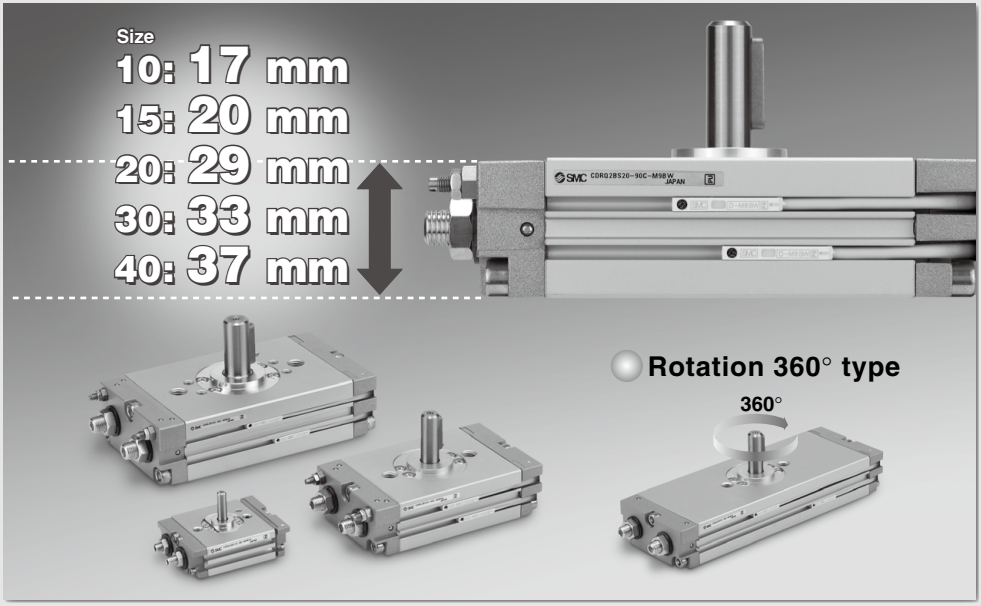
Compact Rotary Actuator

CRQ2 Series

Rack & Pinion Type/Size: 10, 15, 20, 30, 40



Series Variations

				Size					Page
				10	15	20	30	40	
Standard	Rotating angle	80° to 100° 170° to 190° 350° to 370°		●	●	●	●	●	P. 295 to P. 302
	Shaft type	Single shaft	S	●	●	●	●	●	
		Double shaft	W	●	●	●	●	●	
	Cushion	None				●	●	●	
		Rubber cushion		●	●				
		Air cushion				●	●	●	
	Variations	With auto switch		●	●	●	●	●	
		Copper-free (Standard)	20-	●	●	●	●	●	
Made to Order	Shaft type	Single shaft with four chamfers	X			●	●	●	P. 303, P. 304
		Double shaft key	Y			●	●	●	
		Double shaft with four chamfers	Z			●	●	●	
		Single round shaft	T	●	●	●	●	●	
		Double shaft (Without long shaft key)	J	●	●	●	●	●	
		Double round shaft	K	●	●	●	●	●	
	Pattern	Shaft end form		●	●	●	●	●	P. 306 to P. 320
		Rotating range		●	●	●	●	●	
	Shaft and parallel key stainless steel spec.		-X6			●	●	●	

Compact Rotary Actuator

Rack & Pinion Type/Size: 10, 15, 20, 30, 40

Built-in cushion

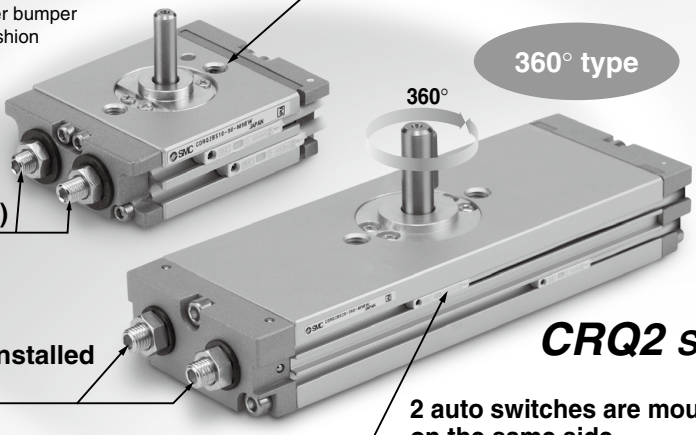
10, 15 : Rubber bumper
20, 30, 40 : Air cushion

Rotary actuator body serves as a flange.

360° type

360°

Equipped with an angle adjusting mechanism (±5°)



Piping can be installed from one end.

***CRQ2* Series**

2 auto switches are mountable on the same side.
(Mountable on the both sides.)

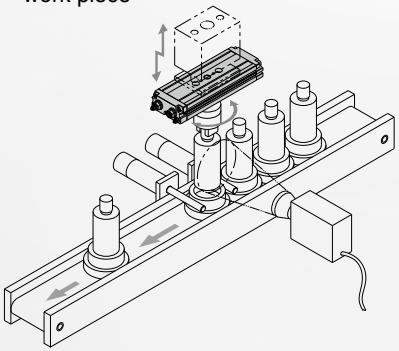
Mounting smaller auto switches prevents the auto switch from protruding from the body edge and realizes space-savings.

Double piston type Compact, with no backlash

Both single shaft and double shaft are available in all sizes.

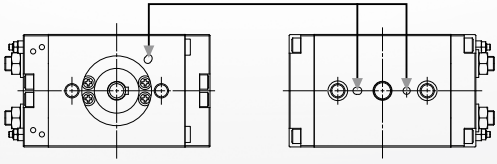
360° type application example

Complete external inspection of a work piece



Centering is easy when mounting the main body.

Pin hole for positioning the main body



Size	Shaft type	Rotating angle	Cushion	
			Rubber	Air
10	• Single • Double	• 80° to 100° • 170° to 190° • 350° to 370°	●	—
15			●	—
20			—	●
30			—	●
40			—	●

Compact Rotary Actuator
Rack & Pinion Type
CRQ2 Series

How to Order

Without auto switch **CRQ2B S 20 — 90**

With auto switch **CDRQ2B S 20 — 90 — M9BW —**

Built-in magnet

Shaft type

S	Single shaft
W	Double shaft

∗ Refer to pages 303 and 304 for the shaft type variations.

Pattern

Nil	Standard
P	Combination of simple specials and Made to Order

∗ Refer to pages 306 to 320 for details.

Size

10
15
20
30
40

Port type

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

Rotating angle

90	80° to 100°
180	170° to 190°
360	350° to 370°

Suffix symbol

Symbol	Cushion	Size				
		10	15	20	30	40
Nil	Without cushion	—	—	●	●	●
	Rubber bumper	●	●	—	—	—
C	Air cushion	—	—	●	●	●

Auto switch

Nil	Without auto switch (Built-in magnet)

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

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

Made to Order
Refer to page 296 for details.

Applicable Auto Switches
/Refer to pages 929 to 983 for further information on auto switches.

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

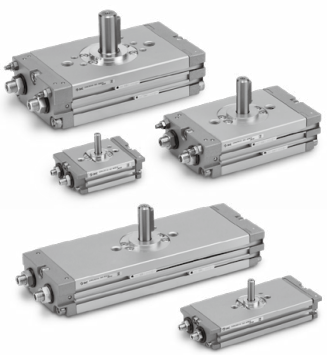
∗1 Although it is possible to mount water resistant type auto switches, note that the rotary actuator itself is not of water resistant construction.
∗2 1 m type lead wire is only applicable to D-A93.

∗ 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 are shipped together, (but not assembled).

∗ Auto switches marked with "○" are made to order specification.

∗ Refer to pages 970 and 971 for the details of solid state auto switch with pre-wired connector.



Symbol

Made to Order

Made to Order
Refer to pages 306 to 320 for details.

Symbol	Specifications/Content	Applicable shaft type
—	Shaft type variation	X, Y, Z, T, J, K
XA1 to XA24	Shaft pattern sequencing I	S, W
XA31 to XA59	Shaft pattern sequencing II	X, Y, Z, T, J, K
XC7	Reversed shaft	S, W, X, T, J
XC8 to XC11	Change of rotating range	S, W, Y X*, Z*, T*, J*, K*
XC12 to XC15	Change of angle adjustable range (0° to 100°)	
XC16, XC17	Change of angle adjustable range (90° to 190°)	
XC18, XC19	Change of rotating range	
XC20, XC21	Change of angle adjustable range (90° to 190°)	
XC22	Without inner rubber bumper	S, W, X, Y, Z, T, J, K
XC30	Fluorine grease	
XC69	Fluororubber seal	
X6	Shaft and parallel key made of stainless steel	

* Among the symbols XC8 to XC21, only XC12 and XC16 are compatible with shaft types X, Z, T, J and K.

Moisture Control Tube IDK Series

When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) may occur inside the piping depending on the conditions.
Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to the Web Catalog.

Specifications

Size	10	15	20	30	40
Fluid	Air (Non-lube)				
Max. operating pressure	0.7 MPa		1.0 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 range	Rotation end ±5°				
Rotation	90°, 180°, 360°				
Port size	M5 x 0.8		Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8		
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 42 for further information.

Allowable Kinetic Energy and Rotation Time Adjustment Range

Size	Allowable kinetic energy			Cushion angle	Stable operational rotation time adjustment range
	Allowable kinetic energy (J)				
	Without cushion	Rubber bumper	With air cushion*		Rotation time (s/90°)
10	—	0.00025	—	—	0.2 to 0.7
15	—	0.00039	—	—	0.2 to 0.7
20	0.025	—	0.12	40°	0.2 to 1
30	0.048	—	0.25	40°	0.2 to 1
40	0.081	—	0.4	40°	0.2 to 1

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

If operated where the kinetic energy exceeds the allowable value, this may cause damage to the internal parts and result in product failure. Please pay special attention to the kinetic energy levels when designing, adjusting and during operation to avoid exceeding the allowable limit.

Weight

(g)

Size	Standard weight*		
	90°	180°	360°
10	120	150	200
15	220	270	380
20	600	700	1000
30	900	1100	1510
40	1400	1600	2280

* Excluding the weight of auto switch.

⚠ Precautions

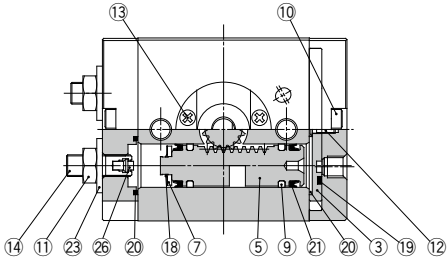
Be sure to read this before handling the products.
For safety instructions as well as rotary actuator and auto switch precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" of each product on the SMC website: https://www.smcworld.com

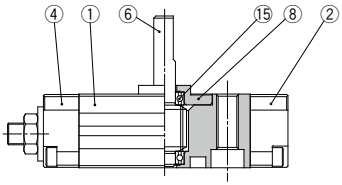
⚠ Caution

(1) The angle adjusting screw (angle adjustment bolt) is set at random near the maximum rotating angle. Therefore, it must be readjusted to obtain the angle that suits your application.

