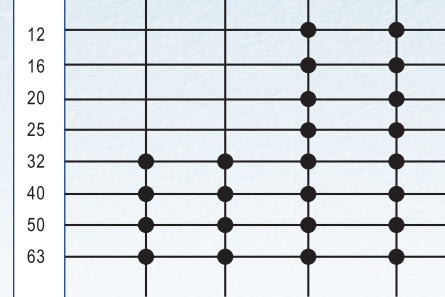




Rotary clamp cylinder——QCK Series

Product series

	Series name	Mounting type		Acting type	Bore size	Collocation of sensor switch			
		Basic	FB			CS1-J	DS1-J	CS1-G	DS1-G
QCK Series				Double acting					
Page	372	373				397			

Installation and application

1. Dirty substances in the pipe must be eliminated before cylinder is connected with pipeline to prevent the entrance of impurities into the cylinder.
2. The medium used by cylinder shall be filtered to 40 μm or below.
3. Anti-freezing measure shall be adopted under low temperature environment to prevent moisture freezing.
4. If the cylinder is dismantled and stored for a long time, please conduct anti-rust treatment to the surface. Anti-dust jam cap shall be added in air inlet and outlet ports.
5. To insure the life-span of cylinder and jig, please use flow control valve to control the speed of cylinder.

Criteria for selection: Cylinder thrust

Unit: Newton(N)

Bore size (mm)	Rod size (mm)	Acting type	Operating pressure(MPa)							
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
12	6	IN(Clamp)	8.5	17.0	25.4	33.9	42.4	50.9	59.4	67.9
		OUT(Release)	11.3	22.6	33.9	45.2	56.5	67.9	79.2	90.4
16	8	IN(Clamp)	15.1	30.2	45.2	60.3	75.4	90.5	105.6	120.6
		OUT(Release)	20.1	40.2	60.3	80.4	100.5	120.6	140.7	160.8
20	12	IN(Clamp)	20.1	40.2	60.3	80.4	100.5	120.6	140.7	160.8
		OUT(Release)	31.4	62.8	94.2	125.7	157.1	188.5	219.9	251.3
25	12	IN(Clamp)	37.8	75.6	113.3	151.1	188.9	226.7	264.4	302.2
		OUT(Release)	49.1	98.2	147.3	196.3	245.4	294.5	343.6	392.7
32	16	IN(Clamp)	60.3	120.6	181.0	241.3	301.6	361.9	422.2	482.5
		OUT(Release)	80.4	160.8	241.3	321.7	402.1	482.5	563.0	643.4
40	16	IN(Clamp)	105.6	211.1	316.7	422.2	527.8	633.3	738.9	844.5
		OUT(Release)	125.7	251.3	377.0	502.7	628.3	754.0	879.6	1005.3
50	20	IN(Clamp)	164.9	329.9	494.8	659.7	824.7	989.6	1154.5	1319.5
		OUT(Release)	196.3	392.7	589.0	785.4	981.7	1178.1	1374.4	1570.8
63	20	IN(Clamp)	280.3	560.6	840.9	1121.2	1401.5	1681.9	1962.2	2242.5
		OUT(Release)	311.7	623.4	935.2	1246.9	1558.6	1870.3	2182.1	2493.8



QCK

Rotary clamp cylinder

QCK Series



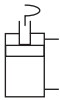
■ Specification

Bore size(mm)	12	16	20	25	32	40	50	63
Acting type	Double acting							
Fluid	Air(to be filtered by 40 μ m filter element)							
Operating pressure	0.15~1.0MPa(23~145psi)/(1.5~10bar)							
Proof pressure	1.5MPa(215psi)(15bar)							
Temperature ℃	-20~80							
Speed range mm/s	50~200							
Rotation angle	90° ± 10°							
Rotation direction	Turn left or turn right							
Rotation stroke mm	7.5		9.5		15		19	
Clamping stroke mm	10 20	10 20 30			10 20 30 50			
Stroke tolerance	+1.0 0							
Cushion type	Bumper							
Port size ①	M5 × 0.8				1/8"		1/4"	

① PT thread, NPT and G thread are available.

Add) QCK series are all attached with magnet, please refer to Page 397~420 for the specific content of sensor switch.

