

Mini-rotary Actuator Rack & Pinion Style *Series CRJ* Size: 05, 1

More Compact.



PAT. PEND

CRB2

CRBU2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MRQ

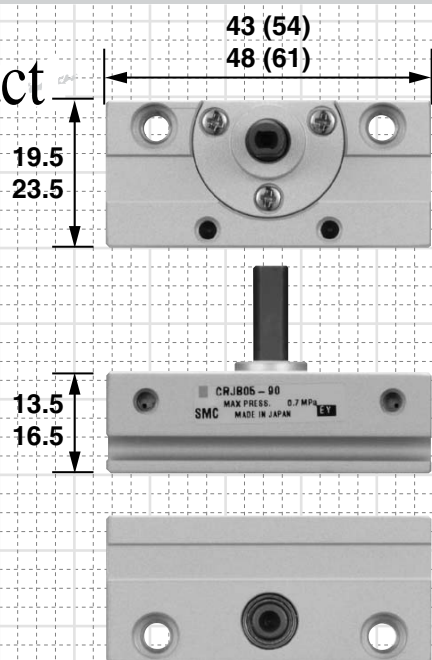
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Mini-rotary Actuator *Series CRJ*

Rack & Pinion Style/Size: 05, 1

Compact



Lightweight

CRJ05: 32 g (39 g)
CRJ1: 54 g (67 g)

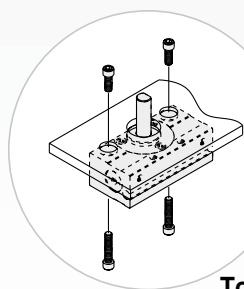
Top CRJ05
Bottom CRJ1
Numbers in () are for 180°.

(CRJB05-90)

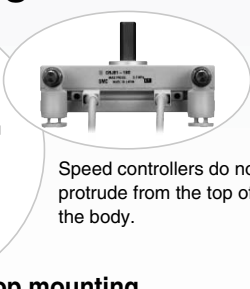
Flexible mounting

A new compact body design not only reduces overall space requirements, but also achieves space-savings in wiring and piping. Ease in mounting is maximized thanks to the merits of the new compact body.

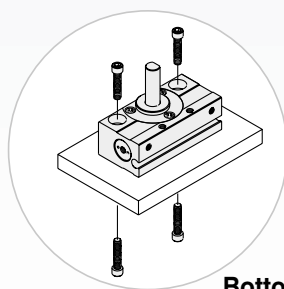
Free mounting



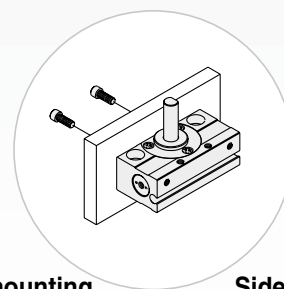
Top mounting



Speed controllers do not protrude from the top of the body.



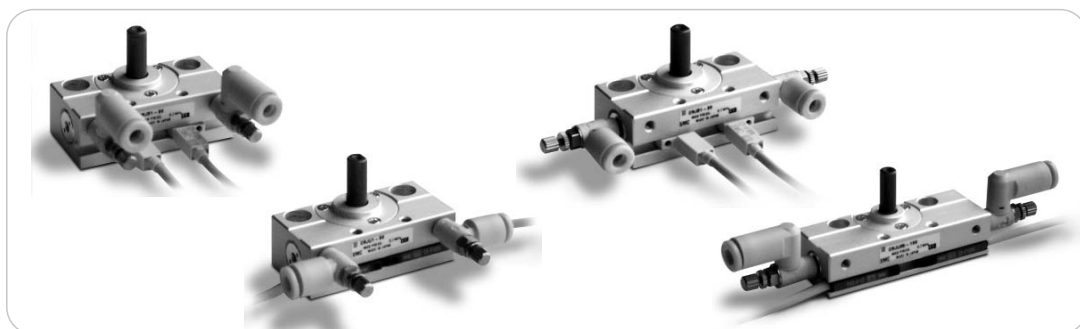
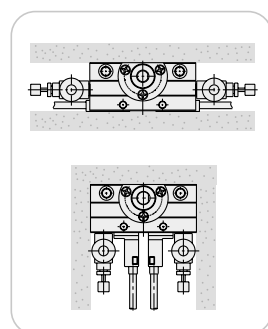
Bottom mounting