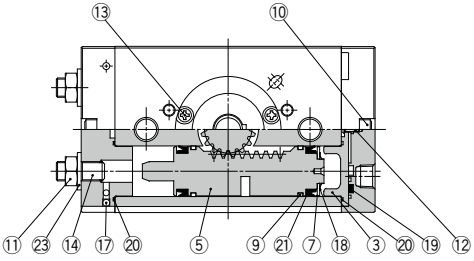
Construction

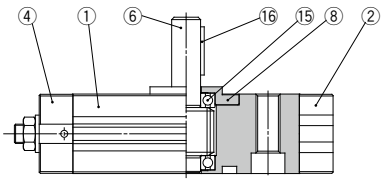
Basic type
Size 10/15





Basic type
Size 20/30/40





Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Cover**	Aluminum alloy	Chromated, painted
3	**Plate**	Aluminum alloy	Chromated
4	**End cover**	Aluminum alloy	Chromated, painted
5	**Piston**	Stainless steel	
6	**Shaft**	Stainless steel	Size: 10, 15
		Chrome molybdenum steel	Size: 20, 30, 40
7	**Seal retainer**	Aluminum alloy	Chromated
8	**Bearing retainer**	Aluminum alloy	Chromated
9	**Wearing**	Resin	
10	**Hexagon socket head cap screw**	Stainless steel	
11	**Hexagon nut**	Steel wire	Size: 10, 15
	Small hexagon nut		Size: 20, 30, 40
12	**Cross recessed No. 0 screw**	Steel wire	
13	**Cross recessed No. 0 screw**	Steel wire	Size: 10, 15
	Cross recessed screw		Size: 20, 30, 40

Component Parts

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

Replacement Parts

Description	Part no.				
	10	**15**	**20**	**30**	**40**
Seal kit	P473010-1	P473020-1	P473030-1	P473040-1	P473050-1

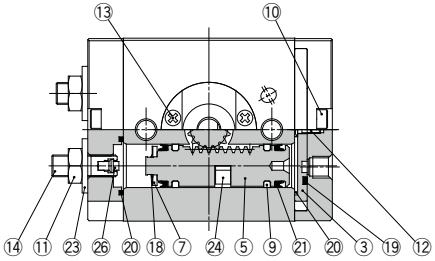
A grease pack (10 g) is included. When you need a grease pack only, order with the following part number.
Grease pack part no: GR-S-010 (10g)

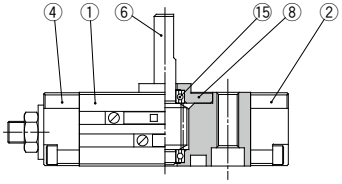
	No.	Description	Qty.	Note
Applicable parts	**19**	**Seal**	1	
	20	**Gasket for cover**	2	Size: 10, 15
		Gasket for endcover	1	
		Gasket	4	Size: 20, 30, 40
	21	**Piston seal**	4	
	23	**Seal washer**	2	

∗ A set includes all parts above.
∗ Individual part cannot be shipped.

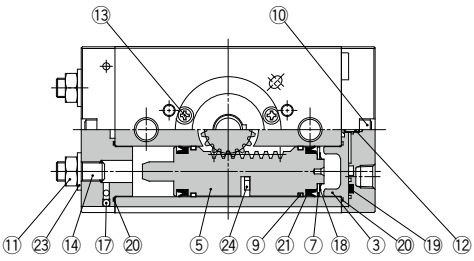
Construction

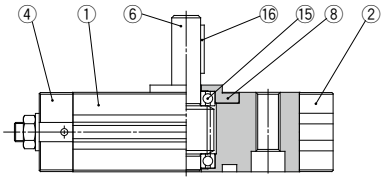
With auto switch
Size 10/15



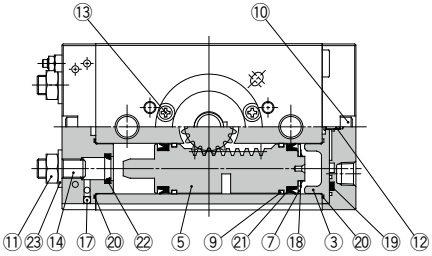


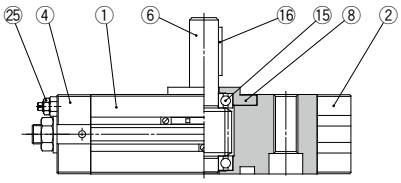
With auto switch
Size 20/30/40



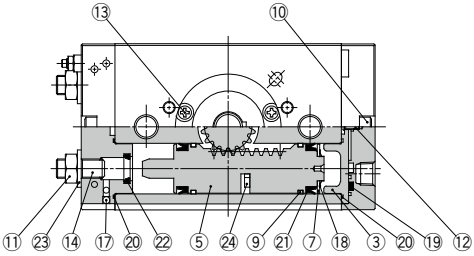


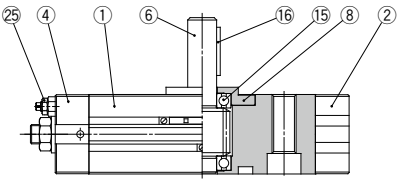
With cushion
Size 20/30/40





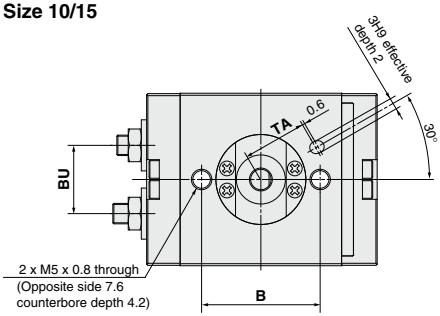
With auto switch and cushion
Size 20/30/40

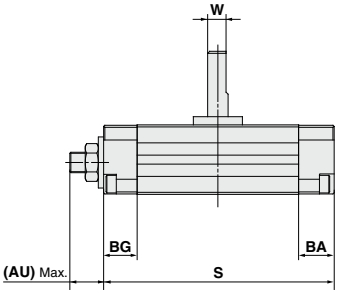


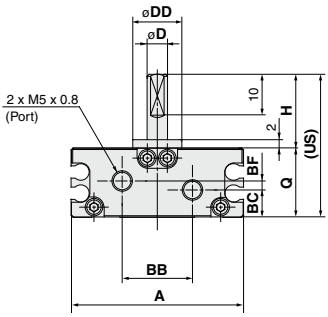


Dimensions

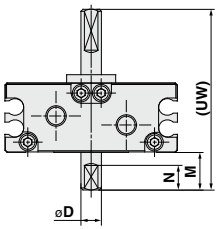
Size 10/15

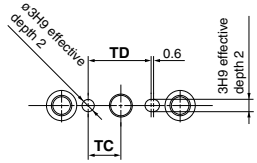






With double shaft





(mm)

Size	Rotating angle	A	AU*	B	BA	BB	BC	BF	BG	BU	D (g6)	DD (h9)	H
10	90°, 180°, 360°	42.4	(8.5)	29	8.7	17.2	6.7	2.2	8.2	16.7	5	12	18
15	90°, 180°, 360°	53.6	(9.5)	31	9.2	26.4	10.6	—	9	23.1	6	14	20

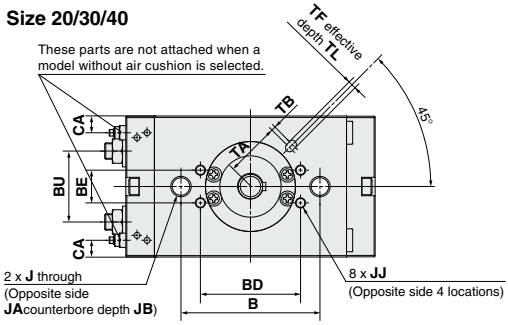
Size	Rotating angle	W	Q	S	US	UW	N	M	TA	TC	TD
10	90°	4.5	17	56.4	35	44	6	9	15.5	8	15.4
	180°			68.9							
	360°			96.9							
15	90°	5.5	20	65.2	40	50	7	10	16	9	17.6
	180°			82.2							
	360°			116.2							

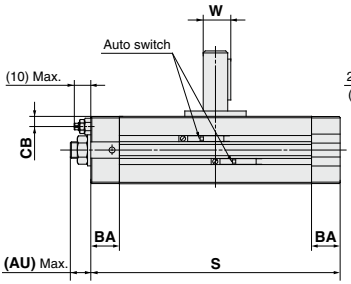
∗ AU dimension is not the dimension at the time of shipment, since its dimension is for adjustment parts.

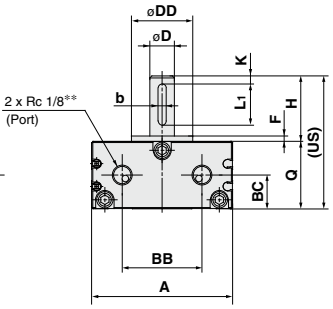
S: Upper 90°, Middle 180°, Lower 360°

Dimensions

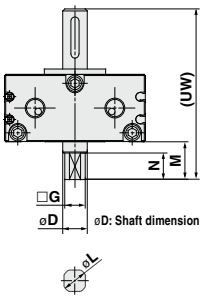
Size 20/30/40

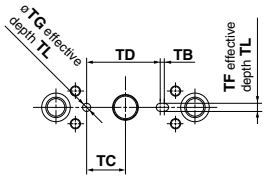






With double shaft





(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°, 360°	63	(11)	50	14	34	14.5	—	—	30.4	7	5	10	25	2.5	30	M 8 x 1.25	11	6.5
30	90°, 180°, 360°	69	(11)	68	14	39	16.5	49	16	34.7	8.1	5.3	12	30	3	32	M10 x 1.5	14	8.5
40	90°, 180°, 360°	78	(13)	76	16	47	18.5	55	16	40.4	8.3	5.5	15	32	3	36	M10 x 1.5	14	8.6

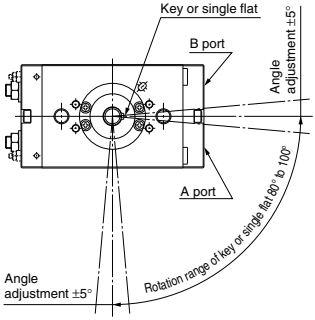
Size	Rotating angle	JJ	K	Q	S	W	Key dimensions b	Key dimensions L1	US	TA	TB	TC	TD	TF (H9)	TG (H9)	TL	UW	G	M	N	L
20	90°	—	3	29	104.4	11.5	$4^{0}_{-0.03}$	20	59	24.5	1	13.5	27	4	4	2.5	74	$8^{0}_{-0.1}$	15	11	$9.6^{0}_{-0.1}$
	180°				129.5																
	360°				179.8																
30	90°	M5 x 0.8 depth 6	4	33	122	13.5	$4^{0}_{-0.03}$	20	65	27	2	19	36	4	4	2.5	83	$10^{0}_{-0.1}$	18	13	$11.4^{0}_{-0.1}$
	180°				153																
	360°				216																
40	90°	M6 x 1 depth 7	5	37	139.3	17	$5^{0}_{-0.03}$	25	73	32.5	2	20	39.5	5	5	3.5	93	$11^{0}_{-0.1}$	20	15	$14^{0}_{-0.1}$
	180°				177																
	360°				253																

∗ AU dimension is not the dimension at the time of shipment, since its dimension is for adjustment parts.
S: Upper 90°, Middle 180°, Lower 360°
∗∗ In addition to Rc 1/ 8, G 1/ 8, NPT 1/ 8, NPTF 1/ 8 are also available.

