

# Rotary Actuator

# CRA1 Series

RoHS

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

## How to Order

**CRA1** **B** **S** **50** **-90** **Z** **-**

**With auto switch** **CDRA1** **B** **S** **50** **-90** **Z** **-M9BW** **-**

**Built-in magnet**

**Mounting**

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

\* For foot bracket and part number, refer to page 189.  
\* Foot bracket is included in the same package, (but not assembled).  
Note) Except size 30

**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 232 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	—	—	—
<b>TF</b>	Rc	—	—	—	—
<b>TN</b>	G	—	1/8	1/8	1/4
<b>TT</b>	NPT	—	—	—	3/8
	NPTF	—	—	—	—

**Made to Order**  
Refer to page 189.

## Applicable Auto Switches/Refer to pages 797 to 850 for further information on auto switches.

Appendix 4: Auto switches (continued)																
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)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)			M9PV	M9P	●	●	●	○	○			
	2-wire			12 V	M9BV		M9B	●	●	●	○	○	—			
	3-wire (NPN)			5 V, 12 V	M9NWV		M9NW	●	●	●	○	○	IC circuit			
	3-wire (PNP)				M9PWV		M9PW	●	●	●	○	○				
	2-wire			12 V	M9BWW		M9BW	●	●	●	○	○	—			
	Water resistant (2-color indicator)	Grommet	Yes	3-wire (NPN)	5 V, 12 V	M9NAV <sup>*1</sup>	M9NA <sup>*1</sup>	○	○	●	○	○	IC circuit			
				3-wire (PNP)		M9PAV <sup>*1</sup>	M9PA <sup>*1</sup>	○	○	●	○	○				
				2-wire	12 V	M9BAV <sup>*1</sup>	M9BA <sup>*1</sup>	○	○	●	○	○	—			
				—	Grommet	No	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—
2-wire	24 V	12 V	100 V or less				A93V <sup>*2</sup>	A93	●	●	●	—	—	—	Relay, PLC	
								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.

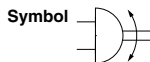
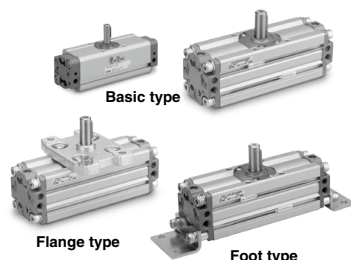
\*2 1 m type lead wire is only applicable to D-A93.

\* 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 pages 837 and 838 for detailed solid state auto switches with pre-wired connectors.



**Made to Order**  
(For details, refer to pages 211 to 231.)

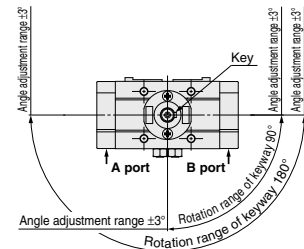
Symbol	Description	Applicable shaft type
-XA1 to -XA24	Shaft pattern sequencing I	S, W, Y
-XA33 to -XA59	Shaft pattern sequencing II	X, Z, T, J, K
-XC7	Reversed shaft	S, W, X, T, J
-XC8 to -XC11	Change of rotation range	S, W, Y
-XC30	Changed to fluorine grease	S, W, X, Y, Z, T, J, K
-XC31 to -XC36	Change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

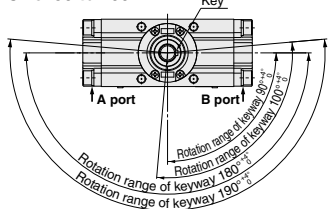
## Rotation Range of Keyway

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.

\* For details on the adjustable range of rotation time safe for operation for the air-hydro type, refer to page 33.

## 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		M 5 x 0.8 x 25
50	CRA1L 50-Y-1Z		M 8 x 1.25 x 35
63	CRA1L 63-Y-1Z	Foot bracket : 2 pcs. Mounting screw: 4 pcs.	M10 x 1.5 x 40
80	CRA1L 80-Y-1Z	Collar* : 4 pcs.	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.

