

# Compact Rotary Actuator Rack & Pinion Style Series **CRQ2** Size: 10, 15, 20, 30, 40

## How to Order

### Without auto switch

**CRQ2B S 20 90**

**Shaft type**

Single shaft	S
Double shaft	W

**Size**

10
15
20
30
40

**Rotating angle**

90	80° to 100°
180	170° to 190°

**Air cushion**

Size	Air cushion	
	None	Attached
10, 15	Nil	—
20, 30, 40	Nil	C

**Thread type**

Size	Port type	
	10, 15	20, 30, 40
Nil	M5	Rc 1/8
Nil	Rc 1/8	G 1/8
TF	G 1/8	NPT 1/8
TN	NPT 1/8	NPTF 1/8
TT	NPTF 1/8	

### With auto switch

**CDRQ2B S 20 90 F9BW S**

**Built-in magnet**

**Shaft type**

Single shaft	S
Double shaft	W

**Rotating angle**

90	80° to 100°
180	170° to 190°

**Size**

10
15
20
30
40

**Suffix symbol**

Size	Air cushion	
	None	Attached
10, 15	Nil	—
20, 30, 40	Nil	C

**Auto switch**

Nil	Without auto switch (Built-in magnet)
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\* For the applicable auto switch model, refer to the table below.  
\* Auto switches are shipped together, (but not assembled).

**Port type**

Size	Port type	
	10, 15	20, 30, 40
Nil	M5	Rc 1/8
Nil	Rc 1/8	G 1/8
TF	G 1/8	NPT 1/8
TN	NPT 1/8	NPTF 1/8
TT	NPTF 1/8	

**Number of auto switches**

Nil	2 pcs.
S	1 pc.

### Applicable Auto Switch/Refer to page 11-11-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length (m) *			Pre-wire connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	3 (L)	5 (Z)	IC circuit		Relay, PLC	
															5 V
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	—	A96V	A96	●	●	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	A93V	A93	●	●	—	—	—	Relay, PLC
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V,	—	M9NV	M9N	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)		12 V		M9PV	M9P	●	●	○	○		
				2-wire		12 V		M9BV	M9B	●	●	○	○		
				3-wire (NPN)		5 V,		F9NWV	F9NW	●	●	○	○		
				3-wire (PNP)		12 V		F9PWV	F9PW	●	●	○	○		
				2-wire		12 V		F9BWV	F9BW	●	●	○	○		
Diagnostic indication (2-color)	Water resistant (2-color)	—	F9BA**	—	●	○	○	—							

\* Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.  
\*\* Lead wire length symbols: 0.5 m ..... Nil (Example) A93      \* Auto switches marked with "○" are made-to-order specification.  
3 m ..... L (Example) A93L  
5 m ..... Z (Example) F9NWZ

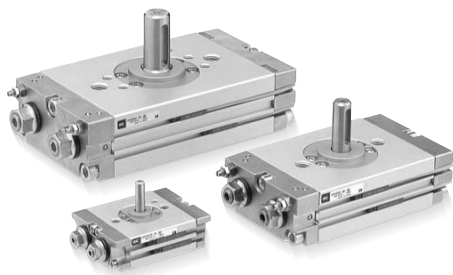
• Auto switches other than those listed above are also available. Refer to page 11-8-9 for details.



Refer to page 11-11-36 for detailed solid state switches with pre-wire connectors.

# Compact Rotary Actuator Rack & Pinion Style Series CRQ2

## Specifications



Size	10	15	20	30	40
Fluid	Air (Non-lube)				
Max. operating pressure	0.7 MPa		1 MPa		
Min. operating pressure	0.15 MPa		0.1 MPa		
Ambient and fluid temperature	0° to 60°C (No freezing)				
Cushion	Rubber bumper		Not attached, Air cushion		
Angle adjustment	±5°				
Rotation	80° to 100°, 170° to 190°				
Port size	M5 x 0.8		Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8		
Mounting	Basic style				
Output (N·m) *	0.3	0.75	1.8	3.1	5.3

\* Output under the operating pressure at 0.5 MPa. Refer to page 11-1-29 for further information.



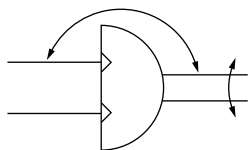
P. 11-8-12 to 11-8-24

## Allowable Kinetic Energy and Rotation Time Adjustment Range

Size	Allowable kinetic energy			Cushion angle	Stable operational rotation time adjustment range
	Allowable kinetic energy (mJ)				
	Without cushion	Rubber bumper	With air cushion*	Rotation time s/90°	
10	—	0.25	—	—	0.2 to 0.7
15	—	0.39	—	—	0.2 to 0.7
20	25	—	120	40°	0.2 to 1
30	48	—	250	40°	0.2 to 1
40	81	—	400	40°	0.2 to 1

\* Allowable kinetic energy for the bumper equipped type.  
Maximum absorbed energy under proper adjustment of the cushion needles.