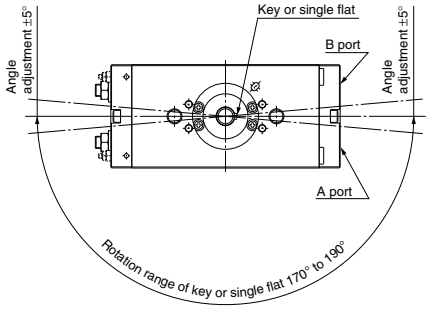
Rotation Range

When the pressure is applied from the A port, the shaft will rotate in a clockwise direction.

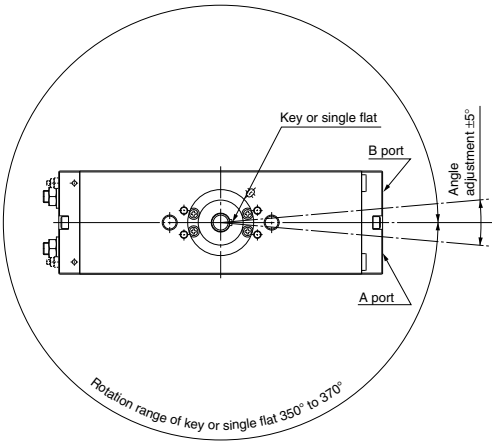
Rotating angle: 90°



Rotating angle: 180°

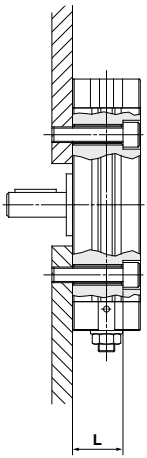


Rotating angle: 360°



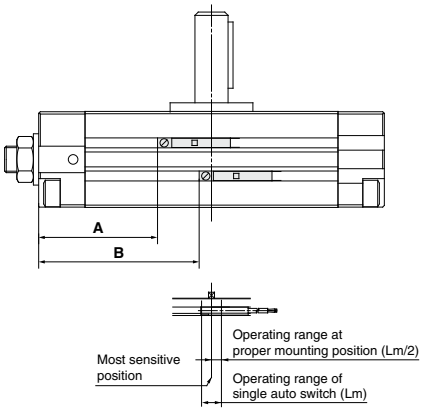
Unit Used as Flange Mount

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

Auto Switch Proper Mounting Position at Rotation End



Size	Rotating angle	Solid state switch				Reed switch			
		A	B	Operating angle (θ m)	Hysteresis angle	A	B	Operating angle (θ m)	Hysteresis angle
10	90°	19	25.5	61°	5°	15	21.5	63°	12°
	180°	22	35			18	31		
	360°	29	56.5			25	52.5		
15	90°	22.5	31	47°	4°	18.5	27	52°	9°
	180°	26.5	43.5			22.5	39.5		
	360°	34.5	68.5			30.5	64.5		
20	90°	40	52.5	40°	4°	36	48.5	41°	9°
	180°	46	71.5			42	67.5		
	360°	59.5	110			55.5	106		
30	90°	47	63	29°	2°	43	59	32°	7°
	180°	55	86			51	82		
	360°	66	129.5			62	125.5		
40	90°	54	73	24°	2°	50	69	24°	5°
	180°	63.5	101.5			59.5	97.5		
	360°	76.5	156			72.5	152		

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.

Note) Since the above values are only provided as a guideline, they are not guaranteed. In the actual setting, adjust them after confirming the auto switch performance.

1 Shaft Type Variation, Four Chamfers (Size 20/30/40) — Shaft Type: X, Z

C RQ2B / CDRQ2B **Shaft type** **Size** — **Rotating angle**

Refer to "How to Order" on page 295 for further information.

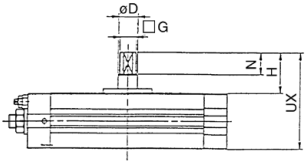
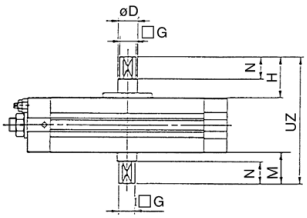
Shaft type

X	Single shaft with four chamfers
Z	Double shaft with four chamfers

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	1.0 MPa
Min. operating pressure	0.1 MPa
Cushion	Not attached, Air cushion
Rotation	80° to 100°, 170° to 190°, 350° to 370°
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	$8^{0}_{-0.1}$	21	11	50	65	15
30	12	$10^{0}_{-0.1}$	24	13	57	75	18
40	15	$11^{0}_{-0.1}$	27	15	64	84	20

Note) Dimension parts different from the standard conform to the general tolerance.

2 Shaft Type Variation, Double Shaft With Key (Size 20/30/40) — Shaft Type: Y

C RQ2B / CDRQ2B **Y** **Size** — **Rotating angle**

Refer to "How to Order" on page 295 for further information.

Shaft type

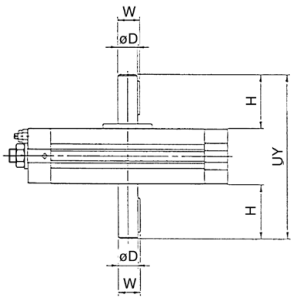
Y	Double shaft with key

Specifications

Fluid	Air (Non-lube)
Applicable shaft type	Double shaft with key (**Y**)
Applicable size	20, 30, 40
Max. operating pressure	1.0 MPa
Min. operating pressure	0.1 MPa
Cushion	Not attached, Air cushion
Rotating angle	80° to 100°, 170° to 190°, 350° to 370°
Port size	Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8
Auto switch	Mountable

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

Note) Dimension parts different from the standard conform to the general tolerance.

3 Shaft Type Variation/Without Keyway

Shaft Type: T, J, K

C RQ2B / CDRQ2B **Shaft type** | **Size** — **Rotating angle**

● Refer to "How to Order" on page 295 for further information.

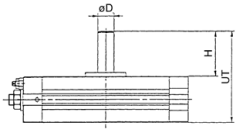
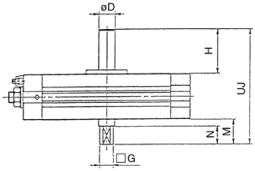
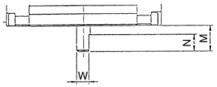
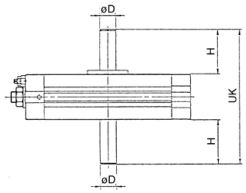
● **Shaft type**

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	1.0 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°, 350° to 370°	
Port size	M5 x 0.8	Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8
Auto switch	Mountable	

Dimensions

Shaft type	T	J	K
Form		**Size 20, 30, 40**  **Size 10, 15** 	

Size	D (g6)	G	W	H	M	N	UT	UJ	UK
10	5	—	4.5	18	9	6	35	44	53
15	6	—	5.5	20	10	7	40	50	60
20	10	$8^{0}_{-0.1}$	—	30	15	11	59	74	89
30	12	$10^{0}_{-0.1}$	—	32	18	13	65	83	97
40	15	$11^{0}_{-0.1}$	—	36	20	15	73	93	109

Note) Dimension parts different from the standard conform to the general tolerance.

CRQ2 Series (Size: 10, 15, 20, 30, 40)

Simple Specials: -XA1 to -XA24: Shaft Pattern Sequencing I

Shaft shape pattern is dealt with through the Simple Specials System.
Please contact your local sales representative for more details.

Symbol
-XA1 to XA24

Shaft Pattern Sequencing I

Applicable shaft type: S, W

How to Order

C D RQ2B S P 20 [ ] – 90 C – M9BW – X A2 A24 C30 -X6

- **Symbol for simple special, Made-to-Order products**
  - When the number of combinations is 1 or 2, refer to chart 1 and 2.
  - ∗ Combination of XA is possible for up to 2 types.
  - ∗ Combination of -X6 (Shaft, parallel stainless spec) is available with all the types.

Built-in magnet

Nil	None
D	Built-in magnet

Shaft type

S	Single shaft
W	Double shaft

Pattern

Size

10
15
20
30
40

Thread type

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

Auto switch

Refer to page 295 for the part no. of auto switches.

Air cushion

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

Rotating angle

90	80° to 100°
180	170° to 190°
360	350° to 370°

How to order model with auto switches

Refer to page 295 for "How to Order"products with auto switch.

