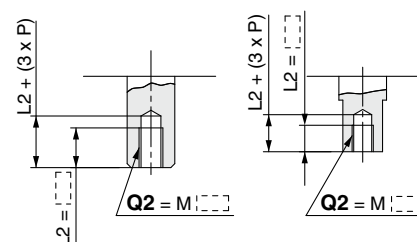
The maximum dimension L1 is, as a rule, twice the thread size.  
(Example) For M4: L1 = 8  
· Applicable shaft types: J, K, T



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

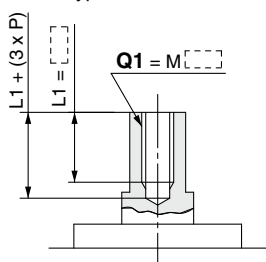
The maximum dimension L2 is, as a rule, twice the thread size.  
(Example) For M4: L2 = 8  
· Applicable shaft types: J, K, T



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

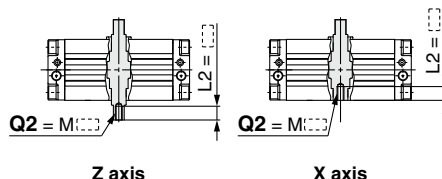
The maximum dimension L1 is, as a rule, twice the thread size.  
(Example) For M4: L1 = 8  
· Applicable shaft types: X, Z



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

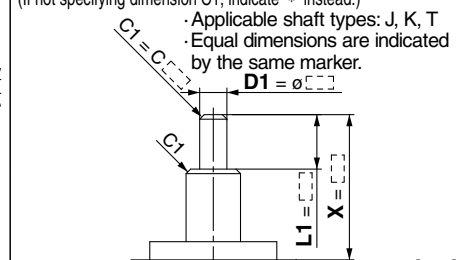


Size	Q2
30	M3
50	M4, M5, M6, M8
63	M4, M5, M6, M8, M10
80	M4, M5, M6, M8, M10, M12
100	M5, M6, M8, M10, M12

**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.)



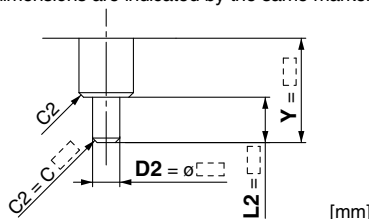
Size	X	L1max	D1
30	3 to 25	X-2	ø5 to ø 7.9
50	3.5 to 36	X-2.5	ø5 to ø14.9
63	3.5 to 41	X-2.5	ø5 to ø16.9
80	4 to 50	X-3	ø8 to ø19.9
100	5 to 60	X-4	ø8 to ø24.9

**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.)

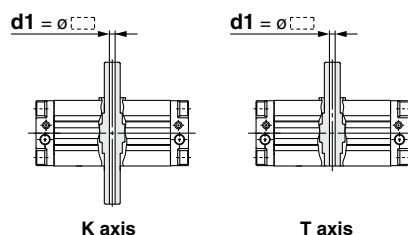
· Applicable shaft type: K  
· Equal dimensions are indicated by the same marker.



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

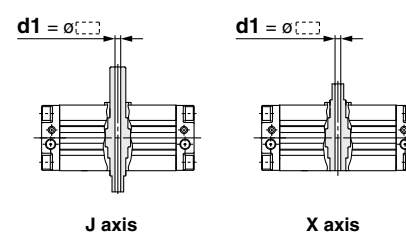
· Minimum machining diameter for d1 is 0.1.  
· Applicable shaft types: K, T



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



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

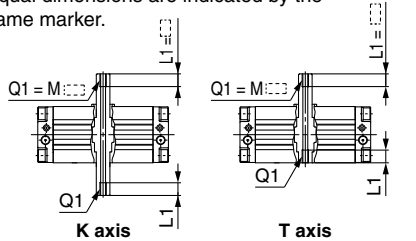
**-XA43 to -XA55**

## Shaft Pattern Sequencing II

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

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

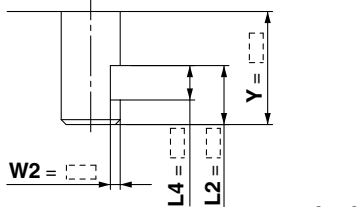
- Applicable shaft types: K, T
- Equal dimensions are indicated by the same marker.



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: A46** Note) Except flange type

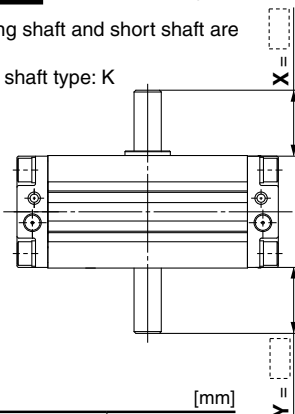
- The short shaft can be further shortened by machining a middle-cut chamfer into it.
- The minimum unit of the dimensions within a range that allows for machining is 0.1.
- (The position is that of the standard flat at the keyway portion.)
- (If shortening the shaft is not required, indicate "\*" for dimension Y.)
- Applicable shaft type: K



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: A53** Note) Except flange type

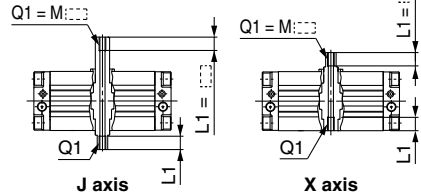
- Both the long shaft and short shaft are shortened.
- Applicable shaft type: K



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: A44** Note) Except flange type

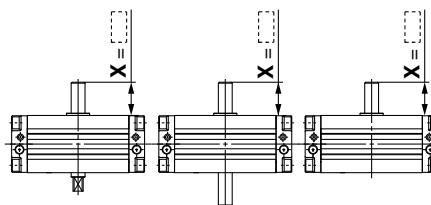
- Shaft through-hole and female thread machining
- Applicable shaft types: J, X, Z
- Equal dimensions are indicated by the same marker.