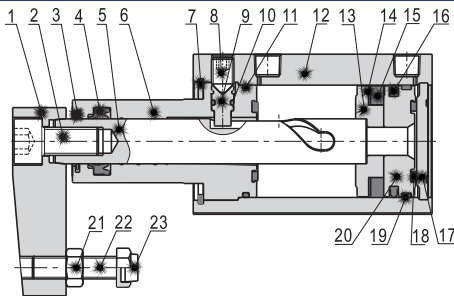
■ Symbol



■ Product feature

1. It can be used on welding fixture, the QPQ surface treatment prevent piston rod damage by welding slag; better than chrome plated piston rod.
2. The front cover with stainless steel dust scraping ring, can keep the dust and welding slag out, and protect cylinder internal parts.
3. Strong magnet is optioned for Φ32 ~ Φ63 bore size, which can be used in high magnetic fields.
4. The mounting dimension of body is the same as ACQ series, can use ACQ series' accessories.

■ Inner structure and material of major parts



NO.	Item	Material
1	Rocker	Carbon steel
2	Screw	Carbon steel
3	Dust scraping ring	No(Φ12, Φ16)\Stainless steel(Others)
4	Front cover packing	NBR
5	Piston rod	SCR440
6	Front cover	Aluminum alloy
7	C Clip	Spring steel
8	Screw	Carbon steel
9	Operating screw	SCR440
10	O-ring	NBR
11	O-ring	NBR
12	Body	Aluminum alloy
13	Magnet holder	Brass(Φ12, Φ16)\Aluminum alloy(Others)
14	Magnet washer	NBR
15	Magnet	Sintered metal(Neodymium-iron-boron(Φ12~Φ25)\Plastic(Others)
16	Piston seal	NBR
17	Back cover	Aluminum alloy
18	Bumper	TPU(Φ12~Φ25)\NBR(Others)
19	Wear ring	No(Φ12~Φ32)\Wear resistant material(Others)
20	Piston	Brass(Φ12, Φ16)\Aluminum alloy(Others)
21	Screw	Carbon steel
22	Fixing screw	Carbon steel
23	Bumper	PTFE(Φ12~Φ40)\POM(Others)

■ Ordering code

QCK L 32 × 20 S FB □			
Model	Rotation direction	Thread type ②	Mounting type
QCK: Rotary clamp cylinder	L: Push and turn left R: Push and turn right	Blank: PT T: NPT G: G	Blank: No bracket FB: FB type ①
Bore size	Clamping stroke	Magnet	
12 16 20 25 32 40 50 63	Bore size Clamping stroke Φ12 10, 20 Φ16~Φ25 10, 20, 30 Φ32~Φ63 10, 20, 30, 50	S: With magnet	

① Back flange is same as ACQ series (please refer below table), if need front flange, please contact us.

Bore size\Accessories	FB	Material	Bore size\Accessories	FB	Material
12	F-ACQ12FA	Aluminum alloy	32	F-ACQ32FA	Aluminum alloy
16	F-ACQ16FA		40	F-ACQ40FA	
20	F-ACQ20FA		50	F-ACQ50FA	
25	F-ACQ25FA		63	F-ACQ63FA	

② When the thread is standard, the code is blank.

■ The definition of rotation direction and angle

QCKL
Clamping turn left

QCKR
Clamping turn right

Levorotary(QCKL):
When the piston of cylinder moves downward, the swivel arms moves anticlockwise, this is called levorotary.

The order code is **L**

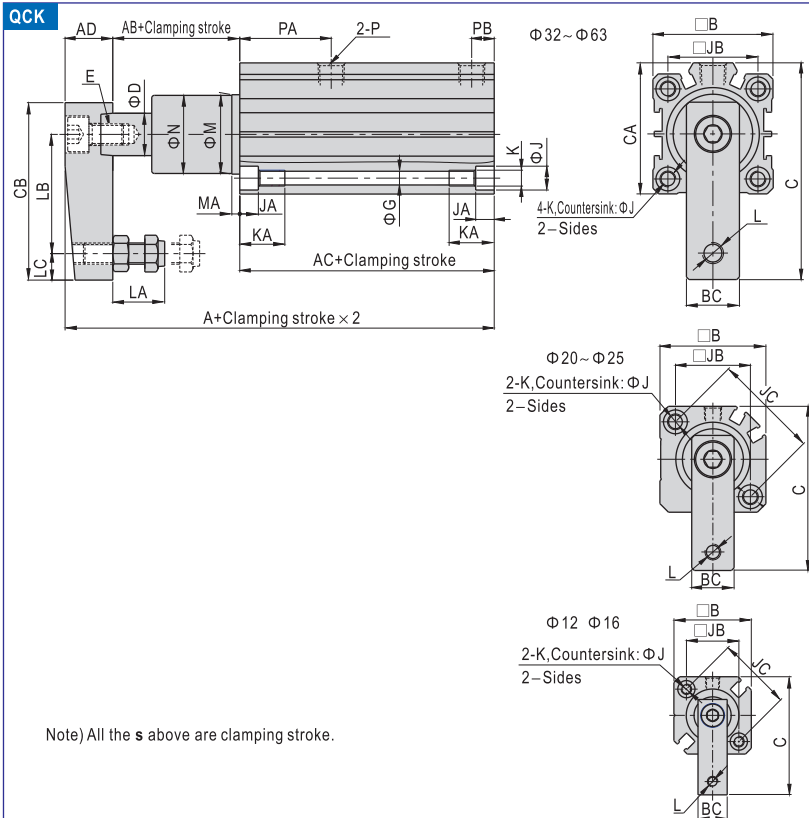
Dextrorotary(QCKR):
When the piston of cylinder moves downward, the swivel arms moves clockwise, this is called dextrorotary.