• Combination 3 Types — **• Combination of Applicable Chart**

A 1	A24	C30	Chart 1, 2
A 2	A24	-X 6	Chart 1
A13	C 8	C30	Chart 2, 5
A14	C30	-X 6	Chart 2

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

• Combination 4 Types — **• Combination of Applicable Chart**

A 1	A 2	C 8	C30	Chart 1, 2, 5
A 2	A24	C10	-X 6	Chart 1, 2
A14	C11	C30	-X 6	Chart 2, 5
A14	C 7	C12	C30	Chart 2, 5

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

∗ **Combination of simple specials and Made-to-Order, it is possible for up to 4 types.**

Combination Chart of Simple Specials for Tip End Shape

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

Symbol	Description	Top port Upper	Top port Lower	Shaft type S	Shaft type W	Applicable size	Combination
XA 1	Female thread at the end	●	–	●	●	10, 15	XA 1
XA 2	Female thread at the end	–	●	●	●	20, 30, 40	● XA 2
XA 3	Tip end of male thread	●	–	●	●		– ● XA 3
XA 4	Tip end of male thread	–	●	–	●		W ∗ – W ∗ XA 4
XA 5	Stepped round shaft	●	–	●	●		– ● – ● XA 5
XA 6	Stepped round shaft	–	●	–	●		W ∗ – W ∗ – W ∗ XA 6
XA 7	Round shaft with steps and male thread	●	–	●	●	10, 15	– ● – ● – ● XA 7
XA 8	Round shaft with steps and male thread	–	●	–	●		W ∗ – W ∗ – W ∗ – W ∗ XA 8
XA 9	Change of the length of standard chamfered face	●	–	●	●		– ● – ● – ● – ● XA 9
XA10	Change of the length of standard chamfered face	–	●	–	●		W ∗ – W ∗ – W ∗ – W ∗ – W ∗ XA10
XA11	Two-sided chamfer	●	–	●	●		– ● – ● – ● – ● – ● XA11
XA12	Two-sided chamfer	–	●	–	●		W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – W ∗ XA12
XA13	Shaft through-hole	●	●	●	●		– – – – – – – – ● ● – – XA13
XA14	Shaft through-hole and female thread	●	–	●	●	10, 15	– – – – – – – – ● ● – – – XA14
XA15	Shaft through-hole and female thread	–	●	●	●	20, 30, 40	– – – – – – – – ● ● – – – – XA15
XA16	Shaft through-hole and female thread	●	●	●	●		– – – – – – – – – – – – – – XA16
XA17	Shortened shaft	●	–	●	●	10,15	– ● – ● – ● – ● – ● – ● – ● – XA17
XA18	Shortened shaft	–	●	–	●	10, 15, 20, 30, 40	W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – W ∗ W ∗ – – W ∗ XA18
XA19	Shortened shaft	●	●	–	●	10,15	– – – – – – – – – – – W ∗ – – – – –
XA20	Reversed shaft	●	●	●	●	10, 15, 20, 30, 40	– – – – – – – – – – – ● – – – – XA20
XA21	Stepped round shaft with double-sided chamfer	●	–	●	●		– ● – ● – ● – ● – ● – ● – – – – ● ● XA21
XA22	Stepped round shaft with double-sided chamfer	–	●	–	●	10, 15	W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – W ∗ – – – – W ∗ – – W ∗ XA22
XA23	Right-angle chamfer	●	–	●	●		● ● – ● – ● – ● – ● – ● ● ● ● – ● ● – ●
XA24	Double key	●	–	●	●	20, 30, 40	● ● – – – – – – – – – ● ● ● ● – ● ● – –

∗ Describes the combination available for corresponding shaft shapes.

Combination Chart of Made to Order

Chart 2. Combination between -XA□ and -XC□ (Made to Order/ Details of -XC□, refer to page 316.)

Symbol	Description	Applicable size	Combination XA1 to XA24
XC 7	Reversed shaft	10, 15 20, 30, 40	–
XC 8	Change of rotating range		●
XC 9			●
XC10			●
XC11			●
XC12	Change in angle adjustable range 0° to 100°		●
XC13			●
XC14			●
XC15			●
XC16	Change in angle adjustable range 90° to 190°		●
XC17			●
XC18	Change of rotating range	20, 30, 40	●
XC19			●
XC20	Change in angle adjustable range 90° to 190°		●
XC21			●
XC22	Without inner rubber bumper	10, 15	●
XC30	Fluorine grease	10, 15, 20, 30, 40	●
XC69	Fluororubber seal	10, 15, 20, 30, 40	●

∗ Chart 5. Refer to page 316 for combination available between -XC□ and -XC□.

Symbol

Shaft Pattern Sequencing I

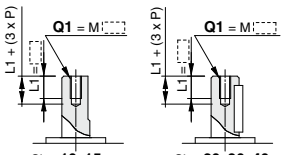
-XA1 to XA8

Additional Reminders

1. Enter the dimensions within a range that allows for additional machining.
2. Unless indicated otherwise, the dimensional tolerance conforms to the general tolerance. SMC will make appropriate arrangements.
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.
   M3 x 0.5, M4 x 0.7, M5 x 0.8
   M6 x 1
5. Enter the desired figures in the ☐ portion of the diagram.
6. XA1 to XA24 are the standard products that have been additionally machined.
7. Chamfer face of the parts machining additionally is C0.5.

Symbol: A1

Machine female threads into the long shaft.
The maximum dimension L1 is, as a rule, twice the thread size (Example) For M3: L1 = 6
• Applicable shaft types: S, W

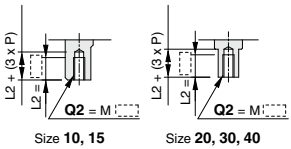


(mm)

Size	Q1
10	M3
15	M3, M4
20	M3, M4
30	M3, M4, M5
40	M4, M5, M6

Symbol: A2

Machine female threads into the short shaft.
The maximum dimension L2 is, as a rule, twice the thread size. (Example) For M4: L2 = 8
• Applicable shaft types: S, W

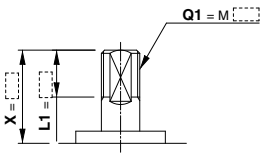


(mm)

Size	Q2
10	M3
15	M3, M4
20	M3, M4
30	M3, M4, M5
40	M4, M5, M6

Symbol: A3

The long shaft can be further shortened by machining male threads into it.
(If shortening the shaft is not required, indicate "∗" for dimension X.)
• Applicable shaft types: S, W

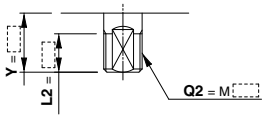


(mm)

Size	X	L1 max	Q1
10	9 to 18	X – 4	M5
15	10 to 20	X – 4	M6

Symbol: A4

The short shaft can be further shortened by machining male threads into it.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
• Applicable shaft type: W

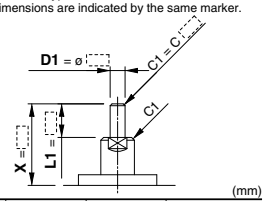


(mm)

Size	Y	L2 max	Q2
10	7 to 9	Y – 2	M5
15	8 to 10	Y – 3	M6

Symbol: A5

The long shaft can be further shortened by machining it into a stepped round shaft.
(If shortening the shaft is not required, indicate "∗" for dimension X.)
(If not specifying dimension C1, indicate "∗" instead.)
• Applicable shaft types: S, W
• Equal dimensions are indicated by the same marker.

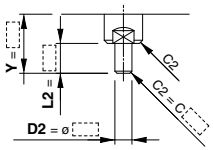


(mm)

Size	X	L1 max	D1
10	3 to 18	X – 2	ø3.5 to ø4.9
15	3 to 20	X – 2	ø3.5 to ø5.9

Symbol: A6

The short shaft can be further shortened by machining it into a stepped round shaft.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
(If not specifying dimension C2, indicate "∗" instead.)
• Applicable shaft type: W
• Equal dimensions are indicated by the same marker.

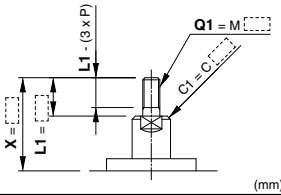


(mm)

Size	Y	L2 max	D2
10	1 to 9	Y	ø3.5 to ø4.9
15	1 to 10	Y	ø3.5 to ø5.9

Symbol: A7

The long shaft can be further shortened by machining it into a stepped round shaft with male threads.
(If shortening the shaft is not required, indicate "∗" for dimension X.)
(If not specifying dimension C1, indicate "∗" instead.)
• Applicable shaft types: S, W

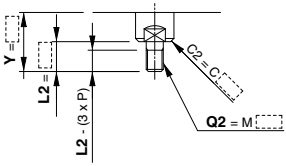


(mm)

Size	X	L1 max	Q1
10	8 to 18	X – 2	M3, M4
15	9.5 to 20	X – 2	M3, M4, M5

Symbol: A8

The short shaft can be further shortened by machining it into a stepped round shaft with male threads.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
(If not specifying dimension C2, indicate "∗" instead.)
• Applicable shaft type: W



(mm)

Size	Y	L2 max	Q2
10	6 to 9	Y	M3, M4
15	7.5 to 10	Y	M3, M4, M5

Symbol

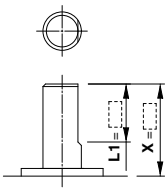
Shaft Pattern Sequencing I — -XA9 to XA16

Additional Reminders

1. Enter the dimensions within a range that allows for additional machining.
2. Unless indicated otherwise, the dimensional tolerance conforms to the general tolerance. SMC will make appropriate arrangements.
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.
   M3 x 0.5, M4 x 0.7, M5 x 0.8
   M6 x 1
5. Enter the desired figures in the ☐ portion of the diagram.
6. XA9 to XA24 are the standard products that have been additionally machined.
7. Chamfer face of the parts machining additionally is C0.5.

Symbol: A9

The long shaft can be further shortened by changing the length of the standard chamfer on the long shaft side.
(If shortening the shaft is not required, indicate "∗" for dimension X.)
• Applicable shaft types: S, W

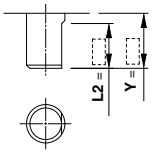


(mm)

Size	X	L1
10	8 to18	{10 – (18 – X) } to (X – 2)
15	10 to 20	{10 – (20 – X) } to (X – 2)

Symbol: A10

The short shaft can be further shortened by changing the length of the standard chamfer.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
• Applicable shaft type: W

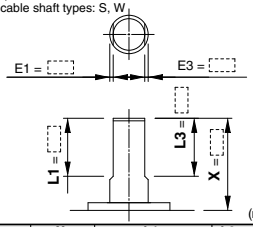


(mm)

Size	Y	L2
10	3 to 9	6 – (9 – Y) to Y
15	3 to 10	7 – (10 – Y) to Y

Symbol: A11

The long shaft can be further shortened by machining a double-sided chamfer on to it.
• Since L1 is a standard chamfer, dimension E1 is 0.5 or more.
(If altering the standard chamfer and shortening the shaft are not required, indicate "∗" for both the L1 and X dimensions.)
• Applicable shaft types: S, W

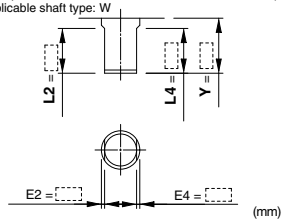


(mm)

Size	X	L1	L3 max
10	8 to 18	{10 – (18 – X)} to (X – 2)	X – 2
15	10 to 20	{10 – (20 – X)} to (X – 2)	X – 2

Symbol: A12

The short shaft can be further shortened by machining a double-sided chamfer on to it.
• Since L2 is a standard chamfer, dimension E2 is 0.5 or more.
(If altering the standard chamfer and shortening the shaft are not required, indicate "∗" for both the L2 and Y dimensions.)
• Applicable shaft type: W

