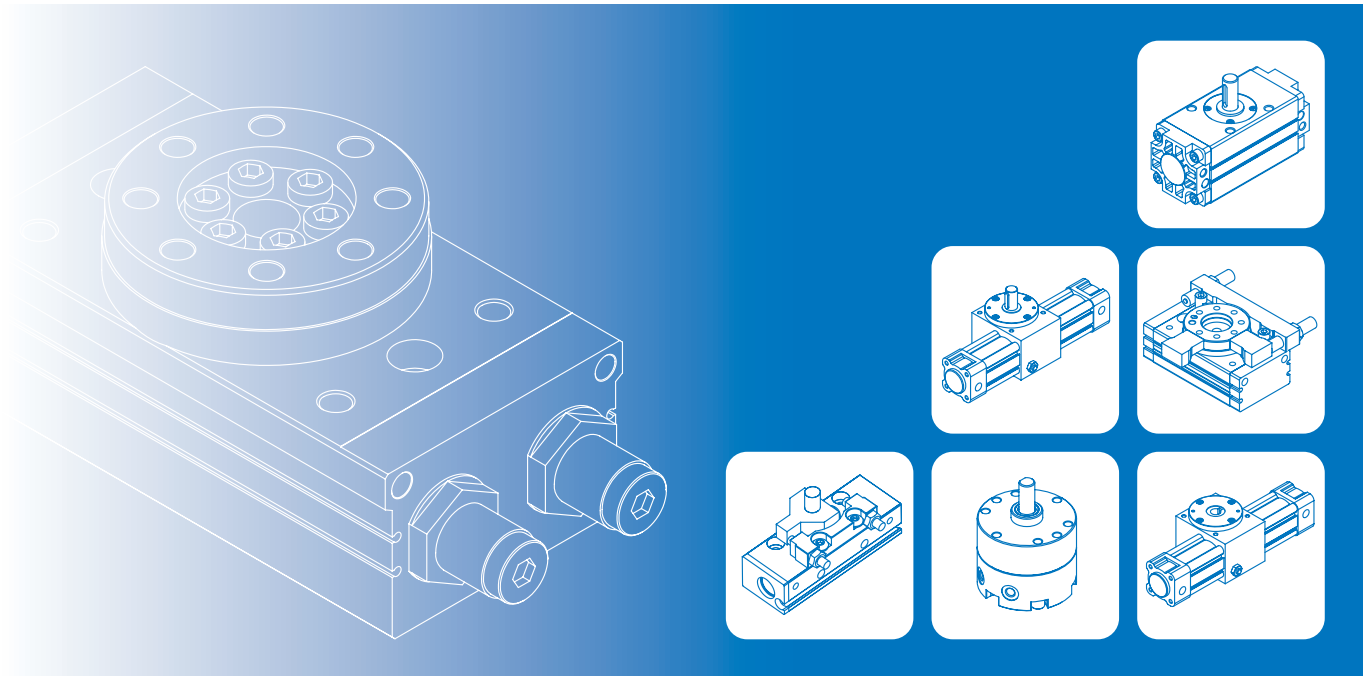
ROTARY ACTUATOR



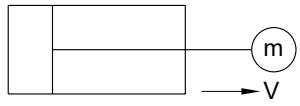
	Moment of inertia	6-2
	MCRA ø63	6-4
	MCRB ø16~ø32	6-8
	MCRJ-S ø6, ø8	6-13
	MCRC 20, 30	6-16
F	**MCRQ2** ø12~ø40	6-22
	MCRQ2-S ø16~ø25	6-29
	MRT* ø40~ø80 MRTH / MRTF	6-33

F Fast delivery

Our goal is to achieve 3-day lead time, if there is stock of component set. For more information, please go to our MINDMAN website (www.mindman.com.tw) and click on the "Component Set Inventory" button.

- The load will create inertial forces (kinetic energy) when moving the load with Rotary Actuator. In order to stop the moving load,It is necessary to use stopper or Shock Absorbers to absorb the kinetic energy of load.
- The moving load with actuator can be distinguished as following
  1. Linear motion (air cylinder), Fig.(1)
  2. Rotation motion (rotary actuator), Fig.(2)
- Calculate the kinetic energy by using the formula in FIG.

Linear motion

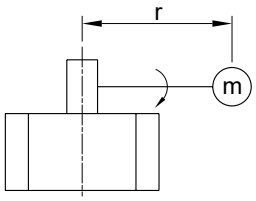


E : Kinetic energy
m : Load mass
V : Speed

$$E = \frac{1}{2} \cdot m \cdot V^2 ....(1)$$

Fig. (1) Linear motion

Rotation motion



E : Kinetic energy
I : Moment of inertia(=m.r^2)
ω : Speed
m : Mass
r : Radius of rotation

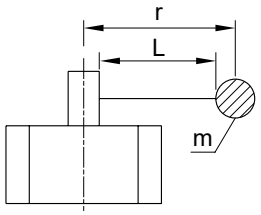
$$E = \frac{1}{2} \cdot I \cdot \omega^2 = \frac{1}{2} \cdot m \cdot r^2 \cdot \omega^2 ....(2)$$

Fig. (2) Rotation motion

- For linear motion, if the velocity V of formula (1) is constant, the kinetic energy E and mass m is proportional ; The rotation motion, formula (2) shows even the angular velocity ω and mass m is constant, kinetic energy E will also proportional with r². Therefore, even the mass is small but the rotation radius r is large, when the moment of Inertia I=m·r² is large, kinetic energy E will becomes larger, it will cause bearing damage or other accidents.
- Therefore when there is a rotation motion, the product selection should be base on moment of inertia instead of mass.

Moment of inertia

- Moment of inertia shows, it is not easy to rotate the stationary object; the same which means it is difficult to stop the rotating object.
- Rotary Actuators in the allowable kinetic energy has its limitations, it can be calculated moment of inertia to calculate minimum rotation of moment of inertia described as following.



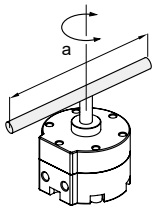
$I = m \cdot r^2$

m : Mass
r : Radius of rotation

Above figure represents the moment of inertia for the distance r from rotary shaft to mass m of the object.
The formula for moment of Inertia is not the same if the shapes of the object are different.
The following examples are the calculated on the basis of specific moment of inertia.

1. Thin shaft

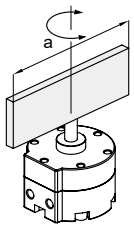
Position of rotational axis: Perpendicular to the shaft through the shaft through the center of gravity.



$I = m \cdot \frac{a^2}{12}$

2. Thin rectangular plate

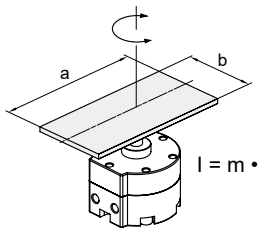
Position of rotational axis: Parallel to side b and through the center of gravity.



$I = m \cdot \frac{a^2}{12}$

3. Thin rectangular plate (Including rectangular parallelepiped)

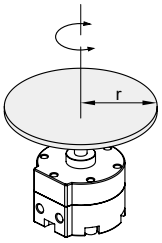
Position of rotational axis: Perpendicular to the plate through the center of gravity.



$$I = m \cdot \frac{a^2 + b^2}{12}$$

4. Round plate (Including column)

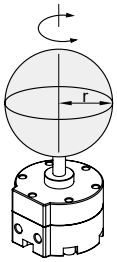
Position of rotational axis: Through the center axis.



$$I = m \cdot \frac{r^2}{2}$$

5. Solid sphere

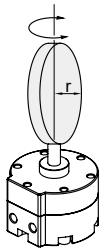
Position of rotational axis: Through the center of diameter.



$$I = m \cdot \frac{2r^2}{2}$$

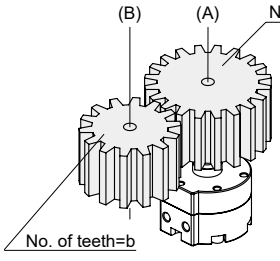
6. Thin round plate

Position of rotational axis: Through the center of diameter.



$$I = m \cdot \frac{r^2}{4}$$

7. Gear transmission



1. Find the moment of inertia I_B for the rotation of shaft (B).
2. I_B is converted to the moment of inertia I_A for the rotation of the shaft (A).

$$I_A = \left(\frac{a}{b}\right)^2 \cdot I_B$$

Use the following formula to calculate the rotation time

$$t \geq \sqrt{\frac{2 \cdot I \cdot \theta^2}{E}}$$

t : Rotation time (s)
E : Kinetic energy (J)
I : Moment of inertia (kg.m^2)
θ : Rotation angle (rad)

The meaning of this formula is the critical rotation time for not cause damage of the cylinder. Therefore the rotation time must be set on or over the t seconds calculated in above formula.

After calculated the moment of inertia by load shape, use the following formula to calculate the kinetic energy of the load.

$$E = 1/2 \cdot I \cdot \omega^2$$

E : Kinetic energy (J)
I : Moment of inertia (kg.m^2)
ω : Angle speed (rad/s)

Angle speed

$$\omega = 2\,\theta / t \ldots (1)$$
$$\omega = \theta / t \ldots\ldots (2)$$

t : Rotation time (s)
I : Moment of inertia (kg.m^2)
θ : R otation angle (rad)

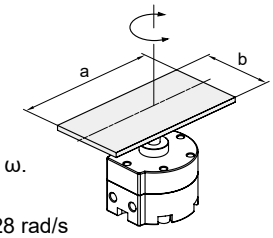
However, when the rotation time for 90° becomes longer than 2 seconds, use formula (2).

Calculation example

Load form: Cuboid
Rotation angle θ: 180°
Rotation time t: 1 s/180°

Length of a part: 0.12 m
Length of b part: 0.06 m
Mass (m) : 0.1 kg

$$I = m \cdot \frac{a^2 + b^2}{12}$$



(Step 1) Find the angle speed ω.

$$\omega = \frac{2\theta}{t} = \frac{2}{1} \times \pi = 6.28 \text{ rad/s}$$

(Step 2) Find the moment of inertia I.

$$I = m \cdot \frac{a^2 + b^2}{12}$$

$$= 0.1 \times \frac{144 \times 10^{-4} + 36 \times 10^{-4}}{12}$$

$$= 1.5 \times 10^{-4} \text{ kg.m}^2$$

(Step 3) Find the kinetic energy E.

$$E = \frac{1}{2} \cdot I \cdot \omega^2 = \frac{1}{2} \times 1.5 \times 10^{-4} \times 6.28^2$$

$$= 0.002958 \text{ J}$$

MCRA series

ROTARY ACTUATOR

Moment of inertia

Technical data

Caution for safety
(Read before installing)



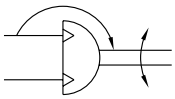
Features

- Compact body.
- Functional design with clean appearance.
- Simple mounting of sensors.
- Magnetic as standard.

Specification

Model	MCRA		
Acting type	Double acting		
Tube I.D. (mm)	ø63		
Port size	Rc1/8		
Medium	Air		
Operating pressure range	0.1~1 MPa		
Proof pressure	1.5 MPa		
Ambient temperature	-5~+60°C (No freezing)		
Acting angle tolerance	0~+4°		
Lubrication	Not required		
Cushion	Air cushion		
Allowable kinetic energy	1.5J (Air cushion)		
Sensor switch	RCE, RCE1, RDEP		
Weight (kg)	90°	180°	LB
	2.7	3.1	0.4

Symbol



Order example

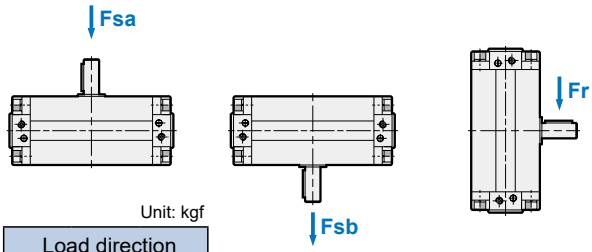
MCRA — 63 — 90 — □

- MODEL
- TUBE I.D.
- ROTARY ANGLE

Code	Rotary angle
90	90°
180	180°

- PORT THREAD
  Blank: Rc thread
  G: G thread
  NPT: NPT thread

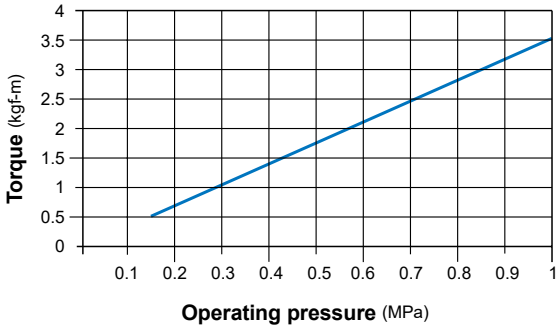
Shaft loading



Unit: kgf

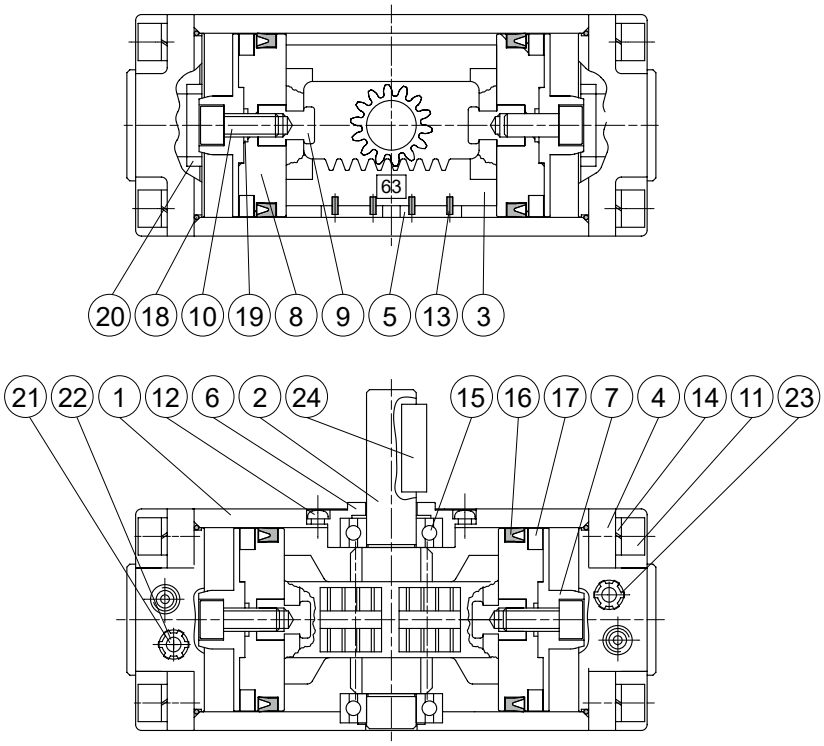
Load direction		
Fsa	**Fsb**	**Fr**
60	20	30

Torque diagram



Order example of mounting accessories

Code	**LB** (Purchase 2 pcs)
Mounting / Tube I.D.	
ø63	**LB-R1-63**



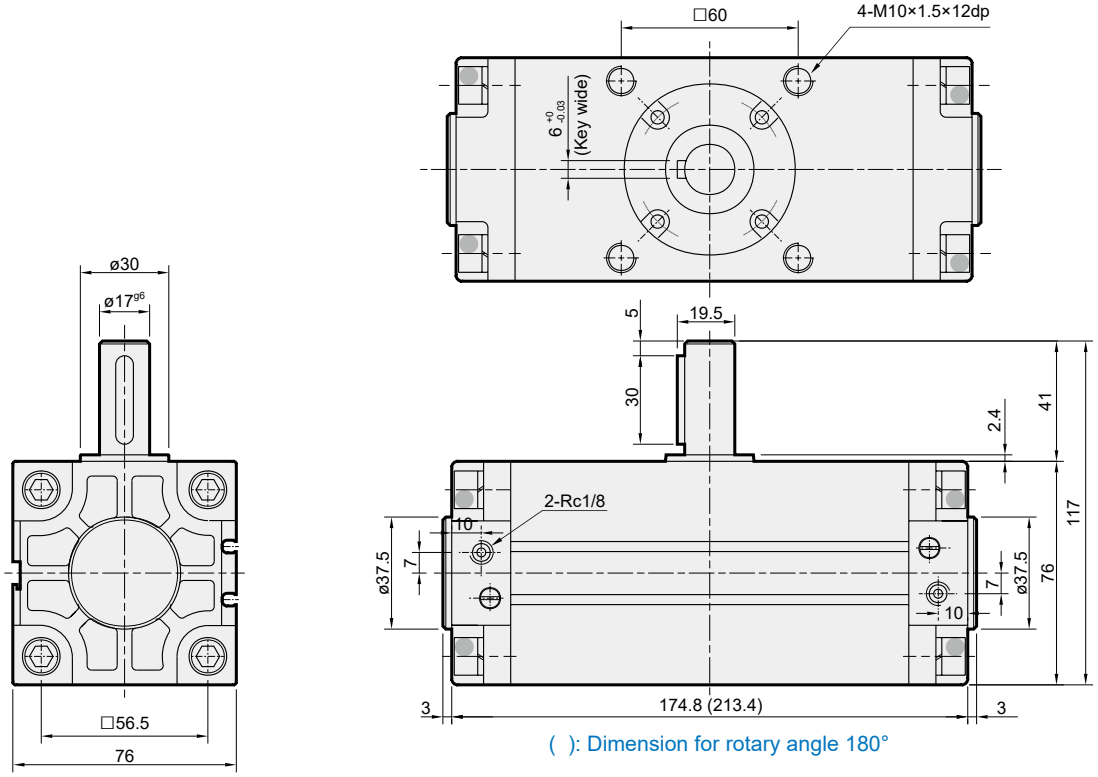
Material

No.	Part name	Material	Q'y	Repair kits (inclusion)
1	Body	Aluminum alloy	1	
2	Shaft	Carbon steel	1	
3	Rack	Carbon steel	1	
4	Cover	Aluminum alloy	2	
5	Slider	Plastic	2	
6	Bearing retainer	Aluminum alloy	1	
7	Piston #1	Aluminum alloy	2	
8	Piston #2	Aluminum alloy	2	
9	Screw #1	Carbon steel	2	
10	Screw #2	SCM	2	
11	Bolt	SCM	8	
12	Screw	SCM	4	
13	Spring pin	Spring steel	4	
14	Spring washer	SCM	8	
15	Bearing	Bearing steel	2	
16	Piston packing	NBR	2	●

No.	Part name	Material	Q'y	Repair kits (inclusion)
17	Magnet ring	Magnet material	2	
18	Gasket	NBR	2	●
19	O-ring	NBR	2	●
20	Cushion packing	NBR	2	
21	Needle valve	Copper	2	
22	Needle valve gasket	NBR	2	●
23	Needle valve washer	Aluminum alloy	2	
24	Parallel key	Carbor steel	1	