Side mounting

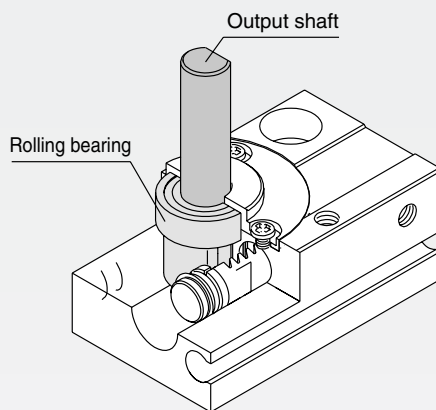
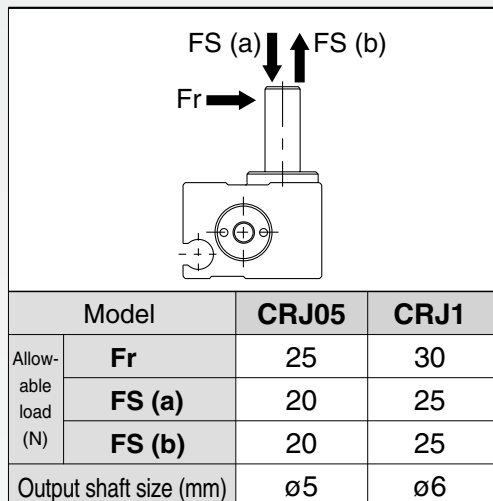
Wiring and piping direction can be selected depending on mounting conditions.

Mounting examples for auto switch and speed controller



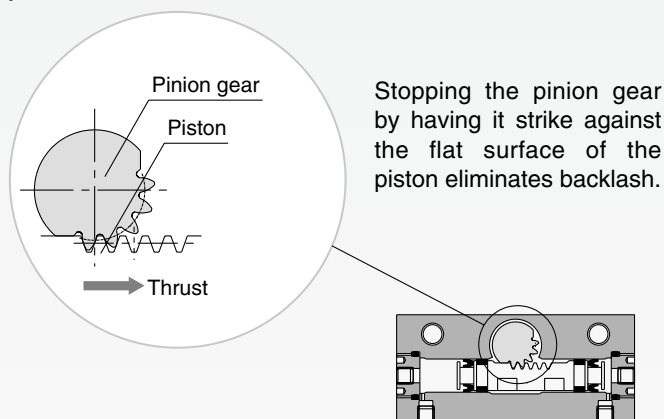
Allowable load improved

Large roller bearing and large diameter output shaft add to overall compactness while ensuring high rigidity.



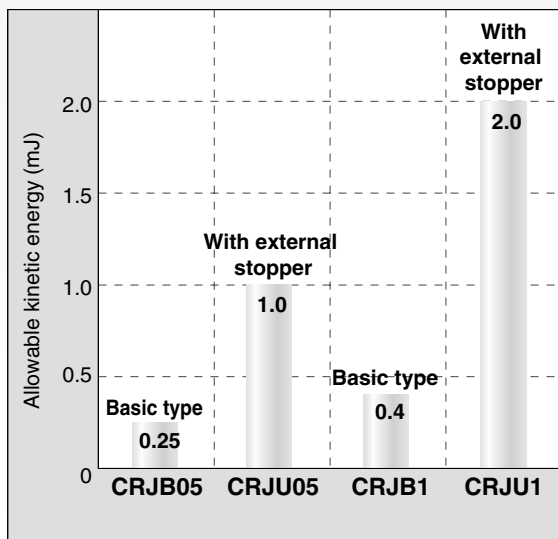
Backlash reduced

Even with a single rack design, the use of a special construction minimizes backlash.