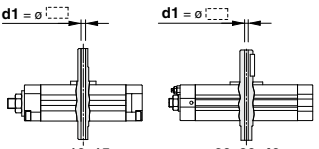


(mm)

Size	Y	L2	L4 max
10	3 to 9	6 – (9 – Y) to Y	Y
15	3 to10	7 – (10 – Y) to Y	Y

Symbol: A13

Shaft with through-hole
Minimum machining diameter for d1 is 0.1.
• Applicable shaft types: S, W



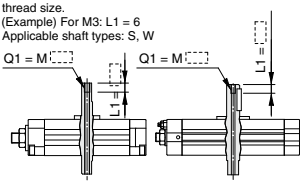
Size **10, 15** Size **20, 30, 40**

(mm)

Size	d1
10	ø2 to ø3
15	ø2 to ø4
20	ø2.5 to ø3.5
30	ø3 to ø5.5
40	ø4 to ø7

Symbol: A14

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 M3: L1 = 6
• Applicable shaft types: S, W



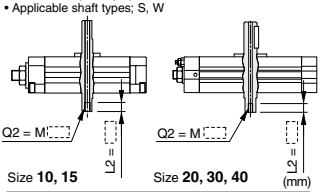
Size **10, 15** Size **20, 30, 40**

(mm)

Thread \ Size	10	15	20	30	40
M3 x 0.5	ø2.5	ø2.5	ø2.5	—	—
M4 x 0.7	—	ø3.3	ø3.3	ø3.3	—
M5 x 0.8	—	—	—	ø4.2	ø4.2
M6 x 1	—	—	—	—	ø5

Symbol: A15

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 M4: L2 = 8
• Applicable shaft types; S, W



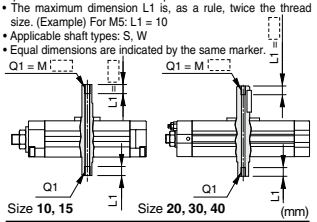
Size **10, 15** Size **20, 30, 40**

(mm)

Thread \ Size	10	15	20	30	40
M3 x 0.5	ø2.5	ø2.5	ø2.5	—	—
M4 x 0.7	—	ø3.3	ø3.3	ø3.3	—
M5 x 0.8	—	—	—	ø4.2	ø4.2
M6 x 1	—	—	—	—	ø5

Symbol: A16

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
• Equal dimensions are indicated by the same marker.



Size **10, 15** Size **20, 30, 40**

(mm)

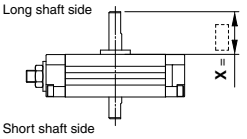
Thread \ Size	10	15	20	30	40
M3 x 0.5	ø2.5	ø2.5	ø2.5	—	—
M4 x 0.7	—	ø3.3	ø3.3	ø3.3	—
M5 x 0.8	—	—	—	ø4.2	ø4.2
M6 x 1	—	—	—	—	ø5

Shaft Pattern Sequencing I

Symbol
-XA17 to XA24

Symbol: A17

Shorten the long shaft.
• Applicable shaft types: S, W

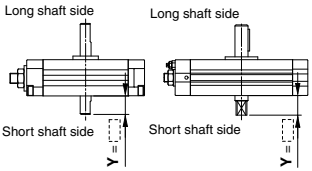


(mm)

Size	X
10	2 to 18
15	2 to 20
20	17 to 30
30	18 to 32
40	18.5 to 36

Symbol: A18

Shorten the short shaft.
• Applicable shaft type: W



Size **10, 15**

(mm)

Size	Y
10	1 to 9
15	1 to 10
20	1 to 15
30	1 to 18
40	1 to 20

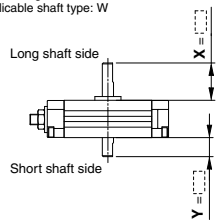
Size **20, 30, 40**

(mm)

Size	Y
10	1 to 9
15	1 to 10
20	1 to 15
30	1 to 18
40	1 to 20

Symbol: A19

Both the long shaft and short shaft are shortened.
• Applicable shaft type: W

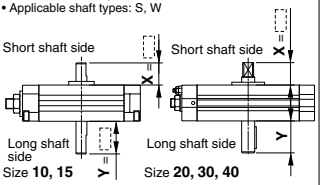


(mm)

Size	X	Y
10	2 to 18	1 to 9
15	2 to 20	1 to 10
20	17 to 30	1 to 15
30	18 to 32	1 to 18
40	18.5 to 36	1 to 20

Symbol: A20

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



Size **10, 15**

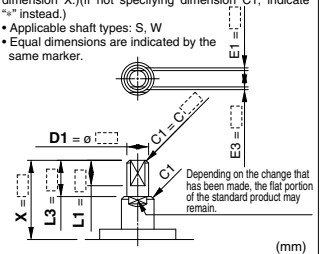
Size **20, 30, 40**

(mm)

Size	X	Y
10	2 to 10	1 to 17
15	2 to 11	1 to 19
20	2.5 to 16.5	16 to 28.5
30	3 to 20	16 to 30
40	3 to 22	16.5 to 34

Symbol: A21

The long shaft can be further shortened by machining it into a stepped round shaft with a double-sided chamfer.
(If shortening the shaft is not required, indicate "∗" for dimension X.)(If not specifying dimension C1, indicate "∗" instead.)
• Applicable shaft types: S, W
• Equal dimensions are indicated by the same marker.

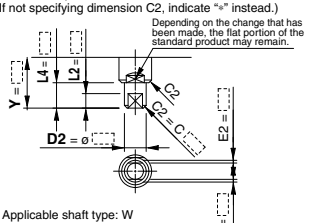


(mm)

Size	X	L1 max	L3	D1
10	5 to 18	X – 3.5	L1 + 1.5	ø3.5 to ø4.9
15	5.5 to 20	X – 4	L1 + 2	ø3.5 to ø5.9

Symbol: A22

The short shaft can be further shortened by machining it into a stepped round shaft with a double-sided chamfer.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
(If not specifying dimension C2, indicate "∗" instead.)



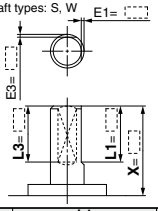
• Applicable shaft type: W
• Equal dimensions are indicated by the same marker.

(mm)

Size	Y	L2 max	L4	D2
10	3 to 9	Y – 1.5	L1 + 1.5	ø3.5 to ø4.9
15	3.5 to 10	Y – 2	L1 + 2	ø3.5 to ø5.9

Symbol: A23

The long shaft can be further shortened by machining right-angle double-sided chamfer onto it.
• Since L1 is a standard chamfer, dimension E1 is 0.5 or more.
(If altering the standard chamfer and shortening th shaft are not required, indicate "∗" for both the L1 and X dimensions.)
• Applicable shaft types: S, W

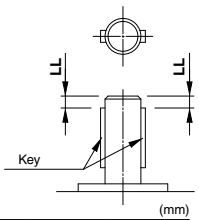


(mm)

Size	X	L1	L3 max
10	8 to 18	(10 – (18 – X)) to (X – 2)	X-2
15	10 to 20	(10 – (20 – X)) to (X – 2)	X-2

Symbol: A24

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



(mm)

Size	Key dimensions	LL
20	4 x 4 x 20	3
30	4 x 4 x 20	4
40	5 x 5 x 25	5

CRQ2 Series (Size: 10, 15, 20, 30, 40)
Simple Specials: -XA31 to -XA59: Shaft Pattern Sequencing II

Shaft shape pattern is dealt with through the Simple Specials System.
Please contact your local sales representative for more details.

Symbol

Shaft Pattern Sequencing II — -XA31 to XA59

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

How to Order

C | D | RQ2B | T | P | 20 | | – | 90 | C | – | M9BW | – | X | A34 | A37 | C30 | -X6

Built-in magnet

Nil	None
D	Built-in magnet

Shaft type

X	Single shaft with four chamfers
Y	Double shaft key
Z	Double shaft with four chamfers
T	Single round shaft
J	Double shaft
K	Double round shaft

∗ Refer to pages 303 and 304 for the shaft type variations.

Size

10
15
20
30
40

Pattern

How to order model with auto switches

Refer to page 295 for "How to Order" products with auto switches.

Thread type

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

Auto switch

Refer to page 295 for "How to Order" products with auto switches.

Air cushion

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

Rotating angle

90	80° to 100°
180	170° to 190°
360	350° to 370°

Symbol for simple specials, Made-to-Order products

- When number of combinations is 1 or 2, refer to chart 3 and 4.

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

∗ Combination of -X6 (shaft, parallel key stainless spec) is available for all the types.

• Combination 3 Types

A33	**A34**	**C30**	Chart 3, 4
A34	**A37**	**-X6**	Chart 3
A35	**C30**	**C69**	Chart 4, 5
A40	**C8**	**-X6**	Chart 4, 5

• Combination of Applicable Chart

Combination is available only when all the conditions are fulfilled among the nation chart above.

• Combination 4 Types

A33	**A34**	**C30**	**C69**	Chart 3, 4, 5
A34	**A37**	**C12**	**-X6**	Chart 3, 4
A43	**C12**	**C30**	**-X6**	Chart 4, 5

• Combination of Applicable Chart

Combination is available only when all the conditions are fulfilled among the nation chart above.

∗ Combination of simple specials and Made-to-Order, it is possible for up to 4 types.