## JIS Symbol



## Weight

Size	Standard weight* (g)	
	90°	180°
10	120	150
15	220	270
20	600	700
30	900	1100
40	1400	1600

\* Values less the weight of auto switch.

## ⚠ Precautions

Be sure to read before handling. Refer to pages 11-13-3 to 11-13-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and refer to pages 11-1-4 to 11-1-6 for Precautions on every series.

## ⚠ Caution

The angle adjustment bolt is set at random within the adjustable rotating range. Therefore, it must be readjusted to obtain the angle that suits your application.

CRB2

CRBU2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MRQ

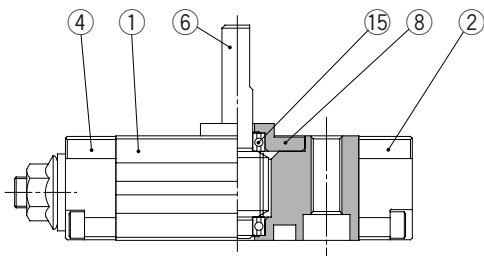
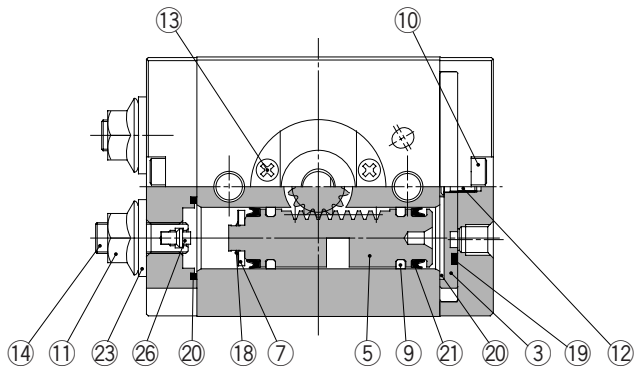
D-

20-

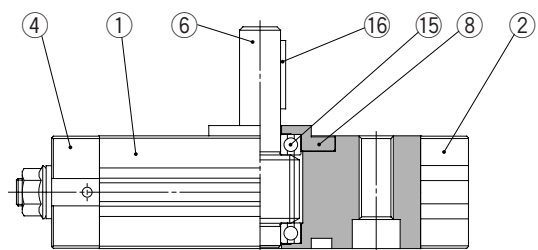
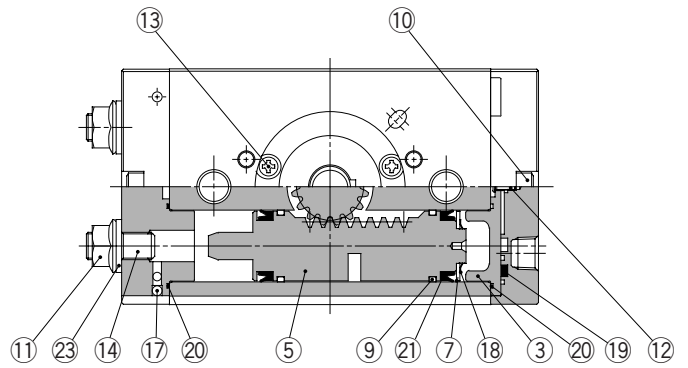
# Series CRQ2

## Construction

### Basic type Size 10/15



### Basic type Size 20/30/40



### Component Parts

No.	Description	Material	Note
①	Body	Aluminum alloy	White hard anodized
②	Cover	Aluminum alloy	Electroless nickel plated
③	Plate	Aluminum alloy	
④	End cover	Aluminum alloy	Electroless nickel plated
⑤	Piston	Stainless steel	
⑥	Shaft	Stainless steel	For 10, 15
		Chrome molybdenum steel	For 20, 30, 40
⑦	Seal retainer	Aluminum alloy	Chromated
⑧	Bearing retainer	Aluminum alloy	White hard anodized
⑨	Wearing	Resin	
⑩	Hexagon socket head cap screw	Stainless steel	
⑪	Hexagon nut with flange	Steel wire	Electroless nickel plated
⑫	Cross recessed No. 0 screw	Steel wire	Zinc chromated
⑬	Cross recessed No. 0 screw	Steel wire	Nickel plated 10, 15
	Round head Phillips screw		Nickel plated 20, 30, 40