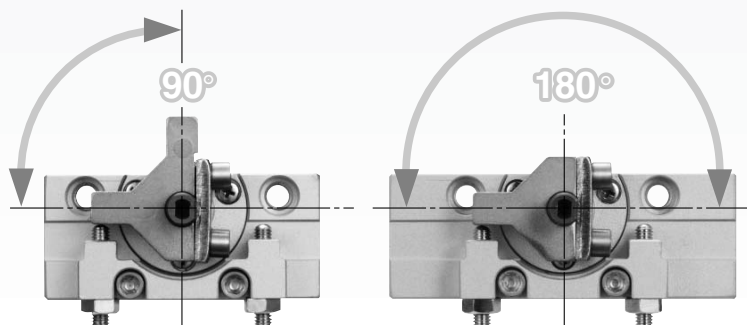


With external stopper/Series CRJU

4 to 5 times allowable kinetic energy (Basic type compared to CRJB)



Angle is adjustable: $\pm 5^\circ$ at each rotation end



Series Variations

Series		Rotating angle				Connection port location	Auto switch
		90°	100°	180°	190°		
Basic type	CRJB05	●	●	●	●	Front ported Side ported	D-F8 D-F9 D-M9
	CRJB1	●	●	●	●		
With external stopper	CRJU05	●	—	●	—		
	CRJU1	●	—	●	—		

⚠ Precautions

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

Rotation Adjustment

⚠ Caution

As a standard feature, the actuator with external stopper is equipped with a rotation angle adjustment screw that can be used to adjust the angle of rotation.

Size	Angle adjustment per single rotation of angle adjustment screw
05	2.3°
1	2.3°

The rotation adjustment range for the actuator with external stopper is $\pm 5^\circ$ at each rotation end. Please note that adjusting beyond this range, may cause product malfunction.

Mounting of Speed Controller and Fittings

⚠ Caution

The M3 x 0.5 piping port is used. In case the speed controller or fittings are directly connected, use the series listed below.

- Speed controller
AS12□1F/Elbow type
AS13□1F/Universal type
- One-touch fitting
One-touch mini Series KJ
- Reducer bushing Series M3

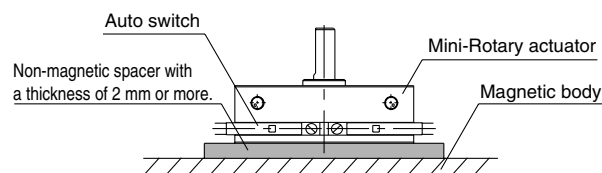
Mounting of Auto Switch

⚠ Caution

If a size 05 actuator with auto switch is being used, keep the magnetic body away at least 2 mm or more from the bottom of the actuator.

If the magnetic body comes closer than 2 mm, malfunction of the auto switch may occur due to the magnetic force drop.

* When using the bottom face for mounting, a non-magnetic spacer (such as aluminum) is required as shown below.



Maintenance

⚠ Caution

This product requires special tools; therefore, it cannot be disassembled for maintenance.

External Stopper Unit

⚠ Caution

Order external stopper unit with the unit part numbers shown below.

Parts List	
	Stopper
	Holder assembly
	Stopper retainer
	Hexagon socket head cap screw (set of 4)

Model	Unit part no.
CRJU05-90	P531010-1
CRJU05-180	P531010-2
CRJU1-90	P531020-1
CRJU1-180	P531020-2

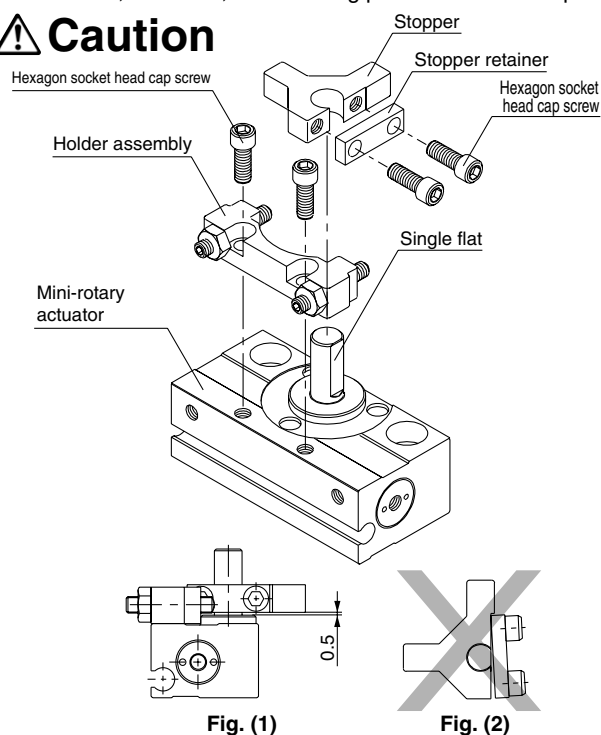
Note 1) External stopper units for 180° cannot be applied to the 90° Mini-rotary Actuators.