Symbol

Shaft Pattern Sequencing II

-XA31 to XA59

Combination Chart of Simple Specials for Tip End Shape

Chart 3. Combination between -XA□ and -XA□ (X, Y, Z, T, J, K shafts)

Symbol	Description	Top port		Shaft type						Applicable size	Combination												
		Upper	Lower	J	K	T	X	Y	Z														
XA31	Female thread at the end	●	–	–	–	–	–	●	–	20, 30, 40	**XA31**												
XA32	Female thread at the end	–	●	–	–	–	–	●	–		Y *	**XA32**											
XA33	Female thread at the end	●	–	●	●	●	–	–	–	10, 15,	–	–	**XA33**										
XA34	Female thread at the end	–	●	–	●	●	●	–	–	20, 30, 40	–	–	K, T *	**XA34**									
XA35	Female thread at the end	●	–	–	–	–	●	–	●	20, 30, 40	–	–	–	X *	**XA35**								
XA36	Female thread at the end	–	●	●	–	–	–	–	●		–	–	J *	–	Z *	**XA36**							
XA37	Stepped round shaft	●	–	●	●	●	–	–	–	10, 15,	–	–	–	KT *	–	J *	**XA37**						
XA38	Stepped round shaft	–	●	–	●	–	–	–	–	20, 30, 40	–	–	K *	–	–	–	K *						
XA39	Shaft through hole	●	●	–	–	–	–	●	–	20, 30, 40	–	–	–	–	–	–	–						
XA40	Shaft through hole	●	●	–	●	●	–	–	–	10, 15,	–	–	–	–	–	–	–						
XA41	Shaft through hole	●	●	●	–	–	●	–	●	20, 30, 40	–	–	–	–	–	–	–						
XA42	Shaft through hole and female thread	●	●	–	–	–	–	●	–	20, 30, 40	–	–	–	–	–	–	–						
XA43	Shaft through hole and female thread	●	●	–	●	●	–	–	–		–	–	–	–	–	–	–						
XA44	Shaft through hole and female thread	●	●	●	–	–	●	–	●	10, 15,	–	–	–	–	–	–	–	**XA38**					
XA45	Middle-cut chamfer	●	–	●	●	●	–	–	–	20, 30, 40	–	–	–	K *	–	J *	–	K *	**XA39**	**XA40**	**XA41**	**XA45**	
XA46	Middle-cut chamfer	–	●	–	●	–	–	–	–		–	–	K *	–	–	–	K *	–	–	–	–	K *	**XA46**
XA48	Change of long shaft length	●	–	–	–	–	–	●	–		–	Y *	–	–	–	–	–	–	Y *	–	–	–	–
XA49	Change of short shaft length	–	●	–	–	–	–	●	–	20, 30, 40	Y *	–	–	–	–	–	–	–	Y *	–	–	–	–
XA50	Change of double shaft length	●	●	–	–	–	–	●	–		–	–	–	–	–	–	–	–	Y *	–	–	–	–
XA51	Change of long shaft length	●	–	●	●	●	–	–	–		–	–	–	K, T *	–	J *	–	K *	–	K, T *	J *	–	K *
XA52	Change of short shaft length	–	●	–	●	–	–	–	–	10, 15, 20, 30, 40	–	–	K *	–	–	–	K *	–	–	K *	–	K *	–
XA53	Change of double shaft length	●	●	–	●	–	–	–	–		–	–	–	–	–	–	–	–	–	K *	–	–	–
XA54	Change of long shaft length	●	–	–	–	–	●	–	●		–	–	–	X *	–	Z *	–	–	–	–	X, Z *	–	–
XA55	Change of short shaft length	–	●	●	–	–	–	–	●	20, 30, 40	–	–	J *	–	Z *	–	J *	–	–	–	J, Z *	J *	–
XA56	Change of double shaft length	●	●	–	–	–	–	–	●		–	–	–	–	–	–	–	–	–	–	Z *	–	–
XA57	Change of double shaft length	●	●	●	–	–	–	–	–	10, 15,	–	–	–	–	–	–	–	–	–	–	J *	–	–
XA58	Reversed shaft, Change of double shaft length	●	●	●	–	●	–	–	–	20, 30, 40	–	–	–	–	–	–	–	–	–	T *	J *	–	–
XA59	Reversed shaft, Change of double shaft length	●	●	–	–	–	●	–	–	20, 30, 40	–	–	–	–	–	–	–	–	–	–	X *	–	–

∗ Corresponding shafts type available for combination

Combination Chart of Made to Order

Chart 4. Combination between -XA□ and -XC□ (Made to Order/Details of -XC□, refer to page 316.)

Symbol	Description	Applicable size	Combination
			XA31 to XA59
XC 7	Reversed shaft	10, 15, 20, 30, 40	–
XC 8	Change of rotating range		●
XC 9			●
XC10			●
XC11			●
XC12	Change in angle adjustable range 0° to 100°		●
XC13			●
XC14			●
XC15			●
XC16	Change in angle adjustable range 90° to 190°		●
XC17			●
XC18	Change of rotating range	20, 30, 40	●
XC19			●
XC20	Change in angle adjustable range 90° to 190°		●
XC21			●
XC22	Without inner rubber bumper	10, 15	●
XC30	Fluorine grease	10, 15, 20, 30, 40	●
XC69	Fluororubber seal	10, 15, 20, 30, 40	●

∗ Chart 5. Refer to page 316 for combination available between -XC□ and -XC□.

Symbol

Shaft Pattern Sequencing II

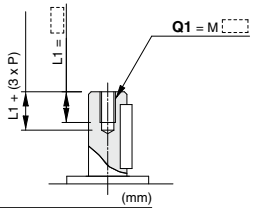
-XA31 to XA38

Additional Reminders

1. Enter the dimensions within a range that allows for additional machining.
2. Unless indicated otherwise, the dimensional tolerance conforms to the general tolerance. SMC will make appropriate arrangements.
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.
   M3 x 0.5, M4 x 0.7, M5 x 0.8
   M6 x 1
5. Enter the desired figures in the ☐☐☐ portion of the diagram.
6. XA31 to XA59 are the standard products that have been additionally machined.
7. Chamfer face of the parts machining additionally is C0.5.

Symbol: A31

Machine female threads into the long shaft.
- The maximum dimension L1 is, as a rule, twice the thread size.
  (Example) For M3: L1 = 6
- Applicable shaft type: Y

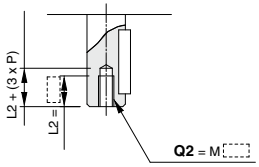


(mm)

Size	Q1
20	M3, M4
30	M3, M4, M5
40	M4, M5, M6

Symbol: A32

Machine female threads into the short shaft.
- The maximum dimension L2 is, as a rule, twice the thread size.
  (Example) For M4: L2 = 8
- Applicable shaft type: Y

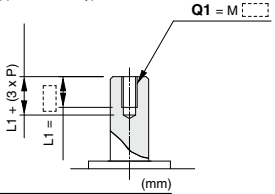


(mm)

Size	Q2
20	M3, M4
30	M3, M4,M5
40	M4, M5,M6

Symbol: A33

Machine female threads into the long shaft.
- The maximum dimension L1 is, as a rule, twice the thread size.
  (Example) For M3: L1 = 6
- Applicable shaft types: J, K, T

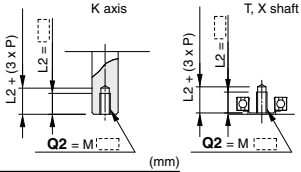


(mm)

Size	Q1
10	M3
15	M3, M4
20	M3, M4, M5, M6
30	M4, M5, M6, M8
40	M4, M5, M6, M8, M10

Symbol: A34

Machine female threads into the short shaft.
- The maximum dimension L2 is, as a rule, twice the thread size.
  (Example) For M5: L2 = 10
- Applicable shaft types: K, T, X

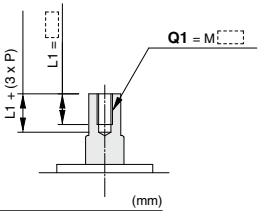


(mm)

Size	Q2
10	M3
15	M3, M4
20	M3, M4, M5, M6
30	M4, M5, M6, M8
40	M4, M5, M6, M8, M10

Symbol: A35

Machine female threads into the long shaft.
- The maximum dimension L1 is, as a rule, twice the thread size.
  (Example) For M3: L1 = 6
- Applicable shaft types: X, Z

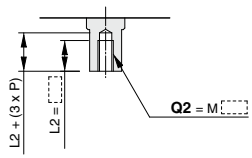


(mm)

Size	Q1
20	M3, M4
30	M3, M4, M5, M6
40	M4, M5, M6, M8

Symbol: A36

Machine female threads into the short shaft.
- The maximum dimension L2 is, as a rule, twice the thread size.
  (Example) For M4: L2 = 8
- Applicable shaft types: J, Z

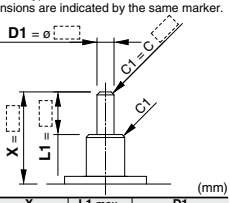


(mm)

Size	Q2
20	M3, M4
30	M3, M4, M5, M6
40	M4, M5, M6, M8

Symbol: A37

The long shaft can be further shortened by machining it into a stepped round shaft. (If shortening the shaft is not required, indicate "✲" for dimension X.) (If not specifying dimension C1, indicate "✲" instead.)
- Applicable shaft types: J, K, T
- Equal dimensions are indicated by the same marker.

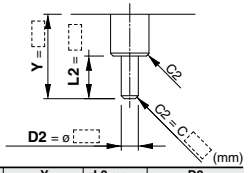


(mm)

Size	X	L1 max	D1
10	3 to 18	X – 2	ø3.5 to ø4.9
15	3 to 20	X – 2	ø3.5 to ø5.9
20	3.5 to 30	X – 2.5	ø5 to ø9.9
30	4 to 32	X–3	ø5 to ø11.9
40	4 to 36	X – 3	ø5 to ø14.9

Symbol: A38

The short shaft can be further shortened by machining it into a stepped round shaft.
(If shortening the shaft is not required, indicate "✲" for dimension Y.)
(If not specifying dimension C2, indicate "✲" instead.)
- Applicable shaft type: K
- Equal dimensions are indicated by the same marker.



(mm)

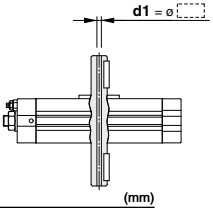
Size	Y	L2 max	D2
10	1 to 18	Y	ø3.5 to ø4.9
15	1 to 20	Y	ø3.5 to ø5.9
20	1 to 30	Y	ø5 to ø9.9
30	1 to 32	Y	ø5 to ø11.9
40	1 to 36	Y	ø5 to ø14.9

Shaft Pattern Sequencing II

Symbol
-XA39 to XA48

Symbol: A39

Shaft with through-hole
Minimum machining diameter for d1 is 0.1.
• Applicable shaft type: Y

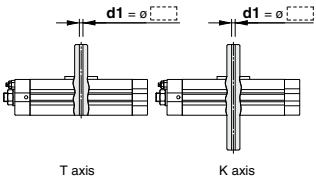


(mm)

Size	d1
20	ø2.5 to ø3.5
30	ø3 to ø5.5
40	ø4 to ø7

Symbol: A40

Shaft with through-hole
Minimum machining diameter for d1 is 0.1.
• Applicable shaft types: K, T

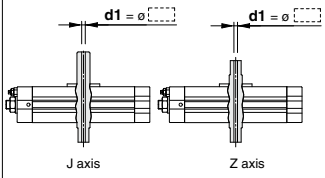


(mm)

Size	d1
10	ø2 to ø3
15	ø2 to ø4
20	ø2.5 to ø6
30	ø3 to ø8
40	ø4 to ø10

Symbol: A41

Shaft with through-hole
Minimum machining diameter for d1 is 0.1.
• Applicable shaft types: J, X, Z

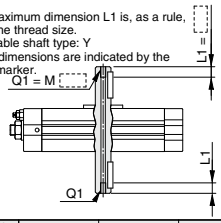


(mm)

Size	d1
10	ø2 to ø3
15	ø2 to ø4
20	ø2.5 to ø5
30	ø3 to ø7
40	ø4 to ø8

Symbol: A42

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.
• Applicable shaft type: Y
• Equal dimensions are indicated by the same marker.