No.	Description	Material	Note
⑭	Hexagon socket head set screw	Chrome molybdenum steel	Electroless nickel plated
⑮	Bearing	Bearing steel	
⑯	Parallel key	Carbon steel	20, 30, 40
⑰	Steel ball	Stainless steel	20, 30, 40
⑱	Type CS retaining ring	Stainless steel	
⑲	Seal	NBR	
⑳	Gasket		
㉑	Piston seal		
㉒	Cushion seal		20, 30, 40 with cushion
㉓	Seal washer		
㉔	Magnet	Magnetic material	With auto switch
㉕	Cushion valve ass'y		20, 30, 40 with cushion
㉖	Cushion pad	Rubber material	10, 15

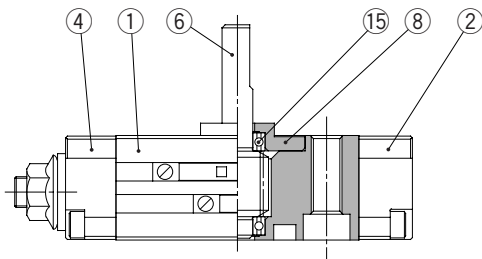
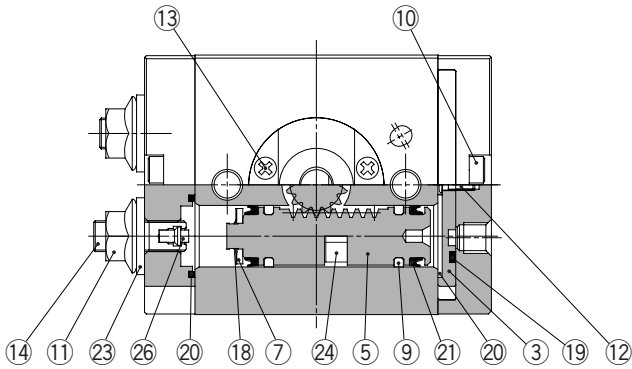
### Replacement Parts

Description	Part no.					Description
	10	15	20	30	40	
Seal kit	P473010-1	P473020-1	P473030-1	P473040-1	P473050-1	19, 20, 21, 23

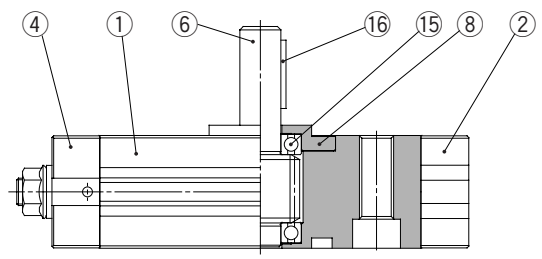
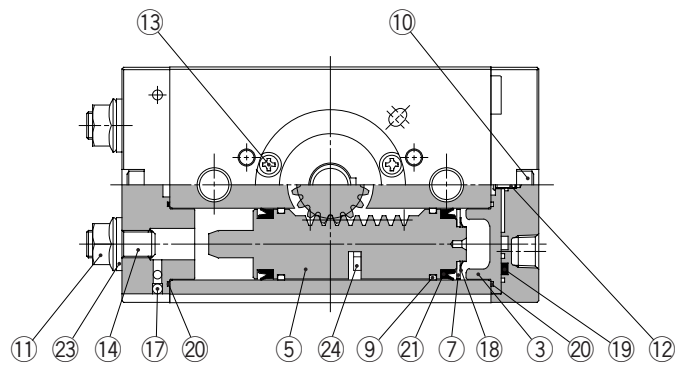
# Compact Rotary Actuator Rack & Pinion Style **Series CRQ2**

## Construction

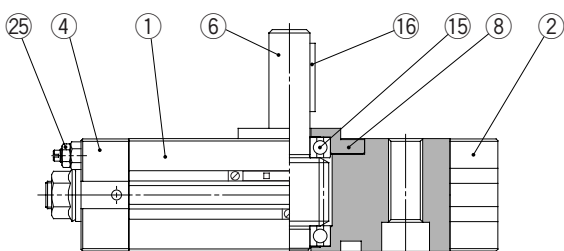
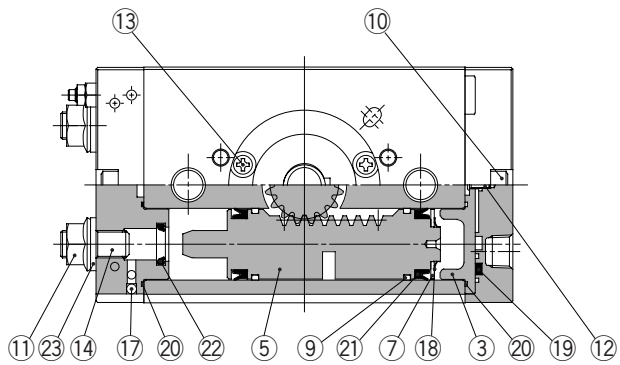
With auto switch  
Size 10/15