Note 2) When using external stoppers for 90°, use Mini-rotary Actuators with a rotation range of 100°, and for 180°, use actuators with a rotation range of 190°.

External Stopper Assembly Procedure

* Actuators with external stopper (Model CRJU) come already assembled; therefore, the following procedure is not required.

⚠ Caution



1. Assemble the stopper retainer to the stopper temporarily. Then place the stopper retainer in the single flat position and tighten with hexagon socket head cap screws. Leave a space of approximately 0.5 mm between the stopper and the Mini-rotary actuator, as shown in Fig. (1).

Tighten the hexagon socket head cap screws evenly so that the stopper retainer is not unevenly tightened as in Fig. (2). Furthermore, take precautions to avoid applying excessive force to the shaft when tightening.

2. Tighten the holder assembly with hexagon socket head cap screws.

	Tightening torque (N·m)
Hexagon socket head cap screw	0.8 to 1.2

Mini-rotary Actuator Rack & Pinion Style Series *CRJ*

How to Order

Basic type

With external stopper

Rotating angle

90	90°
100	100°
180	180°
190	190°

CRJ B 05 — 90 E — M9B S

CRJ U 05 — 90 E — M9B S

Size

05
1

Number of auto switches

Nil	2 pcs.
S	1 pc.

Auto switch

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

Rotating angle

90	90°
180	180°

Connection port location

Nil Front ported

E Side ported

CRB2

CRBU2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MRQ

D-

20-

Applicable Auto Switch/Refer to pages 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)			
					DC	AC	Electrical entry direction		0.5 (Nil)	3 (L)	5 (Z)	
							Perpendicular	In-line				
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	12 V	—	—	M9N	●	●	—
				F8N				—	●	●	○	
				—				M9P	●	●	—	
				F8P				—	●	●	○	
				—				M9B	●	●	—	
				F8B				—	●	●	○	
	Diagnosis indication (2-color)	Grommet	Yes	2-wire	24 V	12 V	—	—	F9NW	●	●	○
				3-wire (NPN)				—	F9PW	●	●	○
				3-wire (PNP)				—	F9BW	●	●	○
				2-wire				—	F9BW	●	●	○

* Lead wire length symbols: 0.5 m Nil (Example) M9N
3 m L (Example) M9NL
5 m Z (Example) F9NWX

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



Specifications

Size	05		1	
	Basic type	With external stopper	Basic type	With external stopper
Fluid	Air (Non-lube)			
Max. operating pressure	0.7 MPa			
Min. operating pressure	0.15 MPa			
Ambient and fluid temperature	0 to 60°C (No freezing)			
Rotating angle <div>Note)</div>	90 ^{+8° 0} , 100 ^{+10° 0} 180 ^{+8° 0} , 190 ^{+10° 0}	90, 180	90 ^{+8° 0} , 100 ^{+10° 0} 180 ^{+8° 0} , 190 ^{+10° 0}	90, 180
Angle adjustment range	—	±5° at each rotation end	—	±5° at each rotation end
Cylinder bore size	ø6		ø8	
Port size	M3 x 0.5			

Note) If optimum accuracy of the (rotating) angle is required, select an actuator with external stopper.

Allowable Kinetic Energy and Rotation Time Adjustment Range

Size			Allowable kinetic energy (mJ)	Rotation time adjustment range for stable operation (s/90°)
05	Basic type	CRJB05	0.25	0.1 to 0.5
	With external stopper	CRJU05	1.0	
1	Basic type	CRJB1	0.40	
	With external stopper	CRJU1	2.0	

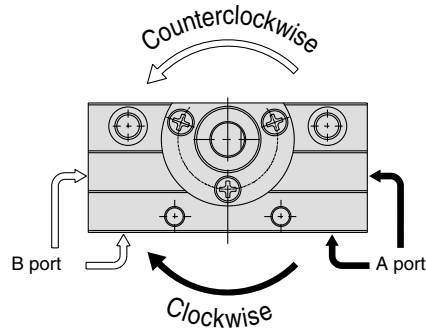
Weight

Type		Model	Weight (g) ^{Note)}
Basic type	05	CRJB05-90	32
		CRJB05-100	
		CRJB05-180	39
		CRJB05-190	
	1	CRJB1-90	54
		CRJB1-100	
		CRJB1-180	67
		CRJB1-190	
With external stopper	05	CRJU05-90	47
		CRJU05-180	53
	1	CRJU1-90	70
		CRJU1-180	81

Note) Values above do not include auto switch weights.