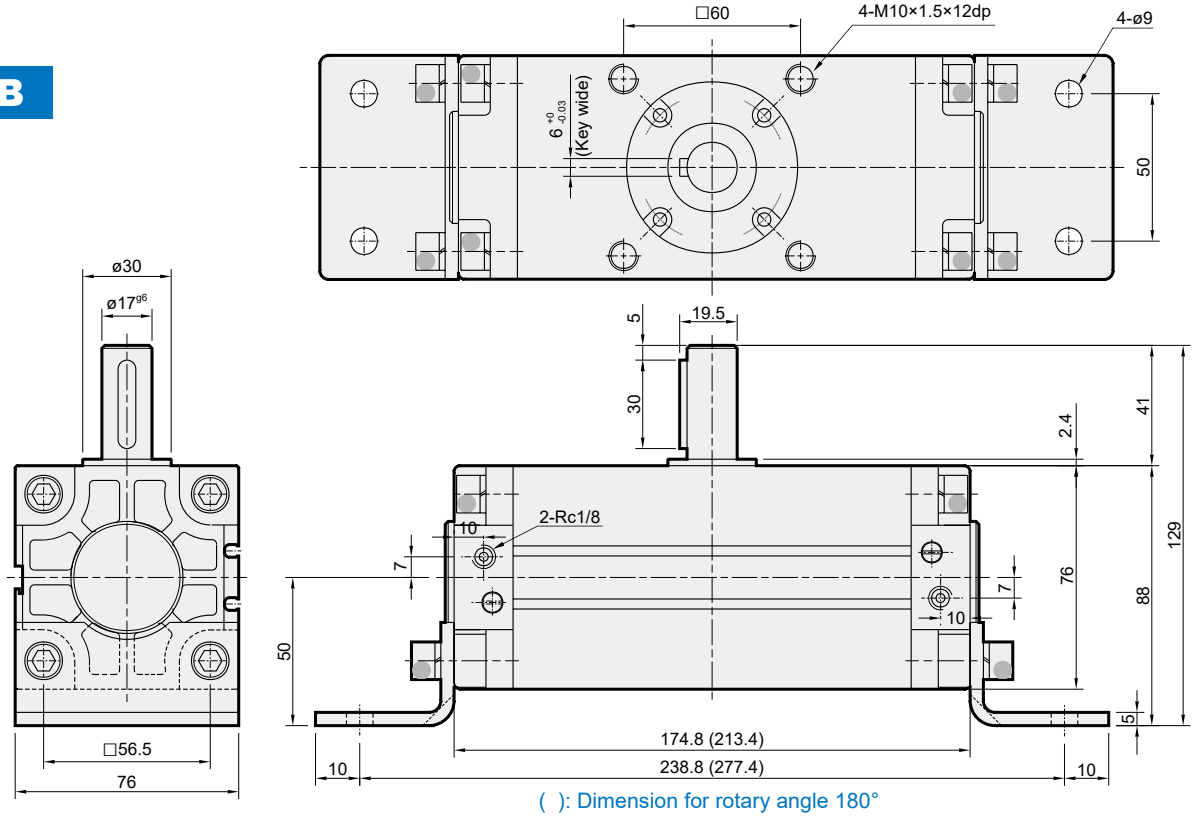
Order example of Repair kits

Tube I.D.	Repair kits
ø63	**PS-MCRA-63**



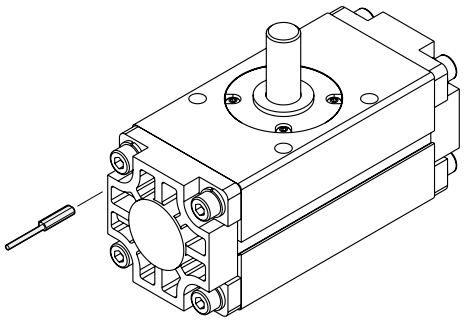
( ): Dimension for rotary angle 180°

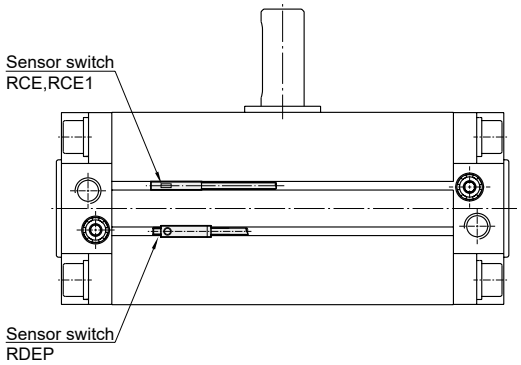
LB



( ): Dimension for rotary angle 180°

Installation of sensor switch





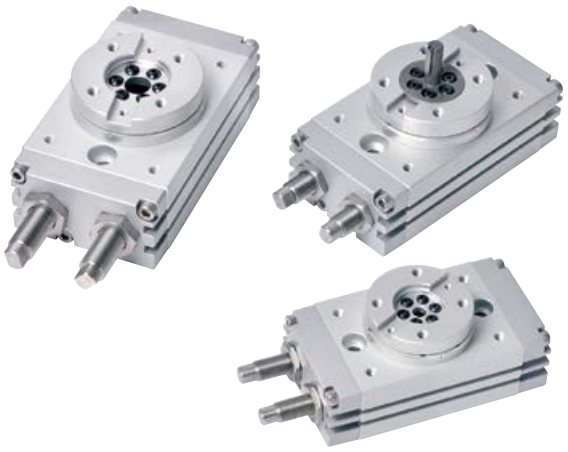
MCRB series

ROTARY ACTUATOR

Moment of inertia

Technical data

Caution for safety
(Read before installing)



Features

- Twin rack and pinion fitted as standard.
- Can be adjusted between 0 and 190 degrees.
- Simple mounting of sensors.
- Magnetic as standard.

Specification

Model		MCRB			
Acting type		Double acting			
Tube I.D. (mm)		16	20	25	32
Port size		Rc1/8			
Medium		Air			
Max. operating pressure	Adjusting bolt	1 MPa			
	Shock absorber	0.6 MPa (*1)			
Min. operating pressure		0.1 MPa (*2)			
Proof pressure		1.5 MPa			
Ambient temperature		-5~+60°C (No freezing)			
Lubrication		Not required			
Cushion		NBR spacer			
Allowable kinetic energy	Cushion pad	0.007J	0.040J	0.081J	0.32J
	Cushion	0.039J	0.116J	0.294J	1.6J
Stable rotation time regulation range		0.2~1.0 s/90°			
Sensor switch		RCD			
Weight (kg)		0.7	1.16	1.57	3.07

*1. The maximum operating pressure of the actuator is restricted by the maximum allowable thrust of the shock absorber.

*2. No-load conditions.

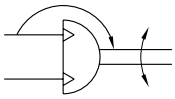
*3. The shock absorber is expendable. Replace when damping performance decrease.

Order example

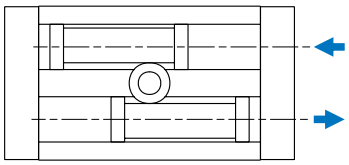
MCRB — 20R — FR — □

- MODEL
- TUBE I.D.
- ANGLE ADJUSTER
  Blank: Adjuster bolts
  R: Shock absorber
- TYPE
  Blank: Standard type
  FR: Flange rod type
- PORT THREAD
  Blank: Rc thread
  G: G thread
  NPT: NPT thread

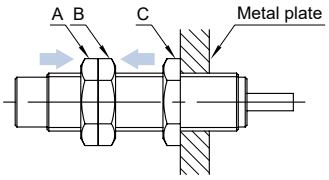
Symbol



Action profile

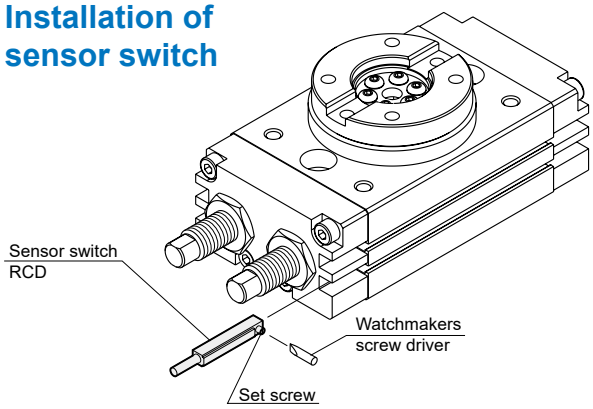


Installation guide of shock absorber

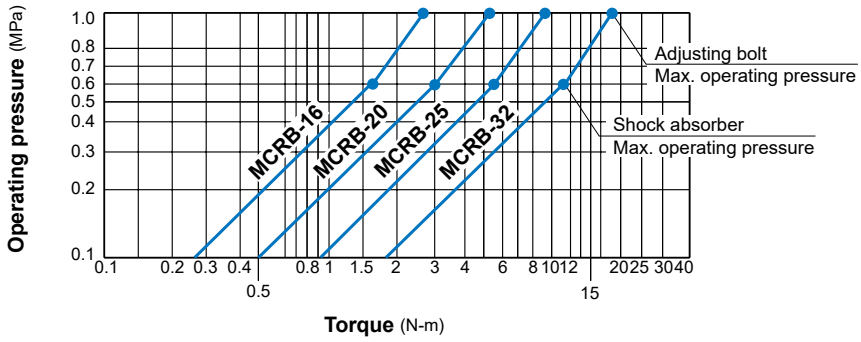


1. Install 3 nuts on the shock absorber as the picture shown.
2. Bind the A nut and B nut together via tightening them with different rotating direction.
3. Hold B nut and rotate C nut to bind the plate and C nut together.
4. Unbind the A nut and B nut. The installation is complete.

Installation of sensor switch



Torque diagram



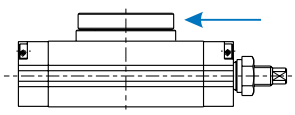
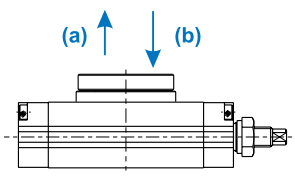
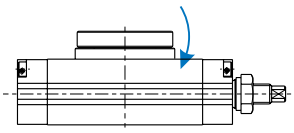
Theoretic force

Unit: N·m

Model		MCRB			
Tube I.D.		16	20	25	32
Operating pressure (MPa)	**0.1**	0.26	0.5	0.91	1.88
	0.2	0.52	1	1.81	3.78
	0.3	0.78	1.5	2.72	5.66
	0.4	1.04	2.01	3.62	7.56
	0.5	1.31	2.51	4.55	9.44
	0.6	1.57	3	5.45	11.32
	0.7	1.83	3.5	6.36	13.23
	0.8	2.09	4.02	7.26	15.12
	0.9	2.35	4.52	8.17	17.01
	1.0	2.61	5.03	9.08	18.9

Allowable load

Set the load and moment to be applied to the table within the allowable values shown in the table below.
(Values outsize of limitations will cause excessive play, deteriorate accuracy, and shorten service life.)

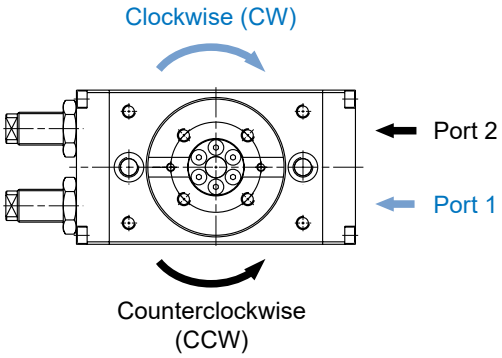
Pictures			

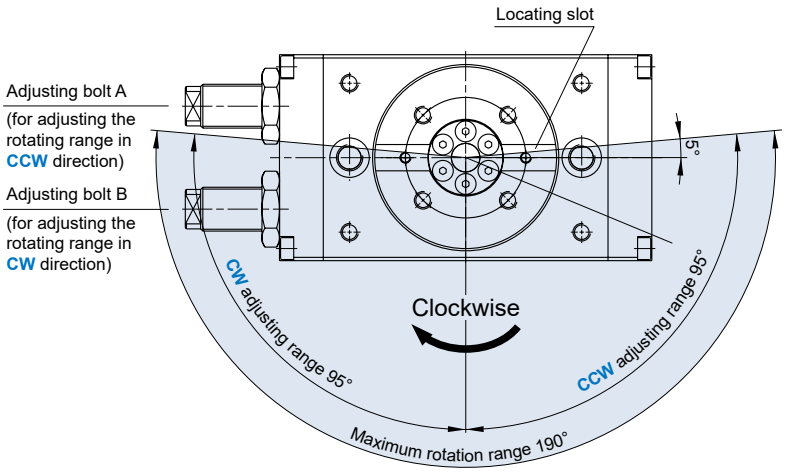
Tube I.D.	Allowable radial load (N)	Allowable thrust load (N)		Allowable moment (N.m)
		(a)	**(b)**	
16	78	74	78	2.4
20	196	197	363	5.3
25	314	296	451	9.7
32	390	493	708	18

Rotating direction and angle

- When the port 1 is pressurized, the flange rotates in clockwise (CW) direction.
- When the port 2 is pressurized, the flange rotates in counter-clockwise (CCW) direction.

  The rotating angle range can be adjust by the method shown as right figure.





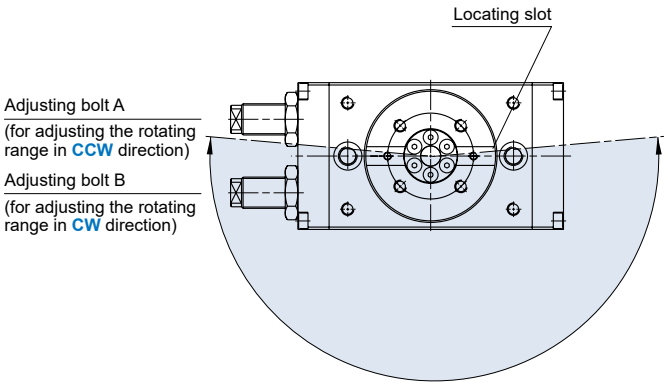
NOTE

- The figure shows the rotating range and use the pin hole as indicator.
- The locating slot in the figure locates at the situation which the CCW & CW rotating range are both adjusted at 90°.

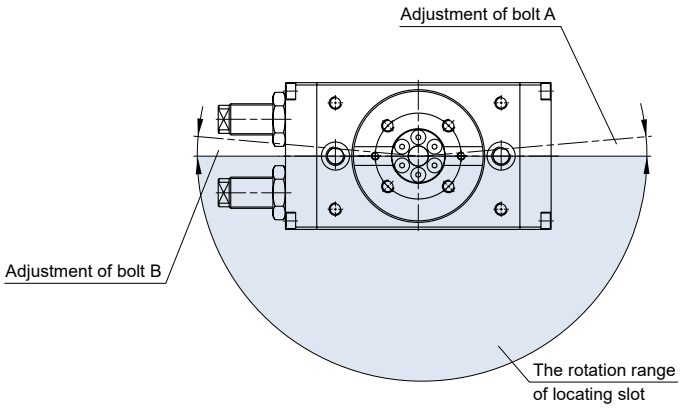
Rotating range adjusting example

- The followed figures show the rotating range of different adjustment via bolt A and B. (The drawings also show the rotation ranges of the locating slot.)

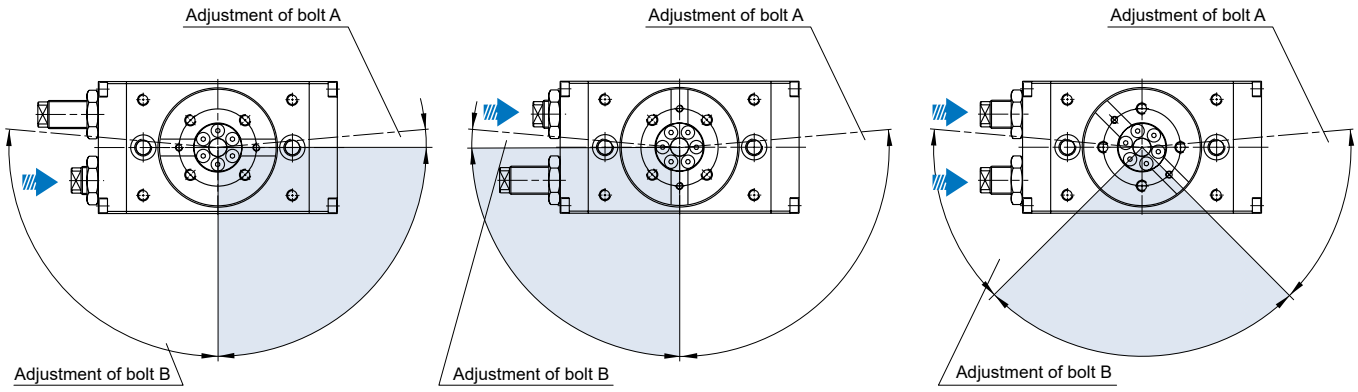
190° (Max) Rotation

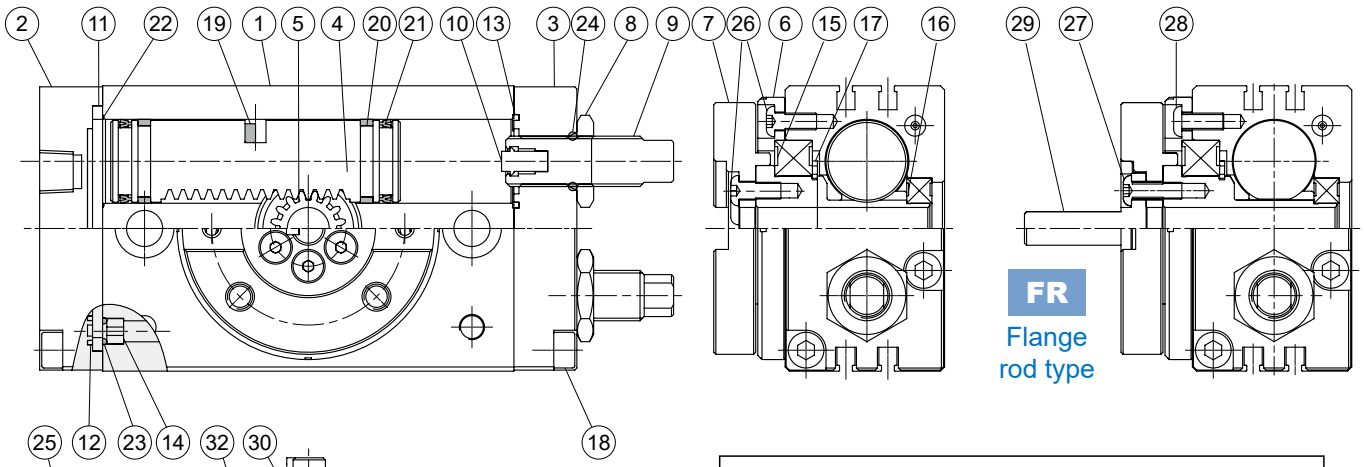


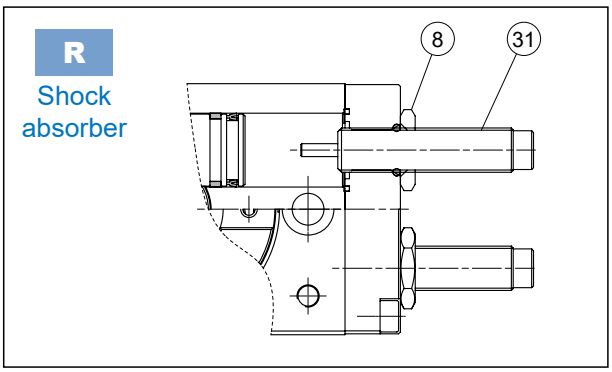
180° Rotation



90° Rotation







Material

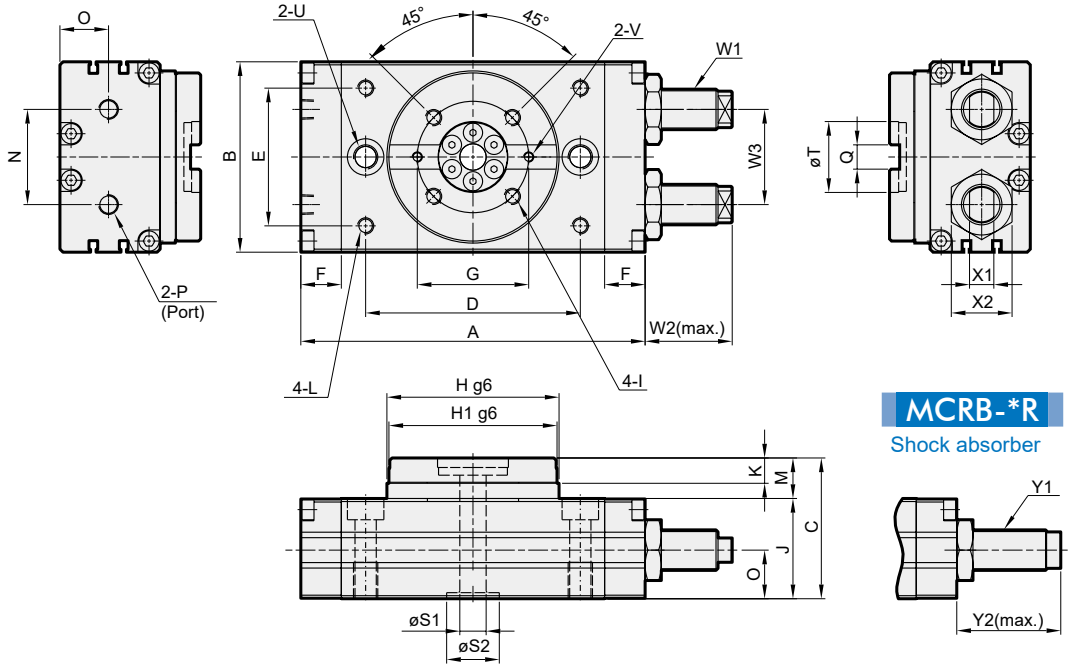
No.	Part name	Material	Q'y	Repair kits (inclusion)
1	Body	Aluminum alloy	1	
2	Cover	Aluminum alloy	1	
3	End cover	Aluminum alloy	1	
4	Piston	Stainless steel	2	
5	Pinion	SCM	1	
6	Bearing retainer	Aluminum alloy	1	
7	Table	Aluminum alloy	1	
8	Seal nut	Stainless steel	2	
9	Adjusting bolt *1	Stainless steel	2	
10	Cushion pad *1	NBR	2	●
11	Plate	Aluminum alloy	1	
12	Packing	NBR	1	●
13	Packing	NBR	2	●
14	Fixed	Copper	2	
15	Ball bearing	Bearing steel	1	
16	Ball bearing	Bearing steel	1	
17	Snap ring	Spring steel	1	
18	Bolt	Stainless steel	8	
19	Magnet	Magnet material	2	
20	Wear ring	Resin	4	
21	Piston packing	NBR	4	●