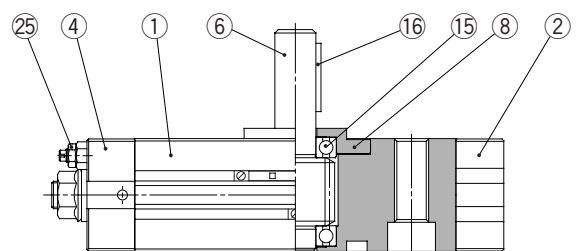
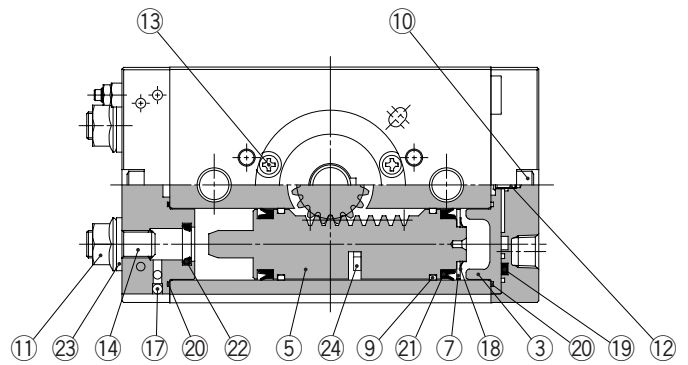
With auto switch  
Size 20/30/40



With cushion  
Size 20/30/40



With auto switch and cushion  
Size 20/30/40

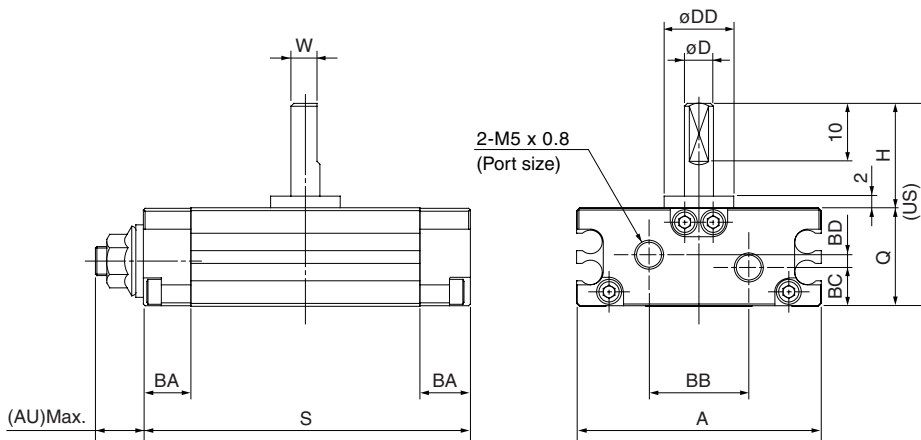
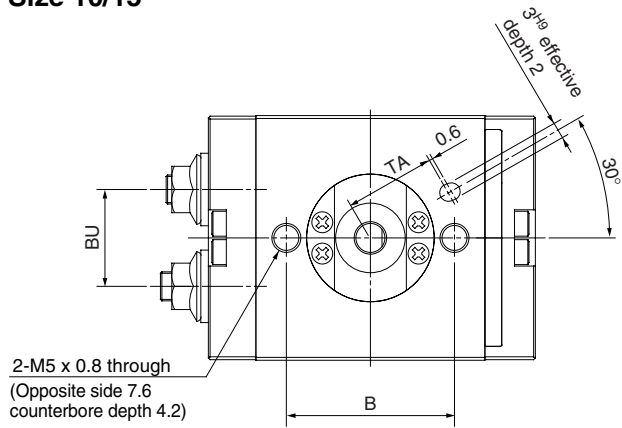


