

# Compact Cylinder

## Series CQS

ø12, ø16, ø20, ø25

**Ideal for machine designs with small space requirements**

The "D-M9" auto switch will not protrude from switch mounting groove.

**Square body shape gives you flexibility for designing machine.**

Cross-section of a cylinder tube is the same configuration regardless of w/ switch or w/o switch.

**Auto switch mounting allows for flexible designing requirements**

3 faces on ø12, ø16, and all 4 faces including port side on ø20, ø25.

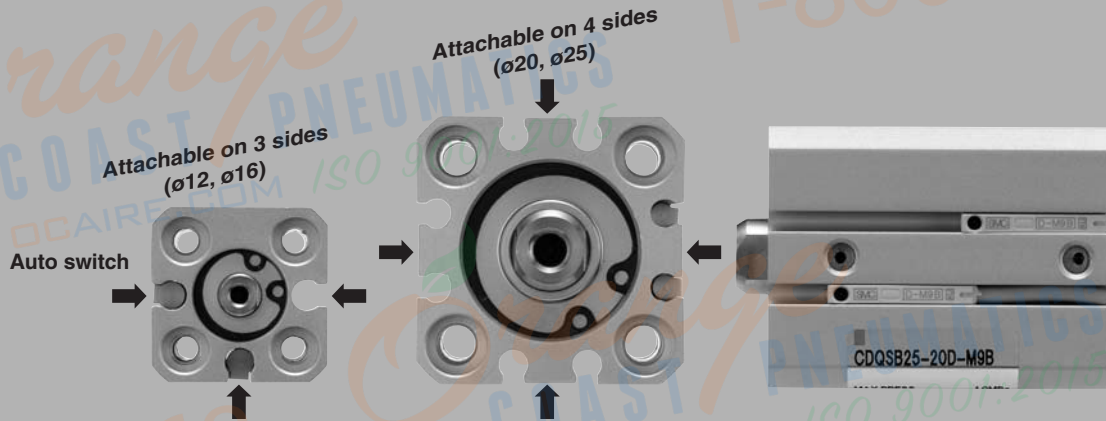
**2 way basic mounting: Through-hole or both ends tapped**

Basic mounting is 2 way. You can choose either through-hole or both ends tapped mounting.

**Non-rotating accuracy  
Non-rotating rod**

Hexagonal cross sectional shape piston rod for high non-rotation accuracy.

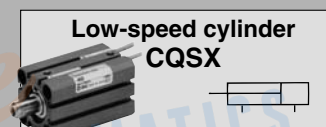
ø12, ø16 — ±1°  
ø20, ø25 — ±0.7°



			Bore size (mm)	Stroke (mm)	Page
<b>Standard</b> 	Double acting	Single rod CQS	12, 16 20, 25	Standard stroke ø12 } 5, 10, 15, 20 ø16 } 25, 30 ø20 } 5, 10, 15, 20, 25 ø25 } 30, 35, 40, 45, 50	551
		Double rod CQSW		Long stroke ø12 } 35, 40, 45, 50, 75, 100 ø16 } 125, 150, 175, 200 ø20 } 75, 100, 125, 150, 175, 200 ø25 } 75, 100, 125, 150, 175, 200, 250, 300	
<b>Non-rotating Rod</b> 	Double acting	Return/Extend CQS		ø12 } 5, 10 ø16 } ø20 } ø25 }	567
		Single acting		Single rod CQSK	ø12 } 5, 10, 15, 20 ø16 } 25, 30 ø20 } 5, 10, 15, 20, 25 ø25 } 30, 35, 40, 45, 50
<b>Anti-lateral Load</b> 	Double acting	Double rod CQSKW		ø12 } 5, 10, 15, 20 ø16 } 25, 30 ø20 } 5, 10, 15, 20, 25 ø25 } 30, 35, 40, 45, 50	582
		Single rod CQS□S		ø12 } 5, 10, 15, 20 ø16 } 25, 30 ø20 } 5, 10, 15, 20, 25 ø25 } 30, 35, 40, 45, 50	589



Refer to Best Pneumatics No. 3.



Refer to Best Pneumatics No. 3.

# Combinations of Standard Products and Made

## Series CQS

- : Standard
- ◎ : Made to Order specifications
- : Special product (Contact SMC for details.)
- : Not available

Symbol	Specification	Applicable bore size	CQS (Standard)			
			Double acting		Single acting	
			Single rod	Double rod	Single rod/Extension	Single rod/Retraction
			ø12 to ø25			
<b>Standard</b>	Standard	ø12 to ø25	●	●	●	●
<b>D</b>	Built-in magnet		●	●	●	●
<b>CQS□-□M</b>	Rod end male thread		●	●	●	●
<b>CQS□-□C</b>	With rubber bumper		●	●	○	○
<b>CQS□-□F</b>	With boss on head end		●	—	●	●
<b>CQS<sub>G</sub><sup>LF</sup></b>	Foot, Flange		●	●	●	●
<b>CQSD</b>	Double clevis style		●	—	●	●
<b>10-, 11-</b>	Clean series		●	○	○	○
<b>20-</b>	Copper and Fluorine-free		●	●	●	●
<b>XB6</b>	Heat-resistant cylinder (-10 to 150 °C)		ø12 to ø25	◎	◎	○
<b>XB7</b>	Cold-resistant cylinder (-40 to 70 °C)	◎		◎	○	○
<b>XB9</b>	Low-speed cylinder (5 to 50 mm/s)	◎		◎	○	○
<b>XB10</b>	Intermediate stroke (Using exclusive body)	◎		◎	◎	○
<b>XB13</b>	Low-speed cylinder (5 to 50 mm/s)	◎		◎	○	○
<b>XC6</b>	Piston rod, retaining ring, rod end nut made of stainless steel	◎		◎	◎	◎
<b>XC8</b>	Adjustable stroke cylinder/Adjustable extension type	◎		—	○	○
<b>XC9</b>	Adjustable stroke cylinder/Adjustable retraction type	◎		—	○	○
<b>XC10</b>	Dual stroke cylinder/Double rod type	◎		—	◎	◎
<b>XC11</b>	Dual stroke cylinder/Single rod type	◎		—	○	○
<b>XC36</b>	With boss on rod side	◎		◎	◎	◎
<b>X235</b>	Change of piston rod end of double rod cylinder	—		◎	—	—
<b>X271</b>	Fluororubber seal	◎		◎	◎	◎
<b>X525</b>	Long stroke of adjustable extension stroke cylinder (-XC8)	◎		—	○	○
<b>X526</b>	Long stroke of adjustable retraction stroke cylinder (-XC9)	◎		—	○	○
<b>X633</b>	Intermediate stroke of double rod type	—		◎	—	—
<b>X636</b>	Long stroke of dual stroke single rod	◎		—	○	—
<b>X1876</b>	With concave shape end boss on the cylinder tube head side	ø20, ø25		◎	—	◎

Note 1) A rubber bumper comes as standard.

Note 2) For ø12 and ø16 only. (○) for ø20 and ø25.

Note 3) Refer to Best Pneumatics No. 3 for low-speed cylinders.





# Series CQS Specific Product Precautions

Be sure to read before handling. Refer to front matters 54 and 55 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

## Operating Precautions

### ⚠ Caution

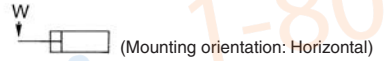
- All loads to piston rod must be applied in axial direction only.
  - When a lateral load is applied unavoidably, ensure that it should not exceed the allowable lateral load to the rod end as specified in graph (1) to (5).
  - When installing a cylinder, centering should be required accurately.
  - Adoption of guide mechanism is strongly recommended for the case when CQS is used as stopper to prevent non-rotating piston rod from side loads.
- When a workpiece is secured to the end of the piston rod, ensure that the piston rod is retracted entirely, and place a wrench on the portion of the rod that protrudes beyond the section. Also, tighten by giving consideration to prevent the tightening torque from being applied to the non-rotating guide.

## Retaining Ring Installation/Removal

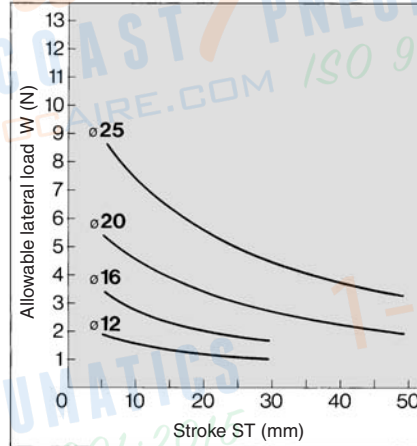
### ⚠ Caution

- For installation and removal, use an appropriate pair of pliers (tool for installing a type C retaining ring).
- Even if a proper plier (tool for installing type C retaining ring) is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier (tool for installing a type C retaining ring). Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.

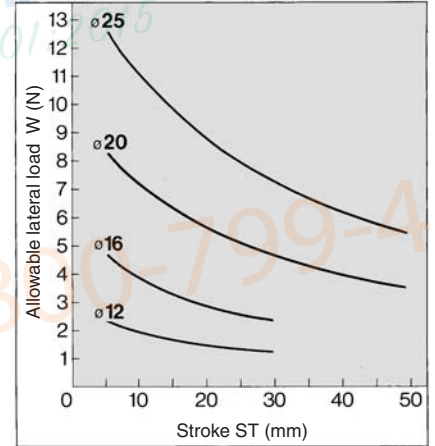
## Allowable Lateral Load at Rod End



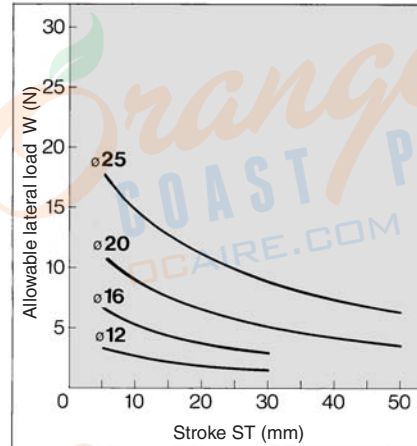
Graph (1) Standard:  
Non-rotating Rod Type/Without Auto Switch



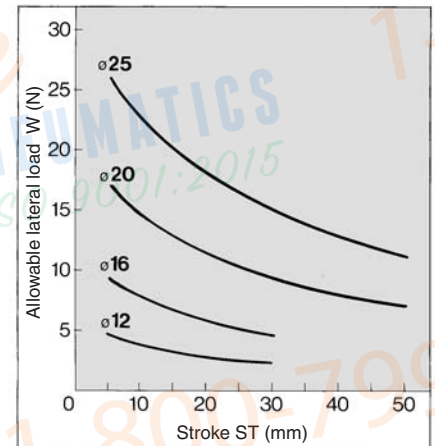
Graph (2) Standard:  
Non-rotating Rod Type/With Auto Switch



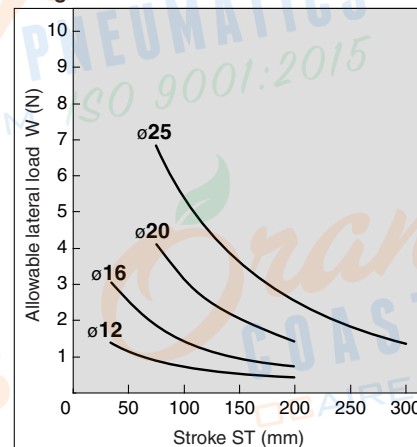
Graph (3)  
Anti-lateral Load Type/Without Auto Switch



Graph (4)  
Anti-lateral Load Type/With Auto Switch



Graph (5)  
Long Stroke/With & Without Auto Switch



Note 1) Graph (1) to (5): Rod end female thread

Note 2) Lateral load allowance varies depending upon rod end shape dimensions or load value (distance to the center of the gravity of load). Please consult with SMC.

# Compact Cylinder: Standard Type Double Acting, Single Rod Series CQS

ø12, ø16, ø20, ø25

## How to Order

**CQS B 20 - 30 D** - [ ] - [ ]

**With auto switch** **CDQS B 20 - 30 D** - [ ] - **M9BW** [ ] - [ ]

**With auto switch** (Built-in magnet)

**Mounting style**

<b>B</b>	Through-hole/Both ends tapped common (Standard)
<b>L</b>	Foot style
<b>F</b>	Rod side flange style
<b>G</b>	Head side flange style
<b>D</b>	Double clevis style

**Bore size**

<b>12</b>	12 mm
<b>16</b>	16 mm
<b>20</b>	20 mm
<b>25</b>	25 mm

**Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.
<b>n</b>	"n" pcs.

**Auto switch**

<b>Nil</b>	Without auto switch
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**Body option**

<b>Nil</b>	Standard
<b>C</b>	With rubber bumper
<b>M</b>	Rod end male thread
<b>F</b>	Boss on head side

**Action**

<b>D</b>	Double acting
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**Body option <Standard stroke>**

<b>C</b>	With rubber bumper Rod end female thread (Standard)
<b>CM</b>	With rubber bumper Rod end male thread

**Body option <Long stroke>**

<b>C</b>	With rubber bumper Rod end female thread (Standard)
<b>CM</b>	With rubber bumper Rod end male thread

**Cylinder stroke (mm)**

Bore size	Standard stroke	Long stroke
<b>12, 16</b>	5, 10, 15, 20, 25, 30	35, 40, 45, 50, 75, 100, 125, 150, 175, 200
<b>20</b>	5, 10, 15, 20, 25, 30, 35, 40, 45, 50	75, 100, 125, 150, 175, 200
<b>25</b>		75, 100, 125, 150, 175, 200, 250, 300

\* In the case of long strokes, use either ends tapped mounting or bracket mounting.  
\* Mounting brackets are shipped together, (but not assembled).  
\* Cylinder mounting bolts are not included. Order them separately referring to "Mounting Bolt for CQS" on pages 556 and 557.

\* Refer to the table below for the applicable auto switch model.

\* Rubber bumper is standard equipment for long stroke type.

**Built-in Magnet Cylinder Model**  
If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.  
(Example) CDQSL25-30D

For "Manufacture of Intermediate Strokes", refer to page 552.

## Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

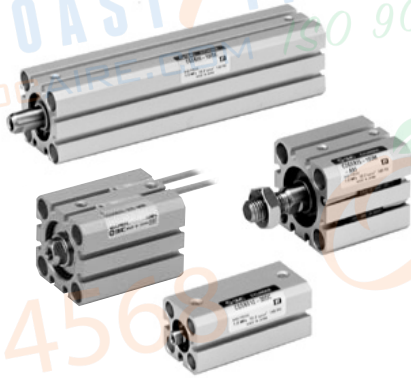
Type	Special function	Electrical entry	Indicator/light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC	
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
				2-wire				M9BV	M9B	●	●	●	○	○		
	3-wire (NPN)			M9NWV				M9NW	●	●	●	○	○			
	3-wire (PNP)			M9PWV				M9PW	●	●	●	○	○			
	2-wire			M9BWV				M9BW	●	●	●	○	○			
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NAV	M9NA	○	○	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PAV	M9PA	○	○	●	○	○		
				2-wire				M9BAV	M9BA	○	○	●	○	○		
Water resistant (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NAV	M9NA	○	○	●	○	○	IC circuit	Relay, PLC	
			3-wire (PNP)				M9PAV	M9PA	○	○	●	○	○			
			2-wire				M9BAV	M9BA	○	○	●	○	○			
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	12 V	100 V	A96V	A96	●	—	●	—	—	IC circuit	Relay, PLC
				2-wire				A93V	A93	●	—	●	—	—		
								A90V	A90	●	—	●	—	—		

\* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW  
1 m..... M (Example) M9NWM  
3 m..... L (Example) M9NWL  
5 m..... Z (Example) M9NWZ

\* Solid state auto switches marked with "○" are produced upon receipt of order.

\* Since there are other applicable auto switches than listed, refer to page 597 for details.  
\* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.  
\* Auto switches are shipped together (not assembled).  
Note) There is the case A9□V/M9□V/M9□WV/M9□AVL type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Consult with SMC for details.

# Series CQS



## Specifications

Bore size (mm)		12	16	20	25
<b>Action</b>		Double acting, Single rod			
<b>Fluid</b>		Air			
<b>Lubrication</b>		Not required (Non-lube)			
<b>Proof pressure</b>		1.5 MPa			
<b>Maximum operating pressure</b>		1.0 MPa			
<b>Minimum operating pressure</b>		0.07 MPa	0.05 MPa		
<b>Ambient and fluid temperature</b>		Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
<b>Cushion</b>		None, Rubber bumper*			
<b>Rod end thread</b>		Female thread			
<b>Stroke length tolerance</b>		Standard stroke: $^{+1.0}_0$ Long stroke: $^{+1.4}_0$ *			
<b>Mounting</b>		Through-hole/Both ends tapped common			
<b>Piston speed</b>		50 to 500 mm/s			
<b>Allowable kinetic energy (J)</b>	Standard type	0.022	0.038	0.055	0.09
	With rubber bumper	0.043	0.075	0.11	0.18

\* Stroke length tolerance does not include the deflection of the bumper.

\* Only rubber bumper is available for the long stroke type.

## JIS Symbol



## Made to Order Specifications

(For details, refer to pages 1373 to 1565.)

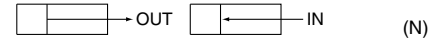
Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat-resistant cylinder (-10 to 150 °C) (without an auto switch)
-XB7	Cold-resistant cylinder (-40 to 70 °C) (without an auto switch)
-XB9	Low speed cylinder (10 to 50 mm/s)
-XB10	Intermediate stroke (Using exclusive body)
-XB13	Low speed cylinder (5 to 50 mm/s)
-XC6	Piston rod, retaining ring, rod end nut made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extension type
-XC9	Adjustable stroke cylinder/Adjustable retraction type
-XC10	Dual stroke cylinder/Double rod type
-XC11	Dual stroke cylinder/Single rod type
-XC36	With boss in rod side
-X271	Fluororubber seals
-X525	Long stroke of adjustable extension stroke cylinder (-XC8)
-X526	Long stroke of adjustable retraction stroke cylinder (-XC9)
-X636	Long stroke of dual stroke single rod
-X1876	With concave shape end boss on the cylinder tube head side

## Body Option

Description	Application
Rod end male thread	Available for all standard models of double acting, single rod.
Rubber bumper	

\* Rubber bumper is standard equipment for long stroke type.

## Theoretical Output



Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)		
				0.3	0.5	0.7
12	6	IN	84.8	25	42	59
		OUT	113	34	57	79
16	8	IN	151	45	75	106
		OUT	201	60	101	141
20	10	IN	236	71	118	165
		OUT	314	94	157	220
25	12	IN	378	113	189	264
		OUT	491	147	245	344

## Manufacture of Intermediate Stroke

Description		Spacer is installed in the standard stroke body.		Exclusive body (-XB10)	
Part no.		Refer to "How to Order" for the standard model no. (page 551).		Suffix "-XB10" to the end of standard model no. (page 551).	
Standard stroke	Description	Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.		Dealing with the stroke by the 1 mm interval by using an exclusive body with the specified stroke.	
	Stroke range	Bore size	Stroke range	Bore size	Stroke range
		12, 16	1 to 29	12, 16	6 to 29
		20, 25	1 to 49	20, 25	6 to 49
Long stroke	Description	Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.		Dealing with the stroke by the 1 mm interval by using an exclusive body with the specified stroke.	
	Stroke range	Bore size	Stroke range	Bore size	Stroke range
		12, 16	31 to 199	12, 16	31 to 199
		20	51 to 199	20	51 to 199
25		51 to 299	25	51 to 299	
Example		Part no.: CQSB25-47D CQSB25-50D with 3 mm width spacer inside. B dimension is 72.5 mm.		Part no.: CQSB25-47D-XB10 Makes 47 stroke tube. B dimension is 69.5 mm.	

Refer to pages 595 to 597 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket/Part no.