No.	Part name	Material	Q'y	Repair kits (inclusion)
22	O-ring	NBR	2	●
23	O-ring	NBR	2	●
24	O-ring	NBR	2	●
25	Screw	Carbon steel	2	
26	Bolt	Carbon steel	10	
27	Bolt *2	Carbon steel	6	
28	Bolt *2	Carbon steel	4	
29	Rotate shaft *2	Carbon steel	1	
30	Round key *2	Carbon steel	1	
31	Shock absorber *3	–	2	
32	Round key	Carbon steel	1	

*1. Only suitable for adjuster bolts.
*2. No.27~30 for (FR) flange rod type.
*3. Only suitable for (R) shock absorber.

Order example of repair kits

Tube I.D.	Repair kits	
	Adjuster bolts	Shock absorber (R)
ø16	**PS-MCRB-16**	**PS-MCRB-16R**
ø20	**PS-MCRB-20**	**PS-MCRB-20R**
ø25	**PS-MCRB-25**	**PS-MCRB-25R**
ø32	**PS-MCRB-32**	**PS-MCRB-32R**



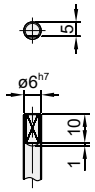
Code / Tubr I.D.	A	B	C	D	E	F	G	H	H1	I	J	K	L	M	N	O	P
16	108	58	47	62	38	15	38	50	48	M5×7dp,P.C.D38	33	8	M5×8dp	14	26	15.5	Rc1/8
20	128	68	55	78	47	15	46	62.5	60	M6×7dp,P.C.D46	38	10	M6×8dp	17	27	18.5	Rc1/8
25	135.5	77	58.5	84	55	15.5	48	67	65	M6×9dp,P.C.D48	41.5	10	M6×8dp	17	37	20	Rc1/8
32	170	94	69.5	106	68	20	55	85	83	M8×10dp,P.C.D55	49.5	12.5	M8×8.5dp	20	47	24	Rc1/8

Code / Tubr I.D.	Q	S1	S2	T	U	V	W1	W2
16	$8^{+0.03}_{-0}$ (wide)×3.3dp	6	17 $H9^{+0.043}_{0}$×2.5dp	24 $H9^{+0.052}_{0}$×3dp	2-ø6.8 thru,ø11×6.5dp,M8×12dp(sink)	M3×4dp	M10×1.0	27
20	$10^{+0.03}_{-0}$ (wide)×3.5dp	10	22 $H9^{+0.052}_{0}$×2.5dp	32 $H9^{+0.062}_{0}$×3dp	2-ø8.6 thru,ø14×8.5dp,M10×15dp(sink)	M4×6dp	M12×1.0	23
25	$12^{+0.03}_{-0}$ (wide)×4dp	13	22 $H9^{+0.052}_{0}$×3dp	32 $H9^{+0.062}_{0}$×3.7dp	2-ø8.6 thru,ø14×8.5dp,M10×15dp(sink)	M4×5dp	M14×1.5	36
32	$12^{+0.03}_{-0}$ (wide)×5dp	13	26 $H9^{+0.052}_{0}$×3dp	35 $H9^{+0.062}_{0}$×4.7dp	2-ø10.5 thru,ø18×10.5dp,M12×18dp(sink)	M5×5dp	M20×1.5	43

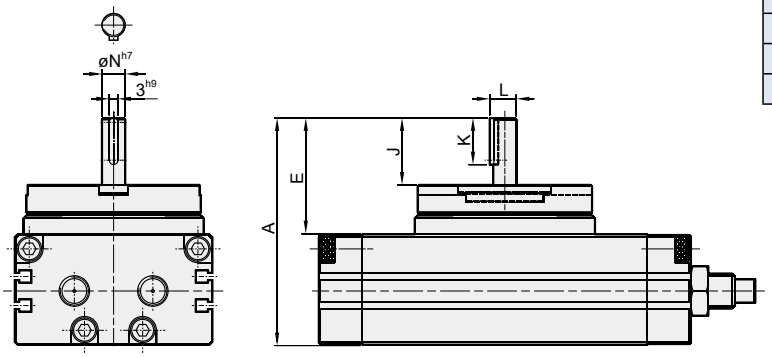
Code / Tubr I.D.	W3	X1	X2	Y1	Y2
16	26	7	17	FK-1008L-S	24
20	32	8	19	FK-1210L-S	36.5
25	37	8	22	FK-1412L-S	41
32	47	12	30	FK-2016L-S	55

Flange rod type

ø16



ø20~ø32



Code / Tubr I.D.	A	E	J	K	L	N
16	64.5	31.5	17.5	-	-	-
20	78	40	23	16	9.2	8
25	81.5	40	23	20	11.2	10
32	109.5	60	40	20	13.2	12

* Other dimensions are the same as standard type.

MCRJ-S series

MINI-ROTARY ACTUATOR

mindman

Moment of inertia
Technical data
Caution for safety
(Read before installing)



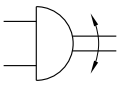
Features

- Rack and pinion type with external stoppers.
- Rotary angle 90°, 180°.
- Compact and lightweight, mounting from 3 directions.
- Standard with magnet.

Specification

Model		MCRJ-S	
Tube I.D. (mm)		6	8
Port size		M3 × 0.5	
Rotation		90°, 180°	
Medium		Air (Non-lube)	
Operating pressure range		0.15~0.7 MPa	
Ambient temperature		0~+60°C (No freezing)	
Angle adjustment range		Each rotation end ±5°	
Sensor switch		RDC(V), RQC(V), RDFE(V)	
Weight (g)	90°	47.2	70.9
	180°	53.4	81.6

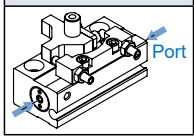
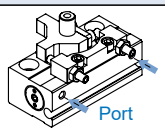
Symbol



Order example

MCRJ — S — 6 — 90 — E

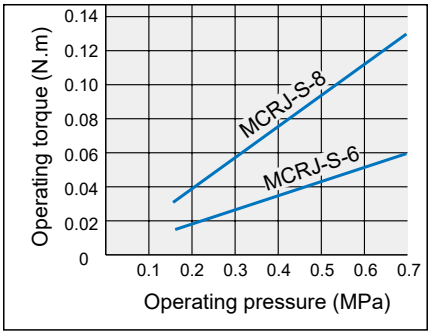
- MODEL
- TUBE I.D.
- ROTARY ANGLE: 90°, 180°
- PORT LOCATION

Blank: Side port	E: Front port
	

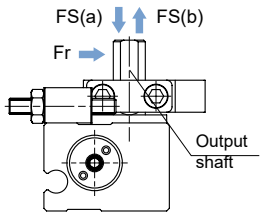
Operating torque

Tube I.D. (mm)	Operating pressure (MPa)						
	0.15	0.2	0.3	0.4	0.5	0.6	0.7
6	0.013	0.017	0.026	0.034	0.042	0.05	0.059
8	0.029	0.038	0.057	0.076	0.095	0.11	0.13

Note. Effective torque values are representative values. They are not guaranteed values. Use them only as a guide.



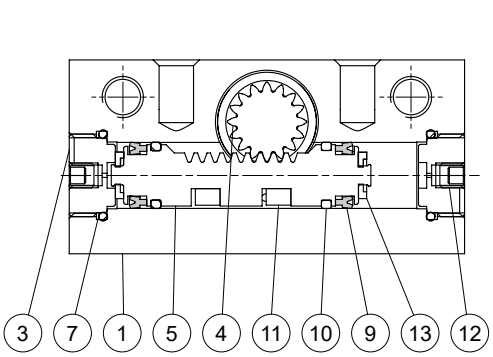
Allowable load

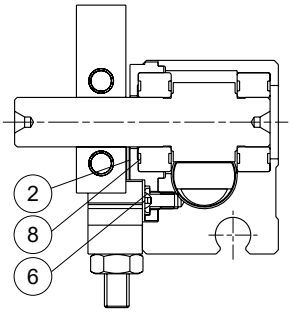


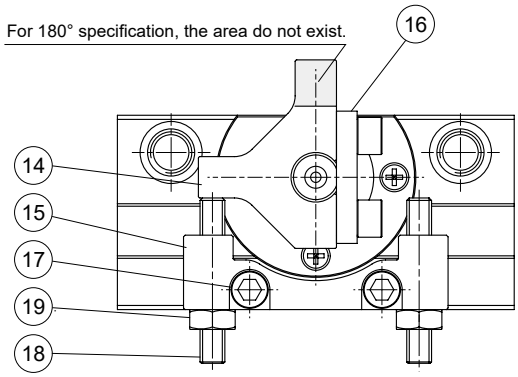
Tube I.D. (mm)	Allowable load (N)			Output shaft size (mm)
	Fr	FS (a)	FS (b)	
6	25	20	20	ø5
8	30	25	25	ø6

Allowable kinetic energy / Rotation time adjustment range

Tube I.D. (mm)	Allowable kinetic energy (J)	Rotation time adjustment range for stable operation (s/90°)
6	0.001	0.1~0.5
8	0.002	





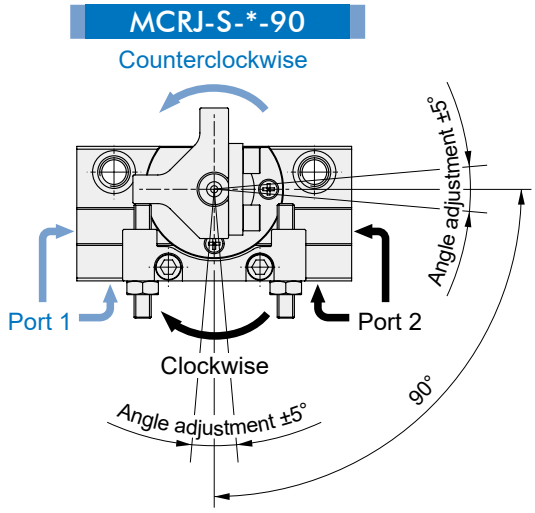


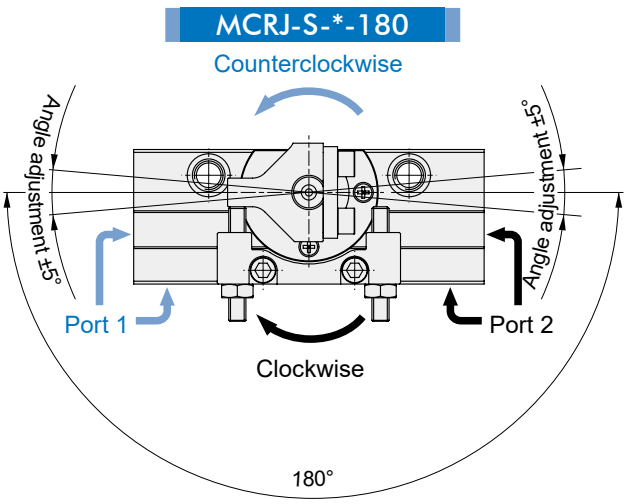
Material

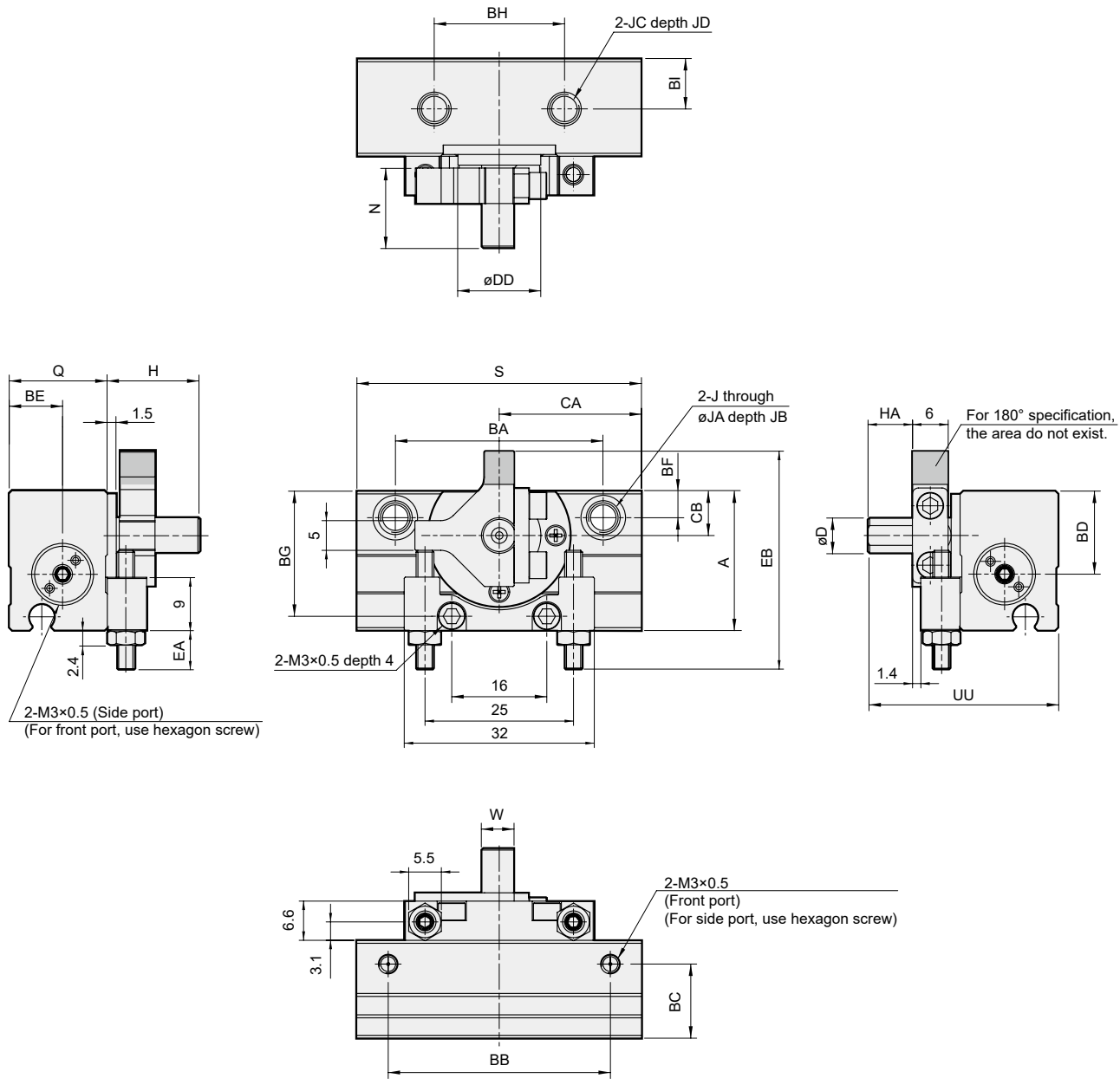
No.	Tube I.D. / Part name	6	8	Q'y
1	Body	Aluminum alloy		1
2	Bearing holder	Aluminum alloy		1
3	Cover	Aluminum alloy		2
4	Pinion	Stainless steel		1
5	Piston	Stainless steel		1
6	Screw	Stainless steel		3
7	O ring	NBR		2
8	Ball bearing	Bearing steel		2
9	Piston seal	NBR		2
10	Wear ring	Resin		2
11	Magnet	Magnet material		2
12	Screw	Steel		2
13	Gasket	NBR		2
14	Stopper	Alloy steel		1
15	Holder	Aluminum alloy		1
16	Stopper retainer	Low carbon steel		1
17	Hexagon screw	Stainless steel		4
18	Hexagon screw	Stainless steel		2
19	Hexagon nut	Low carbon steel		2

Rotating direction and angle

- The shaft rotates counterclockwise when the input air is from port 1. The shaft rotates clockwise when the input air is from port 2.
- The rotation range can be adjusted by adjustment screws.







Code / Tubr I.D.	A	BA	BB	BC	BD	BE	BF	BG	BH	BI	CA	CB	D	DD	EA	EB	HA	J	JA	JB	JC	JD	H	N	Q	S	UU	W
6	19.5	30	32.4 (43.4)	9.5	11	6.5	3.5	17.1	20	7	21.5(27)	5.5	5g6	10h9	4.5	32.7	6.5	M4×0.7	5.8	3.5	M4×0.7	5	14.5	12.5	13.5	43(54)	28	4.5
8	23.5	35	37.4 (50.4)	12.5	14	9	4.5	21.1	22	8.5	24(30.5)	7.5	6g6	14h9	6.5	36.7	7.5	M5×0.8	7.5	4.5	M5×0.8	6	15.5	13.5	16.5	48(61)	32	5.5

* ( ) for 180° specification.

Moment of inertia

Technical data

Caution for safety
(Read before installing)



Features

- Compact and lightweight, mounting from 3 directions.
- Rotary angle 90°, 180°, 270°.
- Both rods have locating plane.
- Spin the rod with built-in vane mechanism.
- Options of angle adjuster for various usage.
- Options of magnet for the flush fitting sensor switch.