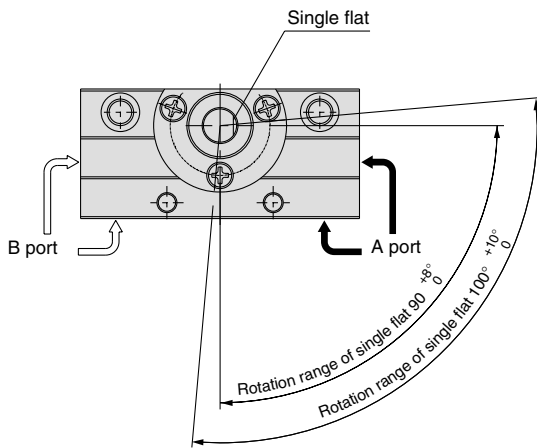
Rotating Direction and Rotating Angle

- The shaft turns clockwise when the A port is pressurized, and counterclockwise when the B port is pressurized.
- For actuators with external stopper, the rotation end can be set within the ranges shown in the drawing by adjusting the stopper bolt.

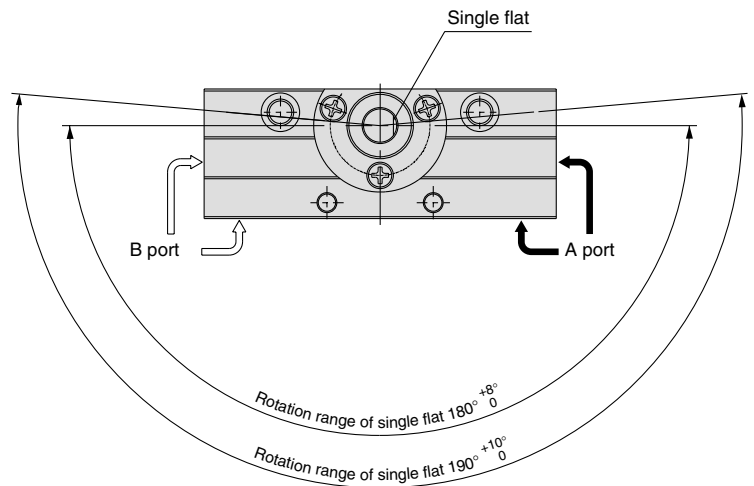


Basic type

For 90° and 100°

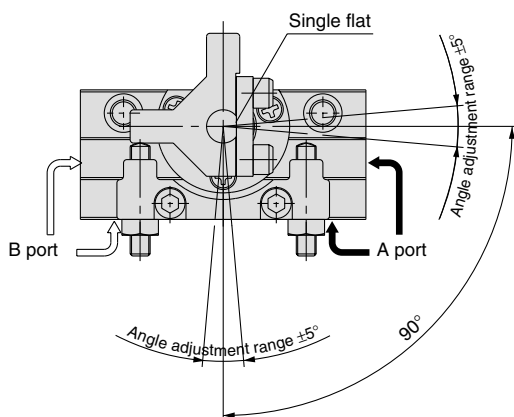


For 180° and 190°

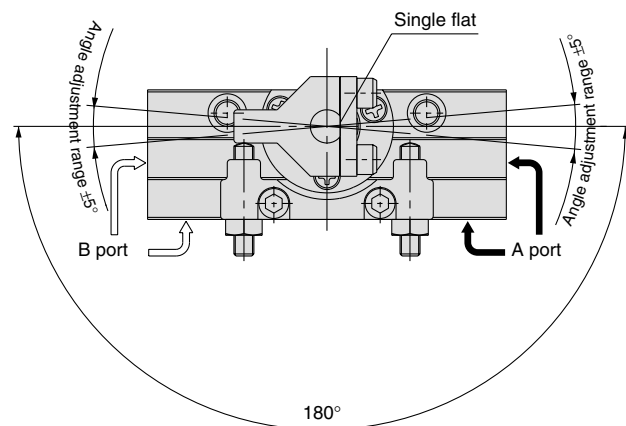


With external stopper

For 90°



For 180°



- Note) • The drawings show the rotation range for the shaft's single flat.
• The single flat position in the drawings shows the counterclockwise rotation end when the rotation angle is adjusted to 90° and 180°.