CRB2
CRBU2
CRB1
MSU
CRJ
CRA1
<b>CRQ2</b>
MSQ
MRQ
D-
20-

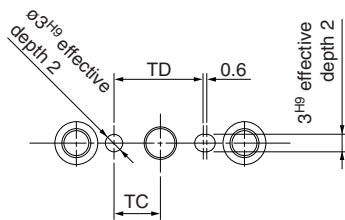
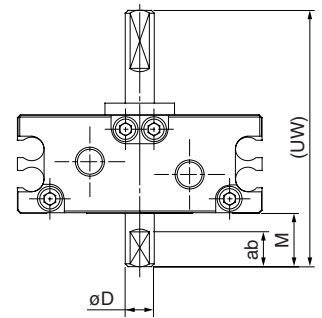
# Series CRQ2

## Dimensions

### Size 10/15



### With double shaft



(mm)

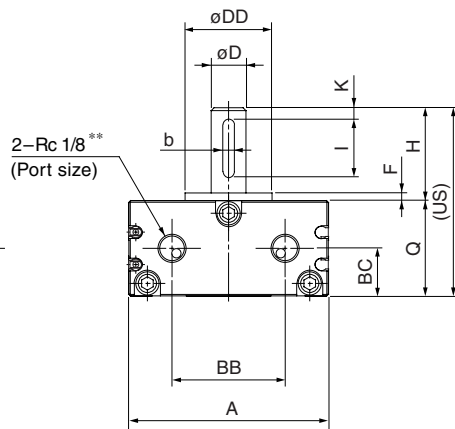
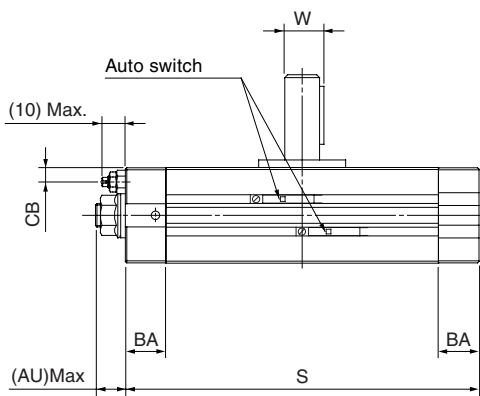
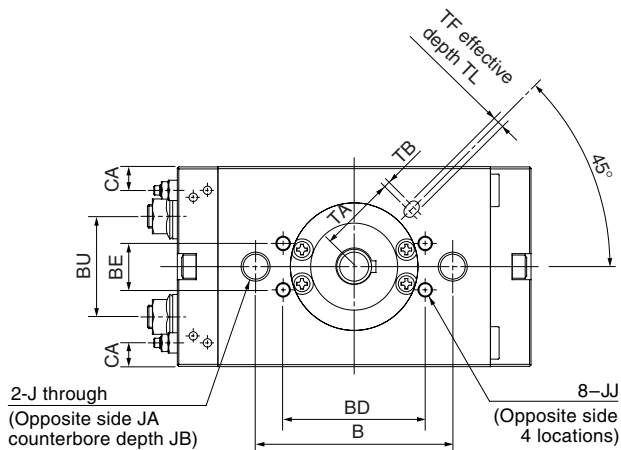
Size	Rotating angle	A	AU*	B	BA	BB	BC	BD	BU	D (g6)	DD (h9)	H
10	90°, 180°	42	(8.5)	29	8.5	17	6.7	2.2	16.7	5	12	18
15	90°, 180°	53	(9.5)	31	9	26.4	10.6	—	23.1	6	14	20

Size	Rotating angle	W	Q	S	US	UW	ab	M	TA	TC	TD
10	90°	4.5	17	56	35	44	6	9	15.5	8	15.4
	180°			69							
15	90°	5.5	20	65	40	50	7	10	16	9	17.6
	180°			82							

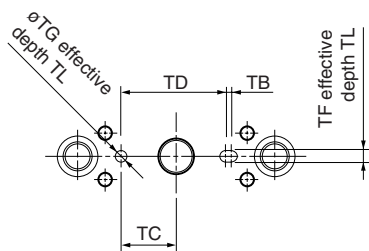
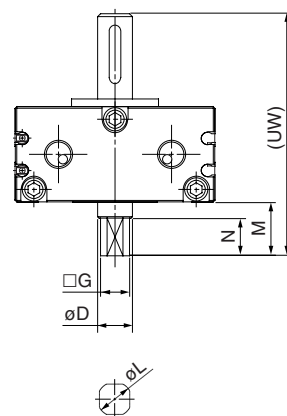
\* AU dimension is not the dimension at the time of shipment, since its dimension is for adjustment parts.  
S: Upper 90° Lower 180°