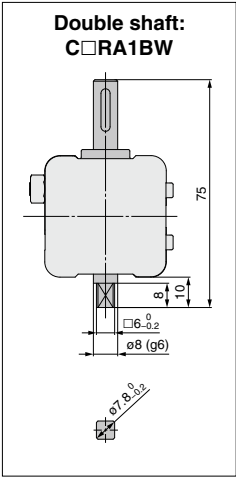
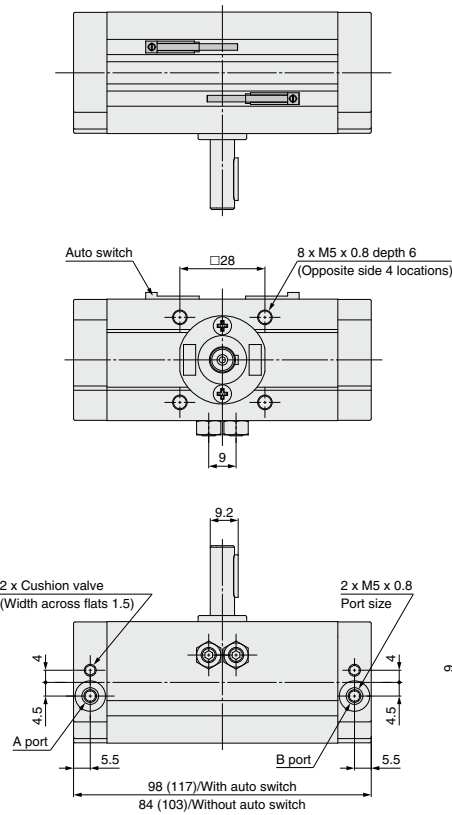
# CRA1 Series



## Dimensions/Basic Type: C□RA1BS

Size: 30

Single shaft: C□RA1BS

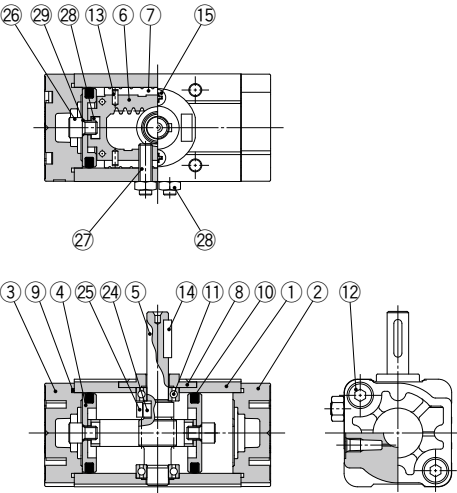


- Drawing shows the appearance for rotation of 90°.
  - Dimensions show pressurization to B port.
  - Drawing shows that the auto switch is mounted on the side opposite to the port side. (Dimensions with an asterisk mark (\*) are not required for actuators without the auto switch.)
  - \* ( ) are the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

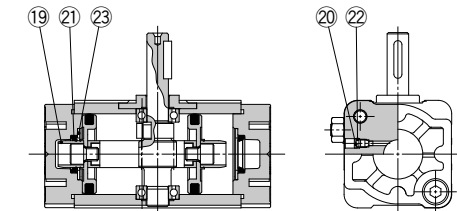
# CRA1 Series

## Construction: Size 30

### Without air cushion



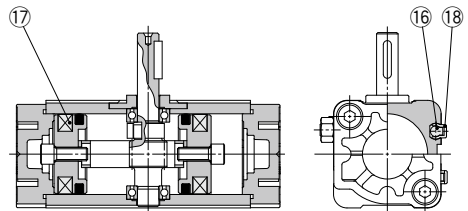
### With air cushion



### 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	

### Without air cushion With auto switch



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) 30	90° P694010-20	P694010-22	—
	180° P694010-21	P694010-23	—
Corresponding parts	⑦, ⑨, ⑩, ⑬ are included as a set.		⑦, ⑨, ⑩, ⑬, ⑳ 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)**