CRB2

CRBU2

CRB1

MSU

CRJ

CRA1

CRQ2

MSQ

MRQ

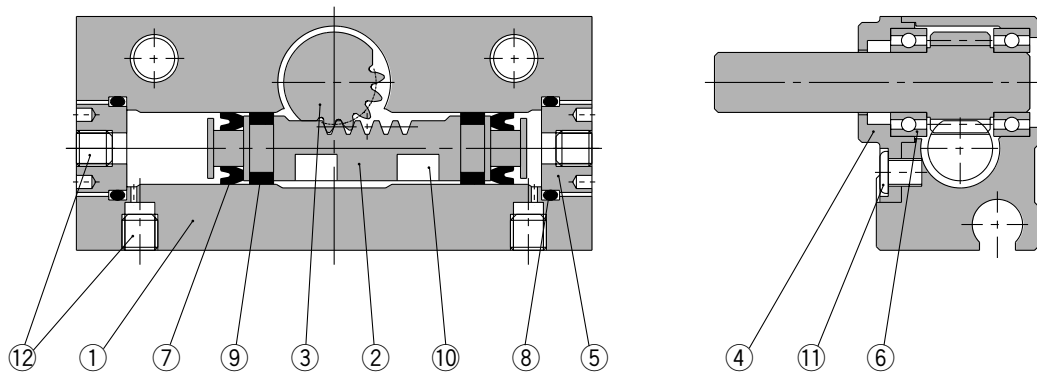
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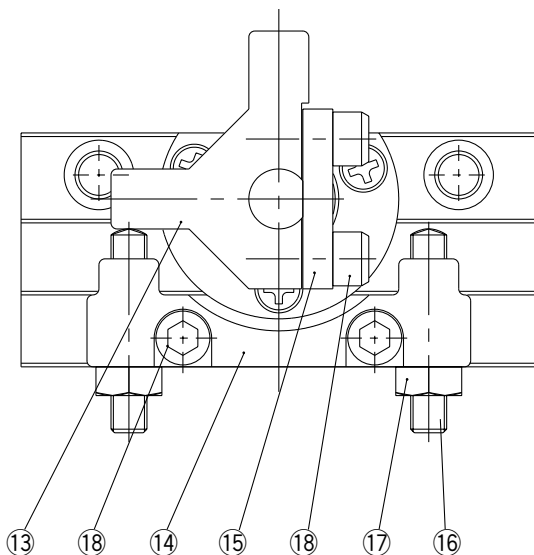
Series CRJ

Construction

Basic type: CRJB



With external stopper: CRJU



Component Parts

No.	Description	Material
①	Body	Aluminum alloy
②	Piston	Stainless steel
③	Shaft	Stainless steel
④	Bearing retainer	Aluminum alloy
⑤	Cover	Aluminum alloy
⑥	Bearing	Bearing steel
⑦	Piston seal	NBR
⑧	O-ring	NBR
⑨	Wear ring	Resin