# Compact Cylinder: Standard Type Double Acting, Single Rod **Series CQS**

## Mass/Without Auto Switch

Bore size (mm)	Cylinder stroke (mm)																	
	5	10	15	20	25	30	35	40	45	50	75	100	125	150	175	200	250	300
12	29	36	42	49	56	63	93	100	107	113	147	180	213	246	279	312	—	—
16	38	47	56	64	73	82	119	128	136	145	187	229	271	313	355	397	—	—
20	63	75	88	101	114	127	140	153	166	178	306	370	434	498	562	627	—	—
25	91	107	123	139	155	171	186	202	218	234	399	478	557	636	715	794	952	1110

## For standard stroke

Calculation: (Example) **CQSD20-20DCM**

- Cylinder mass: CQSB20-20D..... 101 g
  - Option mass: Rod end male thread..... 10 g
  - Option mass: Rubber bumper..... -2 g
  - Option mass: Double clevis style..... 92 g
- 201 g

## Mass/With Auto Switch (Built-in magnet)

Bore size (mm)	Cylinder stroke (mm)																	
	5	10	15	20	25	30	35	40	45	50	75	100	125	150	175	200	250	300
12	37	43	50	57	63	70	94	101	108	114	148	181	214	247	280	313	—	—
16	48	57	66	74	83	92	121	129	137	146	188	231	273	315	357	399	—	—
20	93	106	119	132	144	157	170	182	195	208	311	375	439	503	567	632	—	—
25	134	150	166	182	197	213	229	245	261	277	406	485	564	643	721	800	958	1116

## Additional Mass

Bore size (mm)		12	16	20	25
Rod end male thread	Male thread	1.5	3	6	12
	Nut	1	2	4	8
Rubber bumper * (No need to add for long stroke)		0	1	-2	-3
Foot style (Including mounting bolt)		55 (53)	65 (61)	159 (153)	181 (172)
Rod side flange style (Including mounting bolt)		58 (56)	70 (66)	143 (137)	180 (171)
Head side flange style (Including mounting bolt)		56	66	137	171
Double clevis style (Including pin, snap ring, bolt)		34	40	92	127

( ): denotes the values of long stroke model.

## Mounting Bracket Part No.

Bore size (mm)	Foot (1)	Flange	Double clevis
12	CQS-L012	CQS-F012	CQS-D012
16	CQS-L016	CQS-F016	CQS-D016
20	CQS-L020	CQS-F020	CQS-D020
25	CQS-L025	CQS-F025	CQS-D025

Note1) When ordering foot bracket, order 2 pieces per cylinder.

Note2) Parts belonging to each bracket are as follows.

Foot or Flange style: Body mounting bolt  
Double clevis style: Clevis pin, Type C snap ring for axis, Body mounting bolt.

## Copper and Fluorine-free Series (For CRT manufacturing process)

20-C(D)QS **Mounting** **Bore size** **Stroke** D(C)(M)

• Copper and Fluorine-free Series → ∅12, ∅16, ∅20, ∅25

To prevent the influence of copper ions or halogen ions during CRT manufacturing processes, copper and fluorine materials are not used in the component parts.

## Specifications

Action	Double acting, Single rod
Bore size (mm)	12, 16, 20, 25
Proof pressure	1.5 MPa
Maximum operating pressure	1.0 MPa
Cushion	None, Rubber bumper
Mounting	Through-hole/Both ends tapped common
Piston speed	50 to 500 mm/s

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

Individual

-X□

Technical

data

# Series CQS

## Clean Series (Standard stroke is only available.)

10 — C(D)QSB Bore size — Stroke D(M)

### Clean Series

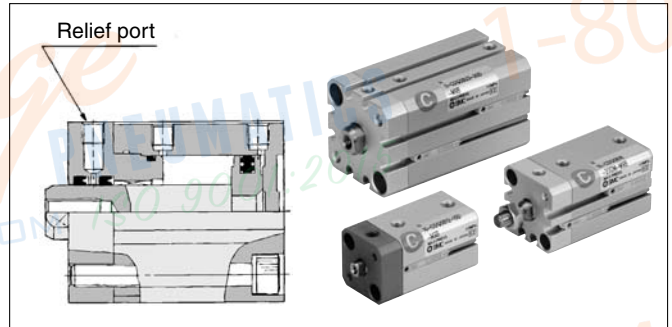
10	Relief type
11	Vacuum type

The type which is applicable for using inside the clean room graded Class 100 by making an actuator's rod section a double seal construction and discharging by relief port directly to the outside of clean room.

### Specifications

Action	Double acting, Single rod
Bore size (mm)	ø12, ø16, ø20, ø25
Proof pressure	1.5 MPa
Maximum operating pressure	1.0 MPa
Rubber bumper	None
Piping	Screw-in piping
Piston speed	30 to 400 mm/s
Mounting	Through-hole/Both ends tapped common
Auto switch	Mountable

Note) For details, please contact SMC.



For details, refer to the separate catalog "Pneumatic Clean Series".

## Smooth Cylinder

CQS Y Mounting Bore size — Stroke D(C)(M)

### Smooth Cylinder

Smooth operation with a little sticking and slipping at low speed.  
Dual-side low friction operation is possible.



Refer to Best Pneumatics No. 3.

### Specifications

Bore size (mm)	12	16	20	25
Type	Pneumatic (Non-lube)			
Action	Double acting, Single rod			
Fluid	Air			
Proof pressure	1.05 MPa			
Maximum operating pressure	0.7 MPa			
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
Cushion	None, Rubber bumper*			
Rod end thread	Female thread			
Stroke length tolerance	+1.0* 0			
Mounting	Through-hole/Both ends tapped common			
Piston speed	50 to 500 mm/s			
Allowable leakage	0.5ℓ/min (ANR) or less			

\* Stroke length tolerance does not include the deflection of the bumper.

### Minimum operating pressure (MPa)

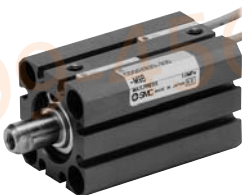
Bore size (mm)	12	16	20	25
Minimum operating pressure	0.03		0.02	

## Low-speed Cylinder

CQS X Mounting Bore size — Stroke D(C)(M)

### Low-speed Cylinder

Smooth operation with a little sticking and slipping at low speed.  
Can start smoothly with a little ejection even after being rendered for hours.



Refer to Best Pneumatics No. 3.

### Specifications

Bore size (mm)	12	16	20	25
Type	Pneumatic (Non-lube)			
Action	Double acting, Single rod			
Fluid	Air			
Proof pressure	1.5 MPa			
Maximum operating pressure	1.0 MPa			
Ambient and fluid temperature	Without auto switch: -10 to 70°C With auto switch: -10 to 60°C (No freezing)			
Rubber bumper	None, Rubber bumper*			
Rod end thread	Female thread			
Stroke length tolerance	Standard stroke +1.0 0			
Mounting	Through-hole/Both ends tapped common			
Piston speed	ø12, ø16: 1 to 300 mm/s ø20, ø25: 0.5 to 300 mm/s			

\* Stroke length tolerance does not include the deflection of the bumper.

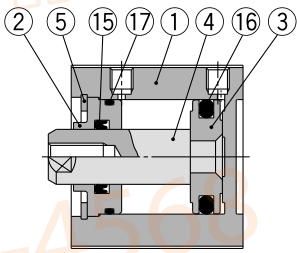
### Minimum operating pressure (MPa)

Bore size (mm)	12	16	20	25
Minimum operating pressure	0.03	0.03	0.025	0.025

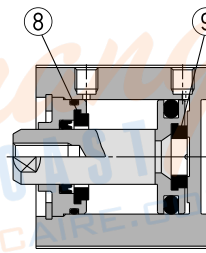
# Compact Cylinder: Standard Type Double Acting, Single Rod **Series CQS**

## Construction

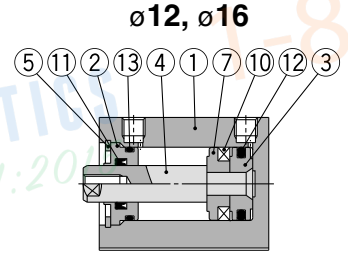
Basic style



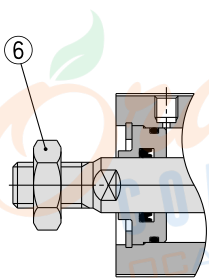
With rubber bumper



With auto switch (Built-in magnet)



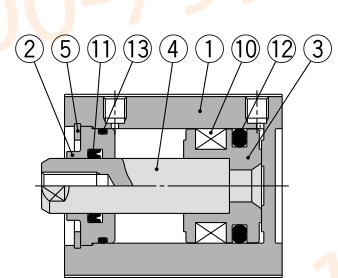
Rod end male thread



Long stroke



ø20, ø25



### Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Collar	Aluminum alloy	Anodized
3	Piston	Aluminum alloy	Chromated
4	Piston rod	Stainless steel	
5	Retaining ring	Carbon tool steel	Phosphate coated
6	Rod end nut	Carbon steel	Nickel plated
7	Spacer for switch type	Aluminum alloy	Chromated
8	Bumper A	Urethane	
9	Bumper B	Urethane	
10	Bottom plate	Aluminum alloy	Anodized

### Component Parts

No.	Description	Material	Note
11	Collar	Aluminum alloy	Anodized
12	Bushing	Oil-impregnated sintered alloy	
13	Wear ring	Resin	
14	Magnet	—	
15 *	Rod seal	NBR	
16 *	Piston seal	NBR	
17 *	Tube gasket	NBR	

### Replacement Parts: Seal Kit (Basic style)

Bore size (mm)	Kit no.	Contents
12	CQSB12-PS	Set of nos. above ⑮, ⑯, ⑰
16	CQSB16-PS	
20	CQSB20-PS	
25	CQSB25-PS	

### Replacement Parts: Seal Kit (Long stroke)

Bore size (mm)	Kit no.	Contents
12	CQSB12-L-PS	Set of nos. above ⑮, ⑯, ⑰
16	CQSB16-L-PS	
20	CQSB20-L-PS	
25	CQSB25-L-PS	

\* Seal kit includes ⑮, ⑯, ⑰. Order the seal kit, based on each bore size. (The long stroke type includes 2 tube gaskets.)

\* Since the seal kit does not include a grease pack, order it separately.

Grease pack part no.: GR-S-010 (10 g)

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-

-X

Individual

-X

Technical data

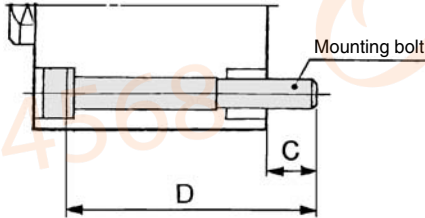
# Series CQS

## Mounting Bolt for CQS without Auto Switch

Mounting method: Mounting bolt for through-hole mounting style of CQSB is available as an option.

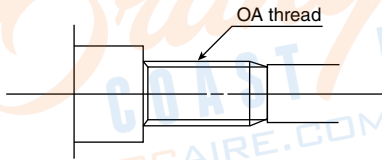
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 25L 4 pcs.**



Note 1) The appropriate plain washer must be used for through-hole mounting.

Note 2) Please contact SMC for details concerning the mounting bolts to be used with  $\phi 12$  and  $\phi 16$  that exceed 30 mm strokes, or  $\phi 20$  and  $\phi 25$  that exceed 50 mm strokes.



Cylinder model	C	D	Mounting bolt size	
<b>CQSB12-5D</b>	6.5	25	M3 x 25L	
<b>-10D</b>		30	x 30L	
<b>-15D</b>		35	x 35L	
<b>-20D</b>		40	x 40L	
<b>-25D</b>		45	x 45L	
<b>-30D</b>		50	x 50L	
<b>-35DC</b>				
<b>-40DC</b>				
<b>-45DC</b>				
<b>-50DC</b>				
Secure the cylinder by using the OA screws that are provided with the cylinder tube.				
<b>-75DC</b>				
<b>-100DC</b>				
<b>-125DC</b>				
<b>-150DC</b>				
<b>-175DC</b>				
<b>-200DC</b>				
<b>CQSB16-5D</b>	6.5	25	M3 x 25L	
<b>-10D</b>		30	x 30L	
<b>-15D</b>		35	x 35L	
<b>-20D</b>		40	x 40L	
<b>-25D</b>		45	x 45L	
<b>-30D</b>		50	x 50L	
<b>-35DC</b>				
<b>-40DC</b>				
<b>-45DC</b>				
<b>-50DC</b>				
Secure the cylinder by using the OA screws that are provided with the cylinder tube.				
<b>-75DC</b>				
<b>-100DC</b>				
<b>-125DC</b>				
<b>-150DC</b>				
<b>-175DC</b>				
<b>-200DC</b>				

Cylinder model	C	D	Mounting bolt size
<b>CQSB20-5D</b>	6.5	25	M5 x 25L
<b>-10D</b>		30	x 30L
<b>-15D</b>		35	x 35L
<b>-20D</b>		40	x 40L
<b>-25D</b>		45	x 45L
<b>-30D</b>		50	x 50L
<b>-35D</b>		55	x 55L
<b>-40D</b>		60	x 60L
<b>-45D</b>		65	x 65L
<b>-50D</b>		70	x 70L
Secure the cylinder by using the OA screws that are provided with the cylinder tube.			
<b>-75DC</b>			
<b>-100DC</b>			
<b>-125DC</b>			
<b>-150DC</b>			
<b>-175DC</b>			
<b>-200DC</b>			
<b>CQSB25-5D</b>	8.5	30	M5 x 30L
<b>-10D</b>		35	x 35L
<b>-15D</b>		40	x 40L
<b>-20D</b>		45	x 45L
<b>-25D</b>		50	x 50L
<b>-30D</b>		55	x 55L
<b>-35D</b>		60	x 60L
<b>-40D</b>		65	x 65L
<b>-45D</b>		70	x 70L
<b>-50D</b>		75	x 75L
Secure the cylinder by using the OA screws that are provided with the cylinder tube.			
<b>-75DC</b>			
<b>-100DC</b>			
<b>-125DC</b>			
<b>-150DC</b>			
<b>-175DC</b>			
<b>-200DC</b>			
<b>-250DC</b>			
<b>-300DC</b>			

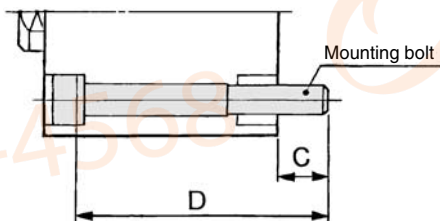
Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

### Mounting Bolt for CDQS with Auto Switch

Mounting method: Mounting bolt for through-hole mounting style of CDQSB is available as an option.

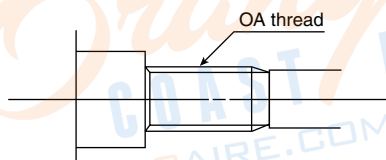
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 30L 4 pcs.**



Note 1) The appropriate plain washer must be used for through-hole mounting.

Note 2) Please contact SMC for details concerning the mounting bolts to be used with  $\phi 12$  and  $\phi 16$  that exceed 30 mm strokes, or  $\phi 20$  and  $\phi 25$  that exceed 50 mm strokes.



### Accessory

For accessory bracket for **Series CQS**, refer to page 620, since it is commonly used with **Series CQ2**.

- Single knuckle joint
- Double knuckle joint
- Pin for knuckle
- Rod end nut

Cylinder model	C	D	Mounting bolt size	
<b>CDQSB12-5D</b>	6.5	30	M3 x 30L	
<b>-10D</b>		35	x 35L	
<b>-15D</b>		40	x 40L	
<b>-20D</b>		45	x 45L	
<b>-25D</b>		50	x 50L	
<b>-30D</b>		55	x 55L	
<b>-35DC</b>				
<b>-40DC</b>				
<b>-45DC</b>				
<b>-50DC</b>				
<b>-75DC</b>				
<b>-100DC</b>				
<b>-125DC</b>				
<b>-150DC</b>				
<b>-175DC</b>				
<b>-200DC</b>				
<b>CDQSB16-5D</b>	6.5	30	M3 x 30L	
<b>-10D</b>		35	x 35L	
<b>-15D</b>		40	x 40L	
<b>-20D</b>		45	x 45L	
<b>-25D</b>		50	x 50L	
<b>-30D</b>		55	x 55L	
<b>-35DC</b>				
<b>-40DC</b>				
<b>-45DC</b>				
<b>-50DC</b>				
<b>-75DC</b>				
<b>-100DC</b>				
<b>-125DC</b>				
<b>-150DC</b>				
<b>-175DC</b>				
<b>-200DC</b>				

Secure the cylinder by using the OA screws that are provided with the cylinder tube.

Secure the cylinder by using the OA screws that are provided with the cylinder tube.

Cylinder model	C	D	Mounting bolt size
<b>CDQSB20-5D</b>	6.5	35	M5 x 35L
<b>-10D</b>		40	x 40L
<b>-15D</b>		45	x 45L
<b>-20D</b>		50	x 50L
<b>-25D</b>		55	x 55L
<b>-30D</b>		60	x 60L
<b>-35D</b>		65	x 65L
<b>-40D</b>		70	x 70L
<b>-45D</b>		75	x 75L
<b>-50D</b>		80	x 80L
<b>-75DC</b>			
<b>-100DC</b>			
<b>-125DC</b>			
<b>-150DC</b>			
<b>-175DC</b>			
<b>-200DC</b>			
<b>CDQSB25-5D</b>	8.5	40	M5 x 40L
<b>-10D</b>		45	x 45L
<b>-15D</b>		50	x 50L
<b>-20D</b>		55	x 55L
<b>-25D</b>		60	x 60L
<b>-30D</b>		65	x 65L
<b>-35D</b>		70	x 70L
<b>-40D</b>		75	x 75L
<b>-45D</b>		80	x 80L
<b>-50D</b>		85	x 85L
<b>-75DC</b>			
<b>-100DC</b>			
<b>-125DC</b>			
<b>-150DC</b>			
<b>-175DC</b>			
<b>-200DC</b>			
<b>-250DC</b>			
<b>-300DC</b>			

Secure the cylinder by using the OA screws that are provided with the cylinder tube.

Secure the cylinder by using the OA screws that are provided with the cylinder tube.

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

**CUJ**

**CU**

**CQS**

**CQ2**

**RQ**

**CQM**

**MU**

**D-□**

**-X□**

Individual  
**-X□**

Technical  
data

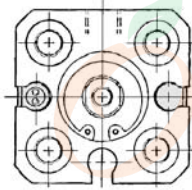
# Series CQS

Dimensions:  $\phi 12$  to  $\phi 25$

Basic style (Through-hole/Both ends tapped common): CQSB/CDQSB

\* For the auto switch mounting position and its mounting height, refer to page 595.

$\phi 12$

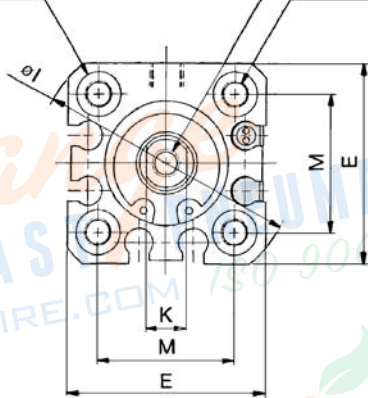


$\phi 16$

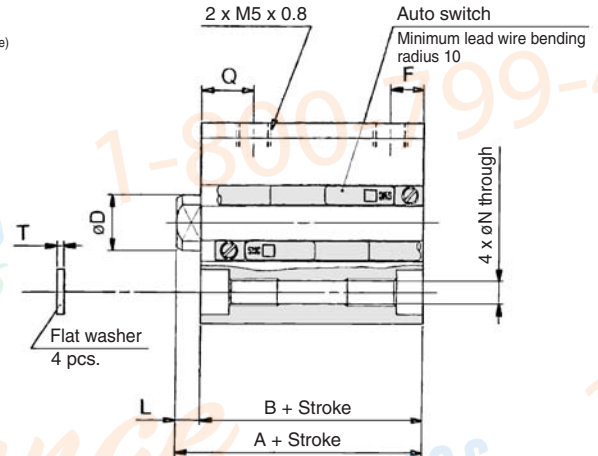
2 x 4 x  $\phi$ OB counterbore RB

H thread effective depth C

2 x 4 x OA counterbore RA (Note)

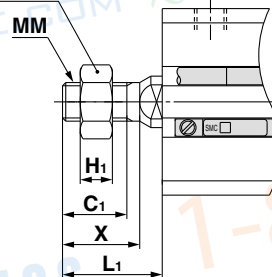


$\phi 20, \phi 25$



## Rod end male thread

Width across flats  $B_1$



## Rod End Male Thread

Bore size (mm)	$B_1$	$C_1$	$H_1$	Standard stroke	Long stroke	MM	X
				$L_1$	$L_1$		
12	8	9	4	14	24	M5 x 0.8	10.5
16	10	10	5	15.5	25.5	M6 x 1.0	12
20	13	12	5	18.5	28.5	M8 x 1.25	14
25	17	15	6	22.5	32.5	M10 x 1.25	17.5



- Length with intermediate stroke
- (1) Spacer ... The dimensions will be identical to those of the nearest long stroke. Those that exceed the standard stroke will have the long stroke dimensions.
- (2) Exclusive body (-XB10) ... Add stroke. Also, the stroke length that exceeds the standard stroke would be the long stroke dimension.