Specification

Model		MCRC	
Acting type		Double acting	
Size		20	30
Port size		M5×0.8	
Rotation		90°, 180°, 270°	
Acting angle tolerance		0~+4°	
Medium		Air (Non-lube)	
Max. operating pressure		0.7 MPa	1 MPa
Min. operating pressure		0.15 MPa	
Proof pressure		1.05 MPa	1.5 MPa
Ambient temperature		+5~+60°C	
Allowable kinetic energy (J)	Non-adj.	0.003	0.02
	Angle adj.	0.0004	0.015
Load (N)	Radial	25	30
	Axial	20	25
Rotation time adjustment range (s/90°) (*1)		0.03~0.3	0.04~0.3
Volume (cm^3)	90°	A port: 3.5 B port: 4.8	A port: 8.4 B port: 11.3
	180° (*2)	5.9	14.9
	270° (*2)	7.7	19.6
Sensor switch		RDC(V), RQC(V), RDFE(V)	
Weight (g)	90°	105	200
	180°	105	195
	270°	103	192

*1. When the operation speed is lower than the lower speed limit, the rod may jitter or stop. Please use the product in the range as table shown.

*2. Port A and B have the same volume.

Order example

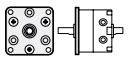
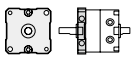
MCRC — 30 W — 180 — M A F

- MODEL
- SIZE: **20**, **30**
- **W**: Double rod; **S**: Single rod
- ROTATION: **90**: 90°; **180**: 180°; **270**: 270°

Magnet *	Angle adjustable *	Type (option)
Blank: without **M**: with magnet	Blank: Non-adjustable **A**: Angle adjustable	**F**: for adding FAC accessories

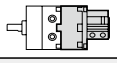
* Only for (W) double rod type.

Order example of mounting accessories

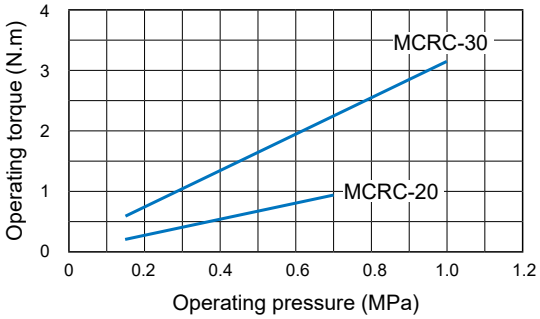
Code		FA	FAC *
Fig / Size			
20		**FA-R2-20**	**FAC-R2-20**
30		**FA-R2-30**	**FAC-R2-30**
Weight	20	46 g	31 g
	30	69 g	47 g

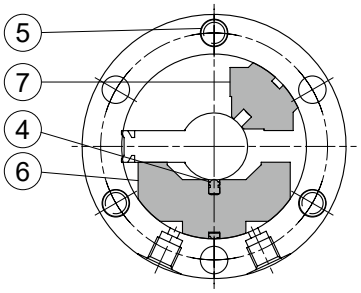
* FAC **cannot** be assembled with standard cylinder because the shaft needs to be extended by 7.5 mm.

Order example of type kits

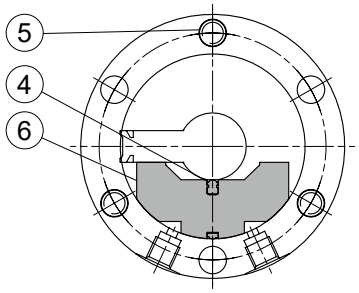
Type		With magnet + Angle adjustable	With magnet	Angle adjustable
Fig / Size				
20		**AK-MCRC-20-MA**	**AK-MCRC-20-M**	**AK-MCRC-20-A**
30		**AK-MCRC-30-MA**	**AK-MCRC-30-M**	**AK-MCRC-30-A**
Weight	20	114 g	45 g	81 g
	30	171 g	68 g	135 g

Torque diagram

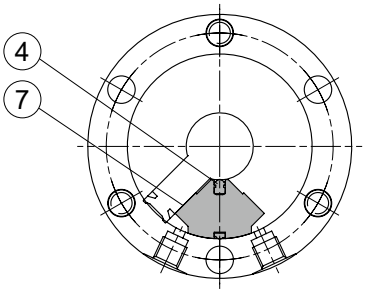




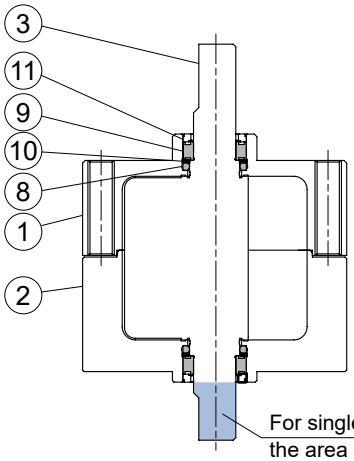
90°



180°



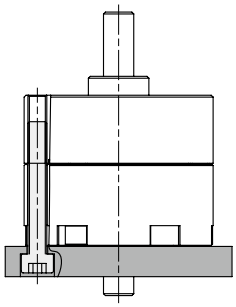
270°



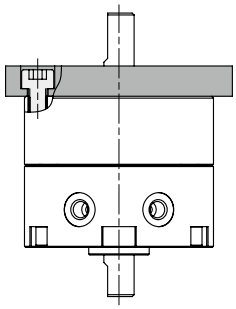
Material

No.	Part name	Material	Q'y		
			90°	180°	270°
1	Upper body	Aluminum	1		
2	Lower body	Aluminum	1		
3	Shaft	Stainless steel	1		
4	Packing	NBR	1		
5	Bolt	Stainless steel	3		
6	Adjusting block	Plastic	1	1	0
7	Adjusting block	Plastic	1	0	1
8	O-ring	NBR	2		
9	Ball bearing	Bearing steel	2		
10	Gasket	Stainless steel	2		
11	Retaining ring	Stainless steel	2		

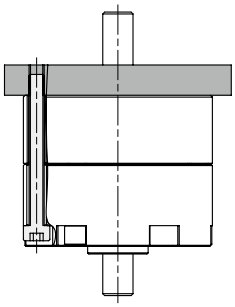
Mounting methods



Body tapped



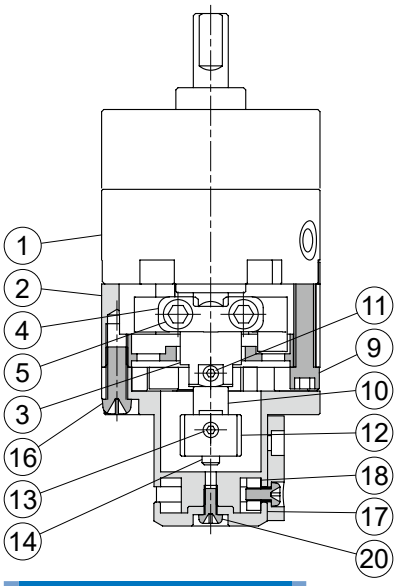
Body tapped

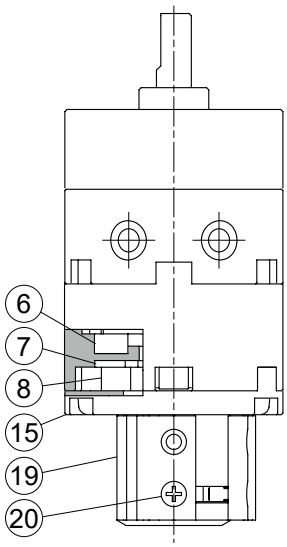


Body through-hole
(Fixed with the customer's plate)

MCRC-W-*-MA

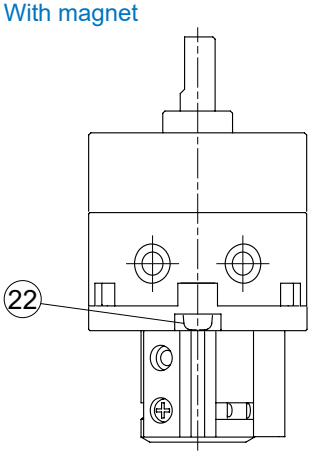
With magnet + Angle adjustable





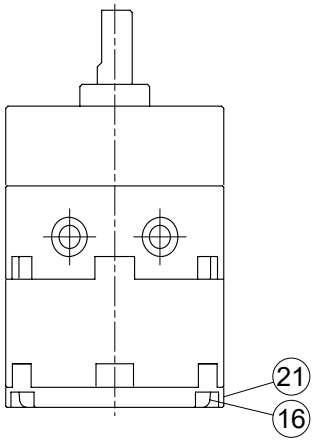
MCRC-W-*-M

With magnet



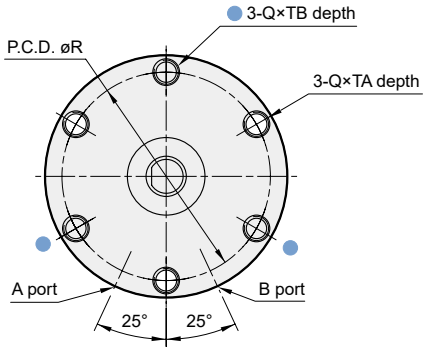
MCRC-W-*-A

Angle adjustable

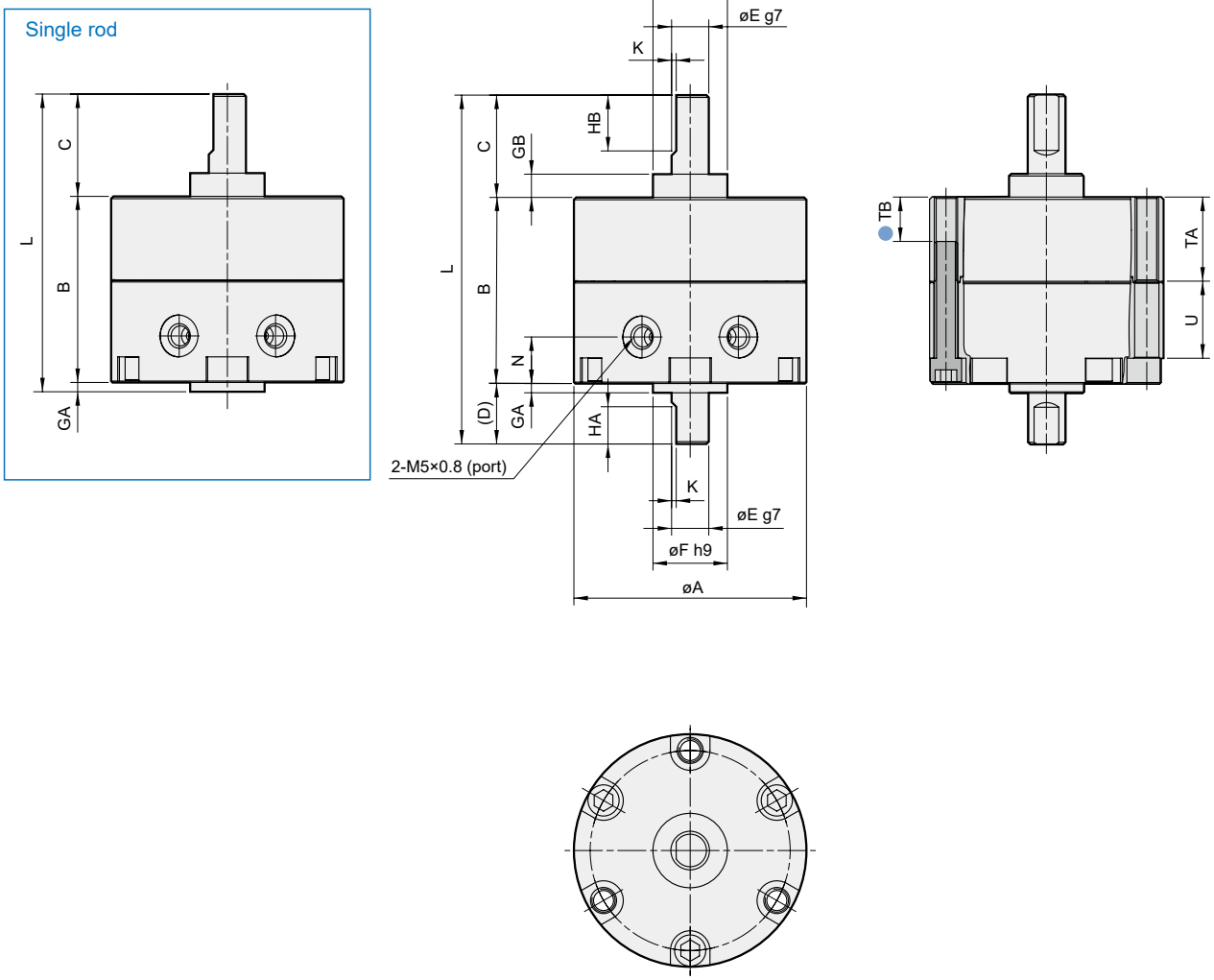


Material

No.	Part name	Material	Q'y		
			MA	M	A
1	MCRC-W- □	–	1	1	1
2	Angle adjusting holder	Aluminum alloy	1	0	1
3	Angle positioning holder	Alloy steel	1	0	1
4	Stopper retainer	Carbon steel	1	0	1
5	Bolt	Stainless steel	2	0	2
6	Adjusting block #1	Alloy steel	2	0	2
7	Adjusting block #2	Carbon steel	2	0	2
8	Bolt	Stainless steel	2	0	2
9	Bolt	Stainless steel	3	0	3
10	Connector	Aluminum alloy	1	0	0
11	Screw	Alloy steel	1	0	0
12	Magnet holder	Aluminum alloy	1	1	0
13	Screw	Alloy steel	1	1	0
14	Magnet	Magnet material	1	1	0
15	Sensor adjustment holder	Aluminum alloy	1	1	0
16	Screw	Stainless steel	3	0	3
17	Cover #1	Aluminum alloy	1	1	0
18	Sensor adjusting block	Aluminum alloy	2	2	0
19	Sensor fixing block	Aluminum alloy	2	2	0
20	Screw	Stainless steel	3	3	0
21	Cover #2	Aluminum alloy	0	0	1
22	Screw	Stainless steel	0	3	0



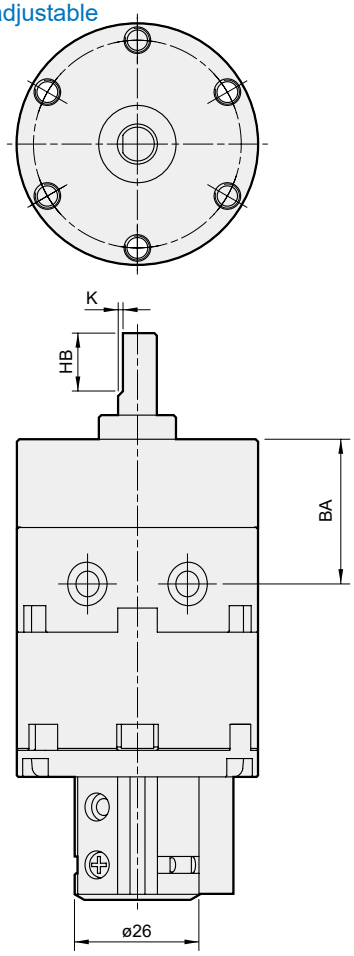
Single rod

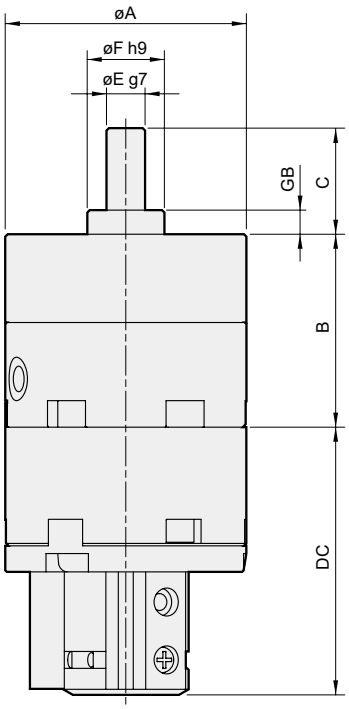


Code / Size	A	B	C	D	E	F	GA	GB	HA	HB	K	L		N	Q	R	TA	TB	U
												Single rod	Double rod						
20	42	29	20	(8.5)	6 $^{-0.004}_{-0.016}$	14 $^{0}_{-0.043}$	1.5	4.5	7	10	0.5	50.5	59	9	M4×0.7	36	13.5	8.5	11
30	50	40	22	(13)	8 $^{-0.005}_{-0.020}$	16 $^{0}_{-0.043}$	2	5	8	12	1	64	75	10	M5×0.8	43	18	9.5	16

MCRC-W-*-MA

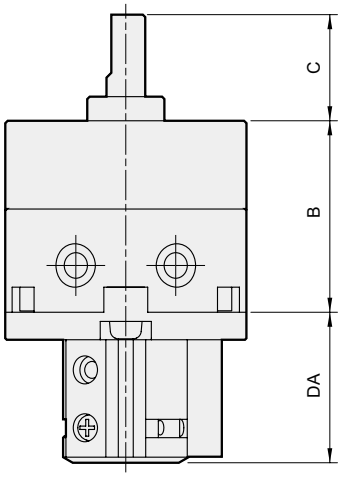
With magnet + Angle adjustable





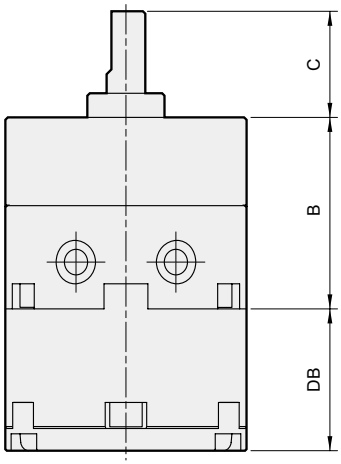
MCRC-W-*-M

With magnet



MCRC-W-*-A

Angle adjustable

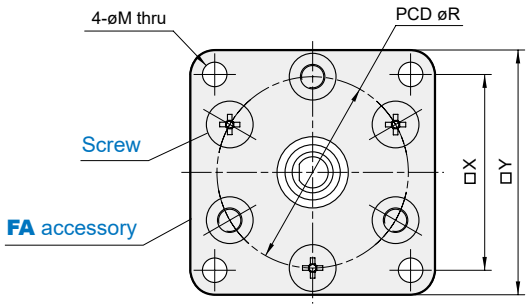


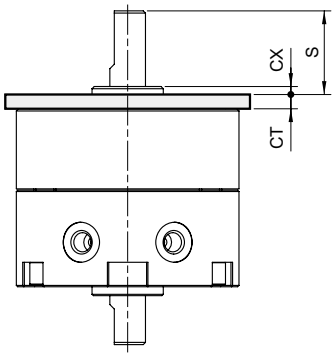
Code / Size	A	B	BA	C	DA	DB	DC	E	F	GB	HB	K
20	42	29	20	20	30	25	51	6 $^{-0.004}_{-0.016}$	14 $^{0}_{-0.043}$	4.5	10	0.5
30	50	40	30	22	31	29	55.5	8 $^{-0.005}_{-0.020}$	16 $^{0}_{-0.043}$	5	12	1

FA

Material
FA: Carbon steel
Screw: Carbon steel

Code / Size	CT	CX	M	R	S	X	Y
20	3.2	1.3	4.5	36	16.8	36	46
30	3.2	1.8	5.5	43	18.8	44	55





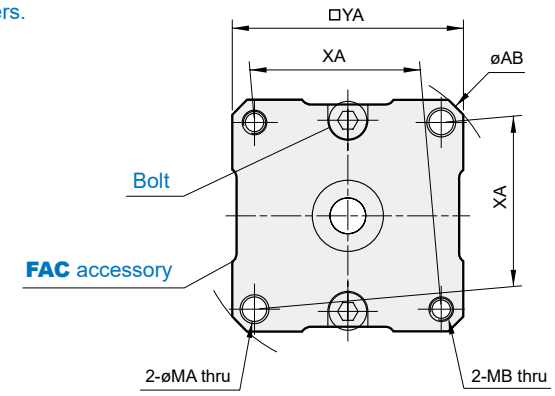
FAC

* Need to select the **MCRC-□-□-F** specification and cannot be assembled with standard cylinders.