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: A51** Note) Except flange type

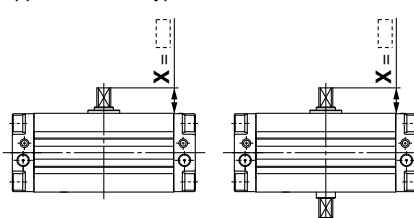
- Shorten the long shaft.
- Applicable shaft types: J, K, T



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: A54** Note) Except flange type

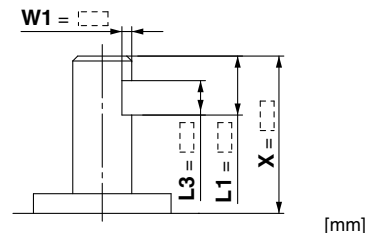
- Shorten the long shaft.
- Applicable shaft types: X, Z



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: A45** Note) Except flange type

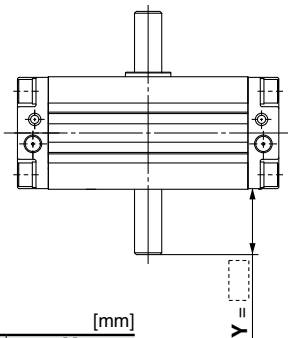
- The long shaft can be further shortened by machining a middle-cut chamfer into it.
- The minimum unit of the dimensions within a range that allows for machining is 0.1.
- (The position is that of the standard flat at the keyway portion.)
- (If shortening the shaft is not required, indicate "\*" for dimension X.)
- Applicable shaft types: J, K, T



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: A52** Note) Except flange type

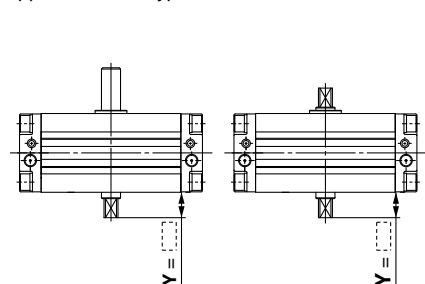
- Shorten the short shaft.
- Applicable shaft type: K



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

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

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



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

CRA1

CRA1□□□

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

Shaft Pattern Sequencing II

Symbol  
-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

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

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

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

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

# Series CRA1

## Made to Order

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



### How to Order

**C D RA1 B S 50 - 90 Z - M9BW - X C8 C30 C59**

• **Magnet**

Nil	None
D	Built-in magnet

• **Solenoid valve**

Nil	None
V*	With solenoid valve

\* Except size 30, air-hydro type

• **Mounting**

B	Basic type
L	Foot type
F*	Flange type

\* Except size 30, with solenoid valve type.

• **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

• **Model with solenoid valve**

\* Refer to page 19 for model number with solenoid valve.

• **Cushion**

Nil	Without air cushion
C*	With air cushion

\* Except angle adjustable type, air-hydro type

• **Rotating angle**

90	90°
180	180°
100*	100°
190*	190°

\* Except size 30

• **Port type**

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

• **Auto switch**

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

\* For applicable auto switch model, refer to page 5.  
\* 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** → Chart 7

• **Combination of applicable chart**

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.

CRA1

CRA1

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

### Combination Chart of Made to Order

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

Symbol	Description	Applicable shaft type								Applicable size	Combination										
		S	W	X	Y	Z	T	J	K												
-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	●	●	—	●	—	—	—	—		S,W,Y*	—	S,W,Y*	-XC31 to -XC36							
-XC37 to -XC46	Change of rotation range and angle adjusting direction	●	●	—	●	—	—	—	—	50, 63, 80, 100	—	—	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*	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	●	●	●	●	●	●	●	●	80, 100	●	●	—	●	—	—	—	—	●		

\* -XC8 to -XC11 and -XC31 to -XC36 do not include the angle adjustable type. \* -XC37 to -XC46 and -XC47 to -XC58 are only the angle adjustable type.  
\* -XC59 to -XC61 do not include the model with solenoid valve.  
\* -XC63 and -XC64 are only the air-hydro type.

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

Symbol	Description	Applicable shaft type										Applicable size	Combination							
		S	W	X	Y	Z	T	J	K				-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)	●	●	●	●	●	●	●	●			30 to 100	●	●	—	●	●	●	—	—
-X10	Both sides angle adjustable	●	●	●	●	●	●	●	●			50 to 100	●	—	●	—	—	●	—	—
-X11	One side angle adjustable, One side with cushion	●	●	●	●	●	●	●	●			50 to 100	●	—	—	—	—	●	—	—
-X16	Fluororubber seal	●	●	●	●	●	●	●	●			30 to 100	●	●	●	●	●	●	—	—

\* -X10 and -X11 are only the angle adjustable type.  
\* -X7 and -X16 do not include the model with solenoid valve.