The order code is **R**

Rotary clamp cylinder

QCK Series

■ Dimensions

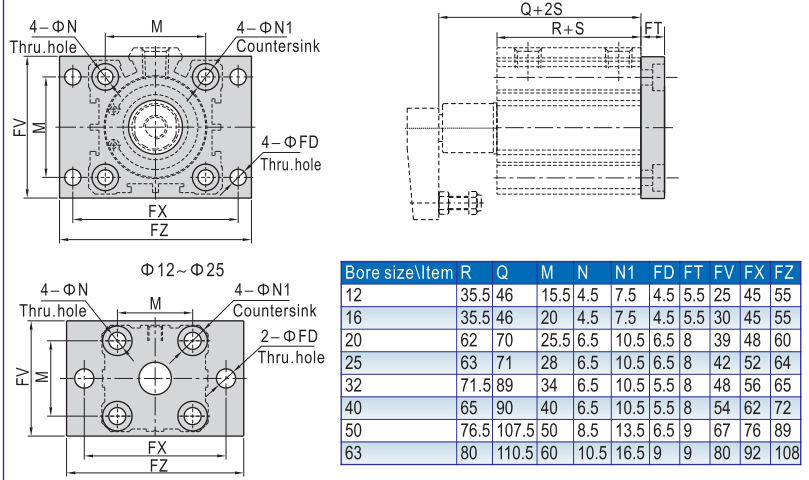


Bore size\Item	A	AB	AC	AD	B	BC	C	CA	CB	D	E	G	J	JA	JB
12	55	10.5	35.5	9	25	9	36.5	—	29	6	M3 × 0.5	3.3	6.5	3.5	15.5
16	59	10.5	35.5	13	29	11	44.5	—	36	8	M5 × 0.8	3.3	6.5	3.5	20
20	86	8	62	16	36	16	60	—	51	12	M8 × 1.25	5	9	7	25.5
25	87	8	63	16	40	16	62	—	51	12	M8 × 1.25	5	9	7	28
32	108	17.5	71.5	19	45	19	82	49.5	67	16	M10 × 1.5	5	9	7	34
40	109	25	65	19	53	19	85.5	57	67	16	M10 × 1.5	5	9	7	40
50	133	31	76.5	25.5	64	25.5	114	71	88	20	M12 × 1.75	6.5	11	8	50
63	136	30.5	80	25.5	77	25.5	120.5	84	88	20	M12 × 1.75	8.5	14	10.5	60

Bore size\Item	JC	K	KA	L	LA	LB	LC	M	MA	N	P	PA	PB
12	22	M4 × 0.7	11	M4 × 0.7	7~13	20	4	11	3	10.8	M5 × 0.8	13.5	5.5
16	28	M4 × 0.7	11	M4 × 0.7	7~13	25	5	14	3	13.8	M5 × 0.8	15	5.5
20	36	M6 × 1.0	17	M6 × 1.0	9.5~20.5	35	7	18	3	17.8	M5 × 0.8	30	6
25	40	M6 × 1.0	17	M6 × 1.0	9.5~20.5	35	7	23	6	22.5	M5 × 0.8	30	7
32	—	M6 × 1.0	17	M8 × 1.25	13.5~25.5	45	10	30	7	29.5	1/8"	34.5	8.5
40	—	M6 × 1.0	17	M8 × 1.25	13.5~25.5	45	10	30	3	29.5	1/8"	26.5	9
50	—	M8 × 1.25	22	M10 × 1.5	14.5~30	65	10	37	3.5	36.5	1/4"	34	11.5
63	—	M10 × 1.5	28.5	M10 × 1.5	14.5~30	65	10	48	3.5	47.5	1/4"	34.5	11.5