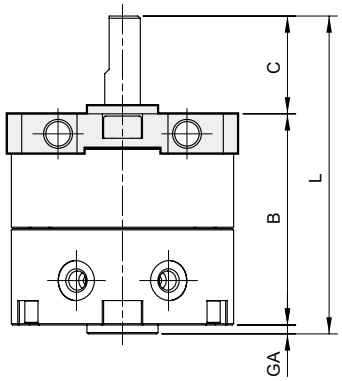
Material
FAC: Aluminum alloy
Bolt: Carbon steel

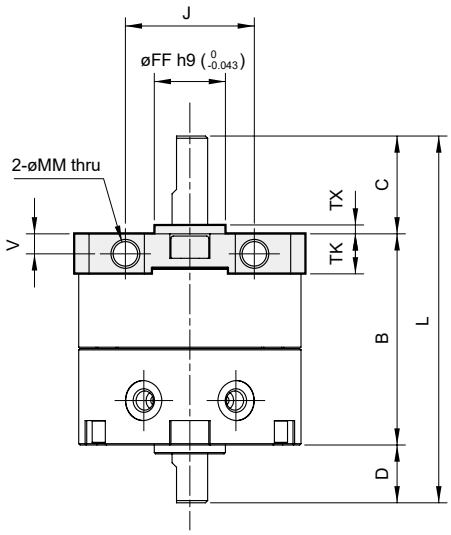
Code / Size	AB	B	C	D	FF	GA	J	L	
								Single rod	Double rod
20	59	35.5	20	8.5	14	1.5	26	57	65.5
30	69	47.5	22	13	16	2	29	71.5	82.5

Code / Size	MA	MB	MM	TK	TX	V	XA	YA
20	4.5	M4×0.7	4.5	8	1.5	4	36	44
30	5.5	M5×0.8	5.5	9	2	4.5	42	52



Single rod





Moment of inertia

Technical data

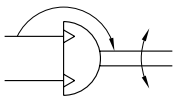
Caution for safety
(Read before installing)



Features

- Centering boss and locating hole for accurate positioning.
- Operating range of table is 0°~190° by angle adjusting screw.
- Compact design using double rack and single pinion.
- Hollow shaft standard for wiring and piping.
- Possible to fit shock absorbers as stops.
- Ease of mounting with integral table.
- Magnetic as standard.

Symbol



Specification

Model		MCRQ2					
Acting type		Double acting					
Tube I.D. (mm)		12	16	20	25	32	40
Port size		M5×0.8		Rc1/8			
Medium		Air					
Max. operating pressure	adjusting bolt	0.7MPa	1 MPa				
	shock absorber	—	0.6 MPa (*1)				
Min. operating pressure		0.1 MPa (*2)					
Ambient temperature		0~+60°C (No freezing)					
Cushion	adjusting bolt	Rubber bumper					
	shock absorber	—	Shock absorber (*3)				
Angle adjustment range		0° to 190°(max.) (*4)					
Sensor switch		RDC(V), RQC(V)					
Weight (kg)	adjusting bolt	0.25	0.60	1.24	2.10	4.18	7.67
	shock absorber	—	0.61	1.31	2.12	4.19	7.72
Minimum rotation that will not allow decrease of energy absorption ability		—	72°	58°	69°	77°	82°

*1. The maximum operating pressure of the actuator is restricted by the maximum allowable thrust of the shock absorber.

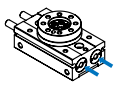
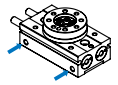
*2. No-load conditions.

*3. The shock absorber is expendable. Replace when damping performance decrease.

*4. Be careful if the rotation angle of a type with internal shock absorber is set below the value in the table below, the piston stroke will be smaller than the shock absorber's effective stroke, resulting in decreased energy absorption ability.

Order example

MCRQ2 — 20R — □ — □

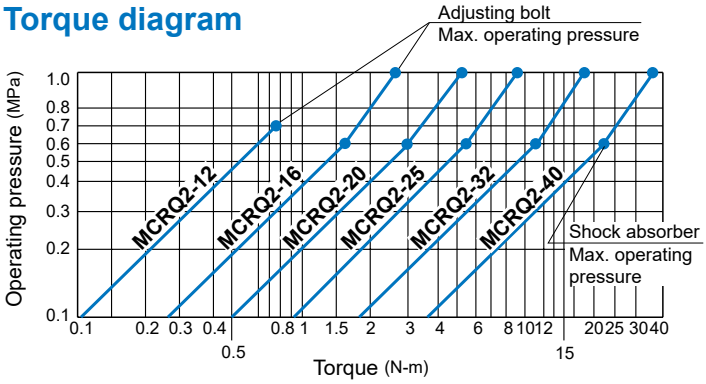
- MODEL
- TUBE I.D.
- ANGLE ADJUSTER
  - **A**: With adjusting bolt
  - **R**: With shock absorber
  - * ø12 without shock absorber.
- PORT LOCATION (*)
  - Blank: End port
  - 
  - **E**: Front port
  - 
  - * ø12 only option.
  - * Port location cannot be changed after delivery.
- PORT THREAD
  - Blank: M5×0.8 (for ø12, ø16)
  - Blank: Rc thread
  - **G**: G thread
  - **NPT**: NPT thread (for ø20~ø40)

Allowable kinetic energy and rotation time adjustment range

Model	Allowable kinetic energy (J)		Rotation time adjustment range for stable operation(s/90°)	
	Adjustment bolt	Internal shock adsorber	Adjustment bolt	Internal shock adsorber
MCRQ2-12	0.006	—	0.2 to 1.0	—
MCRQ2-16	0.007	0.039		0.2 to 0.7
MCRQ2-20	0.048	0.116		
MCRQ2-25	0.081	0.294		
MCRQ2-32	0.32	1.6	0.2 to 2.0	0.2 to 1.0
MCRQ2-40	0.53	2.9	0.2 to 2.5	

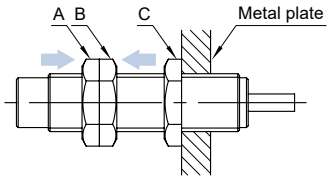
* Be careful if a type with internal absorber is used below the minimum speed, the energy absorption ability will decrease drastically.

Torque diagram



Installation guide of shock absorber

1. Install 3 nuts on the shock absorber as the picture shown.
2. Bind the A nut and B nut together via tightening them with different rotating direction.
3. Hold B nut and rotate C nut to bind the plate and C nut together.
4. Unbind the A nut and B nut. The installation is complete.
5. For the tightening torque of the fixed nut of the shock absorber, please refer to the table below.



Tube I.D.	Max. tightening torque (N.m)
16	1.67
20	3.14
25	10.8
32	23.5
40	62.8

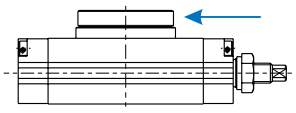
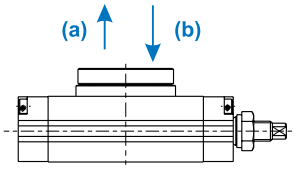
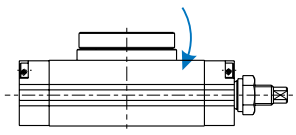
Theoretic force

Unit: N·m

Model		MCRQ2					
Tube I.D.		12	16	20	25	32	40
Operating pressure (MPa)	0.1	0.1	0.26	0.5	0.91	1.88	3.78
	0.2	0.21	0.52	1	1.81	3.78	7.53
	0.3	0.31	0.78	1.5	2.72	5.66	11.31
	0.4	0.41	1.04	2.01	3.62	7.56	15.09
	0.5	0.52	1.31	2.51	4.55	9.44	18.87
	0.6	0.63	1.57	3	5.45	11.32	22.62
	0.7	0.73	1.83	3.5	6.36	13.23	26.4
	0.8	–	2.09	4.02	7.26	15.12	30.16
	0.9	–	2.35	4.52	8.17	17.01	33.93
	1.0	–	2.61	5.03	9.08	18.9	37.7

Allowable load

Set the load and moment to be applied to the table within the allowable values shown in the table below.
(Values outsize of limitations will cause excessive play, deteriorate accuracy, and shorten service life.)

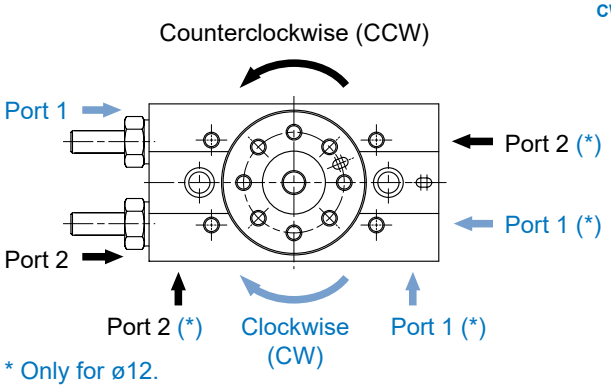
Pictures			

Tube I.D.	Allowable radial load (N)	Allowable thrust load (N)		Allowable moment (N.m)
		(a)	(b)	
12	54	71	71	1.5
16	78	74	78	2.4
20	196	197	363	5.3
25	314	296	451	9.7
32	390	493	708	18
40	543	740	1009	25

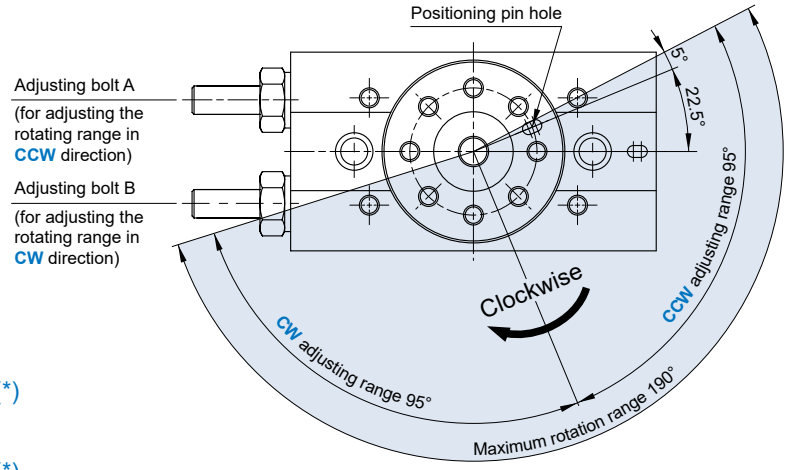
Rotating direction and angle

- When the port 1 is pressurized, the flange rotates in clockwise (CW) direction.
- When the port 2 is pressurized, the flange rotates in counter-clockwise (CCW) direction.

  The rotating angle range can be adjust by the method shown as right figure.



* Only for ø12.



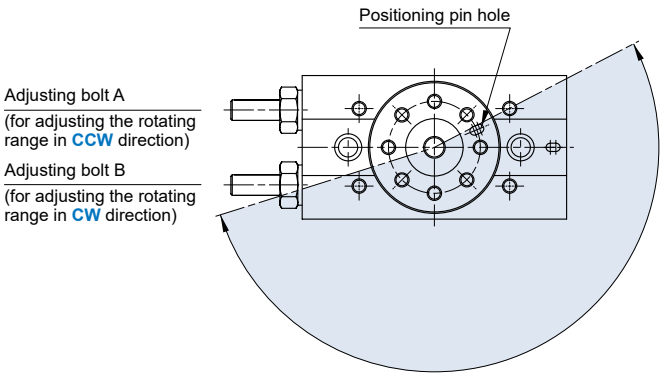
NOTE

- The figure shows the rotating range and use the pin hole as indicator.
- The pin hole position in the figure locates at the situation which the CCW & CW rotating range are both adjusted at 90°.

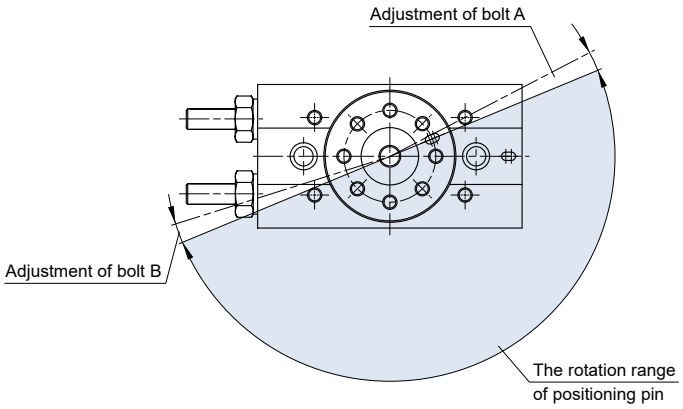
Rotating range adjusting example

- The followed figures show the rotating range of different adjustment via bolt A and B. (The drawings also show the rotation ranges of the positioning pin hole.)

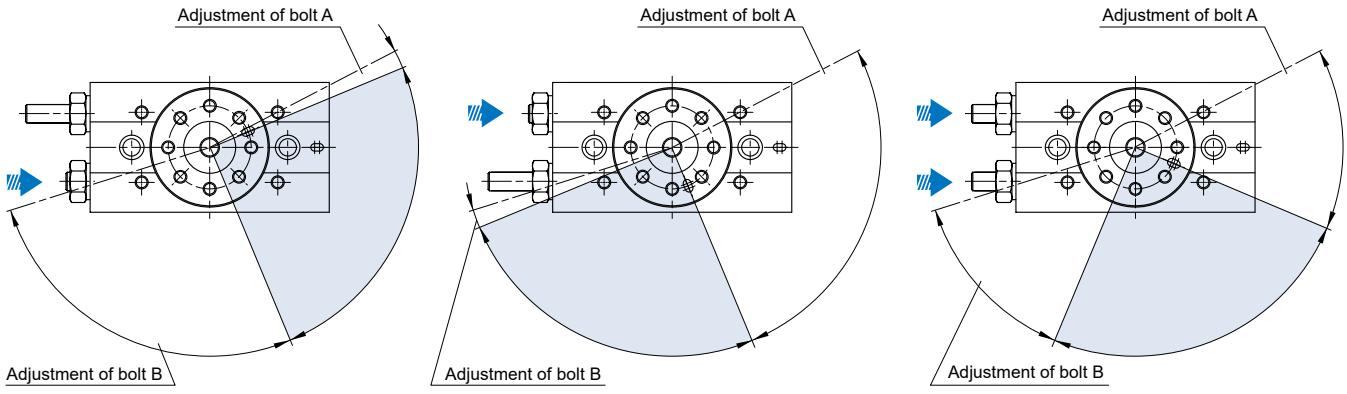
190° (Max) Rotation



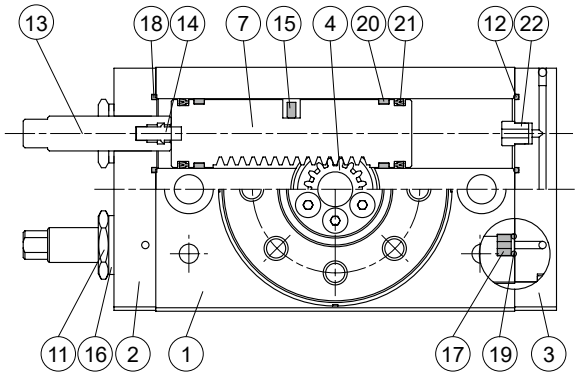
180° Rotation



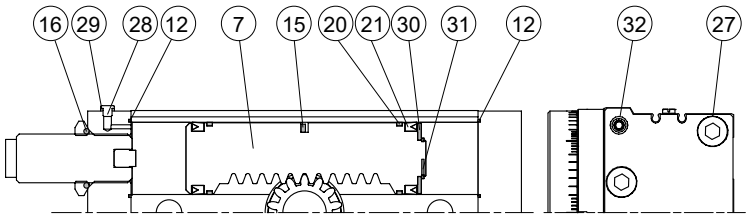
90° Rotation

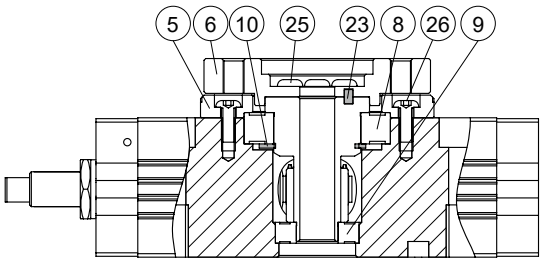


ø16~ø32

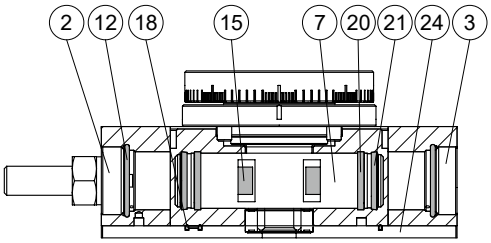


ø40





ø12



Material

A: Repair kits (inclusion)

No.	Part name	Material	Tube I.D. & Q'y				A
			12	16	20~32	40	
1	Body	Aluminum alloy	1				
2	Cover	Aluminum alloy	2	1			
3	End cover	Aluminum alloy	2	1			
4	Pinion	SCM	1				
5	Bearing retainer	Aluminum alloy	1				
6	Table	Aluminum alloy	1				
7	Piston	Stainless steel	2				
8	Rolling bearing	Bearing steel	1				
9	Rolling bearing	Bearing steel	1				
10	Snap ring	Spring steel	–	1		–	
11	Seal nut	Carbon steel	2				
12	O-ring	NBR	4		2	4	●
13	Adjusting bolt *1	Stainless steel *2	2				
	Shock absorber *3	–	–	2			
14	Cushion pad *1	NBR	2				●
15	Magnet	Magnet material	4	2			
16	Seal washer	*4	2				●
17	Fixed	Copper	–	4	2	–	
18	Piston packing	NBR	1	–	2	–	●
19	O-ring	NBR	–	4	2	–	●
20	Wear ring	Resin	4				

*1. Only suitable for (A) with adjusting bolt.
*2. ø40: Carbon steel
*3. Only suitable for (R) with shock absorber.
*4. ø12~ø32: NBR+Carbon steel; ø40: NBR

A: Repair kits (inclusion)