# Series CRA1

## 1 Reversed Shaft Symbol -XC7

C□RA1 Standard model no. -XC7  
C□RA1□□U

Reversed shaft  
(-XC7)

### Specifications

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

## 2 Change of Rotation Range Symbol -XC8 to -XC11

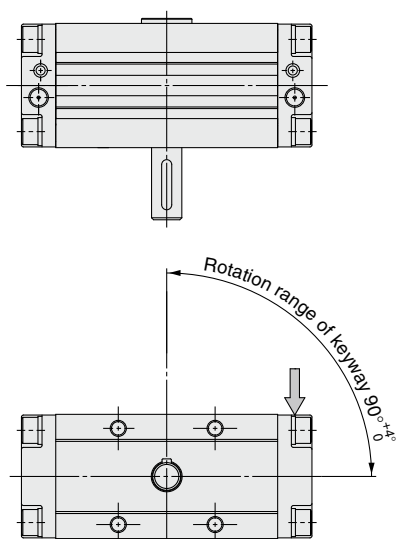
C□RA1 Standard model no. -XC8

Change of rotation range  
(-XC8 to -XC11)

### Specifications

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

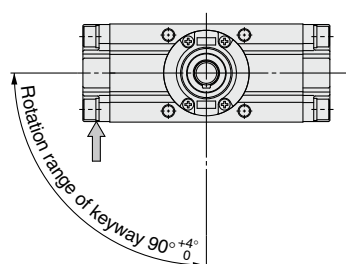
Symbol: C7



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

Symbol: C8

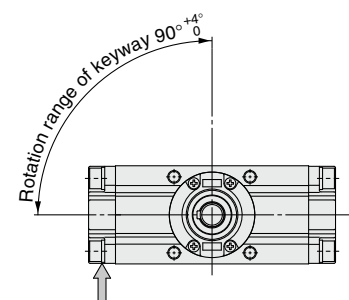
Change of rotation range



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

Symbol: C9

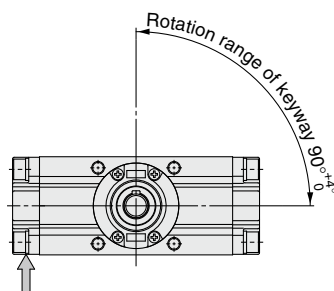
Change of rotation range



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

Symbol: C10

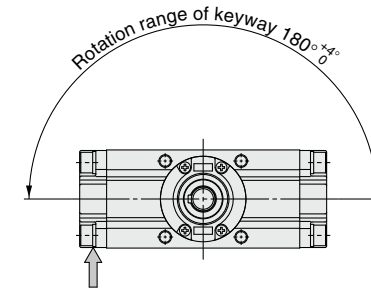
Change of rotation range



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

C□RA1 Standard model no. -XC30  
C□RA1□□U

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

Fluorine grease  
(-XC30)

### 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**

C□RA1

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)

CRA1

CRA1□□U

CVRA1

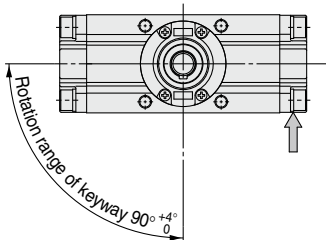
Auto Switch Mounting

Simple Specials

Made to Order

### Symbol: C31

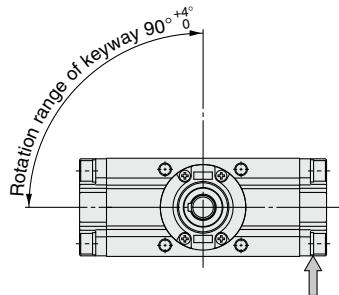
The rotation range is changed and the rotating direction is reversed.



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

### Symbol: C32

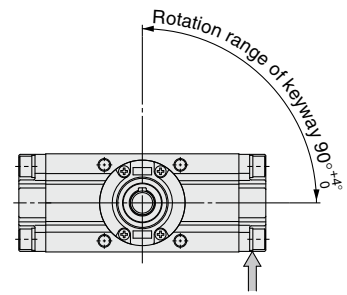
The rotation range is changed and the rotating direction is reversed.



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

### Symbol: C33

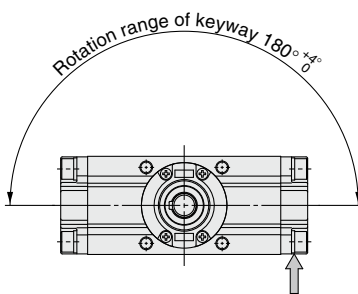
The rotation range is changed and the rotating direction is reversed.



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

### Symbol: C34

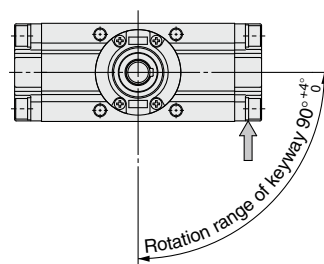
The rotation range is changed and the rotating direction is reversed.



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

### Symbol: C35

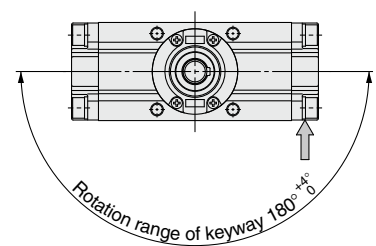
The rotation range is changed and the rotating direction is reversed.



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.