## Basic Style

Bore size (mm)	Standard stroke range (mm)	Standard stroke								Long stroke range (mm)	Long stroke				C	D	E	H	I	K	M	N	OA	OB	Q	RA	RB	T
		Without auto switch				With auto switch					With/Without auto switch																	
		A	B	F	L	A	B	F	L		A	B	F	L														
12	5 to 30	20.5	17	5	3.5	25.5	22	5	3.5	35 to 200	45.5	32	7.5	13.5	6	6	25	M3 x 0.5	32	5	15.5	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
16	5 to 30	20.5	17	5	3.5	25.5	22	5	3.5	35 to 200	45.5	32	7.5	13.5	8	8	29	M4 x 0.7	38	6	20	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
20	5 to 50	24	19.5	5.5	4.5	34	29.5	5.5	4.5	75 to 200	55.5	41	9	14.5	7	10	36	M5 x 0.8	47	8	25.5	5.4	M6 x 1.0	9	9	10	7	1
25	5 to 50	27.5	22.5	5.5	5	37.5	32.5	5.5	5	75 to 300	59	44	11	15	12	12	40	M6 x 1.0	52	10	28	5.4	M6 x 1.0	9	11	10	7	1

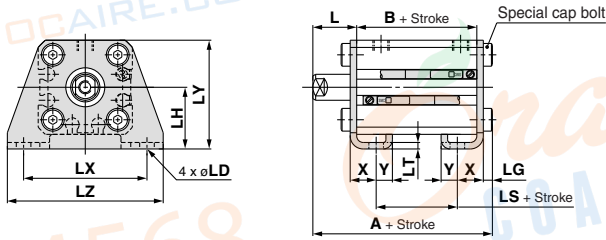
Note 1) For the following bore/stroke sizes through-hole is threaded over the entire length: Basic style  $\phi 12$  and  $\phi 16$ ; 5 stroke,  $\phi 20$ ; 5 to 15 stroke,  $\phi 25$ ; 5 to 10 stroke,  $\phi 20$  with auto switch built-in magnet; 5 stroke.

Note 2) Rubber bumper type has the same dimensions as those indicated above.

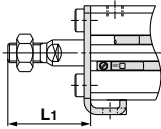
\* For details about the rod end nut and accessory brackets, refer to page 620.

# Compact Cylinder: Standard Type Double Acting, Single Rod **Series CQS**

## Foot style: CQSL/CDQSL



### Rod end male thread



## Foot Style

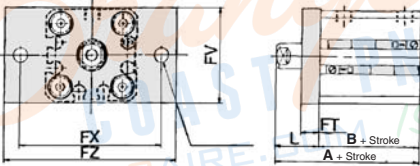
Bore size (mm)	Standard stroke range (mm)	Standard stroke						Long stroke range (mm)	Long stroke		
		Without auto switch			With auto switch				Without/With auto switch		
		A	B	LS	A	B	LS		A	B	LS
12	5 to 30	35.3	17	5	40.3	22	10	35 to 200	50.3	32	20
16	5 to 30	35.3	17	5	40.3	22	10	35 to 200	50.3	32	20
20	5 to 50	41.2	19.5	7.5	51.2	29.5	17.5	75 to 200	62.7	41	29
25	5 to 50	44.7	22.5	7.5	54.7	32.5	17.5	75 to 200	66.2	44	29

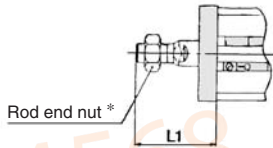
Bore size (mm)	L	L1	LD	LG	LH	LT	LX	LY	LZ	X	Y
12	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5
16	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5
20	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8
25	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

## Rod side flange style: CQSF/CDQSF



### Rod end male thread



## Rod Side Flange Style

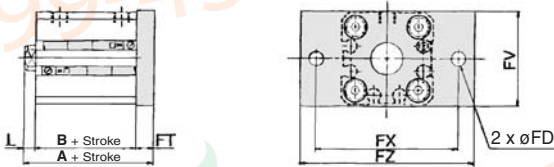
Bore size (mm)	Standard stroke range (mm)	Standard stroke				Long stroke range (mm)	Long stroke	
		Without auto switch		With auto switch			Without/With auto switch	
		A	B	A	B		A	B
12	5 to 30	30.5	17	35.5	22	35 to 200	45.5	32
16	5 to 30	30.5	17	35.5	22	35 to 200	45.5	32
20	5 to 50	34	19.5	44	29.5	75 to 200	55.5	41
25	5 to 50	37.5	22.5	47.5	32.5	75 to 300	59	44

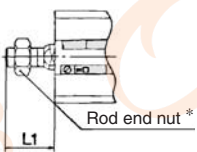
Bore size (mm)	FD	FT	FV	FX	FZ	L	L1
12	4.5	5.5	25	45	55	13.5	24
16	4.5	5.5	30	45	55	13.5	25.5
20	6.6	8	39	48	60	14.5	28.5
25	6.6	8	42	52	64	15	32.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

## Head side flange style: CQSG/CDQSG



### Rod end male thread



## Head Side Flange Style

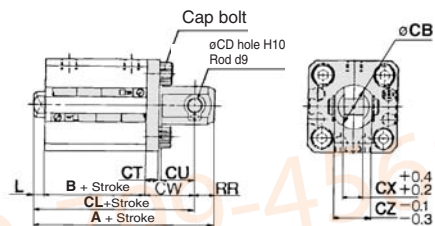
Bore size (mm)	Standard stroke range (mm)	Standard stroke								Long stroke range (mm)	Long stroke			
		Without auto switch				With auto switch					Without/With auto switch			
		A	B	L	L1	A	B	L	L1		A	B	L	L1
12	5 to 30	26	17	3.5	14	31	22	3.5	14	35 to 200	51	32	13.5	24
16	5 to 30	26	17	3.5	15.5	31	22	3.5	15.5	35 to 200	51	32	13.5	25.5
20	5 to 50	32	19.5	4.5	18.5	42	29.5	4.5	18.5	75 to 200	63.5	41	14.5	28.5
25	5 to 50	35.5	22.5	5	22.5	45.5	32.5	5	22.5	75 to 300	67	44	15	32.5

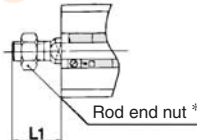
Bore size (mm)	FD	FT	FV	FX	FZ
12	4.5	5.5	25	45	55
16	4.5	5.5	30	45	55
20	6.6	8	39	48	60
25	6.6	8	42	52	64

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

## Double clevis style: CQSD/CDQSD



### Rod end male thread



## Double Cevis Style

Bore size (mm)	Standard stroke range (mm)	Standard stroke												Long stroke range (mm)	Long stroke			
		Without auto switch						With auto switch							Without/With auto switch			
		A	B	CL	L	L1	A	B	CL	L	L1	A	B		CL	L	L1	
12	5 to 30	40.5	17	34.5	3.5	14	45.5	22	39.5	3.5	14	35 to 200	65.5	32	59.5	13.5	24	
16	5 to 30	41.5	17	35.5	3.5	15.5	46.5	22	40.5	3.5	15.5	35 to 200	66.5	32	60.5	13.5	25.5	
20	5 to 50	51	19.5	42	4.5	18.5	61	29.5	52	4.5	18.5	75 to 200	82.5	41	73.5	14.5	28.5	
25	5 to 50	57.5	22.5	47.5	5	22.5	67.5	32.5	57.5	5	22.5	75 to 300	89	44	79	15	32.5	

Bore size (mm)	CB	CD	CT	CU	CW	CX	CZ	RR
12	12	5	4	7	14	5	10	6
16	14	5	4	10	15	6.5	12	6
20	20	8	5	12	18	8	16	9
25	24	10	5	14	20	10	20	10

Double clevis bracket material: Carbon steel  
Surface treatment: Nickel plated

\* For details about the rod end nut and accessory brackets, refer to page 620.

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

Individual

-X□

Technical data

# Compact Cylinder: Standard Type Double Acting, Double Rod Series CQSW

ø12, ø16, ø20, ø25

## How to Order

**CQSW B 20 - 30 D C -**

**With auto switch CDQSW B 20 - 30 D C - M9BW -**

**With auto switch (Built-in magnet)**

**Mounting style**

<b>B</b>	Through-hole/Both ends tapped common (Standard)
<b>L</b>	Foot style
<b>F</b>	Flange style

\* Mounting brackets are shipped together, (but not assembled).  
\* Cylinder mounting bolts are not included. Order them separately referring to "Mounting Bolt for CQSW" on page 564.

**Bore size**

<b>12</b>	12 mm
<b>16</b>	16 mm
<b>20</b>	20 mm
<b>25</b>	25 mm

**Cylinder stroke (mm)**

**Standard Stroke**

Bore size (mm)	Standard stroke (mm)
<b>12, 16</b>	5, 10, 15, 20, 25, 30
<b>20, 25</b>	5, 10, 15, 20, 25, 30, 35, 40, 45, 50

For "Manufacture of Intermediate Strokes", refer to page 561.

**Made to Order**  
Refer to page 561 for details.

**Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.
<b>n</b>	"n" pcs.

**Auto switch**

<b>Nil</b>	Without auto switch
------------	---------------------

\* Refer to the table below for the applicable auto switch model.

**Body option**

<b>Nil</b>	Standard
<b>C</b>	With rubber bumper
<b>M</b>	Rod end male thread

\* Combination of body options is available.

**Action**

<b>D</b>	Double acting
----------	---------------

**Built-in Magnet Cylinder Model**

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.  
(Example) CDQSWL25-30D

## Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state switch	—	Grommet	No	3-wire (NPN)	5 V, 12 V	—	<b>M9NV</b>	<b>M9N</b>	●	●	●	○	○	IC circuit	
				3-wire (PNP)			<b>M9PV</b>	<b>M9P</b>	●	●	●	○			
				2-wire	12 V	<b>M9BV</b>	<b>M9B</b>	●	●	●	○	○	—		
				3-wire (NPN)	24 V	5 V, 12 V	<b>M9NWV</b>	<b>M9NW</b>	●	●	●	○	○		IC circuit
	3-wire (PNP)	<b>M9PWV</b>	<b>M9PW</b>	●			●	●	○	○	—				
	Diagnostic indication (2-color indication)	Grommet	Yes	2-wire	12 V	—	<b>M9BWW</b>	<b>M9BW</b>	●	●	●	○	○		—
				3-wire (NPN)	5 V, 12 V	<b>M9NAV</b>	<b>M9NA</b>	○	○	●	○	○	IC circuit		
				3-wire (PNP)		<b>M9PAV</b>	<b>M9PA</b>	○	○	●	○	○	—		
2-wire				12 V	<b>M9BAV</b>	<b>M9BA</b>	○	○	●	○	○	—			
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	<b>A96V</b>	<b>A96</b>	●	—	●	—	IC circuit	—
				2-wire	24 V	12 V	100 V	<b>A93V</b>	<b>A93</b>	●	—	●	—	—	Relay, PLC
			No	2-wire	24 V	12 V	100 V or less	<b>A90V</b>	<b>A90</b>	●	—	●	—	IC circuit	Relay, PLC

\* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW  
1 m..... M (Example) M9NWM  
3 m..... L (Example) M9NWL  
5 m..... Z (Example) M9NWZ

\* Solid state auto switches marked with "○" are produced upon receipt of order.

\* Since there are other applicable auto switches than listed, refer to page 597 for details.

\* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.

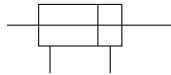
\* Auto switches are shipped together (not assembled).

Note) There is the case A9□V/M9□V/M9□WV/M9□AVL type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Consult with SMC for details.

# Compact Cylinder: Standard Type Double Acting, Double Rod **Series CQSW**



JIS Symbol



**Made to Order Specifications**  
(For details, refer to pages 1373 to 1565.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat-resistant cylinder (-10 to 150 °C) (without an auto switch)
-XB7	Cold-resistant cylinder (-40 to 70 °C) (without an auto switch)
-XB9	Low speed cylinder (10 to 50 mm/s)
-XB10	Intermediate stroke (Using exclusive body)
-XB13	Low speed cylinder (5 to 50 mm/s)
-XC6	Piston rod, retaining ring, rod end nut made of stainless steel
-XC36	With boss in rod side
-X235	Change of piston rod end of double rod cylinder
-X271	Fluororubber seals
-X633	Intermediate stroke of double rod cylinder

## Body Option

Description	Application
Rod end male thread	Available for all standard models of double acting, double rod.
Rubber bumper	

## Mounting Bracket Part No.

Bore size (mm)	Foot <sup>(1)</sup>	Flange
12	CQS-L012	CQS-F012
16	CQS-L016	CQS-F016
20	CQS-L020	CQS-F020
25	CQS-L025	CQS-F025

- Note 1) When ordering foot bracket, order 2 pieces per cylinder.  
Note 2) Parts belonging to each bracket are as follows.  
Foot or Flange style: Body mounting bolt

## Specifications

Bore size (mm)		12	16	20	25
<b>Action</b>		Double acting, Double rod			
<b>Fluid</b>		Air			
<b>Lubrication</b>		Not required (Non-lube)			
<b>Proof pressure</b>		1.5 MPa			
<b>Maximum operating pressure</b>		1.0 MPa			
<b>Minimum operating pressure</b>		0.07 MPa	0.05 MPa		
<b>Ambient and fluid temperature</b>		Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
<b>Cushion</b>		None, Rubber bumper			
<b>Rod end thread</b>		Female thread			
<b>Stroke length tolerance</b>		+1.0 mm *			
<b>Mounting</b>		Through-hole/Both ends tapped common			
<b>Piston speed</b>		50 to 500 mm/s			
<b>Allowable kinetic energy (J)</b>	Standard type	0.022	0.038	0.055	0.09
	With rubber bumper	0.043	0.075	0.11	0.18

\* Stroke length tolerance does not include the deflection of the bumper.

## Theoretical Output

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)		
				0.3	0.5	0.7
12	6	IN	84.8	25	42	59
		OUT				
16	8	IN	151	45	75	106
		OUT				
20	10	IN	236	71	118	165
		OUT				
25	12	IN	378	113	189	264
		OUT				

## Manufacture of Intermediate Stroke

Description	Spacer is installed in the standard stroke body.	Exclusive body (-XB10)
Part no.	Suffix "-X633" to the end of standard model no. (page 560).	Suffix "-XB10" to the end of standard model no. (page 560).
Description	Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.	Dealing with the stroke by the 1 mm interval by using an exclusive body with the specified stroke.
Stroke range	Bore size	Bore size
	Stroke range	Stroke range
Example	Part no.: CQSWB25-47D-X633	Part no.: CQSWB25-47D-XB10
	CQSWB25-50D with 3 mm width spacer inside. B dimension is 79 mm.	Makes 47 stroke tube. B dimension is 76 mm.

Refer to pages 595 to 597 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket/Part no.

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

Individual  
-X□

Technical  
data

# Series CQSW

## Mass/Without Auto Switch

(g)

Bore size (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
12	38	46	54	62	69	77	—	—	—	—
16	50	61	71	81	92	102	—	—	—	—
20	89	104	120	136	152	167	183	199	215	231
25	127	146	166	186	206	227	247	267	287	308

## Mass/With Auto Switch (Built-in magnet)

(g)

Bore size (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
12	46	54	62	70	77	85	—	—	—	—
16	60	71	81	91	102	112	—	—	—	—
20	119	134	150	166	182	198	214	230	245	261
25	154	174	195	215	235	255	276	296	316	336

## Additional Mass

(g)

Bore size (mm)		12	16	20	25
Rod end male thread	Male thread	3	6	12	24
	Nut	2	4	8	16
With rubber bumper		0	-1	-2	-2
Foot style (Including mounting bolt)		55	65	159	181
Rod side flange style (Including mounting bolt)		58	70	143	180

Calculation: (Example) **CQSWF12-10DM**

- Cylinder mass: CQSWB12-10D..... 46 g
  - Option mass: Rod end male thread..... 5 g
  - Rod side flange style..... 58 g
- 109 g

## ⚠ Caution

### Retaining Ring Installation/Removal

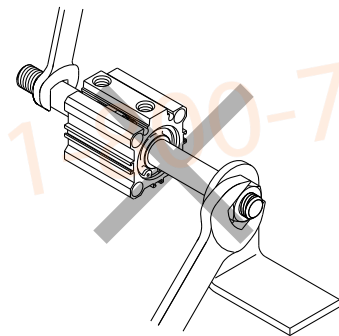
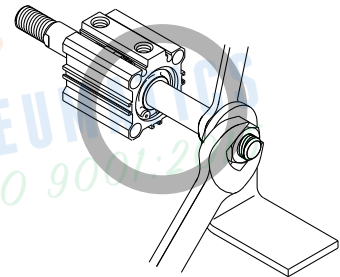
1. For installation and removal, use an appropriate pair of pliers (tool for installing a type C retaining ring).
2. Even if a proper plier (tool for installing a type C retaining ring) is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier (tool for installing a type C retaining ring). Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.

## ⚠ Warning

### Mounting

Do not apply the reverse torque to the piston rods sticking out from both sides of this cylinder at the same time. The torque makes connection threads inside loosen, which may cause an accident or malfunction.

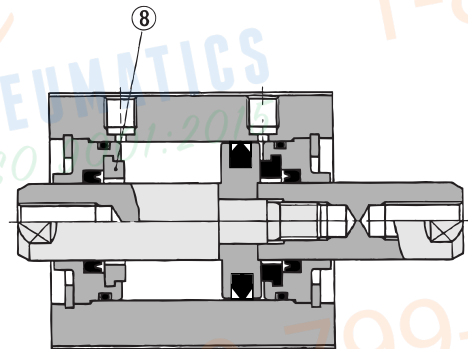
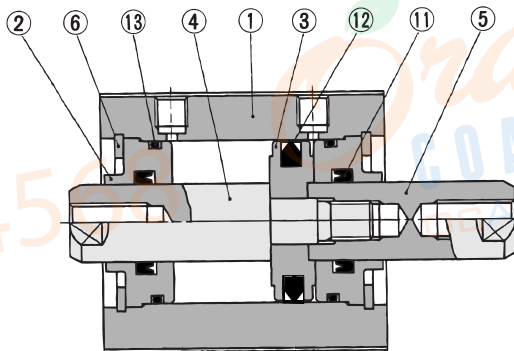
Install or remove a load while the piston rod width across flats are secured. Do not fix the other side of piston rod width across flat and apply the reverse torque.