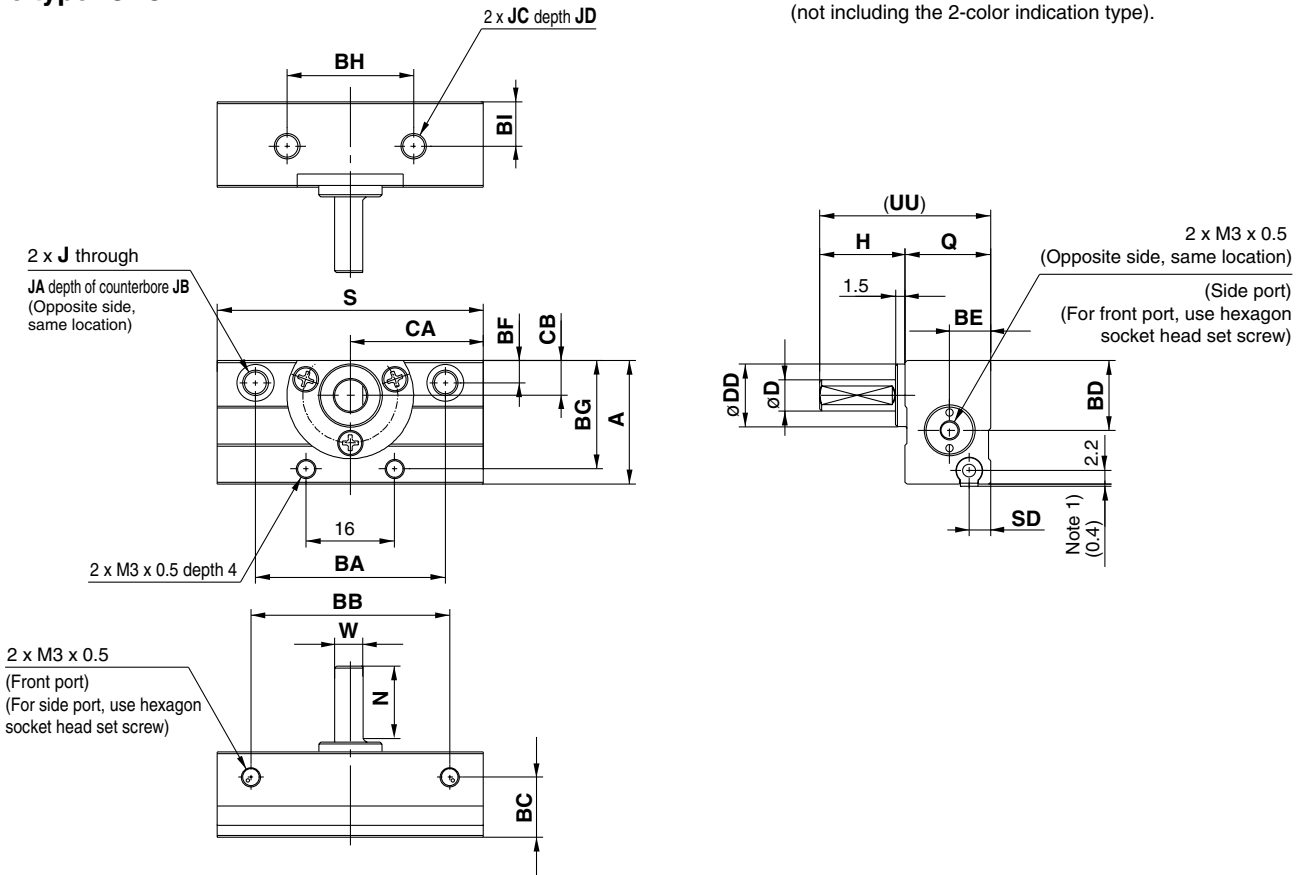
No.	Description	Material
⑩	Magnet	Magnetic material
⑪	Round head no. 0 Philips screw	Steel wire
⑫	Hexagon socket head set screw	Stainless steel
⑬	Stopper	Chrome molybdenum steel
⑭	Holder	Aluminum alloy
⑮	Stopper retainer	Steel
⑯	Hexagon socket head set screw	Steel wire
⑰	Hexagon nut	Steel wire
⑱	Hexagon socket head cap screw	Stainless steel

* The mounting position of hexagon socket head set screws (No. 12) varies depending on the connecting port location.