## 5 Change of Rotation Range and Angle Adjusting Direction

Symbol  
-XC37 to -XC42

C□RA1□□U

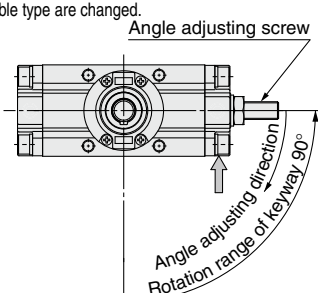
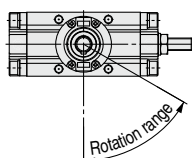
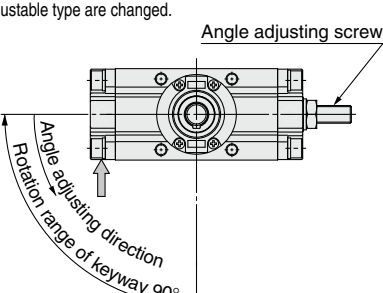
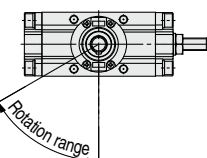
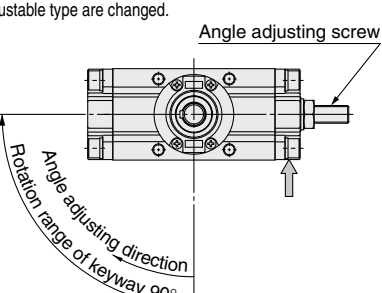
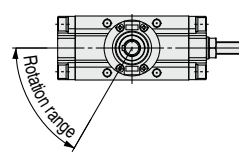
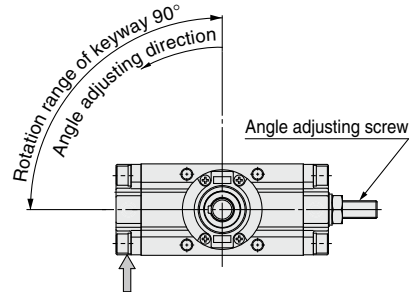
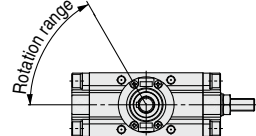
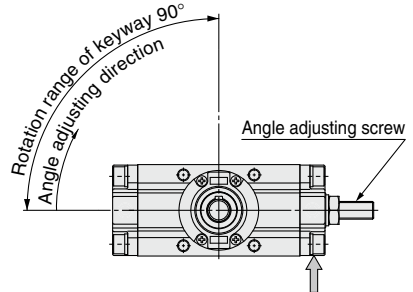
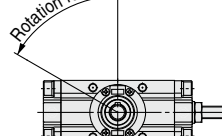
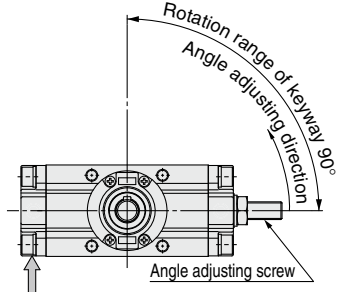
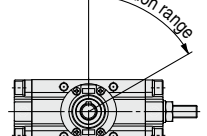
Standard model no.

-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)

<p><b>Symbol: C37</b></p> <p>The rotation range and the angle adjusting direction of the angle adjustable type are changed.</p>  <p>Angle adjusting screw</p> <p>Angle adjusting direction</p> <p>Rotation range of keyway 90°</p> <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Rotation range</p> <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C38</b></p> <p>The rotation range and the angle adjusting direction of the angle adjustable type are changed.</p>  <p>Angle adjusting screw</p> <p>Angle adjusting direction</p> <p>Rotation range of keyway 90°</p> <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Rotation range</p> <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C39</b></p> <p>The rotation range and the angle adjusting direction of the angle adjustable type are changed.</p>  <p>Angle adjusting screw</p> <p>Angle adjusting direction</p> <p>Rotation range of keyway 90°</p> <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Rotation range</p> <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>
<p><b>Symbol: C40</b></p> <p>The rotation range and the angle adjusting direction of the angle adjustable type are changed.</p>  <p>Angle adjusting screw</p> <p>Angle adjusting direction</p> <p>Rotation range of keyway 90°</p> <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Rotation range</p> <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C41</b></p> <p>The rotation range and the angle adjusting direction of the angle adjustable type are changed.</p>  <p>Angle adjusting screw</p> <p>Angle adjusting direction</p> <p>Rotation range of keyway 90°</p> <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Rotation range</p> <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C42</b></p> <p>The rotation range and the angle adjusting direction of the angle adjustable type are changed.</p>  <p>Angle adjusting screw</p> <p>Angle adjusting direction</p> <p>Rotation range of keyway 90°</p> <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Rotation range</p> <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>



Symbol

## 6 Change of Rotation Range and Angle Adjusting Direction

**-XC43 to -XC46**

C□RA1□□U

Standard model no.

-XC43

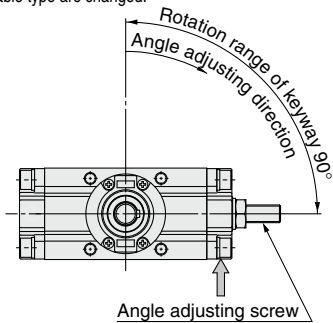
### Specifications

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

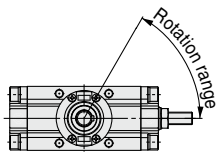
● Change of rotation range and angle adjusting direction (-XC43 to -XC46)

#### Symbol: C43

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



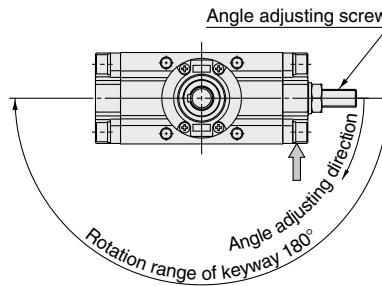
The rotation range under the adjustment of an angle at 60° is indicated below.



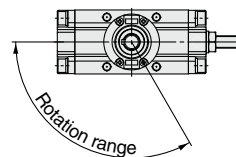
Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

#### Symbol: C44

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



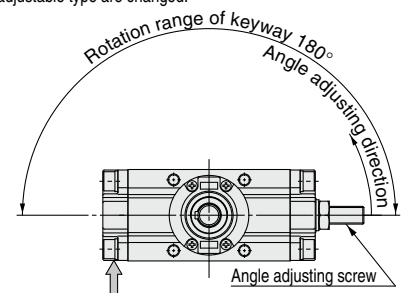
The rotation range under the adjustment of an angle at 120° is indicated below.