**Construction**

**Basic style**

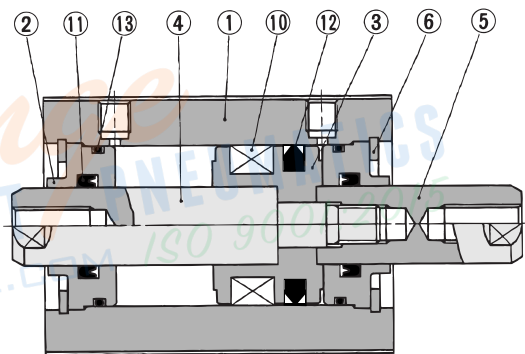
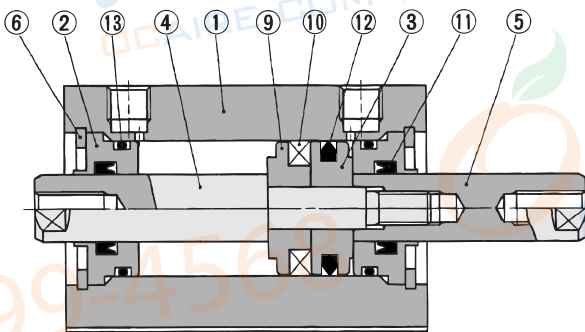
**With rubber bumper**



**With auto switch (Built-in magnet)**

ø12, ø16

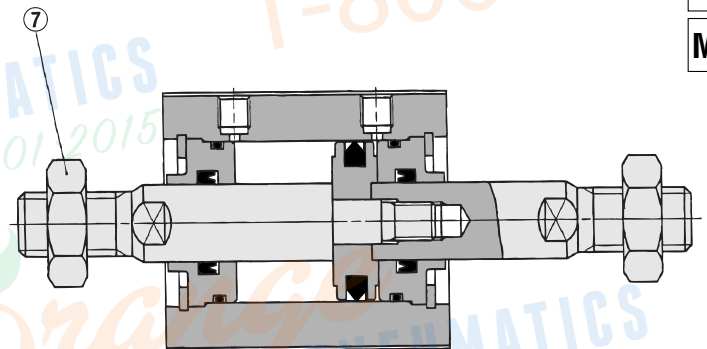
ø20, ø25



**Component Parts**

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Collar	Aluminum alloy	Anodized
3	Piston	Aluminum alloy	Chromated
4	Piston rod A	Stainless steel	
5	Piston rod B	Stainless steel	
6	Retaining ring	Carbon tool steel	Phosphate coated
7	Rod end nut	Carbon steel	Nickel plated
8	Bumper	Urethane	
9	Spacer for switch	Aluminum alloy	Chromated
10	Magnet	—	
11	Rod seal	NBR	
12	Piston seal	NBR	
13	Tube gasket	NBR	

**Rod end male thread**



**Replacement Parts/Seal Kit**

Bore size (mm)	Kit no.	Contents
12	CQSWB12-PS	Set of nos. above ⑪, ⑫, ⑬
16	CQSWB16-PS	
20	CQSWB20-PS	
25	CQSWB25-PS	

- \* Seal kit includes ⑪, ⑫, ⑬. Order the seal kit, based on each bore size.
- \* Since the seal kit does not include a grease pack, order it separately.  
**Grease pack part no.: GR-S-010 (10 g)**

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

Individual

-X□

Technical data

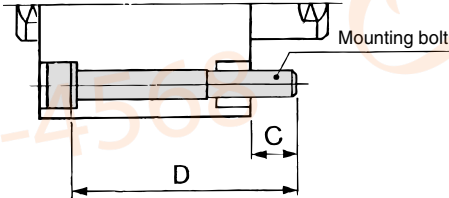
# Series CQSW

## Mounting Bolt for CQSW

Mounting method: Mounting bolt for through-hole mounting style of CQSW is available as an option.

Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 30L 4 pcs.**



Cylinder model	C	D	Mounting bolt size
<b>CQSWB12-5D</b>	6.5	30	M3 x 30L
<b>-10D</b>		35	x 35L
<b>-15D</b>		40	x 40L
<b>-20D</b>		45	x 45L
<b>-25D</b>		50	x 50L
<b>-30D</b>		55	x 55L
<b>CQSWB16-5D</b>	6.5	30	M3 x 30L
<b>-10D</b>		35	x 35L
<b>-15D</b>		40	x 40L
<b>-20D</b>		45	x 45L
<b>-25D</b>		50	x 50L
<b>-30D</b>		55	x 55L
<b>CQSWB20-5D</b>	10	35	M5 x 35L
<b>-10D</b>		40	x 40L
<b>-15D</b>		45	x 45L
<b>-20D</b>		50	x 50L

Cylinder model	C	D	Mounting bolt size
<b>CQSWB20-25D</b>	10	55	M5 x 55L
<b>-30D</b>		60	x 60L
<b>-35D</b>		65	x 6L
<b>-40D</b>		70	x 70L
<b>-45D</b>		75	x 75L
<b>-50D</b>		80	x 80L
<b>CQSWB25-5D</b>	7	35	M5 x 35L
<b>-10D</b>		40	x 40L
<b>-15D</b>		45	x 45L
<b>-20D</b>		50	x 50L
<b>-25D</b>		55	x 55L
<b>-30D</b>		60	x 60L
<b>-35D</b>		65	x 65L
<b>-40D</b>		70	x 70L
<b>-45D</b>		75	x 75L
<b>-50D</b>		80	x 80L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

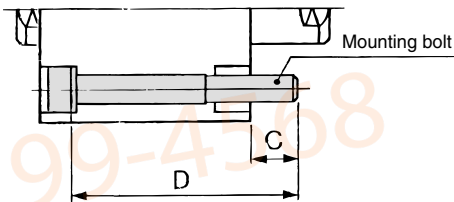
Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

## Mounting Bolt for CDQSW with Auto Switch

Mounting method: Mounting bolt for through-hole mounting style of CDQSW is available as an option.

Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 35L 4 pcs.**



Cylinder model	C	D	Mounting bolt size
<b>CDQSWB12-5D</b>	6.5	35	M3 x 35L
<b>-10D</b>		40	x 40L
<b>-15D</b>		45	x 45L
<b>-20D</b>		50	x 50L
<b>-25D</b>		55	x 55L
<b>-30D</b>		60	x 60L
<b>CDQSWB16-5D</b>	6.5	35	M3 x 35L
<b>-10D</b>		40	x 40L
<b>-15D</b>		45	x 45L
<b>-20D</b>		50	x 50L
<b>-25D</b>		55	x 55L
<b>-30D</b>		60	x 60L
<b>CDQSWB20-5D</b>	10	45	M5 x 45L
<b>-10D</b>		50	x 50L
<b>-15D</b>		55	x 55L
<b>-20D</b>		60	x 60L

Cylinder model	C	D	Mounting bolt size
<b>CDQSWB20-25D</b>	10	65	M5 x 65L
<b>-30D</b>		70	x 70L
<b>-35D</b>		75	x 75L
<b>-40D</b>		80	x 80L
<b>-45D</b>		85	x 85L
<b>-50D</b>		90	x 90L
<b>CDQSWB25-5D</b>	7	45	M5 x 45L
<b>-10D</b>		50	x 50L
<b>-15D</b>		55	x 55L
<b>-20D</b>		60	x 60L
<b>-25D</b>		65	x 65L
<b>-30D</b>		70	x 70L
<b>-35D</b>		75	x 75L
<b>-40D</b>		80	x 80L
<b>-45D</b>		85	x 85L
<b>-50D</b>		90	x 90L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

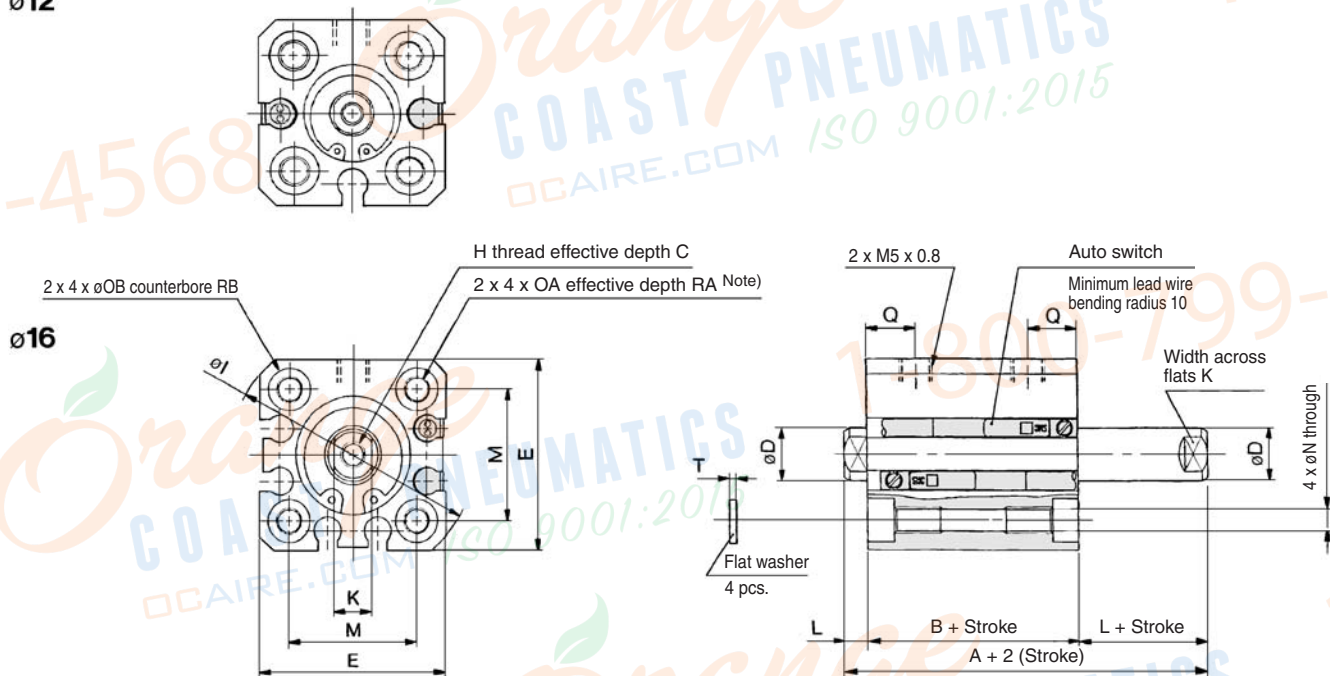
Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

# Compact Cylinder: Standard Type Double Acting, Double Rod **Series CQSW**

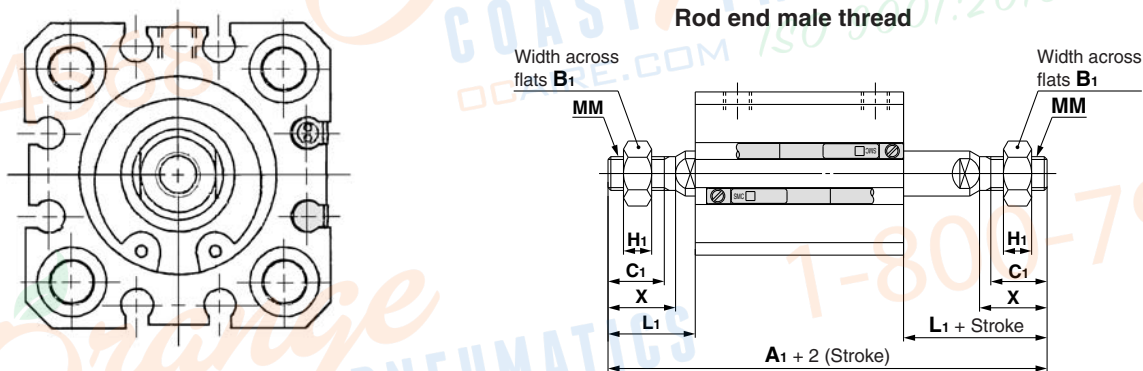
Dimensions:  $\phi 12$  to  $\phi 25$

Basic style (Through-hole/Both ends tapped common): CQSWB/CDQSWB

$\phi 12$



$\phi 20, \phi 25$



### Rod End Male Thread

Bore size (mm)	Without auto switch		With auto switch		B <sub>1</sub>	C <sub>1</sub>	H <sub>1</sub>	L <sub>1</sub>	MM	X
	A <sub>1</sub>	A <sub>1</sub>	A <sub>1</sub>	A <sub>1</sub>						
12	50	55	8	9	4	14	M5 x 0.8	10.5		
16	53	58	10	10	5	15.5	M6 x 1.0	12		
20	63	73	13	12	5	18.5	M8 x 1.25	14		
25	74	84	17	15	6	22.5	M10 x 1.25	17.5		

### Basic Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		C	D	E	H	I	K	L	M	N	OA	OB	Q	RA	RB	T
		A	B	A	B															
12	5 to 30	29	22	34	27	6	6	25	M3 x 0.5	32	5	3.5	15.5	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
16	5 to 30	29	22	34	27	8	8	29	M4 x 0.7	38	6	3.5	20	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
20	5 to 50	35	26	45	36	7	10	36	M5 x 0.8	47	8	4.5	25.5	5.4	M6 x 1.0	9	9	10	7	1
25	5 to 50	39	29	49	39	12	12	40	M6 x 1.0	52	10	5	28	5.4	M6 x 1.0	9	11	10	7	1

Note 1) For basic style  $\phi 20$  and  $\phi 25$  with 5 stroke, through-hole is threaded over the entire length.

Note 2) Rubber bumper type has the same dimensions as those indicated above

Note 3) The positions of width across flats on both sides are not the same.

\* For details about the rod end nut and accessory brackets, refer to page 620.

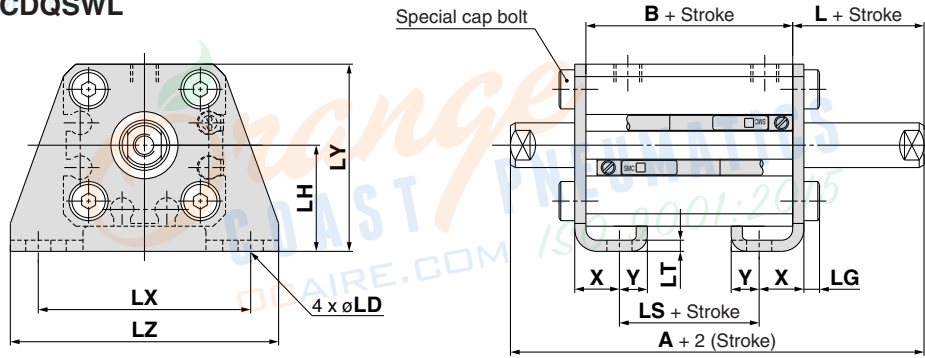
- CUJ**
- CU**
- CQS**
- CQ2**
- RQ**
- CQM**
- MU**

- D-□**
- X□**
- Individual
- X□**
- Technical data

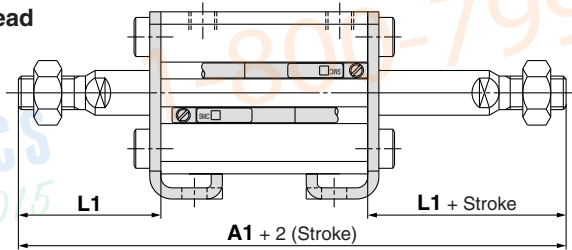
# Series CQSW

Dimensions:  $\varnothing 12$  to  $\varnothing 25$

Foot style: CQSWL/CDQSWL



Rod end male thread

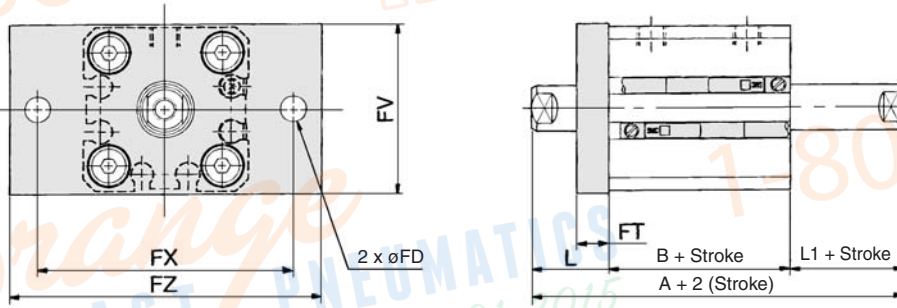


Foot Style

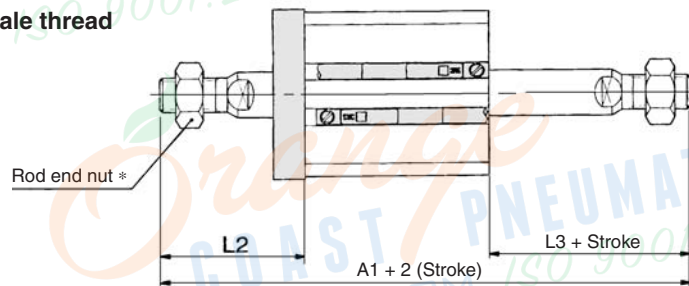
Bore size (mm)	Stroke range (mm)	Without auto switch					With auto switch					L	L1	LD	LG	LH	LT	LX	LY	LZ	X	Y
		A	A1	B	LS	LS	A	A1	B	LS												
12	5 to 30	49	70	22	10	54	75	27	15	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5		
16	5 to 30	49	73	22	10	54	78	27	15	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5		
20	5 to 50	55	83	26	14	65	93	36	24	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8		
25	5 to 50	59	94	29	14	69	104	39	24	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8		

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

Flange style: CQSWF/CDQSWF



Rod end male thread



Flange Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch			FD	FT	FV	FX	FZ	L	L1	L2	L3
		A	A1	B	A	A1	B									
12	5 to 30	39	60	22	44	65	27	4.5	5.5	25	45	55	13.5	3.5	24	14
16	5 to 30	39	63	22	44	68	27	4.5	5.5	30	45	55	13.5	3.5	25.5	15.5
20	5 to 50	45	73	26	55	83	36	6.6	8	39	48	60	14.5	4.5	28.5	18.5
25	5 to 50	49	84	29	59	94	39	6.6	8	42	52	64	15	5	32.5	22.5

\* For details about the rod end nut and accessory brackets, refer to page 620.  
Note 1) The positions of width across flats on both sides are not the same.

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

# Compact Cylinder: Standard Type Single Acting, Single Rod Series CQS

ø12, ø16, ø20, ø25

## How to Order

**CQS B 20 - 10 S** - [ ] - [ ]

**With auto switch** **CDQS B 20 - 10 S** - [ ] - **M9BW** - [ ] - [ ]

**With auto switch** (Built-in magnet)

**Mounting style**

<b>B</b>	Through-hole/Both ends tapped common (Standard)
<b>L</b>	Foot style
<b>F</b>	Rod side flange style
<b>G</b>	Head side flange style
<b>D</b>	Double clevis style

\* Mounting brackets are shipped together, (but not assembled).  
\* Cylinder mounting bolts are not included. Order them separately referring to "Mounting Bolt for CQS" on page 569.

**Bore size**

<b>12</b>	12 mm
<b>16</b>	16 mm
<b>20</b>	20 mm
<b>25</b>	25 mm

**Cylinder stroke (mm)**

**Standard Stroke**

Bore size (mm)	Standard stroke (mm)
<b>12, 16, 20, 25</b>	5, 10

For "Manufacture of Intermediate Strokes", refer to page 568.

**Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.
<b>n</b>	"n" pcs.

**Auto switch**

<b>Nil</b>	Without auto switch
------------	---------------------

\* Refer to the table below for the applicable auto switch model.

**Body option**

<b>Nil</b>	Standard (Rod end female thread)
<b>M</b>	Rod end male thread
<b>F</b>	Boss on head side

**Action**

<b>S</b>	Single acting, Spring return
<b>T</b>	Single acting, Spring extend

**Built-in Magnet Cylinder Model**

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch. (Example) CDQSL25-10T

**Made to Order**  
Refer to page 568 for details.

**Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.**

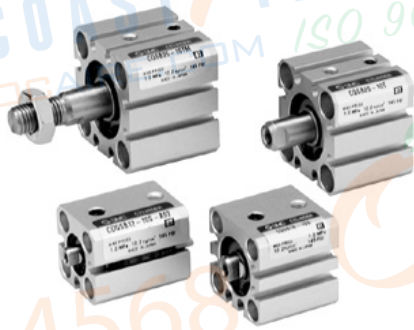
Type	Special function	Electrical entry	indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state switch	—	Grommet	No	3-wire (NPN)	5 V, 12 V	—	<b>M9NV</b>	<b>M9N</b>	●	●	●	○	○	IC circuit	
				3-wire (PNP)			<b>M9PV</b>	<b>M9P</b>	●	●	●	○			
				2-wire	12 V	<b>M9BV</b>	<b>M9B</b>	●	●	●	○	○	○	—	
				3-wire (NPN)	24 V	5 V, 12 V	<b>M9NVV</b>	<b>M9NW</b>	●	●	●	○	○	○	IC circuit
	3-wire (PNP)	<b>M9PVV</b>	<b>M9PW</b>	●			●	●	○	○	○	—			
	Diagnostic indication (2-color indication)	Grommet	Yes	2-wire	12 V	<b>M9BWV</b>	<b>M9BW</b>	●	●	●	○	○	○	—	
				3-wire (NPN)	5 V, 12 V	<b>M9NAV</b>	<b>M9NA</b>	○	○	●	○	○	○	IC circuit	
				3-wire (PNP)	12 V	<b>M9PAV</b>	<b>M9PA</b>	○	○	●	○	○	○	—	
2-wire				<b>M9BAV</b>	<b>M9BA</b>	○	○	●	○	○	○	—			
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	<b>A96V</b>	<b>A96</b>	●	—	●	—	—	IC circuit
				2-wire	24 V	12 V	100 V	<b>A93V</b>	<b>A93</b>	●	—	●	—	—	—
			No	2-wire	—	100 V or less	<b>A90V</b>	<b>A90</b>	●	—	●	—	—	IC circuit	

\* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW  
1 m..... M (Example) M9NWV  
3 m..... L (Example) M9NWL  
5 m..... Z (Example) M9NWLZ

\* Solid state auto switches marked with "○" are produced upon receipt of order.