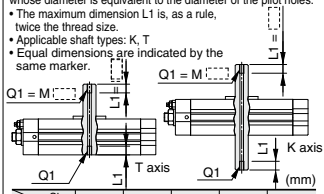


(mm)

Thread \ Size	20	30	40
M3 x 0.5	ø2.5	—	—
M4 x 0.7	ø3.3	ø3.3	—
M5 x 0.8	—	ø4.2	ø4.2
M6 x 1	—	—	ø5

Symbol: A43

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

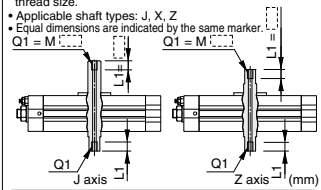


(mm)

Thread \ Size	10	15	20	30	40
M 3 x 0.5	ø2.5	ø2.5	ø2.5	—	—
M 4 x 0.7	—	ø3.3	ø3.3	ø3.3	—
M 5 x 0.8	—	—	ø4.2	ø4.2	ø4.2
M 6 x 1	—	—	ø5	ø5	ø5
M 8 x 1.25	—	—	—	ø6.8	ø6.8
M10 x 1.5	—	—	—	—	ø8.5
Rc 1/8	—	—	—	—	ø8.2

Symbol: A44

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.
• Applicable shaft types: J, X, Z
• Equal dimensions are indicated by the same marker.

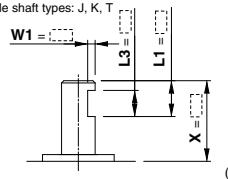


(mm)

Thread \ Size	10	15	20	30	40
M3 x 0.5	ø2.5	ø2.5	ø2.5	—	—
M4 x 0.7	—	ø3.3	ø3.3	ø3.3	—
M5 x 0.8	—	—	ø4.2	ø4.2	ø4.2
M6 x 1	—	—	—	ø5	ø5
M8 x 1.25	—	—	—	—	ø6.8

Symbol: A45

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

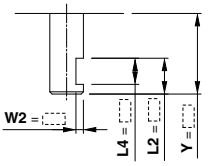


(mm)

Size	X	W1	L1 max	L3 max
10	6 to 18	0.5 to 1.5	X – 2	L1 – 1
15	6.5 to 20	0.5 to 1.5	X – 2	L1 – 1
20	9.5 to 30	1 to 2	X – 2.5	L1 – 2
30	11.5 to 32	1 to 2	X – 3	L1 – 2
40	12.5 to 36	1 to 2	X – 3	L1 – 2

Symbol: A46

The short shaft can be further shortened by machining a middle-cut chamfer into it.
(If shortening the shaft is not required, indicate "∗" for dimension Y.)
(The position is that of the standard flat at the keyway portion.)
• Applicable shaft type: K

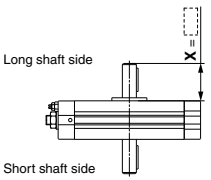


(mm)

Size	Y	W2	L2 max	L4 max
10	4 to 18	0.5 to 1.5	Y	L2 – 1
15	4.5 to 20	0.5 to 1.5	Y	L2 – 1
20	6.5 to 30	1 to 2	Y	L2 – 2
30	8.5 to 32	1 to 2	Y	L2 – 2
40	9.5 to 36	1 to 2	Y	L2 – 2

Symbol: A48

Shorten the long shaft.
• Applicable shaft type: Y



Size **20, 30, 40**

(mm)

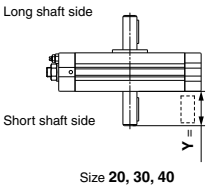
Size	X
20	17 to 30
30	18 to 32
40	18.5 to 36

Shaft Pattern Sequencing II

Symbol
-XA49 to XA57

Symbol: A49

Shorten the short shaft.
• Applicable shaft type: Y

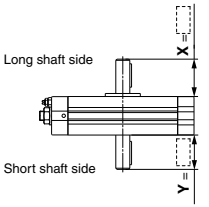


(mm)

Size	Y
20	17 to 30
30	18 to 32
40	18.5 to 36

Symbol: A50

Both the long shaft and short shaft are shortened.
• Applicable shaft type: Y

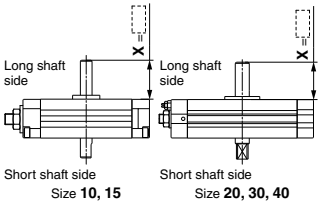


(mm)

Size	X	Y
20	17 to 30	17 to 30
30	18 to 32	18 to 32
40	18.5 to 36	18.5 to 36

Symbol: A51

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

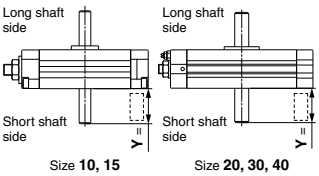


(mm)

Size	X
10	3 to 18
15	3 to 20
20	3.5 to 30
30	4 to 32
40	4 to 36

Symbol: A52

Shorten the short shaft.
• Applicable shaft type: K

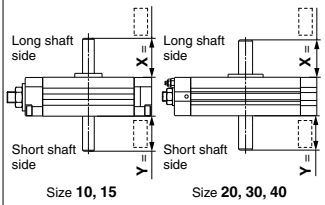


(mm)

Size	Y
10	1 to 18
15	1 to 20
20	1 to 30
30	1 to 32
40	1 to 36

Symbol: A53

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

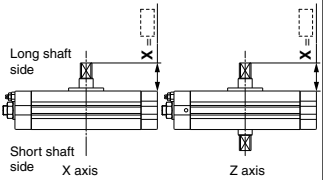


(mm)

Size	X	Y
10	3 to 18	1 to 18
15	3 to 20	1 to 20
20	3.5 to 30	1 to 30
30	4 to 32	1 to 32
40	4 to 36	1 to 36

Symbol: A54

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

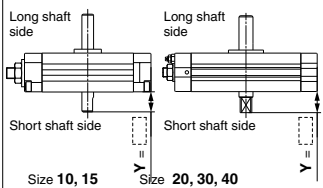


(mm)

Size	X
20	3.5 to 21
30	4 to 24
40	4 to 27

Symbol: A55

Shorten the short shaft.
• Applicable shaft type: J, Z

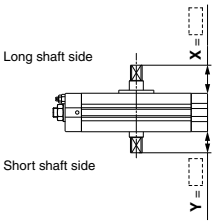


(mm)

Size	Y
10	1 to 9
15	1 to 10
20	1 to 15
30	1 to 18
40	1 to 20

Symbol: A56

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

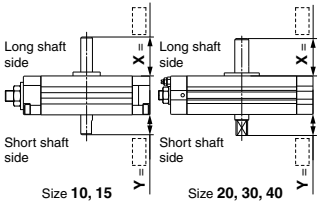


(mm)

Size	X	Y
20	3.5 to 21	1 to 15
30	4 to 24	1 to 18
40	4 to 27	1 to 20

Symbol: A57

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



(mm)

Size	X	Y
10	3 to 18	1 to 9
15	3 to 20	1 to 10
20	3.5 to 30	1 to 15
30	4 to 32	1 to 18
40	4 to 36	1 to 20

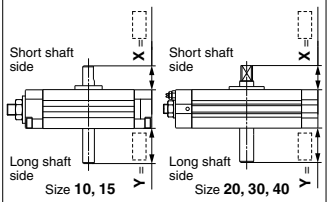
Symbol

Shaft Pattern Sequencing II

-XA58 to XA59

Symbol: A58

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

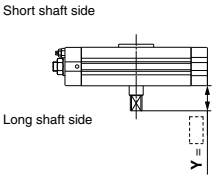


(mm)

Size	X	Y
10	3 to 10	1 to 17
15	3 to 11	1 to 19
20	3.5 to 16.5	1 to 28.5
30	4 to 20	1 to 30
40	4 to 22	1 to 34

Symbol: A59

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



(mm)

Size	Y
20	1 to 19.5
30	1 to 22
40	1 to 25

CRQ2 Series
Made to Order Specifications 1

Please contact SMC for detailed dimensions, specifications and lead times.

Made to Order

How to Order

C D RQ2B S P 20 [ ] – 90 [ ] – M9BW – X C7 C12 C30 -X6

Built-in magnet

Nil	None
D	Built-in magnet

Shaft type

Standard	S	Single shaft
	W	Double shaft
Shaft type variation	X	Single shaft with four chamfers
	Y	Double shaft key
	Z	Double shaft with four chamfers
	T	Single round shaft
	J	Double shaft
	K	Double round shaft

Pattern

Size

10
15
20
30
40

Auto switch

Refer to page 295 for the part no. of auto switches.

Air cushion

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

Rotating angle

90	80° to 100°
180	170° to 190°
360	350° to 370°

Thread type

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

How to order model with auto switches

Refer to page 295 for "How to Order" products with auto switches.

Symbol for simple specials, Made-to-Order products

- When number of combinations is 1 or 2, refer to chart 2, 4 and 5.
  - ∗ Combination of XA is possible for up to 2 types.
  - ∗ Combination of -X6 (shaft, parallel key stainless spec.) is available for all the types.

• Combination 3 Types

C7 C30 C69 → Chart 5
C12 C22 -X6 → Chart 5

• Combination of Applicable Chart

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

• Combination 4 Types

C7 C12 C30 -X6 → Chart 5

• Combination of Applicable Chart

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

∗ Combination of Made-to-Order is available up to 4 types.