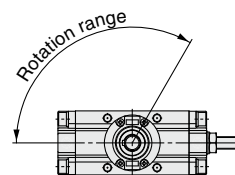
Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

#### Symbol: C45

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



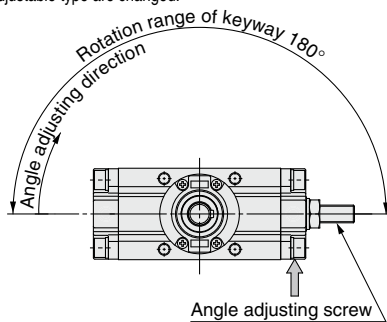
The rotation range under the adjustment of an angle at 120° is indicated below.



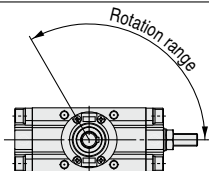
Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.

#### 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.

CRA1

CRA1□□U

CVRA1

Auto Switch Mounting

Simple Specials

Made to Order

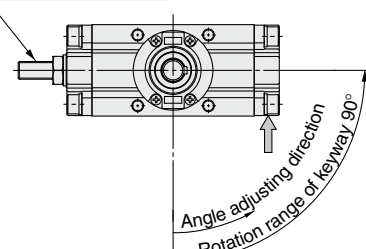
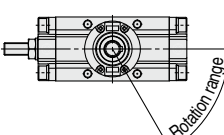
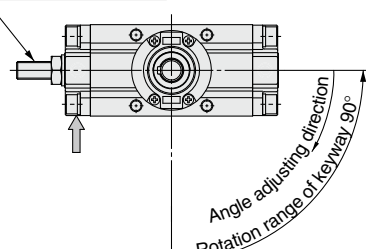
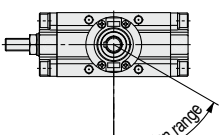
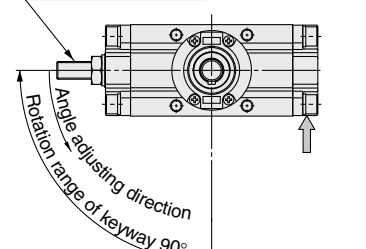
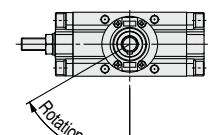
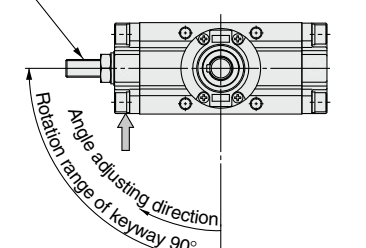
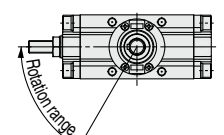
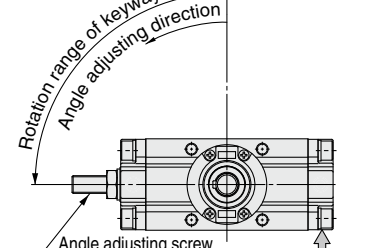
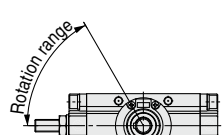
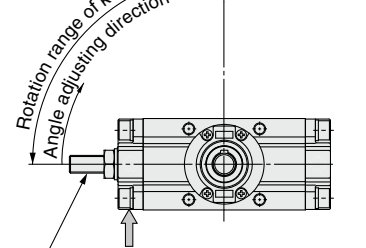
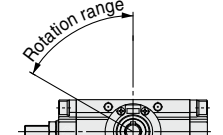
## 7 Change of Rotation Range and Angle Adjusting Direction (Angle adjusting screw is equipped on the left.) Symbol -XC47 to -XC52

C□RA1□□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)

<p><b>Symbol: C47</b></p> <p>For the angle adjusting type, angle adjusting screws are mounted to the left cover.</p>  <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C48</b></p> <p>For the angle adjusting type, angle adjusting screws are mounted to the left cover.</p>  <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C49</b></p> <p>For the angle adjusting type, angle adjusting screws are mounted to the left cover.</p>  <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>
<p><b>Symbol: C50</b></p> <p>For the angle adjusting type, angle adjusting screws are mounted to the left cover.</p>  <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C51</b></p> <p>For the angle adjusting type, angle adjusting screws are mounted to the left cover.</p>  <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>	<p><b>Symbol: C52</b></p> <p>For the angle adjusting type, angle adjusting screws are mounted to the left cover.</p>  <p>The rotation range under the adjustment of an angle at 60° is indicated below.</p>  <p>Note) If it is pressurized from the port indicated with the arrow, the shaft rotates in the clockwise direction.</p>

Symbol

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

**-XC53 to -XC58**

C□RA1□□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)

CRA1

CRA1□□U

CVRA1

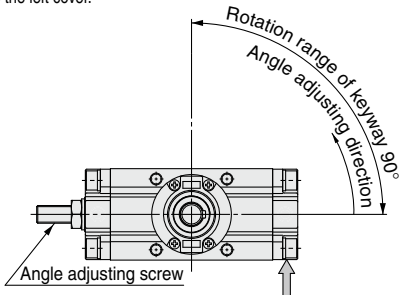
Auto Switch Mounting

Simple Specials

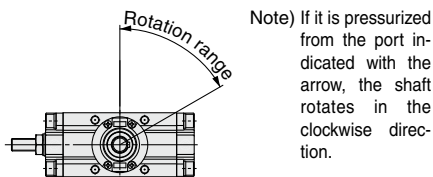
Made to Order

**Symbol: C53**

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

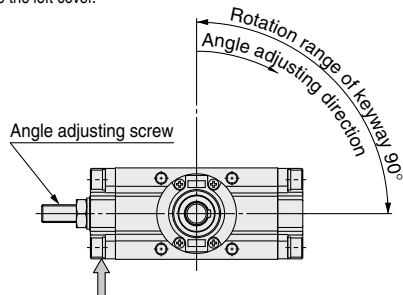


The rotation range under the adjustment of an angle at 60° is indicated below.