\* Since there are other applicable auto switches than listed, refer to page 597 for details.  
\* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.  
\* Auto switches are shipped together (not assembled).  
Note) There is the case A9□V/M9□V/M9□WV/M9□AVL type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Consult with SMC for details.

# Series CQS

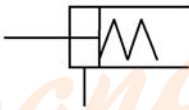


## JIS Symbol

Single acting,  
Spring return



Single acting,  
Spring extend



## Made to Order Specifications

(For details, refer to pages 1373 to 1498 and 1508.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB10	Intermediate stroke (Using exclusive body), Extension type only
-XC6	Piston rod, retaining ring, rod end nut made of stainless steel
-XC36	With boss on rod side, ø12 and ø16 only
-X271	Fluororubber seals
-X1876	With concave shape end boss on the cylinder tube head side

## Body Option

Description	Application
Rod end male thread	Available for all standard models of single acting, single rod.

## Mounting Bracket Part No.

Bore size (mm)	Foot <sup>(1)</sup>	Flange	Double clevis
12	CQS-L012	CQS-F012	CQS-D012
16	CQS-L016	CQS-F016	CQS-D016
20	CQS-L020	CQS-F020	CQS-D020
25	CQS-L025	CQS-F025	CQS-D025



Note 1) When ordering foot bracket, order 2 pieces per cylinder.

Note 2) Parts belonging to each bracket are as follows.

Foot or Flange style: Body mounting bolt  
Double clevis style: Clevis pin, Type C retaining ring for axis, Body mounting bolt.

## Standard Specifications

Bore size (mm)	12	16	20	25
Action	Single acting, Single rod			
Fluid	Air			
Lubrication	Not required (Non-lube)			
Proof pressure	1.5 MPa			
Maximum operating pressure	1.0 MPa			
Minimum operating pressure	0.25 MPa	0.18 MPa		
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
Cushion	None			
Rod end thread	Female thread			
Stroke length tolerance	+1.0 mm 0			
Mounting	Through-hole/Both ends tapped common			
Piston speed	50 to 500 mm/s			
Allowable kinetic energy (J)	0.022	0.038	0.055	0.09

## Theoretical Output

Action	Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)			Retracted side	Extended side
					0.3	0.5	0.7		
Spring return	12	6	IN	-	20	43	65	14	4
			OUT	113					
	16	8	IN	-	45	86	126	15	6
			OUT	201					
	20	10	IN	-	78	141	204	15	6
			OUT	314					
25	12	IN	-	126	224	323	21	11	
		OUT	491						
Spring extend	12	6	IN	84.8	14	31	48	10	3
			OUT	-					
	16	8	IN	151	24	54	85	19	4
			OUT	-					
	20	10	IN	236	44	91	138	27	5
			OUT	-					
25	12	IN	378	84	160	235	29	10	
		OUT	-						

## Manufacture of Intermediate Stroke (Single acting, Spring retract type is excluded.)

Description	Spacer is installed in the standard stroke body.
Part no.	Refer to "How to Order" for the standard model no. (page 567).
Description	Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.
Stroke range	Bore size: 12 to 25 Stroke range: 1 to 9
Example	Part no.: CQSB20-3T CQSB20-5T with 2 mm width spacer inside. B dimension is 24.5 mm.

Refer to pages 595 to 597 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket/Part no.

**Mass/Without Auto Switch**  
**Spring return (Spring extend) (g)**

Bore size (mm)	Cylinder stroke (mm)	
	5	10
12	29 (31)	36 (37)
16	39 (39)	48 (47)
20	63 (68)	76 (79)
25	92 (98)	108 (113)

\* ( ): Denotes the values of spring extend.

**Mass/With Auto Switch (Built-in magnet)**  
**Spring return (Spring extend) (g)**

Bore size (mm)	Cylinder stroke (mm)	
	5	10
12	37 (39)	44 (45)
16	49 (51)	58 (59)
20	94 (104)	107 (115)
25	130 (150)	146 (165)

\* ( ): Denotes the values of spring extend.

**Additional Mass (g)**

Bore size (mm)		12	16	20	25
		Male thread	1.5	3	6
Rod end male thread	Nut	1	2	4	8
Foot style (Including mounting bolt)		55	65	159	181
Rod side flange style (Including mounting bolt)		58	70	143	180
Head side flange style (Including mounting bolt)		56	66	137	171
Double clevis style (Including pin, retaining ring, bolt)		34	40	92	127

Calculation: (Example) **CQSG16-10S**

- Cylinder mass: CQSB16-10S..... 48 g
- Option mass: Head side flange style..... 66 g
- 114 g

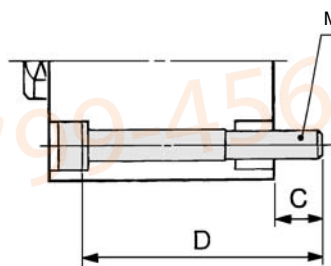
**Mounting Bolt for CQS without Auto Switch**

Mounting method: Mounting bolt for through-hole mounting style of CQS is available as an option.

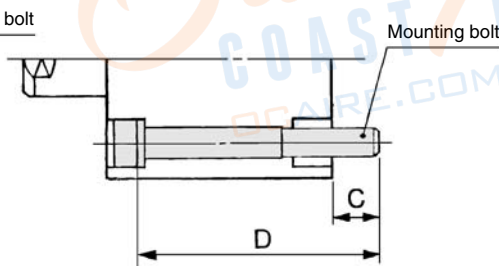
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 25L 4 pcs.**

**Single acting, Spring return**



**Single acting, Spring extend**



Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

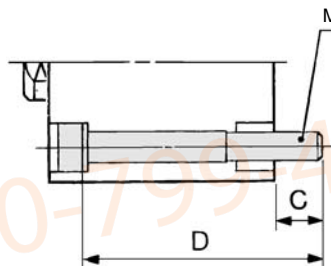
**Mounting Bolt for CDQS with Auto Switch**

Mounting method: Mounting bolt for through-hole mounting style of CDQS is available as an option.

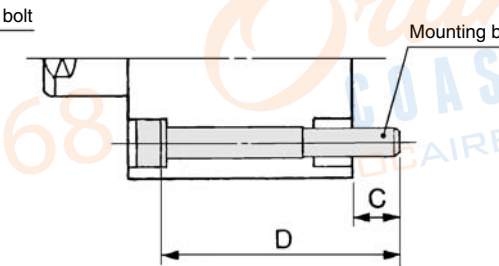
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 30L 4 pcs.**

**Single acting, Spring return**



**Single acting, Spring extend**



Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

**Caution**

**Retaining Ring Installation/Removal**

1. For installation and removal, use an appropriate pair of pliers (tool for installing a type C retaining ring).
2. Even if a proper plier (tool for installing type C retaining ring) is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier (tool for installing a type C retaining ring). Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.

**Single Acting, Spring Return**

Cylinder model	C	D	Mounting bolt size
<b>CQSB12-5S</b>	6.5	25	M3 x 25L
		30	x 30L
<b>CQSB16-5S</b>	6.5	25	M3 x 25L
		30	x 30L
<b>CQSB20-5S</b>	6.5	25	M5 x 25L
		30	x 30L
<b>CQSB25-5S</b>	8.5	30	M5 x 30L
		35	x 35L

**Single Acting, Spring Extend**

Cylinder model	C	D	Mounting bolt size
<b>CQSB12-5T</b>	6.5	25	M3 x 25L
		30	x 30L
<b>CQSB16-5T</b>	6.5	25	M3 x 25L
		30	x 30L
<b>CQSB20-5T</b>	6.5	25	M5 x 25L
		30	x 30L
<b>CQSB25-5T</b>	8.5	30	M5 x 30L
		35	x 35L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

**Single Acting, Spring Return**

Cylinder model	C	D	Mounting bolt size
<b>CDQSB12-5S</b>	6.5	30	M3 x 30L
		35	x 35L
<b>CDQSB16-5S</b>	6.5	30	M3 x 30L
		35	x 35L
<b>CDQSB20-5S</b>	6.5	35	M5 x 35L
		40	x 40L
<b>CDQSB25-5S</b>	8.5	40	M5 x 40L
		45	45L

**Single Acting, Spring Extend**

Cylinder model	C	D	Mounting bolt size
<b>CDQSB12-5T</b>	6.5	30	M3 x 30L
		35	x 35L
<b>CDQSB16-5T</b>	6.5	30	M3 x 30L
		35	x 35L
<b>CDQSB20-5T</b>	6.5	35	M5 x 35L
		40	x 40L
<b>CDQSB25-5T</b>	8.5	40	M5 x 40L
		45	x 45L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

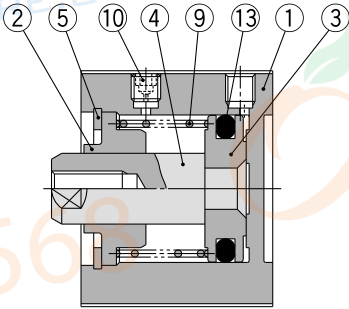
Individual -X□

Technical data

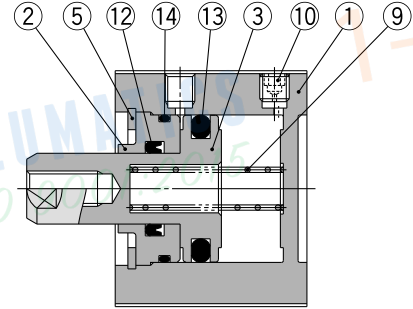
# Series CQS

## Construction

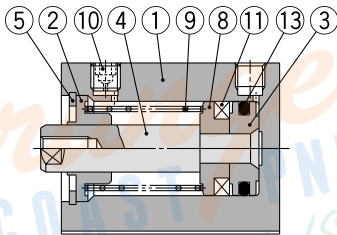
### Single acting, Spring return



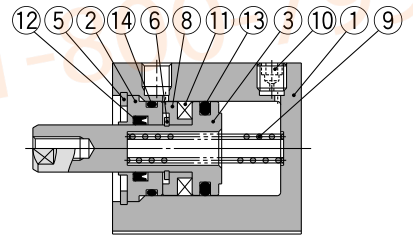
### Single acting, Spring extend



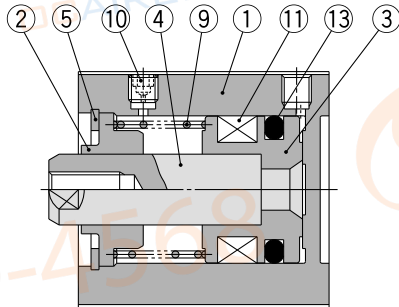
### Single acting, Spring return/With auto switch (Built-in magnet) ø12, 16



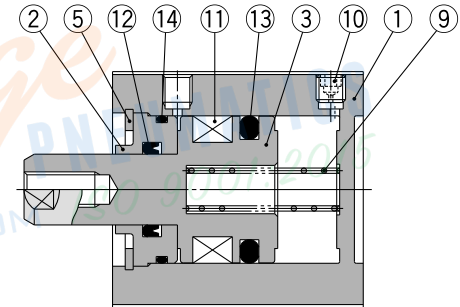
### Single acting, Spring extend/With auto switch (Built-in magnet) ø12, 16



### ø20, 25



### ø20, 25



## Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Collar	Aluminum alloy	Anodized
3	Piston	Aluminum alloy	Single acting, Spring return
		Stainless steel	Single acting, Spring extend
4	Piston rod	Stainless steel	
5	Retaining ring	Carbon tool steel	Phosphate coated
6	Retaining ring	Carbon tool steel	Nickel plated
7	Rod end nut	Carbon steel	Nickel plated
8	Spacer for switch type	Aluminum alloy	Chromated
9	Return spring	Piano wire	Zinc chromated
10	Plug with fixed orifice	Alloy steel	Nickel plated
11	Magnet	—	
12*	Rod seal	NBR	
13*	Piston seal	NBR	
14*	Tube gasket	NBR	

## Replacement Parts/Seal Kit Single acting, Spring return

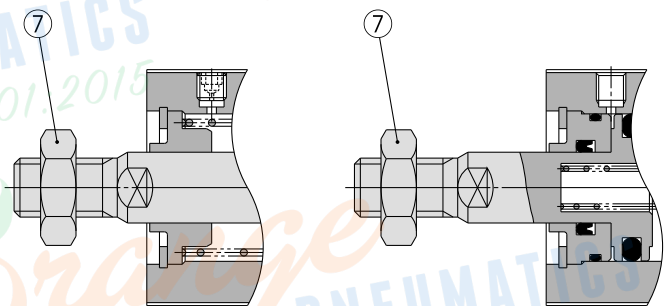
Bore size (mm)	Kit no.	Contents
12	CQSB12-S-PS	Set of nos. above ⑬
16	CQSB16-S-PS	
20	CQSB20-S-PS	
25	CQSB25-S-PS	

\* Seal kit includes ⑬. Order the seal kit, based on each bore size.  
\* Since the seal kit does not include a grease pack, order it separately.  
Grease pack part no.: GR-S-010 (10 g)

## Rod end male thread

### Single acting, Spring return

### Single acting, Spring extend



## Replacement Parts/Seal Kit Single acting, Spring extend

Bore size (mm)	Kit no.	Contents
12	CQSB12-T-PS	Set of nos. above ⑫, ⑬, ⑭
16	CQSB16-T-PS	
20	CQSB20-T-PS	
25	CQSB25-T-PS	

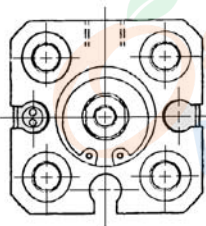
\* Seal kit includes ⑫, ⑬, ⑭. Order the seal kit, based on each bore size.  
\* Since the seal kit does not include a grease pack, order it separately.  
Grease pack part no.: GR-S-010 (10 g)

# Compact Cylinder: Standard Type Single Acting, Single Rod **Series CQS**

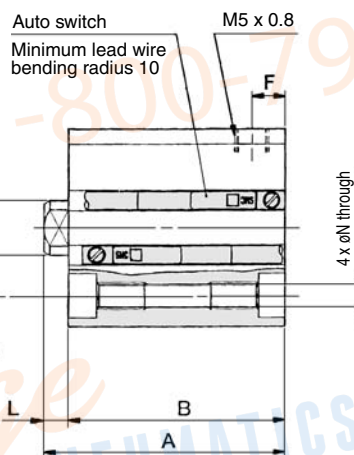
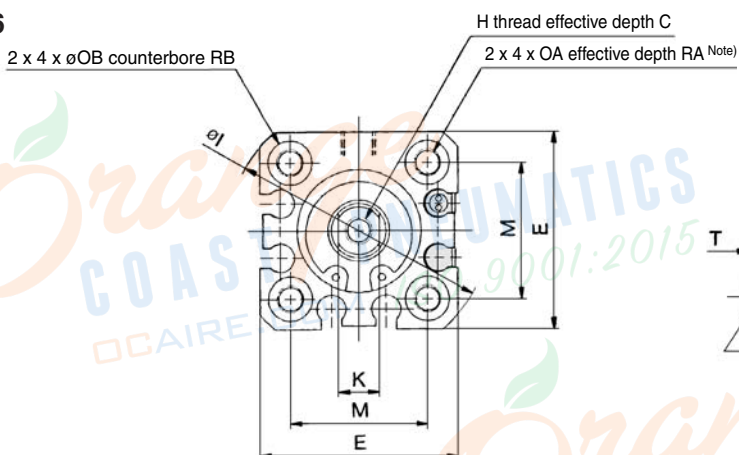
Dimensions:  $\varnothing 12$  to  $\varnothing 25$ /Single Acting, Spring Return

Basic style (Through-hole/Both ends tapped common): CQSB/CDQSB

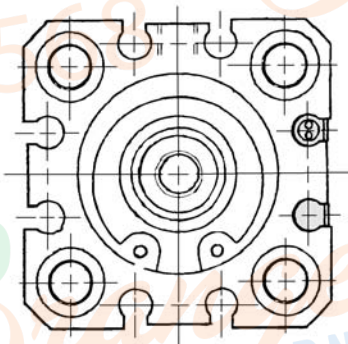
$\varnothing 12$



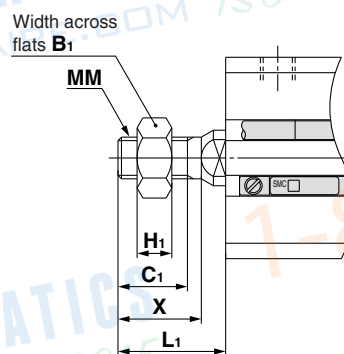
$\varnothing 16$



$\varnothing 20, \varnothing 25$



Rod end male thread



Rod End Male Thread

Bore size (mm)	B <sub>1</sub>	C <sub>1</sub>	H <sub>1</sub>	L <sub>1</sub>	MM	X
12	8	9	4	14	M5 x 0.8	10.5
16	10	10	5	15.5	M6 x 1.0	12
20	13	12	5	18.5	M8 x 1.25	14
25	17	15	6	22.5	M10 x 1.25	17.5

## Basic Style

Bore size (mm)	Stroke range (mm)	Without auto switch				With auto switch				C	D	E	F	H	I	K	L	M	N	OA	OB	RA	RB	T
		A		B		A		B																
		5 <sup>ST</sup>	10 <sup>ST</sup>	5 <sup>ST</sup>	10 <sup>ST</sup>	5 <sup>ST</sup>	10 <sup>ST</sup>	5 <sup>ST</sup>	10 <sup>ST</sup>															
12	5, 10	25.5	30.5	22	27	30.5	35.5	27	32	6	6	25	5	M3 x 0.5	32	5	3.5	15.5	3.5	M4 x 0.7	6.5	7	4	0.5
		25.5	30.5	22	27	30.5	35.5	27	32	8	8	29	5	M4 x 0.7	38	6	3.5	20	3.5	M4 x 0.7	6.5	7	4	0.5
20	5, 10	29	34	24.5	29.5	39	44	34.5	39.5	7	10	36	5.5	M5 x 0.8	47	8	4.5	25.5	5.4	M6 x 1.0	9	10	7	1
25	5, 10	32.5	37.5	27.5	32.5	42.5	47.5	37.5	42.5	12	12	40	5.5	M6 x 1.0	52	10	5	28	5.4	M6 x 1.0	9	10	7	1



Note) For basic style  $\varnothing 12$  and  $\varnothing 16$  with 5 stroke, through-hole is threaded over the entire length.  
For basic style  $\varnothing 20, \varnothing 25$  with 5 and 10 stroke, through-hole is threaded over the entire length.  
With auto switch (Built-in magnet)/ $\varnothing 20$ ; 5 stroke.

\* For details about the rod end nut and accessory brackets, refer to page 620.