Combination Chart of Made to Order

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

Symbol	Description	Applicable size	Rotating angle	Combination								
XC7	Reversed shaft	10, 15, 20, 30, 40	90, 180, 360	XC7								
XC8 to XC10	Change of rotating range		90	●	XC8 to XC10							
XC11	Change of rotating range		180	●	–	XC11						
XC12 to XC15	Change in rotating adjustable range 0°to 100°		90	●	–	–	XC12 to XC15					
XC16 XC17	Change in rotating adjustable range 90°to 190°		180	●	–	–	–	XC16 XC17				
XC18 XC19	Change of rotating range	20, 30, 40		●	–	–	–	–	XC18 XC19			
XC20 XC21	Change in rotating adjustable range 90°to 190°			●	–	–	–	–	–	XC20 XC21		
XC22	Without inner rubber bumper	10, 15	90, 180, 360	●	●	●	●	●	–	–	XC22	
XC30	Fluorine grease	10, 15, 20, 30, 40		●	●	●	●	●	●	●	●	XC30
XC69	Fluororubber seal			●	●	●	●	●	●	●	●	●

1 Reversed Shaft

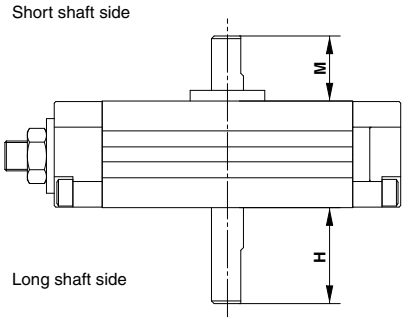
Symbol **-XC7**

CRQ2B
CDRQ2B **Refer to "How to Order" on page 295.** — XC7

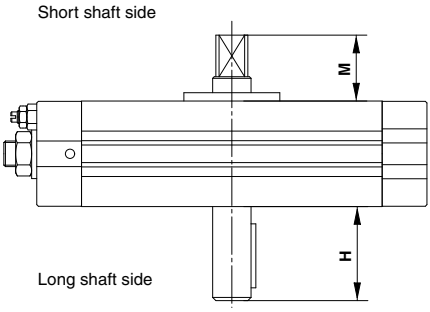
Reversed shaft

Specifications

Applicable size	10, 15, 20, 30, 40
Applicable shaft type	S, W, X, T, J shaft



Size 10, 15



Size 20, 30, 40

(mm)

Size	M	H
10	10	17 (—)*
15	11	19 (—)*
20	16.5	28.5 (19.5)*
30	20	30 (22)*
40	22	34 (25)*

* For X shaft

CRQ2 Series
Made to Order Specifications 2

Please contact SMC for detailed dimensions, specifications and lead times.

Made to Order

2 Change of Rotating Range

Symbol
-XC8 to XC11, XC18/XC19

CRQ2B
CDRQ2B Refer to "How to Order" on page 295. —X **C8**

Specifications

Applicable shaft type	S, W, Y

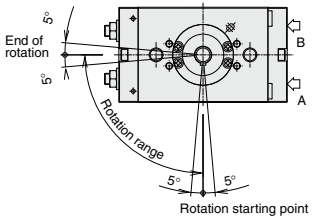
Symbol
-XC8 to XC11, XC18/XC19

Additional Reminders

The rotation starting point shows the positions of one flat chamfering and the key groove when pressurized to the connecting port (B).

Symbol: C8

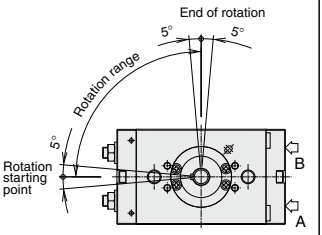
Angle adjustment at the rotation starting point and the end point are at ±5°.
Rotating range is changed. Rotation angle is at 90° ±10°.
The rotation starting point is on the perpendicular line (down).



The figure shows the view from the long shaft end.

Symbol: C9

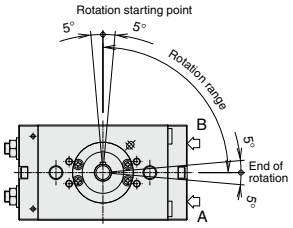
Angle adjustment at the rotation starting point and the end point are at ±5°.
Rotating range is changed. Rotation angle is at 90° ±10°.
The rotation starting point is on the horizontal line (left).



The figure shows the view from the long shaft end.

Symbol: C10

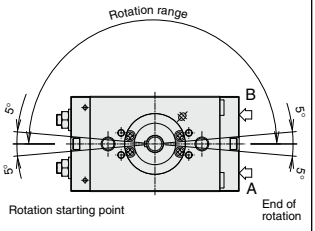
Angle adjustment at the rotation starting point and the end point are at ±5°.
Rotating range is changed. Rotation angle is at 90° ±10°.
The rotation starting point is on the perpendicular line (up).



The figure shows the view from the long shaft end.

Symbol: C11

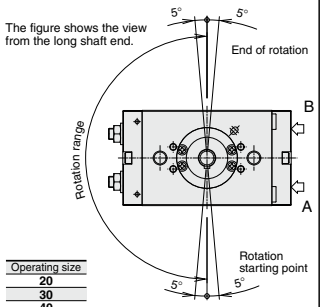
Angle adjustment at the rotation starting point and the end point are at ±5°.
Rotating range is changed. Rotation angle is at 180° ±10°.
The rotation starting point is on the horizontal line (left).



The figure shows the view from the long shaft end.

Symbol: C18

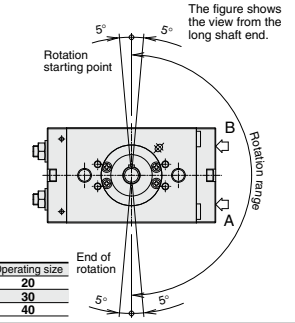
Angle adjustment at the rotation starting point and the end point are at ±5°.
Rotating range is changed. Rotation angle is at 180° ±10°.
The rotation starting point is on the perpendicular line (down).



Operating size
20
30
40

Symbol: C19

Angle adjustment at the rotation starting point and the end point are at ±5°.
Rotating range is changed. Rotation angle is at 180° ±10°.
The rotation starting point is on the perpendicular line (up).



Operating size
20
30
40

SMC

3 Change of Angle Adjustable Range (0° to 100°, 90° to 190°)

Symbol
-XC12 to XC17, XC20/XC21

CRQ2B
CDRQ2B — Refer to "How to Order" on page 295. — X **C12**

Symbol
-XC12 to XC17, XC20/XC21

Specifications

Applicable shaft type	S, W, Y, X*, Z*, T*, J*, K*

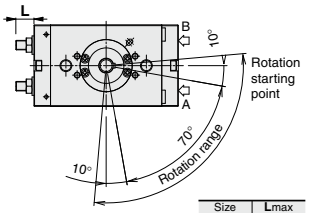
Additional Reminders

The rotation starting point is the position of the flat and the key groove when the actuator is pressurized through connection port B.
There are no air cushion effects in the rotating ranges of 70° or 160° shown in the diagram.

* Only XC12 and XC16 are compatible with shaft types X, Z, T, J and K.

Symbol: C12

The rotation angle can be adjusted between 0° and 100°.

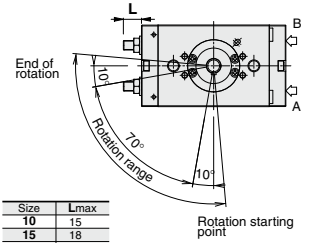


Size	Lmax
10	15
15	18
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C13

The rotation angle can be adjusted between 0° and 100°.

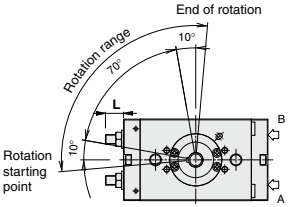


Size	Lmax
10	15
15	18
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C14

The rotation angle can be adjusted between 0° and 100°.

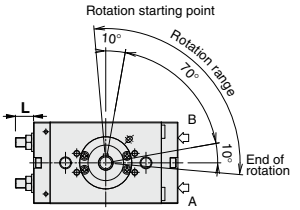


Size	Lmax
10	15
15	18
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C15

The rotation angle can be adjusted between 0° and 100°.

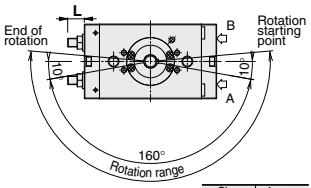


Size	Lmax
10	15
15	18
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C16

The rotation angle can be adjusted between 90° and 190°.

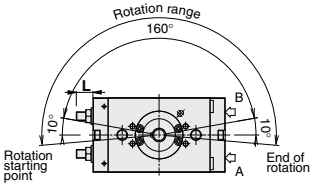


Size	Lmax
10	15
15	18
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C17

The rotation angle can be adjusted between 90° and 190°.

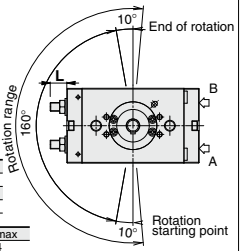


Size	Lmax
10	15
15	18
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C20

The rotation angle can be adjusted between 90° and 190°.



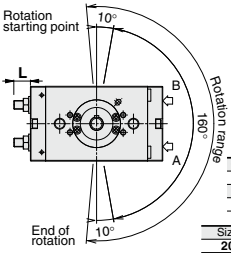
Operating size
20
30
40

Size	Lmax
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

Symbol: C21

The rotation angle can be adjusted between 90° and 190°.



Operating size
20
30
40

Size	Lmax
20	24
30	27
40	31.5

The figure shows the view from the long shaft end.

CRQ2 Series
Made to Order Specifications 3

Please contact SMC for detailed dimensions, specifications and lead times.

Made to Order

4 Without Inner Rubber Bumper

Symbol: **-XC22**

C RQ2B
CDRQ2B — Refer to "How to Order" on page 295. — **-XC22**

-XC22: Without inner rubber bumper

Specifications

Fluid	Air (Non-lube)
Applicable size	10, 15
Max. operating pressure	0.7 MPa
Min. operating pressure	0.15 MPa
Port size	M5 x 0.8
Rotation	80° to 100°, 170° to 190°, 350° to 370°
Applicable shaft type	S, W, X, Y, Z, T, J, K
Auto switch	Mountable

∗Refer to page 296 for other specifications.

Refer to pages 299 and 300 for other specifications.

5 Fluorine Grease

Symbol: **-XC30**

C RQ2B
CDRQ2B — Refer to "How to Order" on page 295. — **-XC30**

-XC30: Fluorine grease

Fluorine grease is used as lubricant oil in seal part of packing and inner wall of cylinder. (Not for low-speed specification.)

6 Fluororubber Seal

Symbol: **-XC69**

C RQ2B
CDRQ2B — Refer to "How to Order" on page 295. — **-XC69**

-XC69: Fluororubber seal

Seal material is changed to fluororubber.

7 Shaft, Parallel Key Made of Stainless Steel Spec.

Symbol: **-X6**

C RQ2B
CDRQ2B — Shaft type — Size — Rotation — **S-X6**

S-X6: Shaft, parallel key made of stainless steel

Shaft type: Refer to "How to Order" on page 295 for further information.

Stainless steel is used as a substitute material for standard parts when used under conditions with a possibility of oxidization or decay.

Fluid	Air (Non-lube)
Applicable shaft type	S, W, X, Y, Z, T, J, K
Applicable size	20, 30, 40
Max. operating pressure	1.0 MPa
Min. operating pressure	0.1 MPa
Cushion	Not attached, Air cushion
Rotation range	80° to 100°, 170° to 190°, 350° to 370°
Stainless steel part	Shaft, Parallel key
Port size	Rc 1/8, G 1/8, NPT 1/8, NPTF 1/8
Auto switch	Mountable