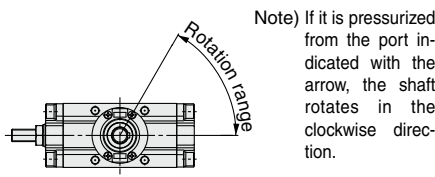


**Symbol: C54**

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

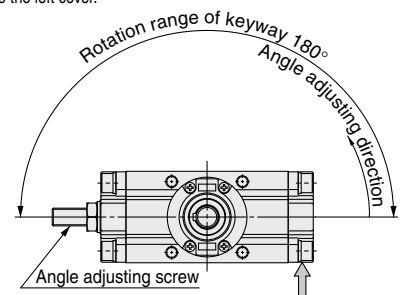


The rotation range under the adjustment of an angle at 60° is indicated below.

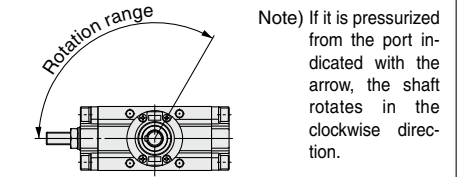


**Symbol: C55**

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

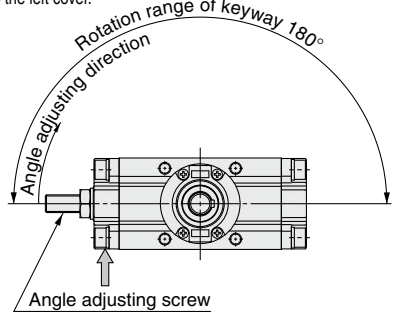


The rotation range under the adjustment of an angle at 120° is indicated below.

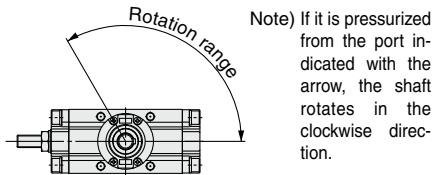


**Symbol: C56**

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

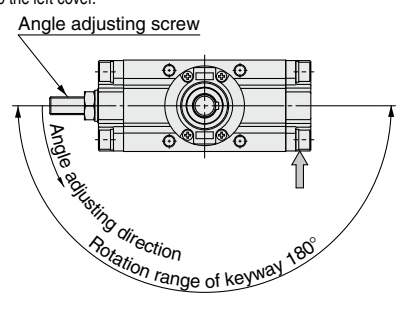


The rotation range under the adjustment of an angle at 120° is indicated below.

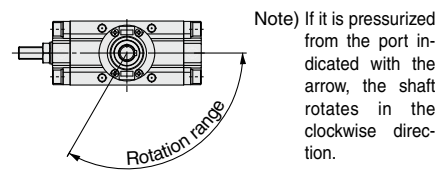


**Symbol: C57**

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

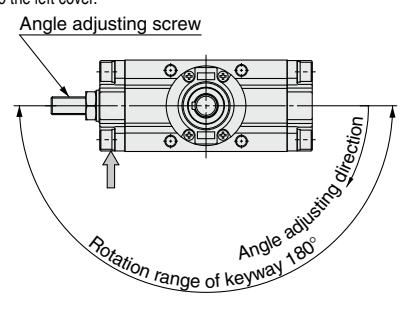


The rotation range under the adjustment of an angle at 120° is indicated below.

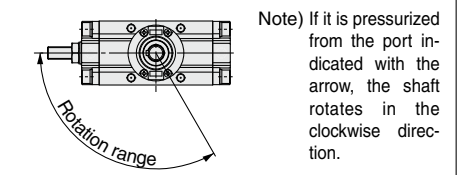


**Symbol: C58**

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.



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

C□RA1 Standard model no. -XC59

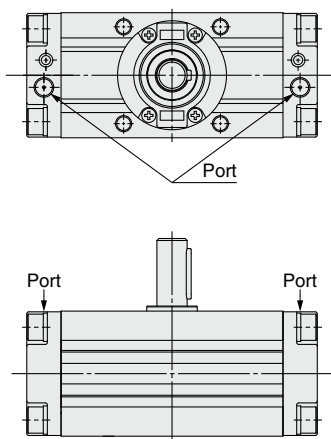
### Specifications

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

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

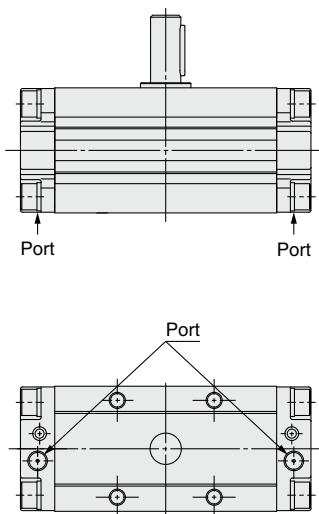
#### Symbol: C59

Direction of the port is changed. (Upward)