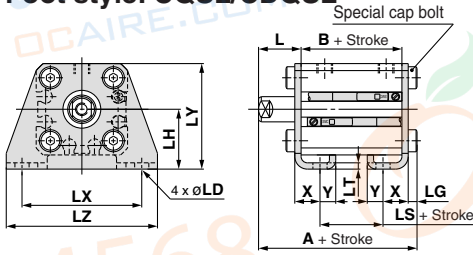
- CUJ
- CU
- CQS**
- CQ2
- RQ
- CQM
- MU

- D-
- X
- Individual
- X
- Technical data

# Series CQS

Dimensions:  $\varnothing 12$  to  $\varnothing 25$ /Single Acting, Spring Return

## Foot style: CQSL/CDQSL

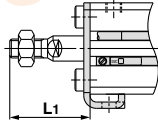


### Foot Style

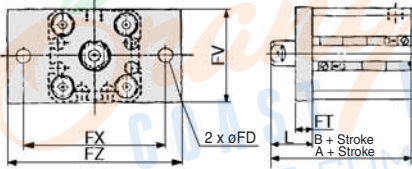
Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch			L	L <sub>1</sub>	LD	LG	LH	LT	LX	LY	LZ	X	Y
		A	B	LS	A	B	LS											
12	5, 10	35.3	17	5	40.3	22	10	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5
16		35.3	17	5	40.3	22	10	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5
20		41.2	19.5	7.5	51.2	29.5	17.5	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8
25		44.7	22.5	7.5	54.7	32.5	17.5	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



## Rod side flange style: CQSF/CDQSF

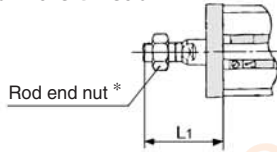


### Rod Side Flange Style

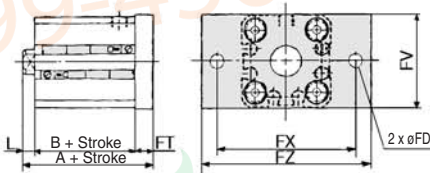
Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		FD	FT	FV	FX	FZ	L	L <sub>1</sub>
		A	B	A	B							
12	5, 10	30.5	17	35.5	22	4.5	5.5	25	45	55	13.5	24
16		30.5	17	35.5	22	4.5	5.5	30	45	55	13.5	25.5
20		34	19.5	44	29.5	6.6	8	39	48	60	14.5	28.5
25		37.5	22.5	47.5	32.5	6.6	8	42	52	64	15	32.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



## Head side flange style: CQSG/CDQSG

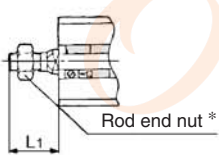


### Head Side Flange Style

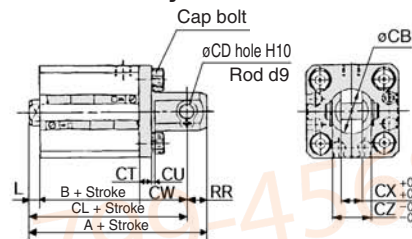
Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		FD	FT	FV	FX	FZ	L	L <sub>1</sub>
		A	B	A	B							
12	5, 10	26	17	31	22	4.5	5.5	25	45	55	3.5	14
16		26	17	31	22	4.5	5.5	30	45	55	3.5	15.5
20		32	19.5	42	29.5	6.6	8	39	48	60	4.5	18.5
25		35.5	22.5	45.5	32.5	6.6	8	42	52	64	5	22.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



## Double clevis style: CQSD/CDQSD

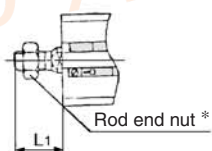


### Double Clevis Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch			CB	CD	CT	CU	CW	CX	CZ	L	L <sub>1</sub>	RR
		A	B	CL	A	B	CL										
12	5, 10	40.5	17	34.5	45.5	22	39.5	12	5	4	7	14	5	10	3.5	14	6
16		41.5	17	35.5	46.5	22	40.5	14	5	4	10	15	6.5	12	3.5	15.5	6
20		51	19.5	42	61	29.5	52	20	8	5	12	18	8	16	4.5	18.5	9
25		57.5	22.5	47.5	67.5	32.5	57.5	24	10	5	14	20	10	20	5	22.5	10

Double clevis bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread

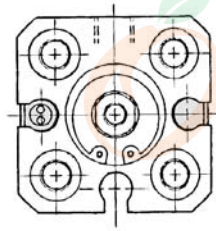


\* For details about the rod end nut and accessory brackets, refer to page 620.

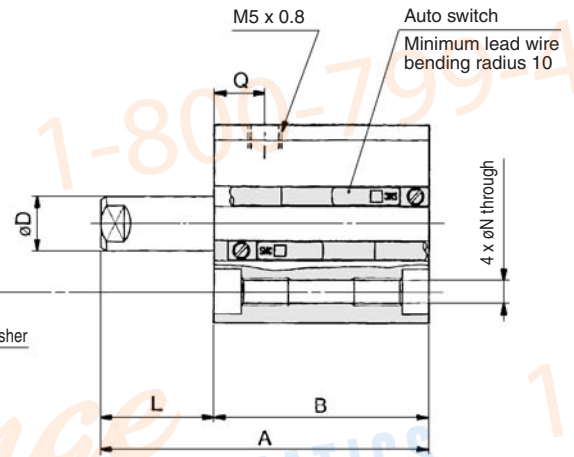
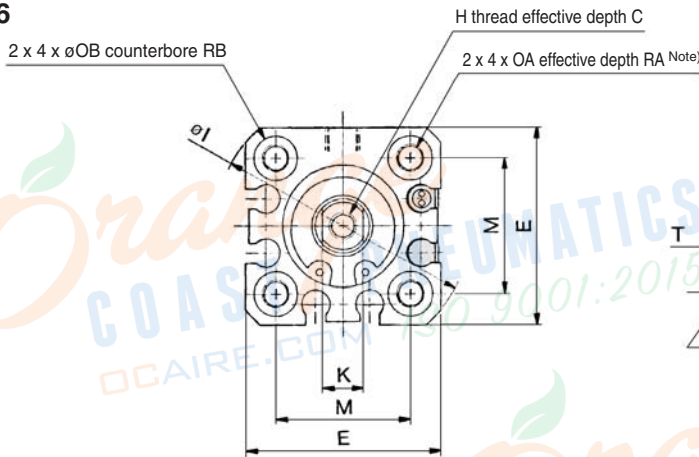
Dimensions:  $\phi 12$  to  $\phi 25$ /Single Acting, Spring Extend

Basic style (Through-hole/Both ends tapped common): CQSB/CDQSB

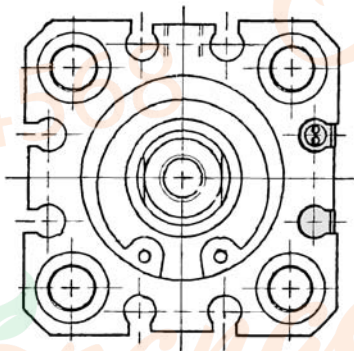
$\phi 12$



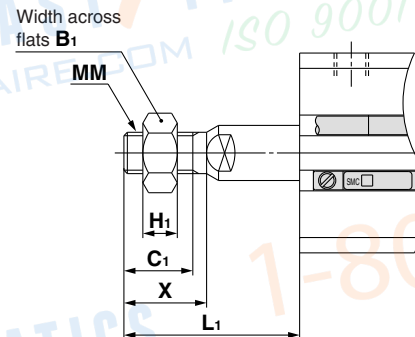
$\phi 16$



$\phi 20, \phi 25$



Rod end male thread



CUJ

CU

CQS

CQ2

RQ

CQM

MU

Rod End Male Thread

Bore size (mm)	B <sub>1</sub>	C <sub>1</sub>	H <sub>1</sub>	L <sub>1</sub>		MM	X
				5 <sup>ST</sup>	10 <sup>ST</sup>		
12	8	9	4	19	24	M5 x 0.8	10.5
16	10	10	5	20.5	25.5	M6 x 1.0	12
20	13	12	5	23.5	28.5	M8 x 1.25	14
25	17	15	6	27.5	32.5	M10 x 1.25	17.5

Basic Style

Bore size (mm)	Stroke range (mm)	Without auto switch				With auto switch				C	D	E	H	I	K	L		M	N	OA	OB	Q	RA	RB	T
		A		B		A		B								5 <sup>ST</sup>	10 <sup>ST</sup>								
		5 <sup>ST</sup>	10 <sup>ST</sup>	5 <sup>ST</sup>	10 <sup>ST</sup>	5 <sup>ST</sup>	10 <sup>ST</sup>	5 <sup>ST</sup>	10 <sup>ST</sup>																
12	5, 10	30.5	40.5	22	27	35.5	45.5	27	32	6	6	25	M3 x 0.5	32	5	8.5	13.5	15.5	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
16		30.5	40.5	22	27	35.5	45.5	27	32	8	8	29	M4 x 0.7	38	6	8.5	13.5	20	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
20		34	44	24.5	29.5	44	54	34.5	39.5	7	10	36	M5 x 0.8	47	8	9.5	14.5	25.5	5.4	M6 x 1.0	9	9	10	7	1
25		37.5	47.5	27.5	32.5	47.5	57.5	37.5	42.5	12	12	40	M6 x 1.0	52	10	10	15	28	5.4	M6 x 1.0	9	11	10	7	1



Note) For basic style  $\phi 12$  and  $\phi 16$  with 5 stroke, through-hole is threaded over the entire length.  
For basic style  $\phi 20, \phi 25$  with 5 and 10 stroke, through-hole is threaded over the entire length.  
With auto switch (Built-in magnet)/ $\phi 20$ ; 5 stroke.

\* For details about the rod end nut and accessory brackets, refer to page 620.

D-□

-X□

Individual

-X□

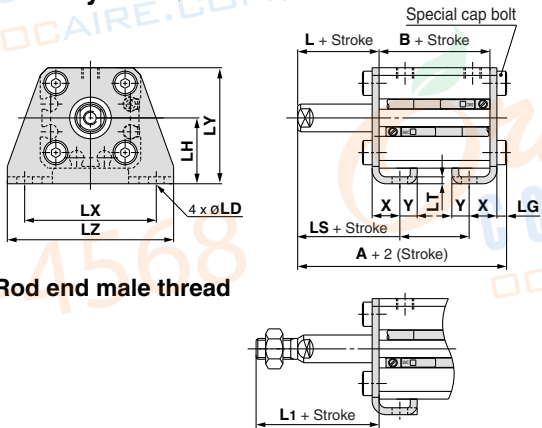
Technical

data

# Series CQS

Dimensions:  $\varnothing 12$  to  $\varnothing 25$ /Single Acting, Spring Extend

## Foot style: CQSL/CDQSL



Rod end male thread

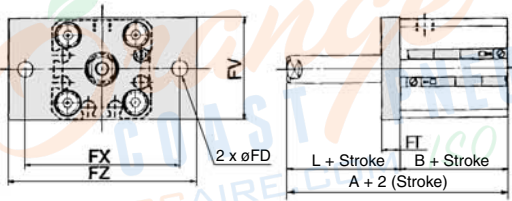
## Foot Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch		
		A	B	LS	A	B	LS
12	5, 10	35.3	17	5	40.3	22	10
16		35.3	17	5	40.3	22	10
20		41.2	19.5	7.5	51.2	29.5	17.5
25		44.7	22.5	7.5	54.7	32.5	17.5

Bore size (mm)	L	L <sub>1</sub>	LD	LG	LH	LT	LX	LY	LZ	X	Y
12	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5
16	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5
20	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8
25	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

## Rod side flange style: CQSF/CDQSF

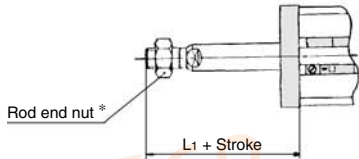


Rod end male thread

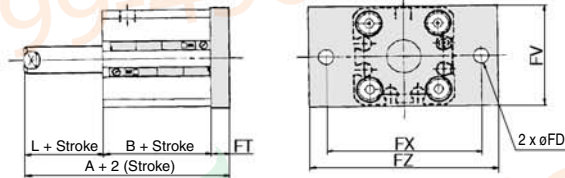
## Rod Side Flange Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		FD	FT	FV	FX	FZ	L	L <sub>1</sub>
		A	B	A	B							
12	5, 10	30.5	17	35.5	22	4.5	5.5	25	45	55	13.5	24
16		30.5	17	35.5	22	4.5	5.5	30	45	55	13.5	25.5
20		34	19.5	44	29.5	6.6	8	39	48	60	14.5	28.5
25		37.5	22.5	47.5	32.5	6.6	8	42	52	64	15	32.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated



## Head side flange style: CQSG/CDQSG

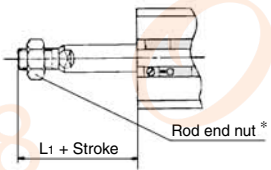


Rod end male thread

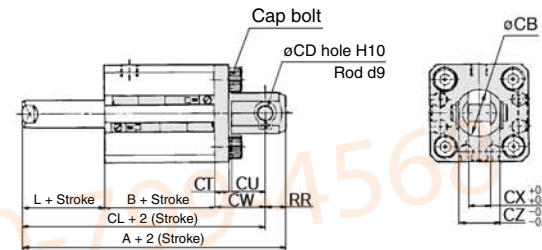
## Head Side Flange Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		FD	FT	FV	FX	FZ	L	L <sub>1</sub>
		A	B	A	B							
12	5, 10	26	17	31	22	4.5	5.5	25	45	55	3.5	14
16		26	17	31	22	4.5	5.5	30	45	55	3.5	15.5
20		32	19.5	42	29.5	6.6	8	39	48	60	4.5	18.5
25		35.5	22.5	45.5	32.5	6.6	8	42	52	64	5	22.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated



## Double clevis style: CQSD/CDQSD



Rod end male thread

## Double Clevis Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch		
		A	B	CL	A	B	CL
12	5, 10	40.5	17	34.5	45.5	22	39.5
16		41.5	17	35.5	46.5	22	40.5
20		51	19.5	42	61	29.5	52
25		57.5	22.5	47.5	67.5	32.5	57.5

Bore size (mm)	CB	CD	CT	CU	CW	CX	CZ	L	L <sub>1</sub>	RR
12	12	5	4	7	14	5	10	3.5	14	6
16	14	5	4	10	15	6.5	12	3.5	15.5	6
20	20	8	5	12	18	8	16	4.5	18.5	9
25	24	10	5	14	20	10	20	5	22.5	10

Double clevis bracket material: Carbon steel  
Surface treatment: Nickel plated

\* For details about the rod end nut and accessory brackets, refer to page 620.

# Compact Cylinder: Non-rotating Rod Type Double Acting, Single Rod Series CQSK

ø12, ø16, ø20, ø25

## How to Order

**CQSK B 20 - 30 D** - [ ] - [ ]

**With auto switch** **CDQSK B 20 - 30 D** - [ ] - **M9BW** [ ] - [ ]

**With auto switch** (Built-in magnet)

**Mounting style**

<b>B</b>	Through-hole/Both ends tapped common (Standard)
<b>L</b>	Foot style
<b>F</b>	Rod side flange style
<b>G</b>	Head side flange style
<b>D</b>	Double clevis style

**Bore size**

<b>12</b>	12 mm
<b>16</b>	16 mm
<b>20</b>	20 mm
<b>25</b>	25 mm

**Number of auto switches**

<b>Nil</b>	2 pcs.
<b>S</b>	1 pc.
<b>n</b>	"n" pcs.

**Auto switch**

<b>Nil</b>	Without auto switch
------------	---------------------

**Body option**

<b>Nil</b>	Standard (Rod end female thread)
<b>M</b>	Rod end male thread
<b>F</b>	Boss on head side

**Action**

<b>D</b>	Double acting
----------	---------------

**Standard Stroke**

Bore size (mm)	Standard stroke (mm)
<b>12, 16</b>	5, 10, 15, 20, 25, 30
<b>20, 25</b>	5, 10, 15, 20, 25, 30, 35, 40, 45, 50

**Cylinder stroke (mm)**

**Made to Order**  
Refer to page 576 for details.

**Built-in Magnet Cylinder Model**  
If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.  
(Example) CDQSKL25-30D

\* Mounting brackets are shipped together, (but not assembled).  
\* Cylinder mounting bolts are not included. Order them separately referring to "Mounting Bolt for CQSK" on page 579.

\* Refer to the table below for the applicable auto switch model.

For "Manufacture of Intermediate Strokes", refer to page 576.

### Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state switch	—	—	—	3-wire (NPN)	5 V, 12 V	—	<b>M9NV</b>	<b>M9N</b>	●	●	●	○	○	IC circuit	
				3-wire (PNP)			<b>M9PV</b>	<b>M9P</b>	●	●	●	○			
				2-wire	12 V	<b>M9BV</b>	<b>M9B</b>	●	●	●	○	○	—		
				3-wire (NPN)	5 V, 12 V	<b>M9NWV</b>	<b>M9NW</b>	●	●	●	○	○	IC circuit		
	3-wire (PNP)	<b>M9PWV</b>	<b>M9PW</b>	●		●	●	○	○						
	Diagnostic indication (2-color indication)	Grommet	Yes	2-wire	12 V	—	<b>M9BWW</b>	<b>M9BW</b>	●	●	●	○	○	—	
				3-wire (NPN)	5 V, 12 V	<b>M9NAV</b>	<b>M9NA</b>	○	○	●	○	○	IC circuit		
	Water resistant (2-color indication)	Grommet	Yes	3-wire (PNP)		12 V	—	<b>M9PAV</b>	<b>M9PA</b>	○	○	●		○	○
2-wire				12 V	<b>M9BAV</b>	<b>M9BA</b>	○	○	●	○	○				
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	<b>A96V</b>	<b>A96</b>	●	—	●	—	—	IC circuit	—
				2-wire	24 V	12 V	<b>A93V</b>	<b>A93</b>	●	—	●	—	—	—	Relay, PLC
			No	2-wire	24 V	100 V or less	<b>A90V</b>	<b>A90</b>	●	—	●	—	—	IC circuit	

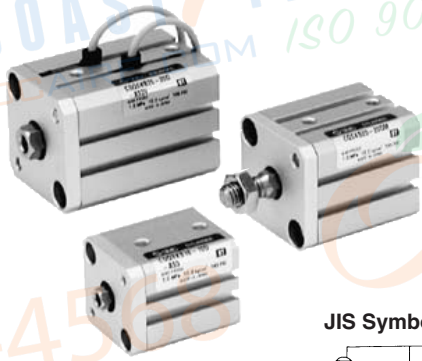
\* Lead wire length symbols: 0.5 m..... Nil (Example) M9NV  
1 m..... M (Example) M9NWM  
3 m..... L (Example) M9NWL  
5 m..... Z (Example) M9NWZ

\* Solid state auto switches marked with "○" are produced upon receipt of order.

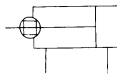
\* Since there are other applicable auto switches than listed, refer to page 597 for details.  
\* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.  
\* Auto switches are shipped together (not assembled).

Note) There is the case A9□V/M9□V/M9□WV/M9□AVL type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Consult with SMC for details.

# Series CQSK



JIS Symbol



## Made to Order Specifications

(For details, refer to pages 1426 and 1430 to 1446.)

Symbol	Specifications
-XC6	Piston rod and rod end nut made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extension type
-XC9	Adjustable stroke cylinder/Adjustable retraction type
-XC10	Dual stroke cylinder/Double rod type
-XC11	Dual stroke cylinder/Single rod type
-X1876	With concave shape end boss on the cylinder tube head side

## Body Option

Description	Application
Rod end male thread	Available for all non-rotating rod type.

## Mounting Bracket Part No.

Bore size (mm)	Foot <sup>(1)</sup>	Flange	Double clevis
12	CQSK-L012	CQSK-F012	CQSK-D012
16	CQSK-L016	CQSK-F016	CQSK-D016
20	CQSK-L020	CQSK-F020	CQSK-D020
25	CQSK-L025	CQSK-F025	CQSK-D025

- Note 1) When ordering foot bracket, order 2 pieces per cylinder.  
 Note 2) Parts belonging to each bracket are as follows.  
 Foot or Flange style: Body mounting bolt  
 Double clevis style: Clevis pin, Type C retaining ring for axis, Body mounting bolt.