Dimensions/Size 05, 1

Basic type: CRJB

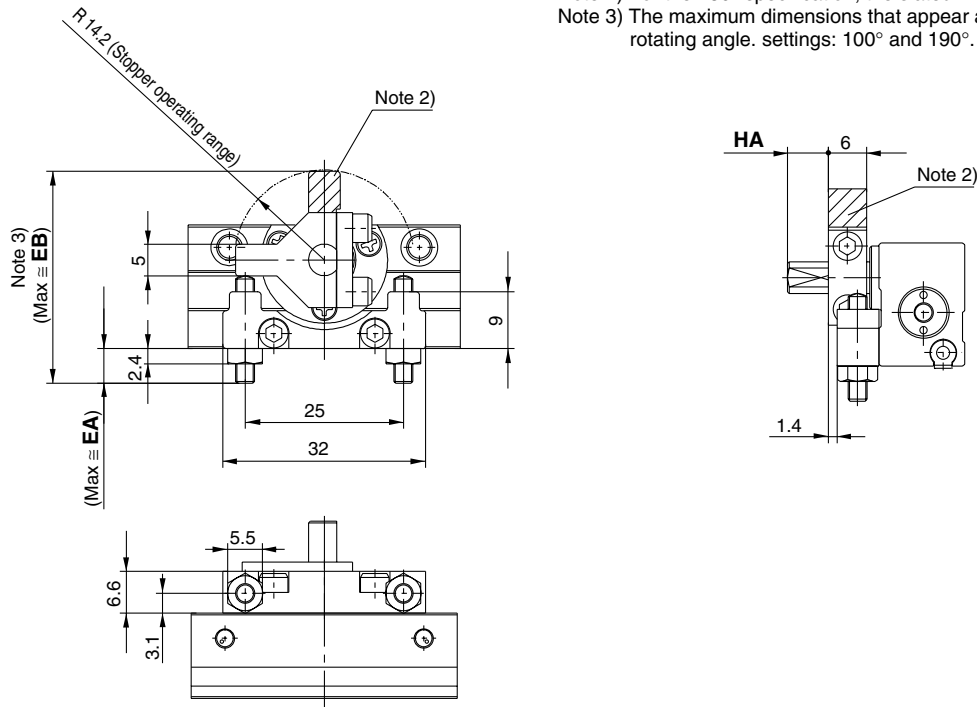
Note 1) This dimension is for the actuator with D-F9 type auto switch (not including the 2-color indication type).



With external stopper: CRJU

Note 2) For the 180° specification, the slated line area do not exist.

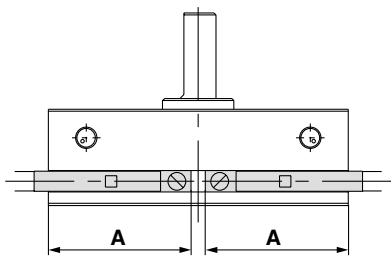
Note 3) The maximum dimensions that appear are those measured at the maximum rotating angle. settings: 100° and 190°.



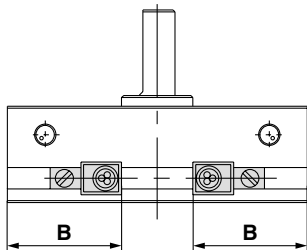
	(mm)		
Size	EA	EB	HA
CRJU05	5.6	33.8	6.5
CRJU1	5.6	35.8	7.5

(mm)																											
Size	Rotating angle	A	BA	BB	BC	BD	BE	BF	BG	BH	BI	CA	CB	D	DD	J	JA	JB	JC	JD	H	N	Q	S	SD	UU	W
CRJB05	90°	19.5	30	32.4	9.5	11	6.5	3.5	17.1	20	7	21.5	5.5	5g6	10h9	M4 x 0.7	5.8	3.5	M4 x 0.7	5	14.5	12.5	13.5	43	3.4	28	4.5
	180°			43.4								27												54			
CRJB 1	90°	23.5	35	37.4	12.5	14	9	4.5	21.1	22	8.5	24	7.5	6g6	14h9	M5 x 0.8	7.5	4.5	M5 x 0.8	6	15.5	13.5	16.5	48	5.9	32	5.5
	180°			50.4								30.5												61			

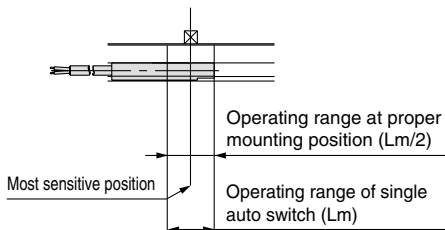
Proper Auto Switch Mounting Position (Detection at rotation end)



For D-F9, D-M9



For D-F8



Size	Rotating angle	D-F9, D-M9 auto switch			D-F8 auto switch		
		A	Operating angle θ m	Hysteresis angle	B	Operating angle θ m	Hysteresis angle
05	90°	20.5	40°	10°	16.5	20°	10°
	180°	23.2	(35°)	(10°)	19.2		
1	90°	22.4	30°	10°	18.4	15°	10°
	180°	25.6	(25°)	(10°)	21.6		

Operating angle θ m: Value of the operating range L_m of a single auto switch converted to an axial rotating angle.
Hysteresis angle : Value of auto switch hysteresis converted to an angle.
Note) Figures in parentheses are the cases for D-M9 switch types.