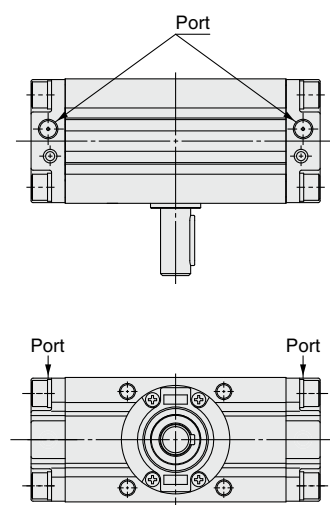
#### Symbol: C60

Direction of the port is changed. (Downward)



#### Symbol: C61

Direction of the port is changed. (Backward)



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

C□RA1 Standard model no. -XC63

### Specifications

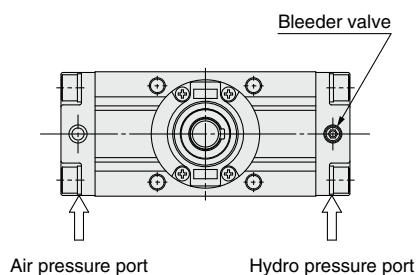
Applicable size	50, 63, 80, 100
Applicable shaft type	S, W, X, Y Z, T, J, K

\* 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

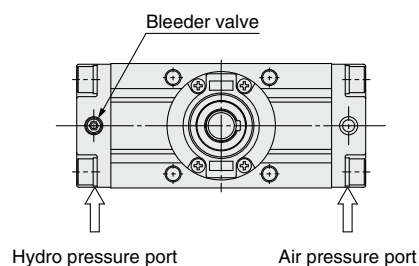
One side air, one side air-hydro specification (Left side air, Right side hydro)



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 **-X6**

C□RA1 Standard model no. **-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	<b>30, 50, 63, 80, 100</b>
Rotating angle	90°, 180° (Size 30 to 100) 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 (Except air-hydro type)
Auto switch	Mountable

\* Refer to page 5 for other specifications.

\*\* Except angle adjustable type

\*\*\* Only single shaft (S) and double shaft (W) types are applicable to flange type.

## 12 Heat Resistant **-X7**

CRA1 Standard model no. **-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	<b>30, 50, 63, 80, 100</b>
Rotating angle	90°, 180° (Size 30 to 100) 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 Size 50 to 100: Not attached, Air cushion
Auto switch	Not mountable

\* Refer to page 5 for other specifications.

\*\* Except with solenoid valve type.

## 13 Both Sides Angle Adjustable **-X10**

C□RA1□□U Standard model no. **-X10**

Both sides angle adjustable ●

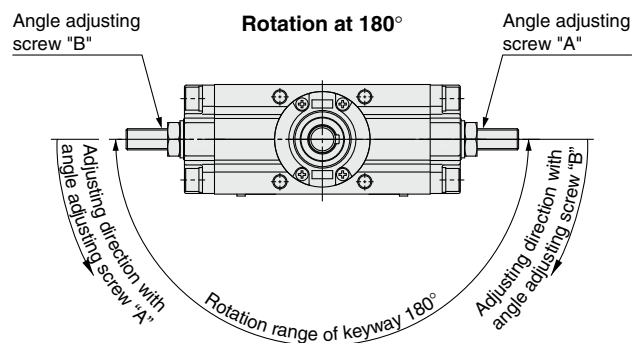
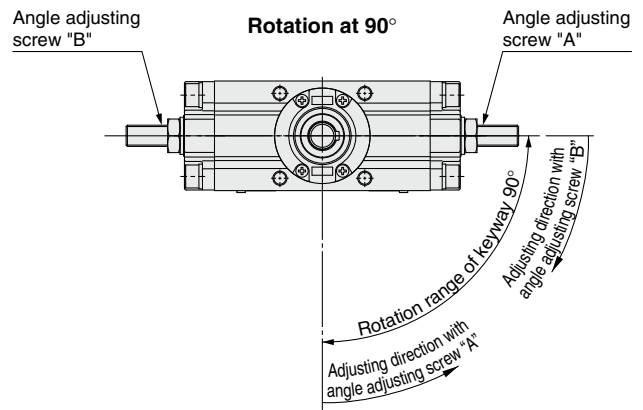


### Specifications

Type	Pneumatic
Size	<b>50, 63, 80, 100</b>
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 15 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.



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CRA1□□U

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Auto Switch Mounting

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Made to Order

# Series CRA1

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One Side Angle Adjustable, One Side with Cushion

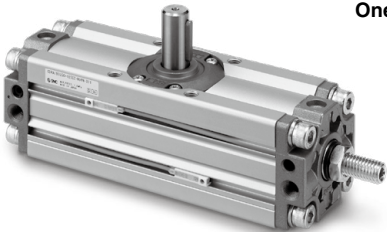
Symbol

-X11

C□RA1□□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 15 for other specifications.

15

Fluororubber Seal

Symbol

-X16

CDRA1

Standard model no.

-X16

Fluororubber seal ●

Seal is now changed to fluororubber.