QCK-FB

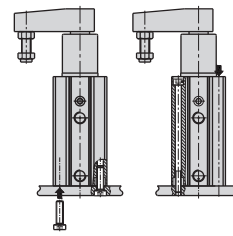
Φ32~Φ63



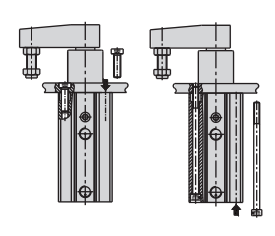
■ Installation and operation

1. To insure the life-span of cylinder and jig, please use flow control valve to control the speed of cylinder.
2. The method of installation are mounted by flange on top or bottom.

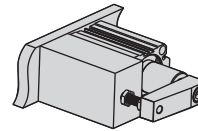
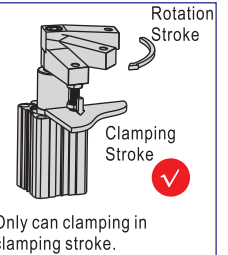
Mounting on bottom



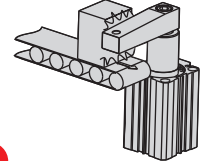
Mounting on top



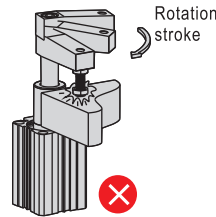
3. Before the cylinder is connected to pipeline sundries in the pipe must be eliminated, or may cause leakage.
4. Please clean the piston-rod and dust scraping ring to protect the cylinder.
5. The cylinder using normal magnet ring can use the same sensor as ACQ series. For the cylinder using strong magnet ring we suggest using AirTAC's CS1-69AM sensor.
6. Because the rotary force is strong when the cylinder's acting, we suggest using flow control valve to control the speed to protect cylinder.
7. Please install the cylinder following the right diagram.
8. The installation method as the diagram below is wrong, and will injure the cylinder and shorten the cylinder life.



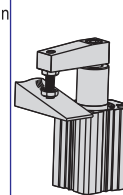
Don't installed horizontally



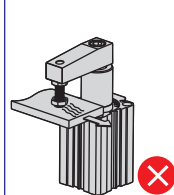
Don't exert horizontally load or force



Please don't clamp when rotating.

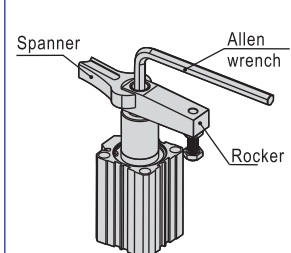
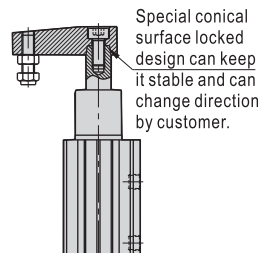


Please don't clamp on bevel



Do not more the workpiece when clamped

9. Rocker
 - 9.1) The design of rocker can keep it stable and can change direction by customer.
 - 9.2) Please follow the diagram below on right side to assemble/disassemble the rocker by spanner and allen wrench; don't hold the body to assemble/disassemble rocker, or will damage the cylinder.
 - 9.3) If need customize rocker, please contact us.