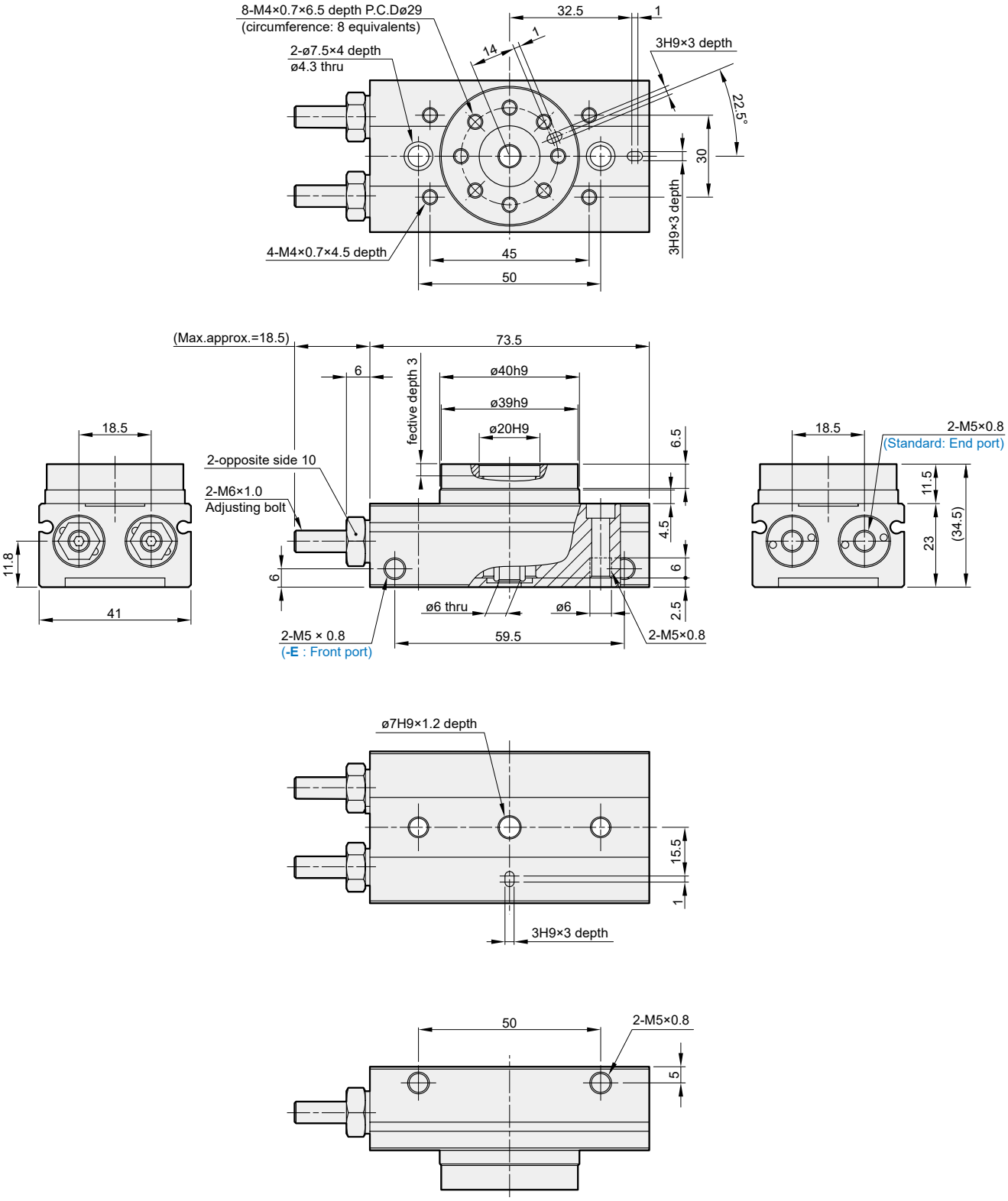
No.	Part name	Material	Tube I.D. & Q'y						A
			12	16	20	25	32	40	
21	Piston Seal	NBR	4						●
22	Stop chunk	Aluminum alloy	–	2				–	
23	Pin *5	SCM	1						
24	Plate	Aluminum alloy	1	–					
25	Bolt	Stainless steel *6	6						
26	Bolt	Carbon steel	4	6	4	6			
27	Bolt	Stainless steel	4						
28	Plug	Copper	–					1	
29	Plug washer	PET	–					1	
30	Piston retainer	Aluminum alloy	–					2	
31	Piston snap ring	Spring steel	–					2	
32	Plug	Carbon steel	–					2	

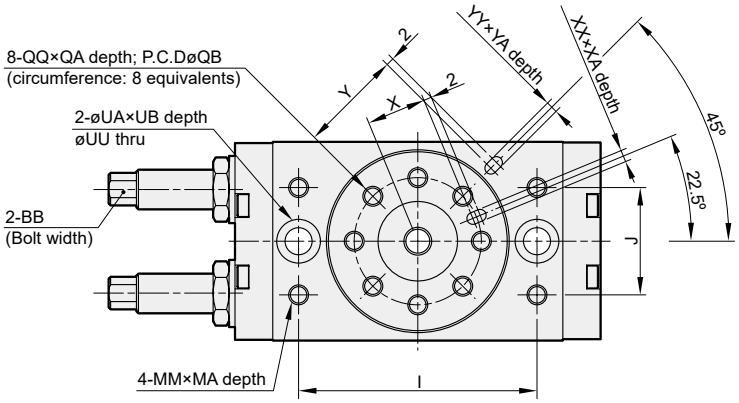
*5. ø20~ø40: Key
*6. ø16, ø20: Carbon steel

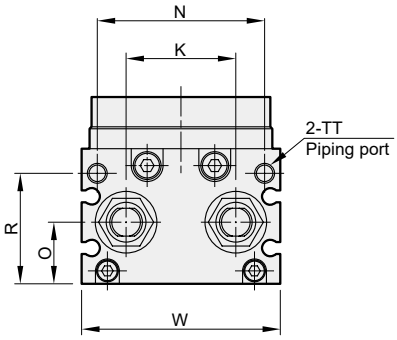
Order example of repair kits

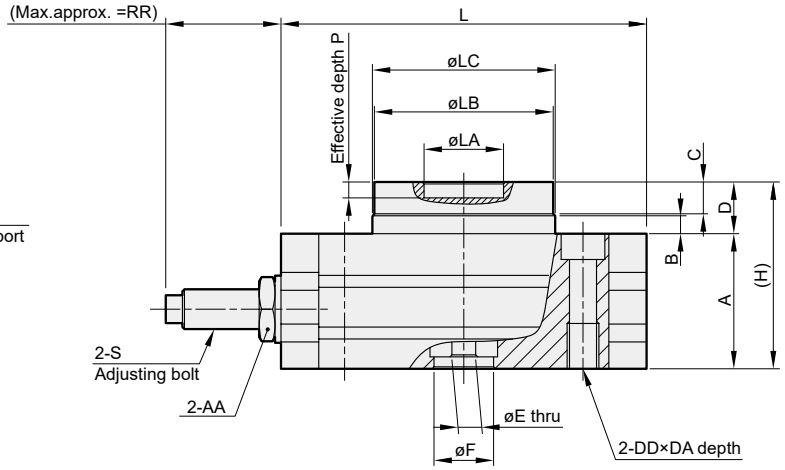
Tube I.D.	Repair kits	
	Adjuster bolts (A)	Shock absorber (R)
ø12	**PS-MCRQ-12A**	–
ø16	**PS-MCRQ-16A**	**PS-MCRQ-16R**
ø20	**PS-MCRQ-20A**	**PS-MCRQ-20R**
ø25	**PS-MCRQ-25A**	**PS-MCRQ-25R**
ø32	**PS-MCRQ-32A**	**PS-MCRQ-32R**
ø40	**PS-MCRQ-40A**	**PS-MCRQ-40R**

* Use the same repair kits with MCRQ series.


8-M4×0.7×6.5 depth P.C.Dø29
(circumference: 8 equivalents)
2-ø7.5×4 depth
ø4.3 thru
4-M4×0.7×4.5 depth
32.5
1
14
1
3H9×3 depth
22.5°
30
3H9×3 depth
45
50
(Max.approx.=18.5)
73.5
6
ø40h9
ø39h9
ø20H9
fective depth 3
2-opposite side 10
2-M6×1.0
Adjusting bolt
6.5
4.5
6
2.5
6
ø6 thru
ø6
2-M5 × 0.8
(-E : Front port)
59.5
2-M5×0.8
18.5
11.8
41
18.5
2-M5×0.8
(Standard: End port)
11.5
23
(34.5)
ø7H9×1.2 depth
15.5
1
3H9×3 depth
50
2-M5×0.8
5

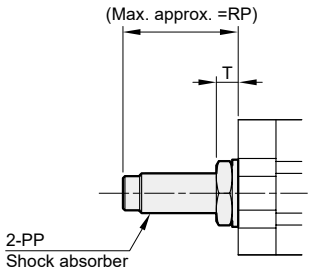


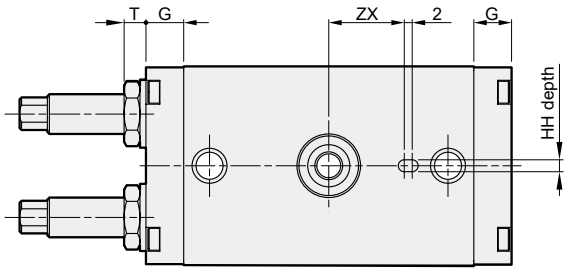




MCRQ2-16~25R

With shock absorber



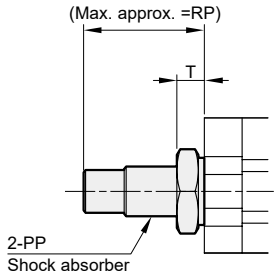


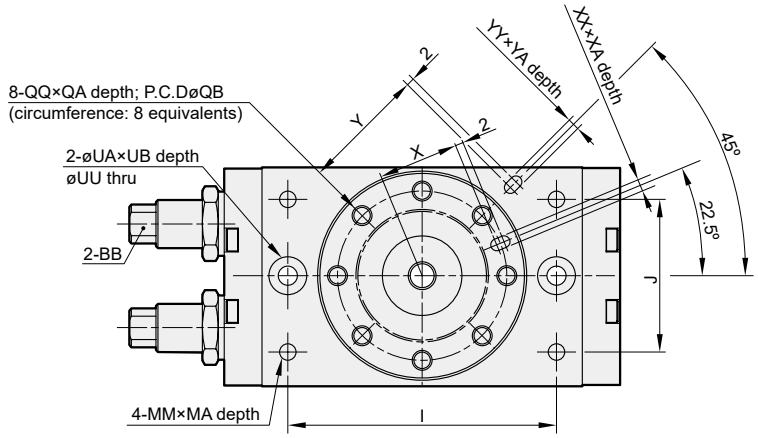
Code / Tubr I.D.	A	AA	B	BB	C	D	DA	DD	E	F	G	H	HH	I	J	K	L	LA	LB	LC	MA	MM	N
16	34	14	4.5	7	8	13	12	M8×1.25	6	15H9	9.5	47	3H9×3.5	60	27	26	92	20H9	45h9	46h9	8	M5×0.8	37
20	40	17	6.5	7	10	17	15	M10×1.5	10	22H9	12	57	4H9×4.5	84	37	32	127	32H9	65h9	67h9	8	M6×1	54
25	46	22	7.5	8	12	20	18	M12×1.75	13	26H9	15.5	66	5H9×5.5	100	50	37	152	35H9	75h9	77h9	8	M8×1.25	63

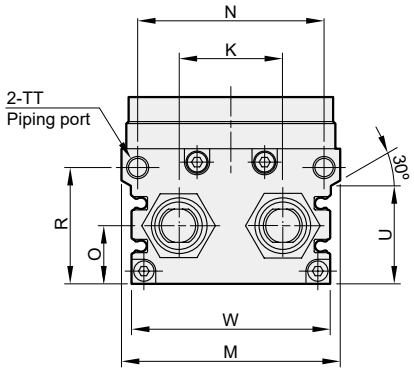
Code / Tubr I.D.	O	P	PP	QA	QB	QQ	R	RP	RR	S	T	TT	UA	UB	UU	W	X	XA	XX	Y	YA	YY	ZX
16	15.5	4	FK-1008L-S	8	32	M5×0.8	29	29	31	M10×1.0	5.5	M5×0.8	11	6.5	6.8	50	15	3.5	3H9	27	3.5	3H9	19
20	19.5	4.5	FK-1008L-S	10	48	M6×1.0	33	23.5	26	M10×1.0	4.5	Rc1/8	14	8.5	8.6	70	23	4.5	4H9	39	4.5	4H9	28
25	22	5	FK-1412L-S	12	55	M8×1.25	37.5	33	31.2	M14×1.5	7.5	Rc1/8	18	10.5	10.5	80	26.5	5.5	5H9	45	5.5	5H9	33

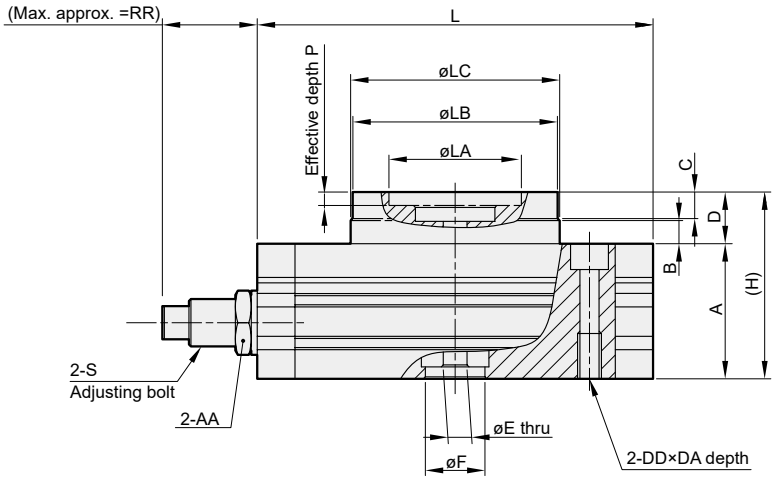
MCRQ2-32R, 40R

With shock absorber

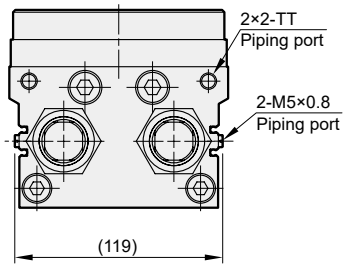


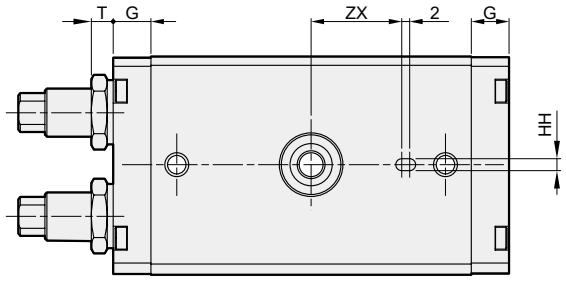






MCRQ2-40





Code / Tubr I.D.	A	AA	B	BB	C	D	DA	DD	E	F	G	H	HH	I	J	K	L	LA	LB	LC	M	MA
32	59	30	12	Bolt width 12	14.5	27	18	M12×1.75	13	24H9	17	86	6H9×4.5 dp	130	66	47	189	56H9	98h9	100h9	102	10
40	74	36	15	Bolt width 21	16.5	32	25	M16×2.0	24	32H9	24	106	8H9×6.5 dp	150	80	60	240	64H9	116h9	118h9	120	13

Code / Tubr I.D.	MM	N	O	P	PP	QA	QB	QQ	R	RP	RR	S	T	TT	U	UA	UB	UU	W	X	XA
32	M8×1.25	85	27.5	6	FK-2016L-S	14.5	77	M10×1.5	50.5	46	38.1	M20×1.5	10.5	Rc1/8	42	18	10.5	10.5	95	37.5	6.5
40	M12×1.75	100	37	9	FK-2725L-S	16.5	90	M12×1.75	65.5	68	45	M27×1.5	7	Rc1/8	57	20	12.5	14.2	113	44	8.5

Code / Tubr I.D.	XX	Y	YA	YY	ZX
32	6H9	59	4.5	6H9	49
40	8H9	69	4.5	8H9	54

MCRQ2-S series

ROTARY ACTUATOR

Moment of inertia

Technical data

Caution for safety
(Read before installing)



Features

- **4 to 10 times more allowable kinetic energy**
  (compared with internal shock absorber type)
- **Total length shortened**
  Longitudinal mounting space is reduced because there is no protrusion from adjustment bolts or internal shock absorbers.

Specification

Model	MCRQ2-S		
Acting type	Double acting		
Tube I.D. (mm)	16	20	25
Port size	M5×0.8	Rc1/8	
Rotation	90°, 180°		
Medium	Air (Non-lube)		
Max. operating pressure	1 MPa (*1)		
Min. operating pressure	0.2 MPa		
Ambient temperature	0~+60°C (No freezing)		
Allowable kinetic energy (J)	0.231	1.21	1.82
Rotation time adjustment range (s/90°)	0.2~1.0 (*2)		
Cushion	Shock absorber		
Shock absorber type	MDSC-0806-3N	MDSC-1008-3N	MDSC-1412-3N
Angle adjustment range	Each rotation end ± 3°		
Weight (kg) 90°	0.67	1.55	2.52
Weight (kg) 180°	0.64	1.48	2.41
Sensor switch	RDC(V), RQC(V)		

*1. The maximum operating pressure of the actuator is restricted by the maximum allowable thrust of the shock absorber.

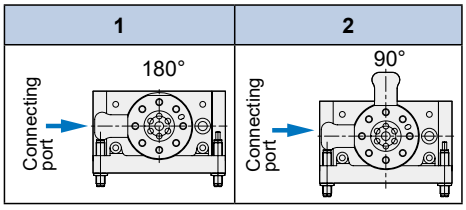
*2. For stable operation the time required for the rotary table to reach the rotation end after deceleration differs depending on the operating conditions (inertial moment of the load, rotation speed, and operating pressure), however, approximately 0.2 to 2 seconds are required.

Order example

MCRQ2 — S — 20 — 1 — G

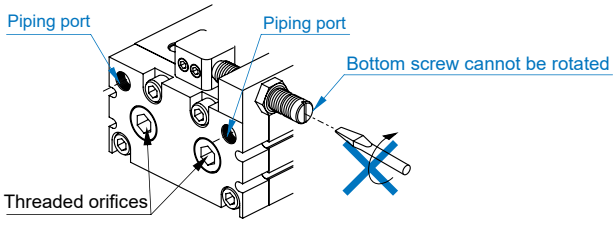
- MCRQ2: MODEL
- S: EXTERNAL CUSHION TYPE
- 20: TUBE I.D.
- 1: CONNECTING PORT POSITION AND ROTATION
- G: PORT THREAD
  Blank: M5×0.8 (for ø16)
  Blank: Rc thread
  G: G thread
  NPT: NPT thread (for ø20, ø25)

CONNECTING PORT POSITION AND ROTATION



Notice for shock absorber

- The threaded orifices shown below are not connecting ports. Never remove the plugs as this will cause malfunction.
- Never rotate the bottom screw of the shock absorber. (It is not an adjustment screw.) This may cause oil leakage.



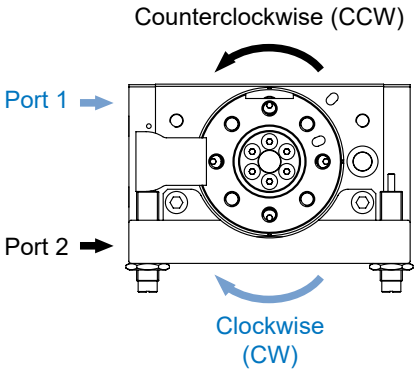
Range of shock absorber operates

Model	Adjustment angle per rotation of angle adjustment screw	Range of angle the shock absorber operates (single side)
MCRQ2-S-16	1.5°	12°
MCRQ2-S-20	1.1°	9°
MCRQ2-S-25	1.3°	11°

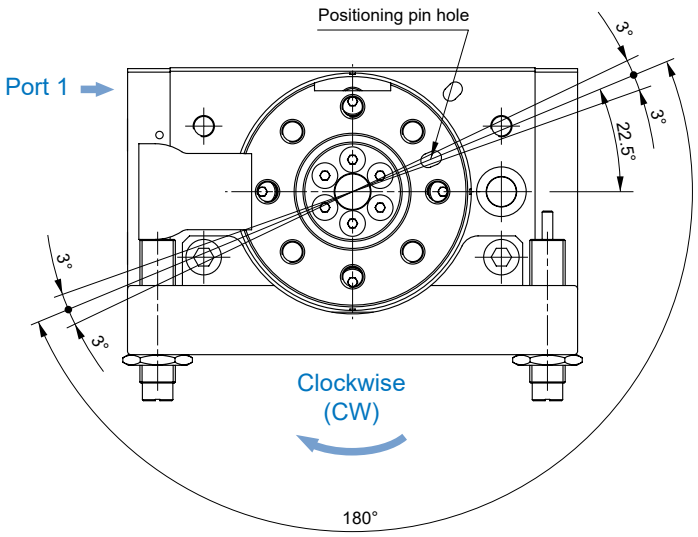
Rotating direction and angle

- When the port 1 is pressurized, the flange rotates in clockwise (CW) direction.
- When the port 2 is pressurized, the flange rotates in counter-clockwise (CCW) direction.