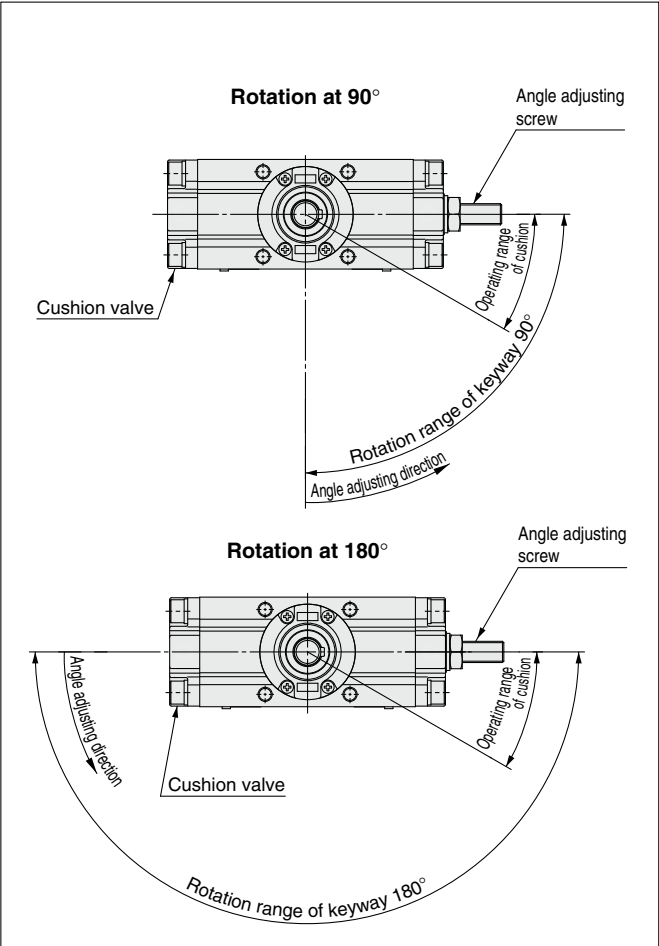
### Specifications

Type	Pneumatic
Size	30, 50, 63, 80, 100
Rotating angle	90°, 180° (Size 30 to 100) 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 5 for other specifications.

\*\* Except with solenoid valve type.

\*\*\* For built-in magnet type only.



\* Refer to page 17 for dimensions.





## How to Order

<b>C</b>	<b>D</b>	<b>RA1</b>	<b>B</b>	<b>S</b>	<b>50</b>	<b>-</b>	<b>90</b>	<b>Z</b>	<b>-</b>	<b>M9BW</b>	<b>-</b>	<b>X6</b>	<b>-</b>	<b>X16</b>
----------	----------	------------	----------	----------	-----------	----------	-----------	----------	----------	-------------	----------	-----------	----------	------------

• **Magnet**

<b>Nil</b>	None
<b>D</b>	Built-in magnet

• **Solenoid valve**

<b>Nil</b>	None
<b>V*</b>	With solenoid valve

\* Except size 30, air-hydro type

• **Mounting**

<b>B</b>	Basic type
<b>L</b>	Foot type
<b>F*</b>	Flange type

\* Except size 30, with solenoid valve type.

• **Shaft type**

<b>S</b>	Single shaft
<b>W</b>	Double shaft
<b>X</b>	Single shaft with four chamfers
<b>Y</b>	Double shaft with key
<b>Z</b>	Double shaft with four chamfers
<b>T</b>	Single round shaft
<b>J</b>	Double shaft (round shaft, with four chamfers)
<b>K</b>	Double round shaft

• **Variation**

<b>Nil</b>	Without angle adjustment
<b>U*</b>	Angle adjustable type
<b>H*</b>	Air-hydro type

\* Except size 30

• **Size**

<b>30</b>
<b>50</b>
<b>63</b>
<b>80</b>
<b>100</b>

• **Model with solenoid valve**

\* Refer to page 19 for model number with solenoid valve.

• **Auto switch**

<b>Nil</b>	Without auto switch (Built-in magnet)
------------	---------------------------------------

\* For applicable auto switch model, refer to page 5.  
\* Auto switches are shipped together, (but not assembled).

• **Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.

• **Cushion**

<b>Nil</b>	Without air cushion
<b>C*</b>	With air cushion

\* Except angle adjustable type, air-hydro type

• **Rotating angle**

<b>90</b>	90°
<b>180</b>	180°
<b>100*</b>	100°
<b>190*</b>	190°

\* Except size 30

• **Port type**

Size	30	50	63	80	100
<b>Nil</b>	M thread	M5	—	—	—
<b>TF</b>	Rc	—	—	—	—
<b>TN</b>	G	—	1/8	1/8	1/4
<b>TT</b>	NPT	—	—	—	3/8

• **Made to Order**

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

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Auto Switch Mounting

Simple Specials

Made to Order

## 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				
-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.



# Series CRA1 Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions. For Rotary Actuator Precautions and Auto Switch Precautions, refer to “Handling Precautions for SMC Products” and the Operation Manual on SMC 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.

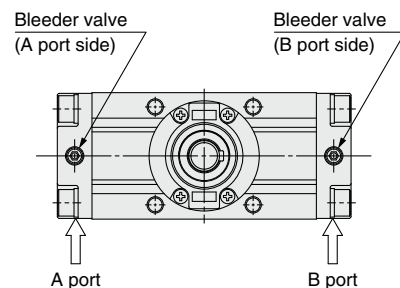
If the air-hydro unit's supply port is opened with compressed air still remaining in the system, there is a danger of hydraulic fluid being blown out.

### 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.

## Safety Instructions

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

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

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

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

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

### Warning

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

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

#### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

#### 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

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

### Caution

#### 1. The product is provided for use in manufacturing industries.

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

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

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

#### \*2) Vacuum pads are excluded from this 1 year warranty.

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

### Compliance Requirements

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

### Caution

#### SMC products are not intended for use as instruments for legal metrology.

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

### Revision history

**Edition B** \* Addition of angle adjustable type.  
\* Addition of size 30.  
\* Addition of air-hydro type.  
\* Addition of Made to Order (-X6, -X7, -X16).  
\* Changed the number of pages from 28 to 40.

RT

**Edition C** \* Addition of with solenoid valve type.  
\* Addition of standard type size 30 with air cushion.  
\* Changed the number of pages from 40 to 52.

TS

## Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.