QCK

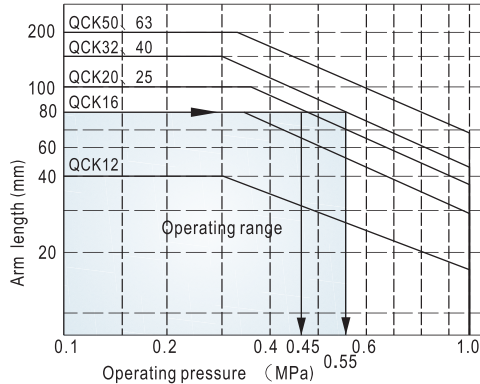
QCK Series

How to select product

1. When arms are to be made separately, their length and weight should be within the following range.

2. Allowable bending moment:

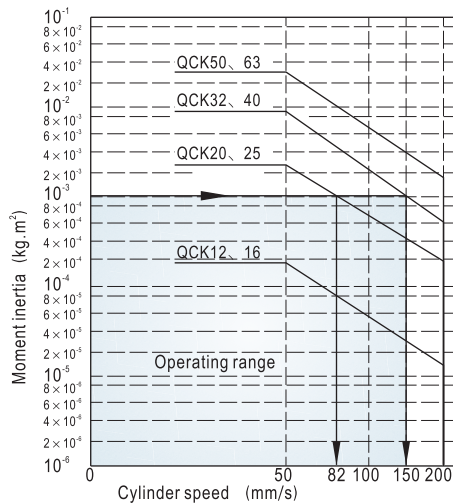
Use the arm length and operating pressure within graph(1) for allowable bending moment loaded piston rod.



Example: When arm length is 80mm, pressure should be less than QCK20/25:0.45MPa
QCK32/40:0.55MPa

3. Moment of inertia:

When the arm is long and heavy, damage of internal parts may be caused due to inertia. Use the inertia moment and cylinder speed within graph(2) based on arm requirements.



Example: When arm's moment of inertia is 10^{-3} Kg·m², cylinder speed should be less than
QCK20/25:82mm/s
QCK32/40:150mm/s

(Note) The average speed of piston=the highest speed of piston/1.6

4. Moment of inertia of cylinder's arm when rotating based on its rotary axis, shown in graph(3).

Model	Moment of inertia(Kg·m ²)
QCK12	3.555×10^{-6}
QCK16	1.053×10^{-5}
QCK20/25	5.257×10^{-5}
QCK32/40	1.653×10^{-4}
QCK50/63	7.387×10^{-4}

5. Calculation reference:

5.1 Moment of inertia of arm (I_1): Refer to the graph(3) after the cylinder bore diameter is determined.

5.2 Moment of inertia of jig (I_2): According to shape of the jig and the next item 6 "Calculation for moment of inertia", pick out a proper formula for calculation. The jig shown on the right graph is a cylinder, its formula of moment of inertia is:

$$I_2 = (m_2 \cdot D \cdot D) / 8 + m_2 \cdot L \cdot L$$

When QCK32 is selected: $L = 0.045$ m (arm length);

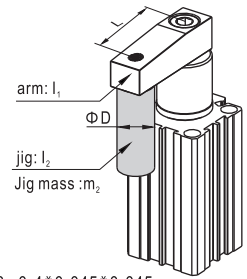
If $D = 0.04$ m $m_2 = 0.4$ kg

From graph(3): $I_1 = 1.653 \times 10^{-4}$ (Kg·m²)

By Calculation: $I_2 = (m_2 \cdot D \cdot D) / 8 + m_2 \cdot L \cdot L = (0.4 \cdot 0.04 \cdot 0.04) / 8 + 0.4 \cdot 0.045 \cdot 0.045 = 8.9 \times 10^{-4}$ (Kg·m²)

Total value: $I = I_1 + I_2 = 10.553 \times 10^{-4} = 1.0553 \times 10^{-3}$ (Kg·m²)

According to graph(2), the highest speed of the cylinder should be less than 150 mm/s; According to graph(1), it can be used under a pressure of 0.9MPa. The average speed of piston=the highest speed of piston/1.6=94 mm/s.



6. Calculation for moment of inertia

Diagram	Calculation formula of moment of inertia
1. Thin bar Position of rotary axis: Vertical to the bar and through the end	$I = \frac{m_1 a_1^2 + m_2 a_2^2}{3}$
2. Thin bar Position of rotary axis: Vertical to the bar and through the center of gravity	$I = \frac{ma^2}{12}$
3. Load at the end of lever arm	$I = m_1 \times \frac{a_1^2}{3} + m_2 \times a_2^2 + k$ $k = m_2 \times \frac{2r^2}{5}$
4. Thin rectangular plate (Rectangular parallelepiped) Position of rotary axis: Parallel to side b and through the center of gravity	$I = \frac{ma^2}{12}$
5. Thin rectangular plate (Rectangular parallelepiped) Position of rotary axis: Vertical to the plate and through the end	$I = m_1 \times \frac{4a^2 + b^2}{12} + m_2 \times \frac{4a_2^2 + b^2}{12}$
6. Thin rectangular plate (Rectangular parallelepiped) Position of rotary axis: Through the center of gravity and vertical to the plate (Same as also thick rectangular plate)	$I = \frac{ma^2 + mb^2}{12}$