# Compact Rotary Actuator Rack & Pinion Style Series CRQ2

Size 20/30/40



With double shaft



(mm)

Size	Rotating angle	A	AU*	B	BA	BB	BC	BD	BE	BU	CA	CB	D (g6)	DD (h9)	F	H	J	JA	JB
20	90°, 180°	63	(11)	50	14	34	14.5	—	—	30.4	7	4.7	10	25	2.5	30	M8 x 1.25	11	6.5
30	90°, 180°	69	(11)	68	14	39	16.5	49	16	34.7	8.1	4.9	12	30	3	32	M10 x 1.5	14	8.5
40	90°, 180°	78	(13)	76	16	47	18.5	55	16	40.4	8.3	5.2	15	32	3	36	M10 x 1.5	14	8.6

Size	Rotating angle	JJ	K	Q	S	W	Keyway dimensions		US	TA	TB	TC	TD	TF (H9)	TG (H9)	TL	UW	G	M	N	L
							b	I													
20	90°	—	3	29	104	11.5	4 <sup>0</sup> <sub>-0.03</sub>	20	59	24.5	1	13.5	27	4	4	2.5	74	8	15	11	9.6
	180°				130																
30	90°	M5 x 0.8 depth 6	4	33	122	13.5	4 <sup>0</sup> <sub>-0.03</sub>	20	65	27	2	19	36	4	4	2.5	83	10	18	13	11.4
	180°				153																
40	90°	M6 x 1 depth 7	5	37	139	17	5 <sup>0</sup> <sub>-0.03</sub>	25	73	32.5	2	20	39.5	5	5	3.5	93	11	20	15	14
	180°				177																

\* AU dimension is not the dimension at the time of shipment, since its dimension is for adjustment parts.

\*\* In addition to Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8 are also available.

S: Upper space 90°, Lower space 180°

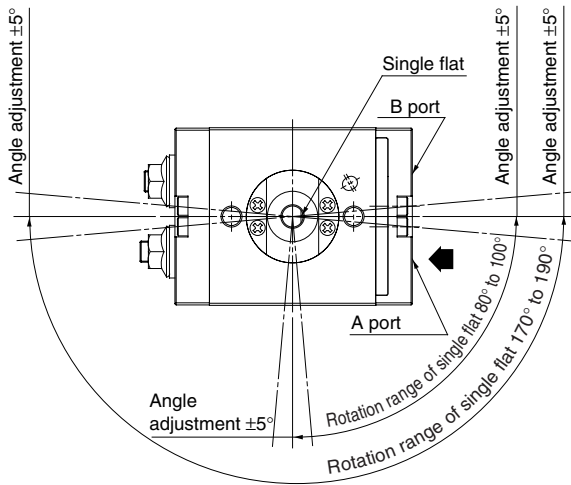
- CRB2
- CRBU2
- CRB1
- MSU
- CRJ
- CRA1
- CRQ2**
- MSQ
- MRQ
- D-
- 20-

# Series CRQ2

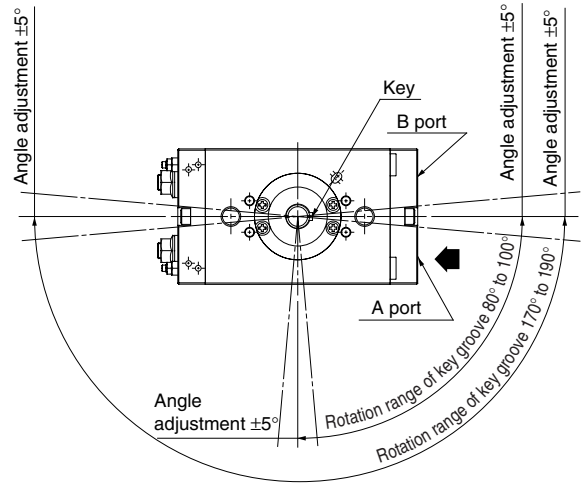
## Rotation Range

When pressurized from the port indicated by the arrow, the shaft will rotate in a clockwise direction.