## Standard Specifications

Bore size (mm)	12	16	20	25
Action	Double acting, Single rod			
Fluid	Air			
Lubrication	Not required (Non-lube)			
Proof pressure	1.5 MPa			
Maximum operating pressure	1.0 MPa			
Minimum operating pressure	0.07 MPa	0.05 MPa		
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
Cushion	None			
Rod end thread	Female thread			
Stroke length tolerance	+1.0 mm 0			
Mounting	Through-hole/Both ends tapped common			
Piston speed	50 to 500 mm/s			
Allowable kinetic energy (J)	0.022	0.038	0.055	0.09
Rod non-rotating accuracy	±1°		±0.7°	

## Theoretical Output

Bore size (mm)	Rod width across flats (mm)	Action	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)		
				0.3	0.5	0.7
12	5.2	IN	90	27	45	63
		OUT	113	34	57	79
16	6.2	IN	168	50	84	117
		OUT	201	60	101	141
20	8.2	IN	256	77	128	179
		OUT	314	94	157	220
25	10.2	IN	401	120	200	281
		OUT	491	147	245	344

## Manufacture of Intermediate Stroke

Description	Spacer is installed in the standard stroke body.		
Part no.	Refer to "How to Order" for the standard model no. (page 575).		
Standard stroke	Description	Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.	
	Stroke range	Bore size	Stroke range
		12, 16	1 to 29
20, 25	1 to 49		
Example	Part no.: CQSKB25-47D CQSKB25-50D with 3 mm width spacer inside. B dimension is 77.5 mm.		

Refer to pages 595 to 597 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

# Compact Cylinder: Non-rotating Rod Type Double Acting, Single Rod **Series CQSK**

## Mass/Without Auto Switch

(g)

Bore size (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
12	39	46	53	60	67	74	—	—	—	—
16	52	61	69	78	86	95	—	—	—	—
20	89	102	116	129	143	156	170	183	197	211
25	124	141	157	174	190	207	224	240	257	273

Calculation: (Example) **CQSKF20-5DM**

- Cylinder mass: CQSKB20-5D..... 89 g
- Option mass: Rod end male thread..... 10 g
- : Rod side flange style..... 142 g
- 241 g

## Mass/With Auto Switch (Built-in magnet)

(g)

Bore size (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
12	47	54	62	69	76	83	—	—	—	—
16	63	71	80	88	97	106	—	—	—	—
20	122	136	149	163	176	190	203	217	230	244
25	168	185	201	218	235	251	268	284	301	317

## Additional Mass

(g)

Bore size (mm)		12	16	20	25
Rod end male thread	Male thread	1.5	3	6	12
	Nut	1	2	4	8
Foot style (Including mounting bolt)		55	64	158	179
Rod side flange style (Including mounting bolt)		58	69	142	178
Head side flange style (Including mounting bolt)		56	66	137	171
Double clevis style (Including pin, retaining ring, bolt)		34	40	92	127

- CUJ**
- CU**
- CQS**
- CQ2**
- RQ**
- CQM**
- MU**

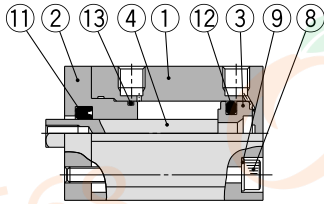
- D-□**
- X□**
- Individual  
**-X□**
- Technical  
data

# Series CQSK

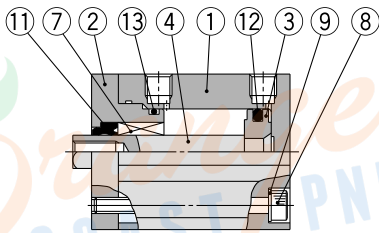
## Construction

### Basic style

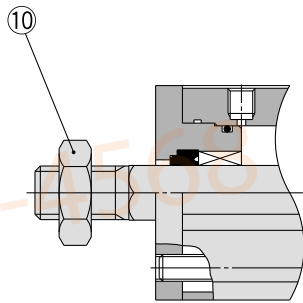
ø12



ø16, ø20, ø25

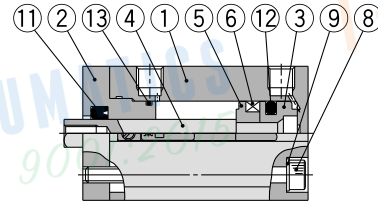


### Rod end male thread

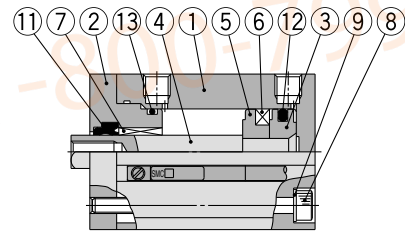


### With auto switch (Built-in magnet)

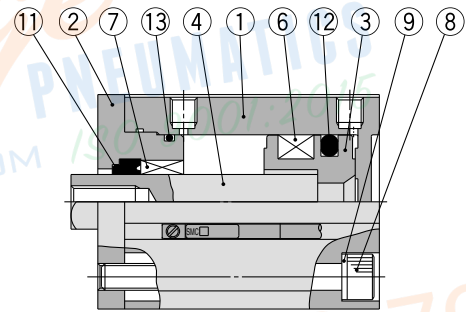
ø12



ø16



ø20, ø25



### Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Rod cover	Aluminum alloy	Anodized
3	Piston	Aluminum alloy	Chromated
4	Piston rod	Stainless steel	
5	Spacer for switch type	Aluminum alloy	Chromated
6	Magnet	—	
7	Non-rotating guide	Oil impregnated sintered alloy	ø16, ø20 and ø25
8	Hexagon socket head cap screw	Alloy steel	Nickel plated
9	Plain washer	Rolled steel	Nickel plated
10	Rod end nut	Carbon steel	Nickel plated
11*	Rod seal	NBR	
12*	Piston seal	NBR	
13*	Tube gasket	NBR	

### Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
12	CQSKB12-PS	Set of nos. above ①, ②, ⑬.
16	CQSKB16-PS	
20	CQSKB20-PS	
25	CQSKB25-PS	

\* Seal kit includes ①, ②, ⑬. Order the seal kit, based on each bore size.

\* Since the seal kit does not include a grease pack, order it separately.

Grease pack part no.: GR-S-010 (10 g)

## ⚠ Precautions

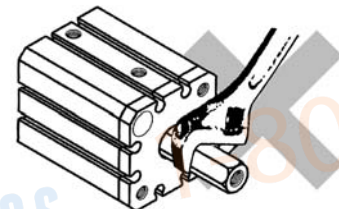
### Operating Precautions

#### ⚠ Caution

1. Any kind of operation producing rotational torque to piston rod must be considered. The non-rotating guide would be deformed and the accuracy would be compromised. Refer to the table below for rotation torque allowance.

Allowable rotational torque (N-m) or less	ø12	ø16	ø20	ø25
		0.04	0.04	0.2

- Load to piston rod must always be in an axial direction.
- When a workpiece is secured to the end of the piston rod, ensure that the piston rod is retracted entirely, and place a wrench on the portion of the rod that protrudes beyond the section. Also, tighten by giving consideration to prevent the tightening torque from being applied to the non-rotating guide.



# Compact Cylinder: Non-rotating Rod Type Double Acting, Single Rod **Series CQSK**

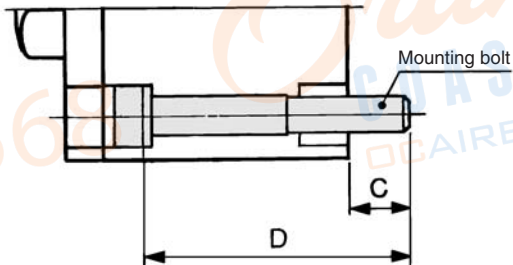
## Mounting Bolt for CQSK

Mounting method: Mounting bolt for through-hole mounting style of CQSK is available as an option.

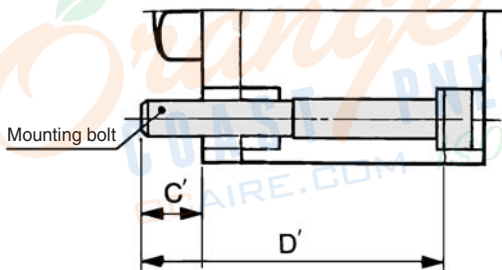
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 30L 2 pcs.**

### Head side mounting style



### Rod side mounting style



Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

Cylinder model	C	D	Mounting bolt size	C'	D'	Mounting bolt size
<b>CQSKB12-5D</b>	6.5	25	M3 x 25L	6.5	30	M3 x 30L
<b>-10D</b>		30	x 30L		35	x 35L
<b>-15D</b>		35	x 35L		40	x 40L
<b>-20D</b>		40	x 40L		45	x 45L
<b>-25D</b>		45	x 45L		50	x 50L
<b>-30D</b>		50	x 50L		55	x 55L
<b>CQSKB16-5D</b>	6.5	25	M3 x 25L	6.5	30	M3 x 30L
<b>-10D</b>		30	x 30L		35	x 35L
<b>-15D</b>		35	x 35L		40	x 40L
<b>-20D</b>		40	x 40L		45	x 45L
<b>-25D</b>		45	x 45L		50	x 50L
<b>-30D</b>		50	x 50L		55	x 55L
<b>CQSKB20-5D</b>	6.5	25	M5 x 25L	6.5	30	M5 x 30L
<b>-10D</b>		30	x 30L		35	x 35L
<b>-15D</b>		35	x 35L		40	x 40L
<b>-20D</b>		40	x 40L		45	x 45L
<b>-25D</b>		45	x 45L		50	x 50L
<b>-30D</b>		50	x 50L		55	x 55L
<b>-35D</b>		55	x 55L		60	x 60L
<b>-40D</b>		60	x 60L		65	x 65L
<b>-45D</b>		65	x 65L		70	x 70L
<b>-50D</b>		70	x 70L		75	x 75L
<b>CQSKB25-5D</b>	8.5	30	M5 x 30L	8.5	35	M5 x 35L
<b>-10D</b>		35	x 35L		40	x 40L
<b>-15D</b>		40	x 40L		45	x 45L
<b>-20D</b>		45	x 45L		50	x 50L
<b>-25D</b>		50	x 50L		55	x 55L
<b>-30D</b>		55	x 55L		60	x 60L
<b>-35D</b>		60	x 60L		65	x 65L
<b>-40D</b>		65	x 65L		70	x 70L
<b>-45D</b>		70	x 70L		75	x 75L
<b>-50D</b>		75	x 75L		80	x 80L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

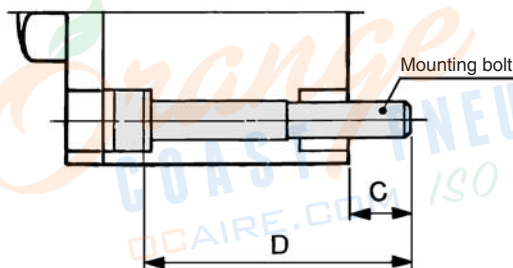
## Mounting Bolt for CDQSK

Mounting method: Mounting bolt for through-hole mounting style of CDQSK is available as an option.

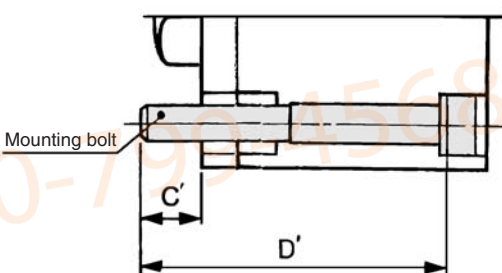
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 35L 2 pcs.**

### Head side mounting style



### Rod side mounting style



Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

Cylinder model	C	D	Mounting bolt size	C'	D'	Mounting bolt size
<b>CDQSKB12-5D</b>	6.5	30	M3 x 30L	6.5	35	M3 x 35L
<b>-10D</b>		35	x 35L		40	x 40L
<b>-15D</b>		40	x 40L		45	x 45L
<b>-20D</b>		45	x 45L		50	x 50L
<b>-25D</b>		50	x 50L		55	x 55L
<b>-30D</b>		55	x 55L		60	x 60L
<b>CDQSKB16-5D</b>	6.5	30	M3 x 30L	6.5	35	M3 x 35L
<b>-10D</b>		35	x 35L		40	x 40L
<b>-15D</b>		40	x 40L		45	x 45L
<b>-20D</b>		45	x 45L		50	x 50L
<b>-25D</b>		50	x 50L		55	x 55L
<b>-30D</b>		55	x 55L		60	x 60L
<b>CDQSKB20-5D</b>	6.5	35	M5 x 35L	6.5	40	M5 x 40L
<b>-10D</b>		40	x 40L		45	x 45L
<b>-15D</b>		45	x 45L		50	x 50L
<b>-20D</b>		50	x 50L		55	x 55L
<b>-25D</b>		55	x 55L		60	x 60L
<b>-30D</b>		60	x 60L		65	x 65L
<b>-35D</b>		65	x 65L		70	x 70L
<b>-40D</b>		70	x 70L		75	x 75L
<b>-45D</b>		75	x 75L		80	x 80L
<b>-50D</b>		80	x 80L		85	x 85L
<b>CDQSKB25-5D</b>	8.5	40	M5 x 40L	8.5	45	M5 x 45L
<b>-10D</b>		45	x 45L		50	x 50L
<b>-15D</b>		50	x 50L		55	x 55L
<b>-20D</b>		55	x 55L		60	x 60L
<b>-25D</b>		60	x 60L		65	x 65L
<b>-30D</b>		65	x 65L		70	x 70L
<b>-35D</b>		70	x 70L		75	x 75L
<b>-40D</b>		75	x 75L		80	x 80L
<b>-45D</b>		80	x 80L		85	x 85L
<b>-50D</b>		85	x 85L		90	x 90L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

# Series CQSK

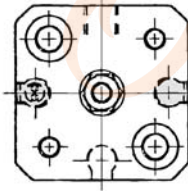
Dimensions:  $\phi 12$  to  $\phi 25$

Basic style (Through-hole/Both ends tapped common): CQSK/CDQSK

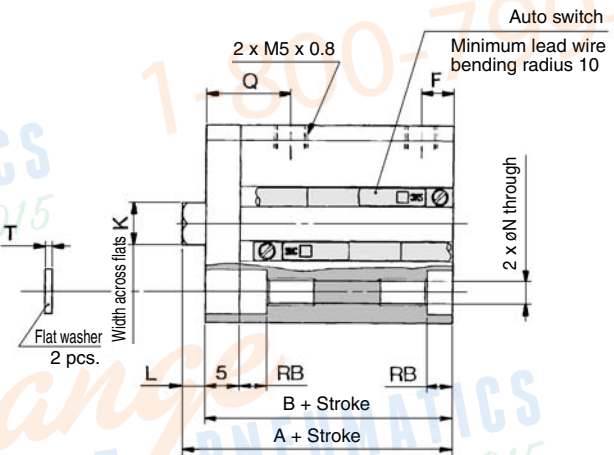
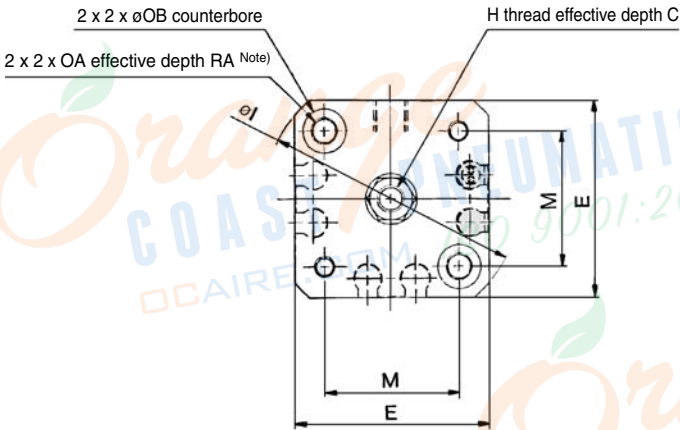


\* For the auto switch mounting position and its mounting height, refer to page 596.

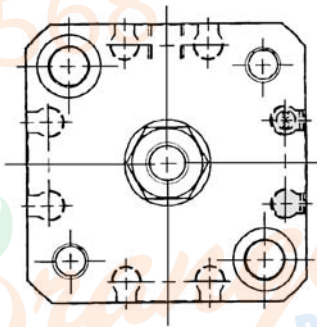
$\phi 12$



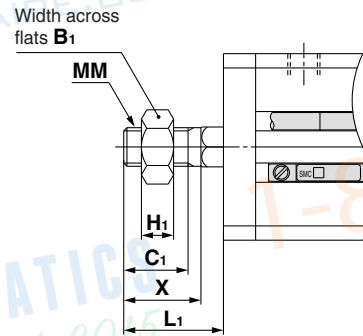
$\phi 16$



$\phi 20, \phi 25$



Rod end male thread



## Rod End Male Thread

Bore size (mm)	B <sub>1</sub>	C <sub>1</sub>	H <sub>1</sub>	L <sub>1</sub>	MM	X
12	8	9	4	14	M5 x 0.8	10.5
16	10	10	5	15.5	M6 x 1.0	12
20	13	12	5	18.5	M8 x 1.25	14
25	17	15	6	22.5	M10 x 1.25	17.5

## Basic Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		C	E	F	H	I	K	L	M	N	OA	OB	Q	RA	RB	T
		A	B	A	B															
12	5 to 30	25.5	22	30.5	27	6	25	5	M3 x 0.5	32	5.2	3.5	15.5	3.5	M4 x 0.7	6.5	12.5	7	4	0.5
16	5 to 30	25.5	22	30.5	27	8	29	5	M4 x 0.7	38	6.2	3.5	20	3.5	M4 x 0.7	6.5	12.5	7	4	0.5
20	5 to 50	29	24.5	39	34.5	7	36	5.5	M5 x 0.8	47	8.2	4.5	25.5	5.4	M6 x 1.0	9	14	10	7	1
25	5 to 50	32.5	27.5	42.5	37.5	12	40	5.5	M6 x 1.0	52	10.2	5	28	5.4	M6 x 1.0	9	16	10	7	1

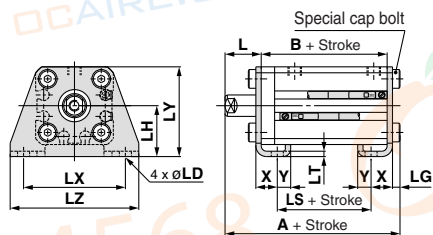
Note) For basic style  $\phi 12$  and  $\phi 16$  with 5 stroke, through-hole is threaded over the entire length.  
 For basic style  $\phi 20$  with 5 to 15 stroke, through-hole is threaded over the entire length.  
 For basic style  $\phi 25$  with 5 and 10 stroke, through-hole is threaded over the entire length.

Note) With auto switch (Built-in magnet):  $\phi 20$ ; 5 stroke

\* For details about the rod end nut and accessory brackets, refer to page 620.