The rotating angle range can be adjust by the method shown as right figure.

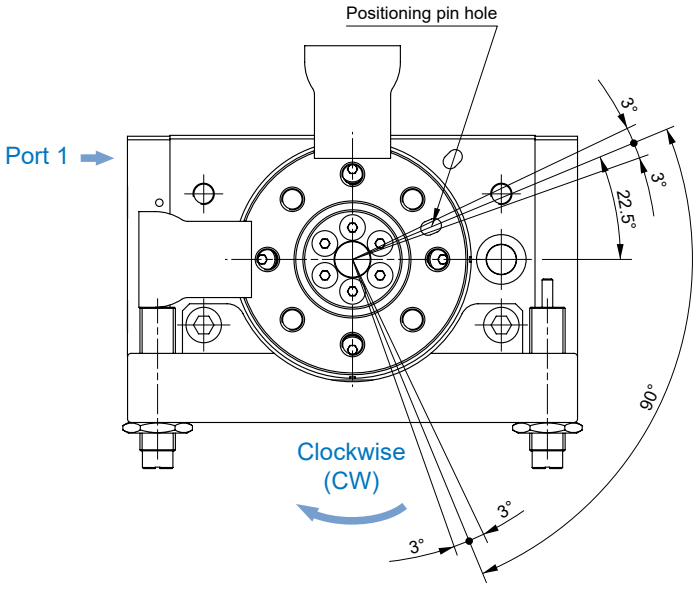


MCRQ2-S-*-1 180°

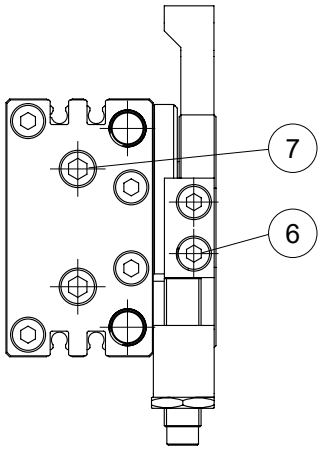


Minimum rotating range 174°
Maximum rotating range 186°

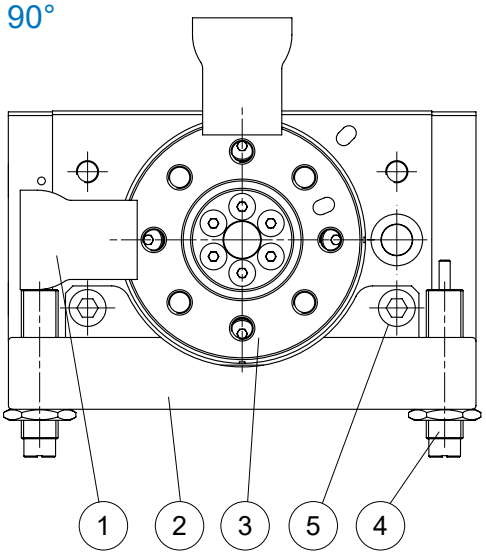
MCRQ2-S-*-2 90°



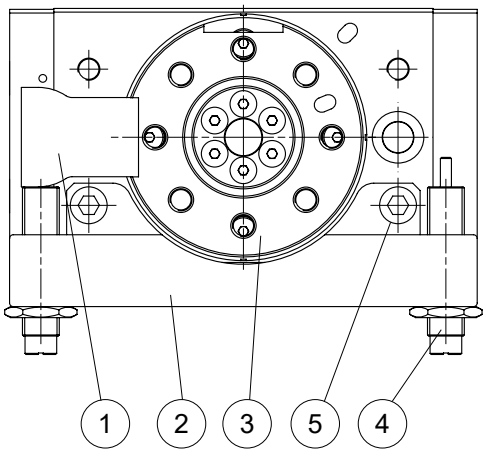
Minimum rotating range 84°
Maximum rotating range 96°



90°



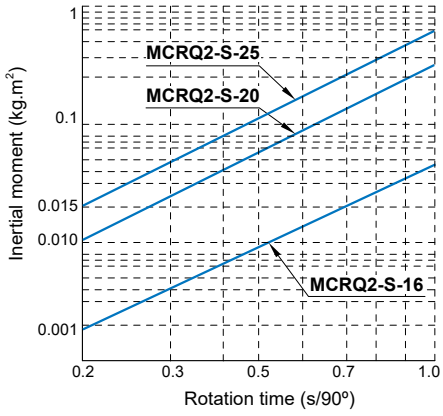
180°

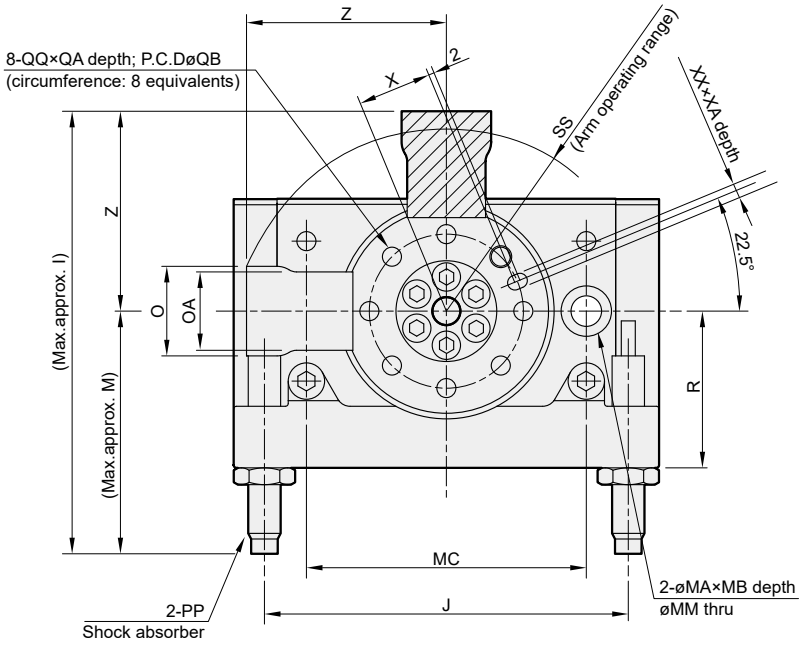


Material

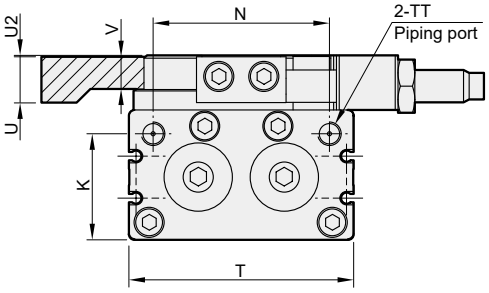
No.	Part name	Material	Rotation & Q'y	
			90°	180°
1	Fixing plate	Carbon steel	2	1
2	Cushion mount	Aluminum alloy	1	1
3	Flange table	Aluminum alloy	1	1
4	Shock absorber	–	2	2
5	Bolt	Stainless steel	2	2
6	Bolt	Stainless steel	4	2
7	Plug	Stainless steel	2	2

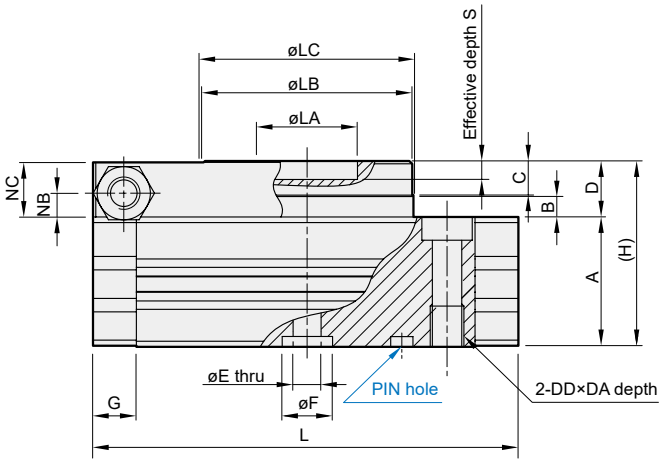
In the inertial moment and rotation time



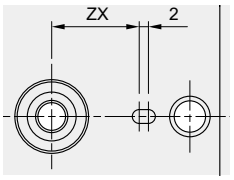


Code / Tubr I.D	PP
16	MDSC-0806-3N
20	MDSC-1008-3N
25	MDSC-1412-3N





PIN hole size



Code / Tubr I.D	HH	ZX
16	3H9×3.5	19
20	4H9×4.5	28
25	5H9×5.5	33

Code / Tubr I.D	A	B	C	D	DA	DD	E	F	G	H	I	J	K	L	LA	LB	LC	M	MA	MB	MC
16	34	4.5	8	13	12	M8×1.25	6	15H9	9.5	47	92.8	80.6	29	92	20H9	45h9	46h9	48.5	11	6.5	60
20	40	6.5	10	17	15	M10×1.5	10	22H9	12	57	119.3	110	33	127	32H9	65h9	67h9	59	14	8.5	84
25	46	7.5	12	20	18	M12×1.75	13	26H9	15.5	66	154.8	130	37.5	152	35H9	75h9	77h9	83.3	18	10.5	100

Code / Tubr I.D	MM	N	NB	NC	O	OA	QA	QB	QQ	R	S	SS	T	TT	U	U2	V	X	XA	XX	Z
16	6.8	37	5.5	12.5	20	15.6	8	32	M5×0.8	33	4	45.4	50	M5×0.8	11.5	0.3	7.5	15	3.5	3H9	44.3
20	8.6	54	8	16.5	27	21.5	10	48	M6×1	46	4.5	61.8	70	Rc1/8	13.5	0.5	9	23	4.5	4H9	60.3
25	10.5	63	8.5	19.5	32	28	12	55	M8×1.25	54.5	5	73.3	80	Rc1/8	18	0.5	11	26.5	5.5	5H9	71.5

Moment of inertia
Technical data
Caution for safety
(Read before installing)



Features

- The body is manufactured in anodized aluminium alloy, and has been designed looking at the harmonious aesthetic development.
- Pinion and rack produced from carbon steel reduces backlash within the mechanism.
- Rotation adjustment screw.
- Magnetic as standard.

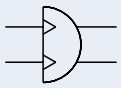
Specification

Model		MRTF, MRTH, MRTH-D		
Tube I.D. (mm)		40	63	80
Standard rotation		90±5°, 180±5°		
Rotating shaft dia. (mm)		16	24	28
Initial position of slot (mm)		See dimensional feature		
Medium		Filtered air with or without lubrication		
Operating pressure range		0.13~0.7 MPa		
Ambient temperature		-5~+60°C (No freezing)		
Max. allowable axial thrust (kg)		10	12	20
Cushion angle		74°	75°	80°
Max. allowable kinetic energy	90°	0.266J	0.675J	1.34J
	180°	0.58J	1.54J	3.03J
Max. allowable radial trust (Fr)		514.5 N	725.2 N	896.7 N
Sensor switch		LN65		

MRTH Male pivot gear (standard type)

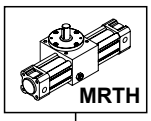
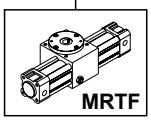
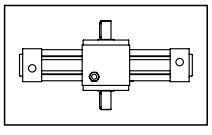
MRTH-D Male pivot gear (double end rod type)

MRTF Female pivot gear

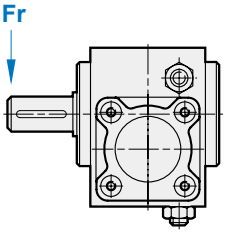


Order example

MRTH — 40 — 90 — D

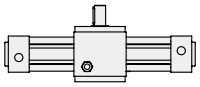
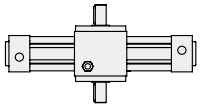
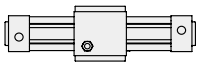
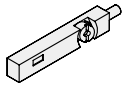
- MODEL:  MRTH;  MRTF
- TUBE I.D.
- ROTATION: **90**: 90°, **180**: 180°
- END ROD TYPE: 
  D: Double rod type
  * Only for **MRTH**.

Max. allowable radial trust

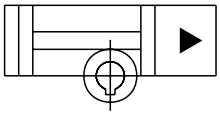


Weight

Unit: kg

Model	MRTH		MRTH-D		MRTF		LN65
Fig							
Tube I.D./Angle	90°	180°	90°	180°	90°	180°	Sensor switch
40	3.30	3.40	3.35	3.45	3.14	3.24	0.03
63	5.80	6.20	5.95	6.35	5.47	5.87	
80	10.25	10.80	10.49	11.00	9.69	10.24	

Compressed air consumption for a complete cycle



Unit: L/cycle

Model	Rotation	Operating pressure (MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
MRTH40 MRTF40	90°	0.1571	0.2352	0.3133	0.3915	0.4696	0.5477	0.6259	0.7040	0.7821	0.8603
	180°	0.3141	0.4704	0.6267	0.7829	0.9392	1.0955	1.2517	1.4080	1.5643	1.7205
MRTH63 MRTF63	90°	0.4383	0.6564	0.8744	1.0925	1.3105	1.5286	1.7466	1.9647	2.1828	2.4008
	180°	0.8766	1.3127	1.7488	2.1850	2.6211	3.0572	3.4933	3.9294	4.3655	4.8016
MRTH80 MRTF80	90°	0.8480	1.2698	1.6917	2.1135	2.5354	2.9572	3.3791	3.8009	4.2228	4.6447
	180°	1.6959	2.5396	3.3834	4.2271	5.0708	5.9145	6.7582	7.6019	8.4456	9.2893

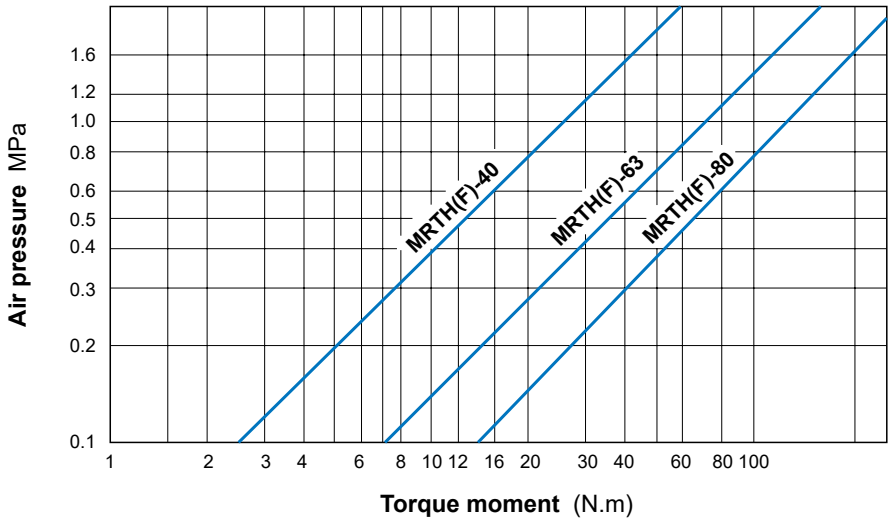
Model	MRTH, MRTF		
Tube I.D.(mm)	40	63	80
Constant K	0.3491	0.3927	0.4712

The method of calculation (Compressed air consumption)

$$Q = 2 \times K \times A \times n \times Dg \times \frac{P+0.101}{0.101} \times 10^{-6}$$

Q:	Compressed air consumption	(L/cycle)
A:	Piston area	(mm^2)
Dg:	Rotation	
P:	Air pressure	(MPa)
K:	Constant	
n:	Cycle of operation	(cycle/min)

Output torque table



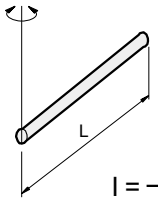
Kinetic energy of rotation motion

$$E = \frac{1}{2} \times I\omega^2$$

E:	Kinetic energy	(J)
I:	Moment of inertia	(Kg·m^2)
ω:	Angle speed	(rad/s)

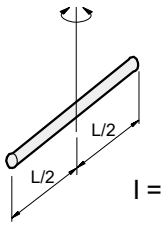
Equation table moment of inertia

(1)



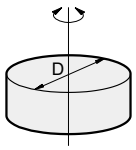
$$I = \frac{ML^2}{3}$$

(2)



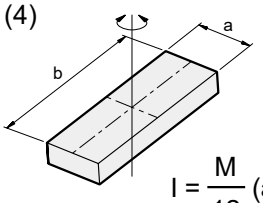
$$I = \frac{ML^2}{12}$$

(3)



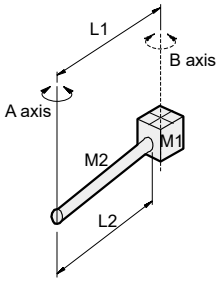
$$I = \frac{MD^2}{8}$$

(4)



$$I = \frac{M}{12}(a^2+b^2)$$

(5)

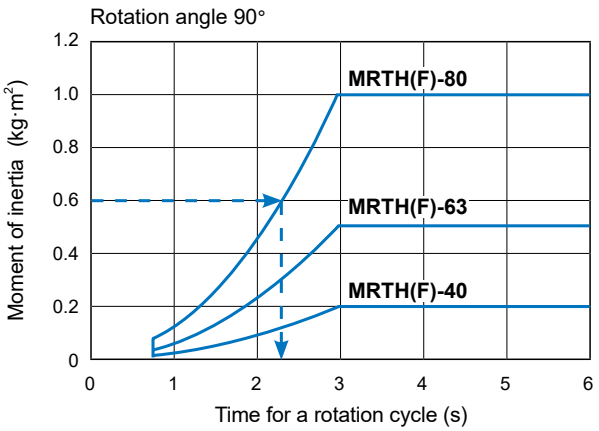


$$I = I_1 + M_1 L_1^2 + \frac{M_2 L_2^2}{3}$$

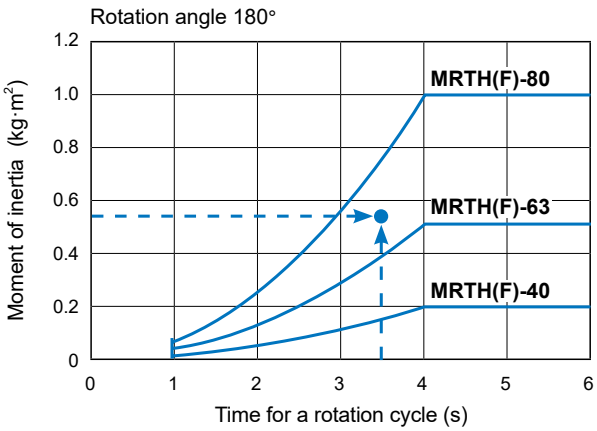
I_1 = Obtain the center of gravity of the load (M_1) as I_1, a provisional shaft (B).