### Size 10/15

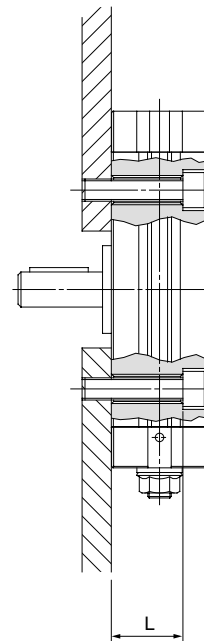


### Size 20/30/40



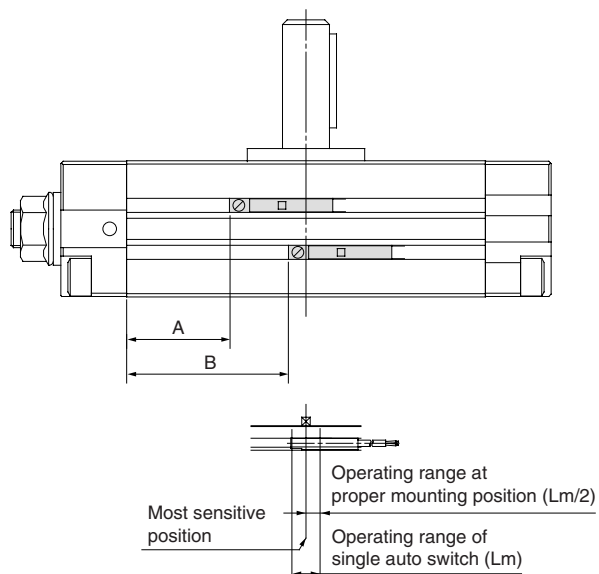
## Unit Used as Flange Mount

The L dimensions of this unit are shown in the table below. When hexagon socket head cap bolt of the JIS standard is used, the head of the bolt will recess into the groove of actuator.



Size	L	Screw
10	13	M4
15	16	M4
20	22.5	M6
30	24.5	M8
40	28.5	M8

**Proper Auto Switch Mounting Position at Rotation End**



Size	Rotating angle	Reed switch				Solid state switch			
		A	B	Operating angle (θ m)	Hysteresis angle	A	B	Operating angle (θ m)	Hysteresis angle
10	90°	6.5	13	63°	12°	10.5	17	75° (41°)*	3°
	180°	9.5	22.5			13.5	26.5		
15	90°	9.5	18	52°	9°	13.5	22	69° (32°)*	3°
	180°	13.5	30.5			17.5	34.5		
20	90°	22	34.5	41°	9°	26	38.5	56° (25°)*	4°
	180°	28	53.5			32	57.5		
30	90°	29	45	32°	7°	33	49	43° (20°)*	3°
	180°	37	68			41	72		
40	90°	34	53	24°	5°	38	57	36° (17°)*	4°
	180°	43.5	81.5			47.5	85.5		

Operating angle θ m: The value of the individual switch's movement range Lm as represented by an angle.

Hysteresis angle: Value of the switch's hysteresis as represented by an angle.

\* Figures in parentheses are the cases for D-M9□, D-M9□V switch types.

Auto switches in addition to those listed above are also available. For detail specifications, refer to page 11-11-1.

Type	Model	Electrical entry	Feature
Reed switch	D-A90	Grommet (In-line)	Without indicator light
	D-A90V	Grommet (Perpendicular)	

• For details, refer to "Best Pneumatics Vol. 6/7/8/9/10". It is also available as normally closed (NC = b contact), and also with solid state switches (D-F9G, F9H type).

CRB2

CRBU2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MRQ

D-

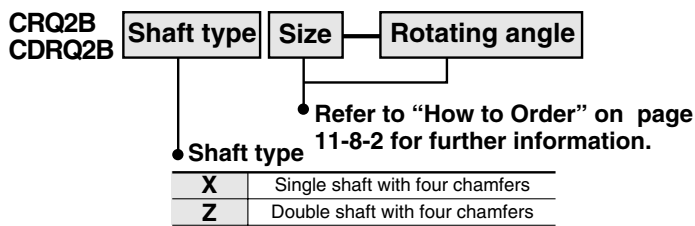
20-



# Series CRQ2

## 1. Shaft Type Variation, Four Chamfers (Size 20/30/40)

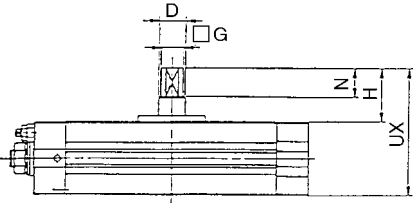
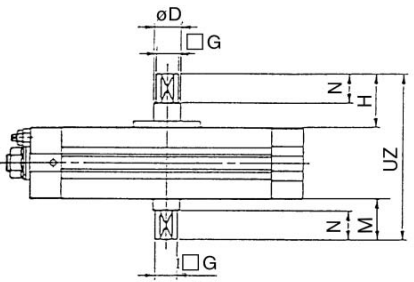
Shaft Type: X, Z



### Specifications

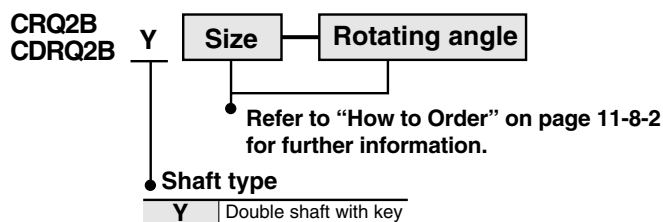
Fluid	Air (Non-lube)
Applicable shaft type	Single w/ four chamfers (X), Double w/ four chamfers (Z)
Applicable size	20, 30, 40
Max. operating pressure	1 MPa
Min. operating pressure	0.1 MPa
Cushion	Not attached, Air cushion
Rotation	80° to 100°, 170° to 190°
Port size	Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8
Auto switch	Mountable

### Dimensions

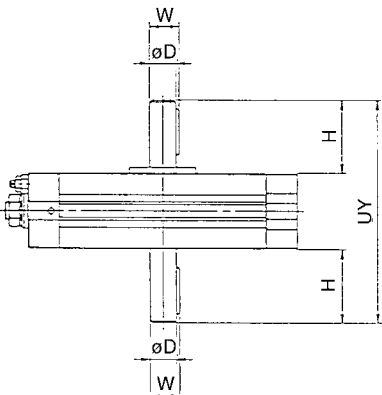
Shaft type	X				Z			
Form								
								(mm)
Size	D (g6)	G	H	N	UX	UZ	M	
20	10	8	21	11	50	65	15	
30	12	10	24	13	57	75	18	
40	15	11	27	15	64	84	20	

## 2. Shaft Type Variation, Double Shaft With Key (Size 20/30/40)

Shaft Type: Y



### Dimensions

Y					
					(mm)
Size	D (g6)	W	H	UY	
20	10	11.5	30	89	
30	12	13.5	32	97	
40	15	17	36	109	

### Specifications

Fluid	Air (Non-lube)
Applicable shaft type	Double shaft with key (Y)
Applicable size	20, 30, 40
Max. operating pressure	1 MPa
Min. operating pressure	0.1 MPa
Cushion	Not attached, Air cushion
Rotating angle	80° to 100°, 170° to 190°
Port size	Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8
Auto switch	Mountable

### 3. Shaft Type Variation/Without Key Groove

Shaft Type: T, J, K

CRQ2B  
CDRQ2B

Shaft type	Size	Rotating angle
------------	------	----------------

Refer to "How to Order" on page 11-8-2 for further information.

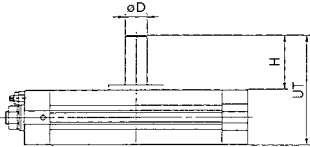
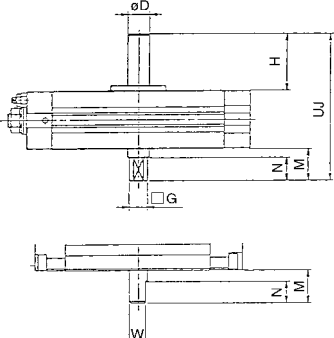
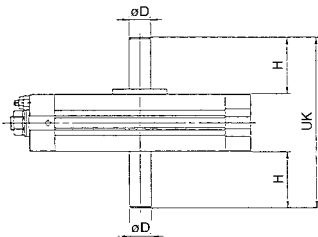
● Shaft type

T	Single round shaft
J	Double shaft (Without long shaft key, with four chamfers on short shaft, one chamfer on short shaft for 10 and 15.)
K	Double round shaft

#### Specifications

Fluid	Air (Non-lube)	
Applicable shaft type	Single round shaft (T), Double shaft (J), Double round shaft (K)	
Applicable size	10, 15	20, 30, 40
Max. operating pressure	0.7 MPa	1 MPa
Min. operating pressure	0.15 MPa	0.1 MPa
Cushion	Rubber bumper	Not attached, Air cushion
Rotating angle	80° to 100°, 170° to 190°	
Port size	Rc 1/8 G 1/8, NPT 1/8, NPTF 1/8	
Auto switch	Mountable	

#### Dimensions

Shaft type	T		J			K	
Form							
Size	D (g6)	H	M	N	UT	UJ	UK
10	5	18	9	6	35	44	53
15	6	20	10	7	40	50	60
20	10	30	15	11	59	74	89
30	12	32	18	13	65	83	97
40	15	36	20	15	73	93	109

CRB2

CRBU2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MRQ

D-

20-