I (**I$_1$**):	Moment of inertia	(Kg·m^2)
M (**M$_1$**,**M$_2$**):	Load mass	(Kg)
L, **a**, **b**:	Side length	(m)
D:	Diameter	(m)

Moment of inertia



Example 1
When there are constraints for the moment of inertia of load, but not for rotation time. From "rotation angle = 90°", MRTH(F)-80, to operate at the load moment of inertia 0.6 kg·m^2: MRTH(F)-80 will be 2.3 seconds or higher.



Example 2
When there are constraints for the moment of inertia of load, but not for rotation time. From "rotation angle = 180°",to operate at the load moment of inertia 0.5 kg·m^2 and at the rotation time setting of 3.5 seconds: The model will be MRTH(F)-80.

How to order the seal kit

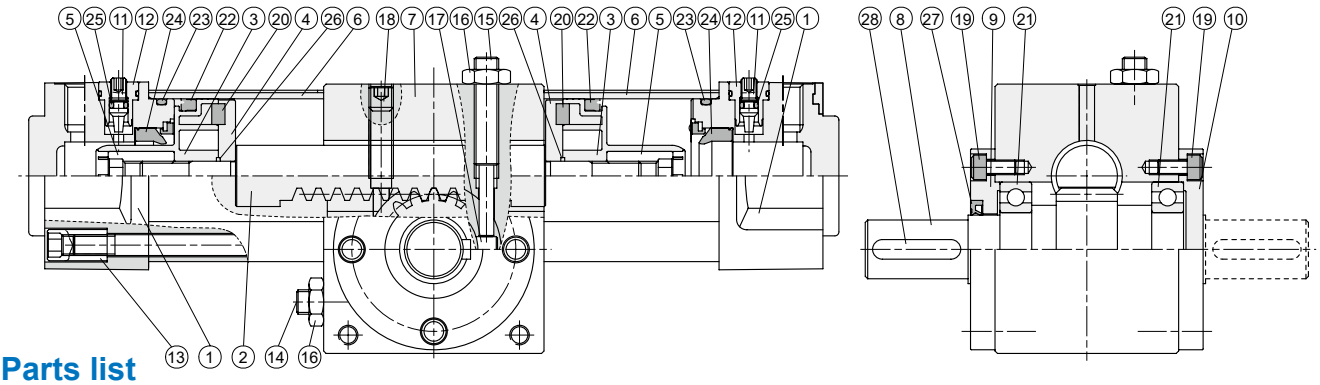
MRT□SK□

- H
- F

Tube I.D.	Seal kit
40	MRTHSK40 - Including No.22,23,24,25,26,27
63	MRTHSK63 - Including No.22,23,24,25,26,27
80	MRTHSK80 - Including No.22,23,24,25,26,27

Tube I.D.	Seal kit
40	MRTFSK40 - Including No.22,23,24,26,27
63	MRTFSK63 - Including No.22,23,24,26,27
80	MRTFSK80 - Including No.22,23,24,26,27

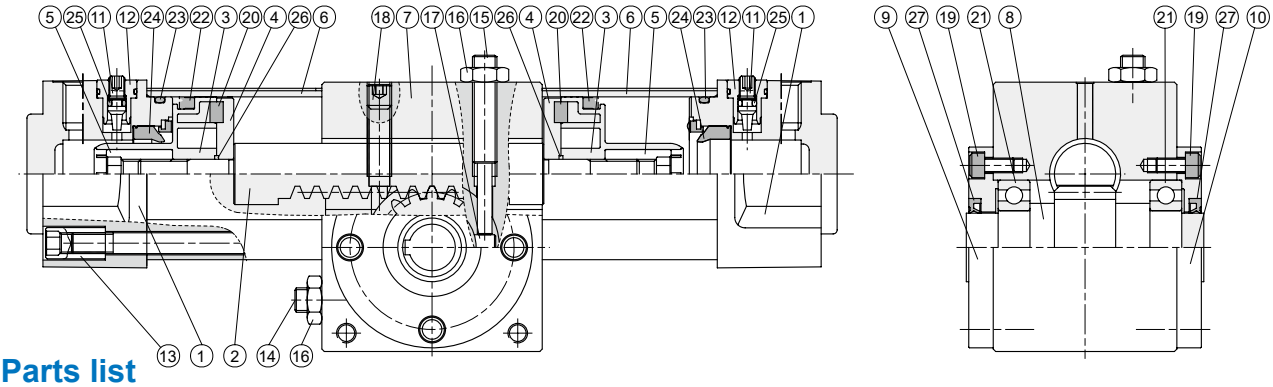
MRTH MRTH-D



Parts list

No.	Part name	Q'y	No.	Part name	Q'y	No.	Part name	Q'y
1	End cap	2	11	Cushion needle	2	21	Ball bearing	2
2	Rack	1	12	Washer	2	22	Piston packing	2
3	Piston	2	13	Tie bolt	8	23	Cylinder gasket	2
4	Magnet holder	2	14	Adjusting screw	1	24	Cushion packing	2
5	Piston nut	2	15	Adjusting screw	1	25	O-ring	2
6	Cylinder tube	2	16	Lock nut	2	26	Piston gasket	2
7	Housing	1	17	Stopper pin	1	27	Rod packing	1
8	Pinion shaft	1	18	Set screw	1	28	Key (MRTH-D=2)	1
9	End cover	1	19	Hexagon socket head screw	8			
10	End cover	1	20	Magnet	2			

MRTF

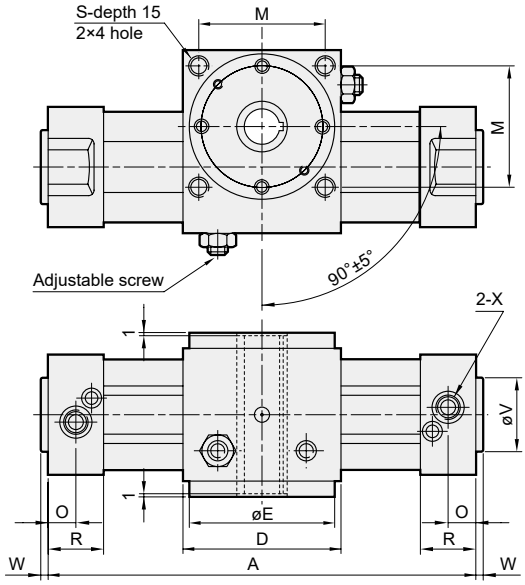


Parts list

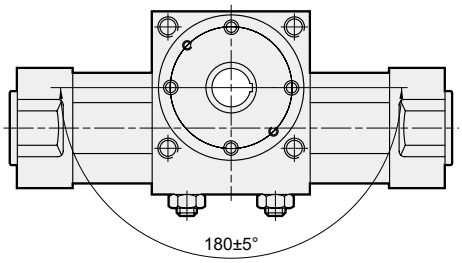
No.	Part name	Q'y	No.	Part name	Q'y	No.	Part name	Q'y
1	End cap	2	10	End cover	1	19	Hexagon socket head screw	8
2	Rack	1	11	Cushion needle	2	20	Magnet	2
3	Piston	2	12	Cushion plug	2	21	Ball bearing	2
4	Magnet holder	2	13	Tie bolt	8	22	Piston packing	2
5	Piston nut	2	14	Adjusting screw	1	23	Cylinder gasket	2
6	Cylinder tube	2	15	Adjusting screw	1	24	Cushion packing	2
7	Housing	1	16	Lock nut	2	25	O-ring	2
8	Pinion shaft	1	17	Stopper pin	1	26	Piston gasket	2
9	End cover	1	18	Set screw	1	27	Rod packing	2

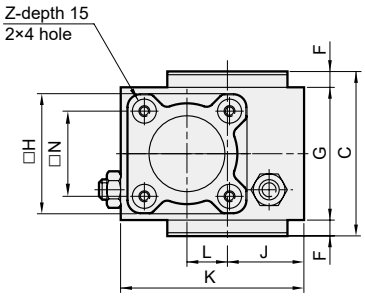
MRTF

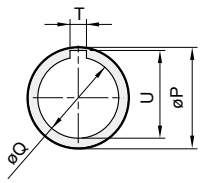
Angle of rotation 90°



Angle of rotation 180°



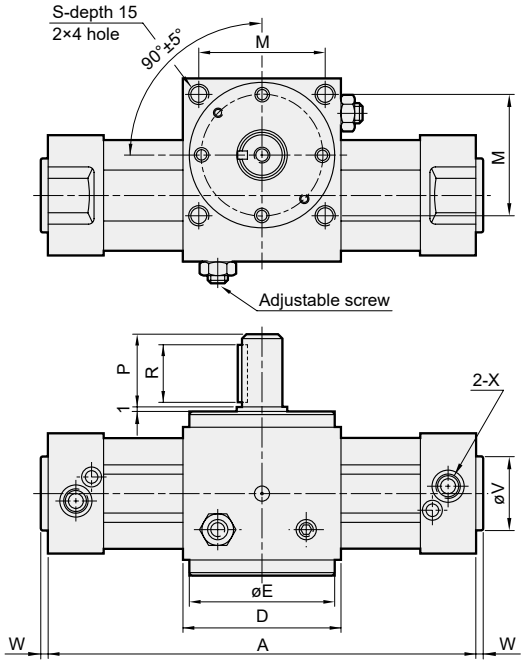




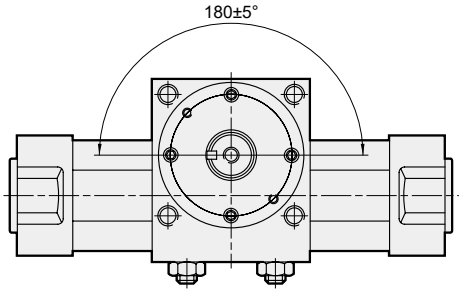
Model	A		C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
	90°	180°																						
MRTF-40	263	326	81	75	72	8	65	53	37.5	93	27.5	60	38	15	25	14	30	M6	5	16.5	35	5	G1/4	M6
MRTF-63	306	377	95	90	82	10	75	75	42.5	110	30	70	56.5	16	30	19	32	M8	6	22	45	4	G3/8	M8
MRTF-80	343	428	119	105	96	12	95	95	51.5	135	36	82	72	19	35	24	38	M10	6	27	45	5	G3/8	M10

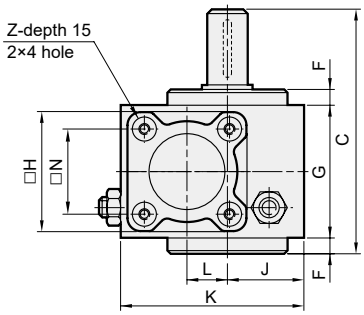
MRTH

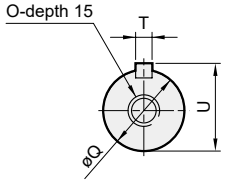
Angle of rotation 90°



Angle of rotation 180°

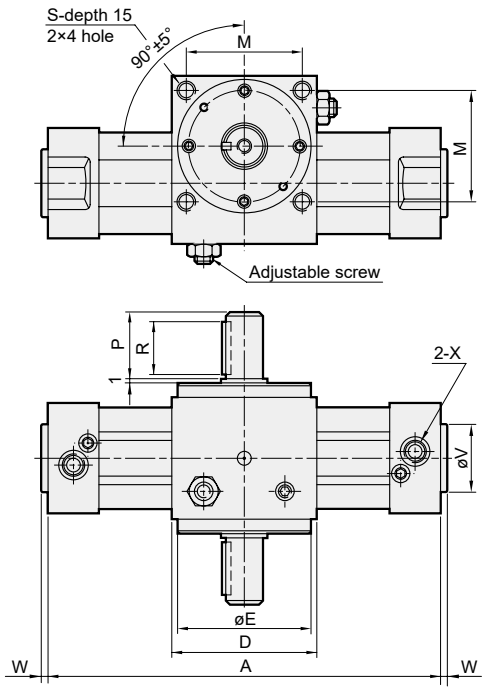




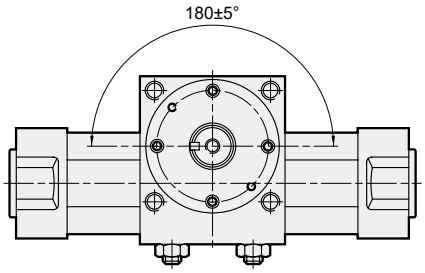


Model	A		C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
	90°	180°																						
MRTH-40	263	326	112	75	72	8	65	53	37.5	93	27.5	60	38	M5	30	16	25	M6	5	18	35	5	G1/4	M6
MRTH-63	306	377	138	90	82	10	75	75	42.5	110	30	70	56.5	M8	42	24	36	M8	8	27	45	4	G3/8	M8
MRTH-80	343	428	170	105	96	12	95	95	51.5	135	36	82	72	M8	50	28	45	M10	8	31	45	5	G3/8	M10

MRTH-D Angle of rotation 90°



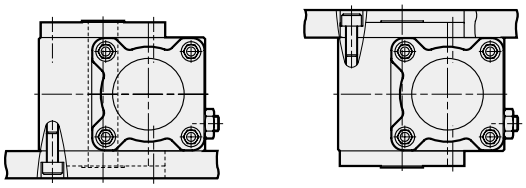
Angle of rotation 180°



Model	A		B	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
	90°	180°																						
MRTH-40-D	263	326	143	75	72	8	65	53	37.5	93	27.5	60	38	M5	30	16	25	M6	5	18	35	5	G1/4	M6
MRTH-63-D	306	377	181	90	82	10	75	75	42.5	110	30	70	56.5	M8	42	24	36	M8	8	27	45	4	G3/8	M8
MRTH-80-D	343	428	221	105	96	12	95	95	51.5	135	36	82	72	M8	50	28	45	M10	8	31	45	5	G3/8	M10

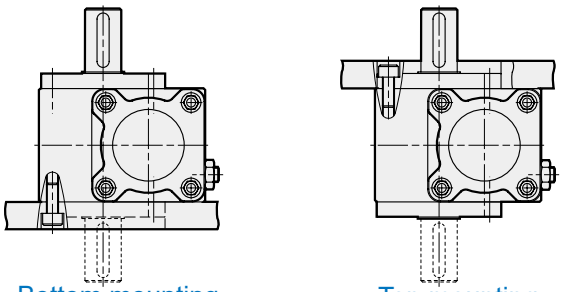
Mounting type

MRTF



Bottom mounting | Top mounting

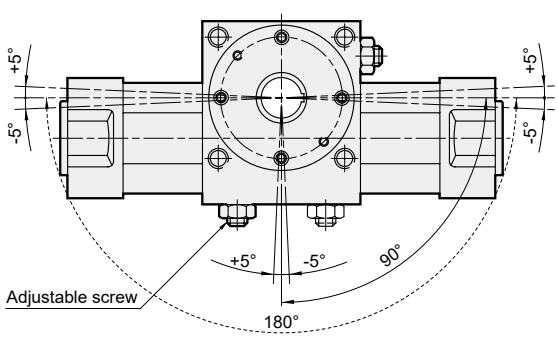
MRTH MRTH-D



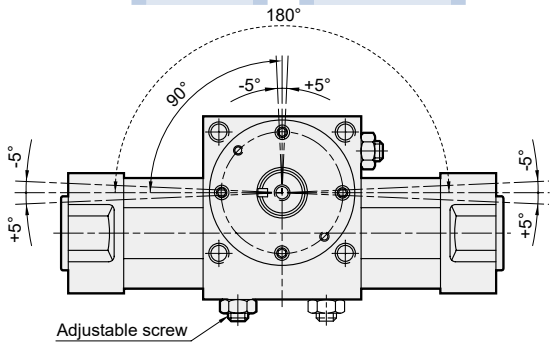
Bottom mounting | Top mounting

Rotating direction and adjustable angle

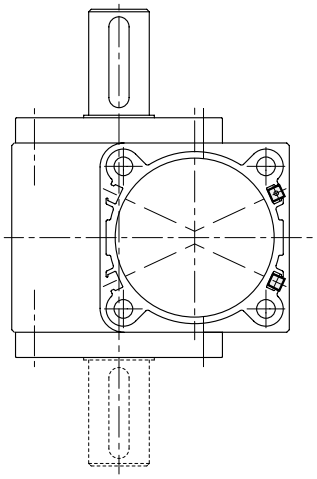
MRTF

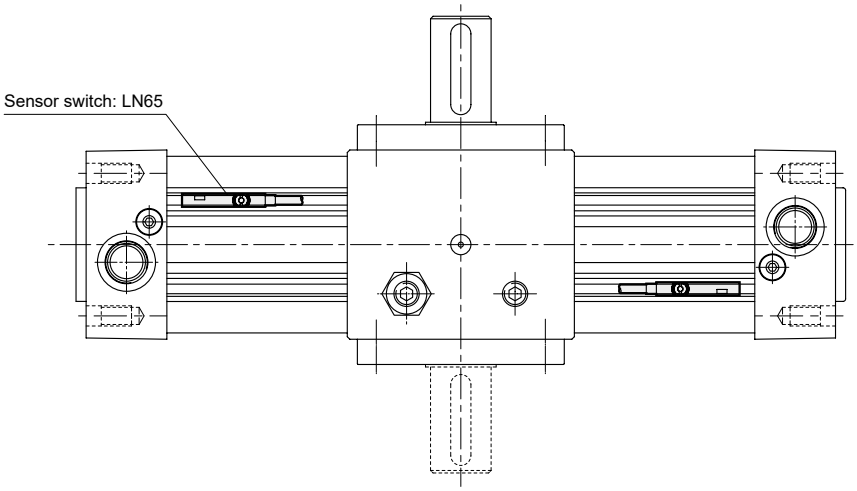


MRTH MRTH-D

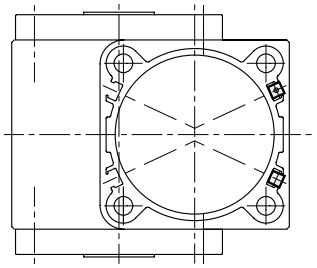


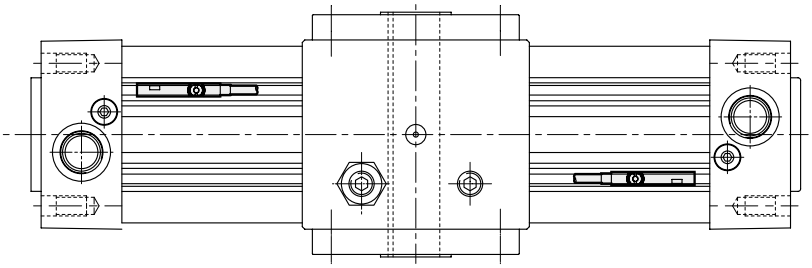
MRTH MRTH-D





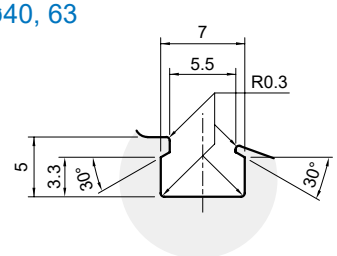
MRTF



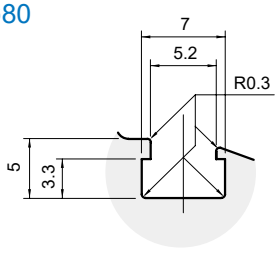


Sensor siwtch mounting groove

ø40, 63



ø80



Tube I.D.	Sensor switch
40, 63, 80	LN65