# Compact Cylinder: Non-rotating Rod Type Double Acting, Single Rod **Series CQSK**

## Foot style: CQSKL/CDQSKL

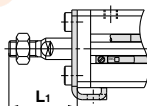


### Foot Style

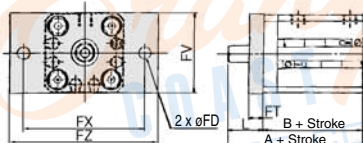
Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch			L	L <sub>1</sub>	LD	LG	LH	LT	LX	LY	LZ	X	Y
		A	B	LS	A	B	LS											
12	5 to 30	40.3	22	10	45.3	27	15	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5
16	5 to 30	40.3	22	10	45.3	27	15	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5
20	5 to 50	46.2	24.5	12.5	56.2	34.5	22.5	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8
25	5 to 50	49.7	27.5	12.5	59.7	37.5	22.5	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



## Rod side flange style: CQSKF/CDQSKF

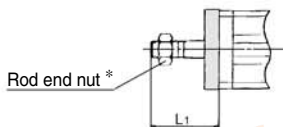


### Rod Side Flange Style

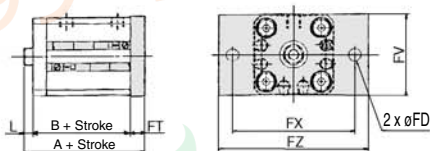
Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		FD	FT	FV	FX	FZ	L	L <sub>1</sub>
		A	B	A	B							
12	5 to 30	35.5	22	40.5	27	4.5	5.5	25	45	55	13.5	24
16	5 to 30	35.5	22	40.5	27	4.5	5.5	30	45	55	13.5	25.5
20	5 to 50	39	24.5	49	34.5	6.6	8	39	48	60	14.5	28.5
25	5 to 50	42.5	27.5	52.5	37.5	6.6	8	42	52	64	15	32.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



## Head side flange style: CQSKG/CDQSKG

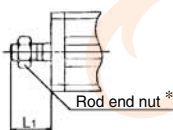


### Head Side Flange Style

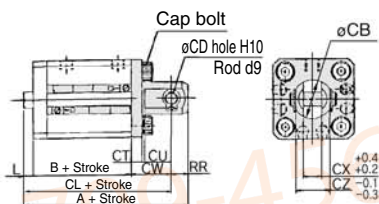
Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		FD	FT	FV	FX	FZ	L	L <sub>1</sub>
		A	B	A	B							
12	5 to 30	31	22	36	27	4.5	5.5	25	45	55	3.5	14
16	5 to 30	31	22	36	27	4.5	5.5	30	45	55	3.5	15.5
20	5 to 50	37	24.5	47	34.5	6.6	8	39	48	60	4.5	18.5
25	5 to 50	40.5	27.5	50.5	37.5	6.6	8	42	52	64	5	22.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



## Double clevis style: CQSKD/CDQSKD

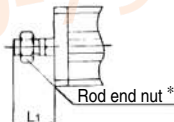


### Double Clevis Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch			CB	CD	CT	CU	CW	CX	CZ	L	L <sub>1</sub>	RR
		A	B	CL	A	B	CL										
12	5 to 30	45.5	22	39.5	50.5	27	44.5	12	5	4	7	14	5	10	3.5	14	6
16	5 to 30	46.5	22	40.5	51.5	27	45.5	14	5	4	10	15	6.5	12	3.5	15.5	6
20	5 to 50	56	24.5	47	66	34.5	57	20	8	5	12	18	8	16	4.5	18.5	9
25	5 to 50	62.5	27.5	52.5	72.5	37.5	62.5	24	10	5	14	20	10	20	5	22.5	10

Double clevis bracket material: Carbon steel  
Surface treatment: Nickel plated

### Rod end male thread



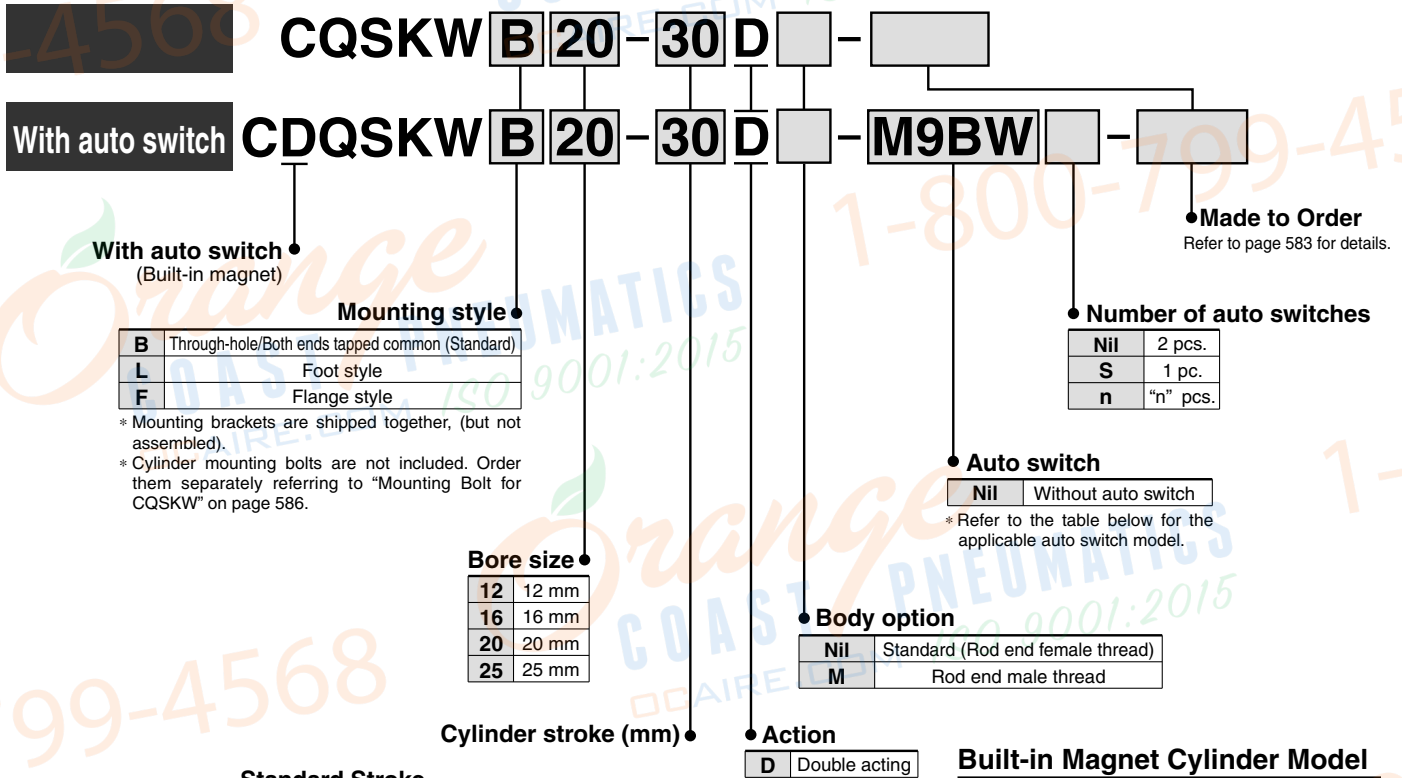
\* For details about the rod end nut and accessory brackets, refer to page 620.

- CUJ**
- CU**
- CQS**
- CQ2**
- RQ**
- CQM**
- MU**

- D-□**
- X□**
- Individual
- X□**
- Technical data

# Compact Cylinder: Non-rotating Rod Type Double Acting, Double Rod Series **CQSKW** ø12, ø16, ø20, ø25

## How to Order



### Standard Stroke

Bore size (mm)	Standard stroke (mm)
<b>12, 16</b>	5, 10, 15, 20, 25, 30
<b>20, 25</b>	5, 10, 15, 20, 25, 30, 35, 40, 45, 50

### Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.  
(Example) CDQSKWL25-30D

**Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.**

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

\* Lead wire length symbols: 0.5 m..... Nil (Example) M9NV  
1 m..... M (Example) M9NW  
3 m..... L (Example) M9NL  
5 m..... Z (Example) M9NZ

\* Solid state auto switches marked with "○" are produced upon receipt of order.

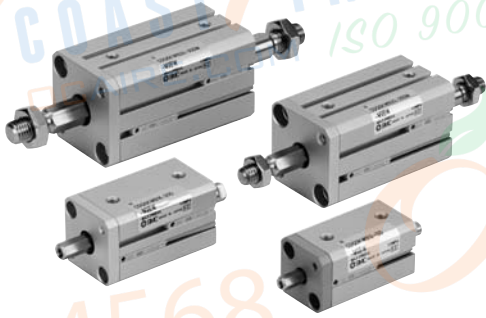
\* Since there are other applicable auto switches than listed, refer to page 597 for details.

\* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.

\* Auto switches are shipped together (not assembled).

Note) There is the case A9□V/M9□V/M9□WV/M9□AVL type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Consult with SMC for details.

# Compact Cylinder: Non-rotating Rod Type Double Acting, Double Rod **Series CQSKW**



JIS Symbol



## Specifications

Bore size (mm)	12	16	20	25
<b>Action</b>	Double acting, Single rod			
<b>Fluid</b>	Air			
<b>Lubrication</b>	Not required (Non-lube)			
<b>Proof pressure</b>	1.5 MPa			
<b>Maximum operating pressure</b>	1.0 MPa			
<b>Minimum operating pressure</b>	0.07 MPa		0.05 MPa	
<b>Ambient and fluid temperature</b>	Without auto switch: -10 to 70°C (No freezing)			
	With auto switch: -10 to 60°C (No freezing)			
<b>Cushion</b>	None			
<b>Rod end thread</b>	Female thread			
<b>Stroke length tolerance</b>	+1.0 mm			
<b>Mounting</b>	Through-hole/Both ends tapped common			
<b>Piston speed</b>	50 to 500 mm/s			
<b>Allowable kinetic energy (J)</b>	0.022	0.038	0.055	0.09
<b>Rod non-rotating accuracy</b>	±1°		±0.7°	



**Made to Order Specifications**  
(For details, refer to pages 1426 to 1511.)

Symbol	Specifications
-XC6	Piston rod, retaining ring, rod end nut made of stainless steel
-X633	Intermediate stroke of double rod cylinder

## Body Option

Description	Application
Rod end male thread	Available for all non-rotating rod type.

## Mounting Bracket Part No.

Bore size (mm)	Foot (1)	Flange
12	CQSK-L012	CQSK-F012
16	CQSK-L016	CQSK-F016
20	CQSK-L020	CQSK-F020
25	CQSK-L025	CQSK-F025

- Note 1) When ordering foot bracket, order 2 pieces per cylinder.  
Note 2) Parts belonging to each bracket are as follows.  
Foot or Flange style: Body mounting bolt

## Theoretical Output

Bore size (mm)	Rod width across flats (mm)	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)		
			0.3	0.5	0.7
12	5.2	90	27	45	63
16	6.2	168	50	84	117
20	8.2	256	77	128	179
25	10.2	401	120	200	281

Refer to pages 595 to 597 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket/Part no.

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

Individual  
-X□

Technical  
data

# Series CQSKW

## Mass/Without Auto Switch

Bore size (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
12	48	56	65	73	80	88	—	—	—	—
16	64	75	84	95	105	115	—	—	—	—
20	115	131	148	164	191	196	213	229	246	264
25	160	180	200	221	241	263	285	305	320	347

## Mass/With Auto Switch (Built-in magnet)

Bore size (mm)	Cylinder stroke (mm)									
	5	10	15	20	25	30	35	40	45	50
12	56	65	74	82	90	98	—	—	—	—
16	75	85	95	105	116	126	—	—	—	—
20	148	164	180	197	214	231	247	265	280	297
25	188	209	230	251	273	293	315	335	356	376

## Additional Mass

Bore size (mm)		12	16	20	25
Rod end male thread	Male thread	1.5	3	6	12
	Nut	1	2	4	8
Foot style (Including mounting bolt)		55	64	158	179
Rod side flange style (Including mounting bolt)		58	69	142	178

Calculation: (Example) CQSKWF20-5DM

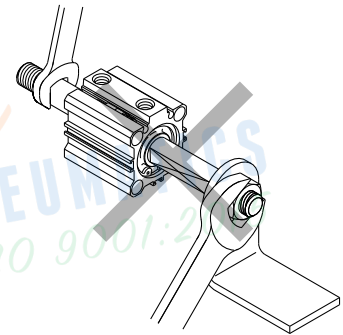
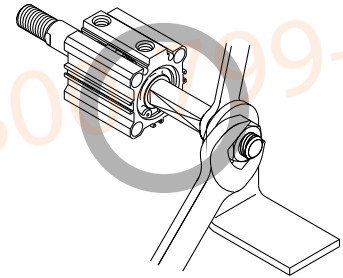
- Cylinder mass: CQSKWB20-5D..... 115 g
  - Option mass: Rod end male thread..... 10 g
  - : Rod side flange style..... 142 g
- 267 g

## ⚠ Precautions

### Operating Precautions

#### ⚠ Warning

1. Do not apply the reverse torque to the piston rods sticking out from both sides of this cylinder at the same time. The torque makes connection threads inside loosen, which may cause an accident or malfunction. Install or remove a load while the piston rod width across flats are secured. Do not fix the other side of piston rod width across flat and apply the reverse torque.



#### ⚠ Caution

1. Any kind of operation producing rotational torque to piston rod must be considered. The non-rotating guide would be deformed and the accuracy would be compromised. Refer to the table below for rotation torque allowance.

Allowable rotational torque (N·m) or less	ø12	ø16	ø20	ø25
	0.04	0.04	0.2	0.25

2. Load to piston rod must always be in an axial direction.

### Retaining Ring Installation/Removal

#### ⚠ Caution

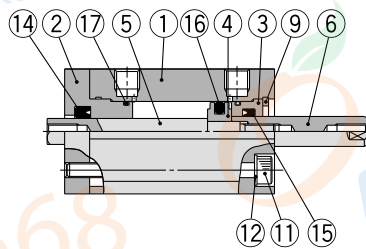
1. For installation and removal, use an appropriate pair of pliers (tool for installing a type C retaining ring).
2. Even if a proper plier (tool for installing type C retaining ring) is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier (tool for installing a type C retaining ring). Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.

# Compact Cylinder: Non-rotating Rod Type Double Acting, Double Rod **Series CQSKW**

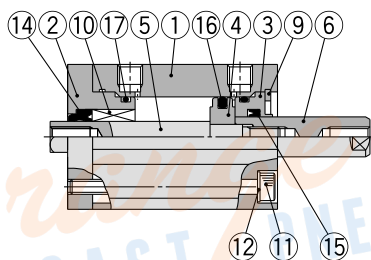
## Construction

### Basic style

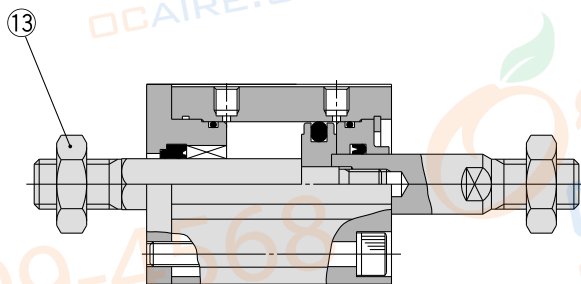
ø12



ø16, ø20, ø25

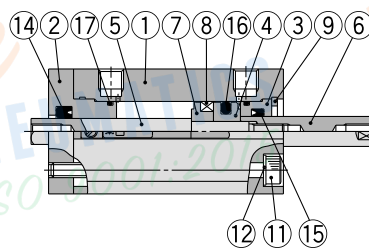


### Rod end male thread

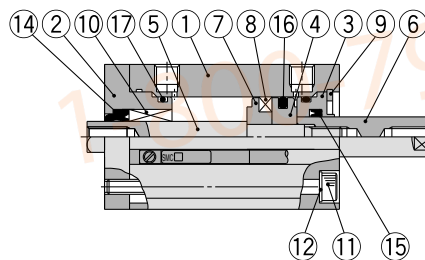


### With auto switch (Built-in magnet)

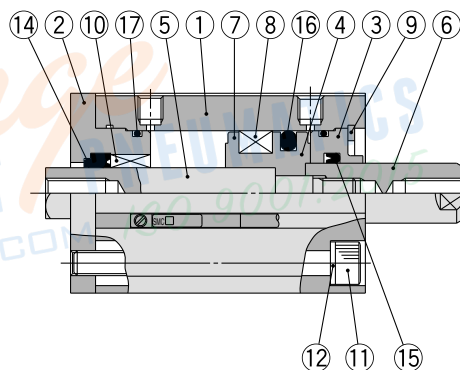
ø12



ø16



ø20, ø25



### Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Rod cover	Aluminum alloy	Anodized
3	Collar	Aluminum alloy	Anodized
4	Piston	Aluminum alloy	Chromated
5	Piston rod A	Stainless steel	
6	Piston rod B	Stainless steel	
7	Spacer for switch type	Aluminum alloy	Chromated
8	Magnet	—	
9	Retaining ring	Carbon tool steel	Phosphate coated
10	Non-rotating guide	Oil impregnated sintered alloy	ø16, ø20 and ø25
11	Hexagon socket head cap screw	Alloy steel	Nickel plated
12	Plain washer	Rolled steel	Nickel plated
13	Rod end nut	Carbon steel	Nickel plated
14*	Rod seal for non-rotating	NBR	
15*	Rod seal	NBR	
16*	Piston seal	NBR	
17*	Tube gasket	NBR	

### Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
12	CQSKWB12-PS	Set of nos. above 14, 15, 16, 17.
16	CQSKWB16-PS	
20	CQSKWB20-PS	
25	CQSKWB25-PS	

\* Seal kit includes 14, 15, 16, 17. Order the seal kit, based on each bore size.

\* Since the seal kit does not include a grease pack, order it separately.

Grease pack part no.: GR-S-010 (10 g)

CUJ

CU

CQS

CQ2

RQ

CQM

MU

D-□

-X□

Individual

-X□

Technical data

# Series CQSKW

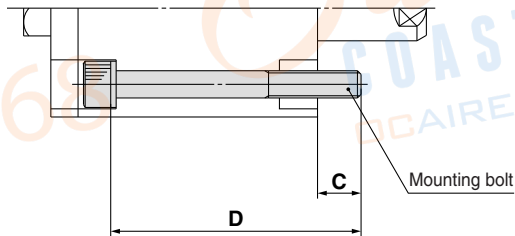
## Mounting Bolt for CQSKW

Mounting method: Mounting bolt for through-hole mounting style of CQSKW is available as an option.

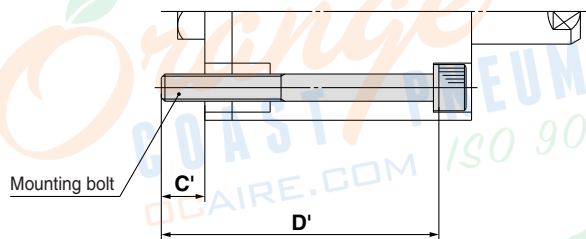
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 30L 2 pcs.**

### Round rod side mounting



### Non-rotating rod side mounting



Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

Cylinder model	C	D	Mounting bolt size	C'	D'	Mounting bolt size
<b>CQSKWB12-5D</b>	6.5	25	M3 x 30L	6.5	30	M3 x 35L
<b>-10D</b>		30	x 35L		35	x 40L
<b>-15D</b>		35	x 40L		40	x 45L
<b>-20D</b>		40	x 45L		45	x 50L
<b>-25D</b>		45	x 50L		50	x 55L
<b>-30D</b>		50	x 55L		55	x 60L
<b>CQSKWB16-5D</b>	6.5	25	M3 x 30L	6.5	30	M3 x 35L
<b>-10D</b>		30	x 35L		35	x 40L
<b>-15D</b>		35	x 40L		40	x 45L
<b>-20D</b>		40	x 45L		45	x 50L
<b>-25D</b>		45	x 50L		50	x 55L
<b>-30D</b>		50	x 55L		55	x 60L
<b>CQSKWB20-5D</b>	10	25	M5 x 35L	10	30	M5 x 40L
<b>-10D</b>		30	x 40L		35	x 45L
<b>-15D</b>		35	x 45L		40	x 50L
<b>-20D</b>		40	x 50L		45	x 55L
<b>-25D</b>		45	x 55L		50	x 60L
<b>-30D</b>		50	x 60L		55	x 65L
<b>-35D</b>		55	x 65L		60	x 70L
<b>-40D</b>		60	x 70L		65	x 75L
<b>-45D</b>		65	x 75L		70	x 80L
<b>-50D</b>		70	x 80L		75	x 85L
<b>CQSKWB25-5D</b>	7	30	M5 x 35L	7	35	M5 x 40L
<b>-10D</b>		35	x 40L		40	x 45L
<b>-15D</b>		40	x 45L		45	x 50L
<b>-20D</b>		45	x 50L		50	x 55L
<b>-25D</b>		50	x 55L		55	x 60L
<b>-30D</b>		55	x 60L		60	x 65L
<b>-35D</b>		60	x 65L		65	x 70L
<b>-40D</b>		65	x 70L		70	x 75L
<b>-45D</b>		70	x 75L		75	x 80L
<b>-50D</b>		75	x 80L		80	x 85L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

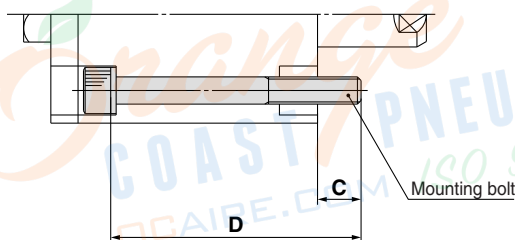
## Mounting Bolt for CQSKW

Mounting method: Mounting bolt for through-hole mounting style of CDQSKW is available as an option.

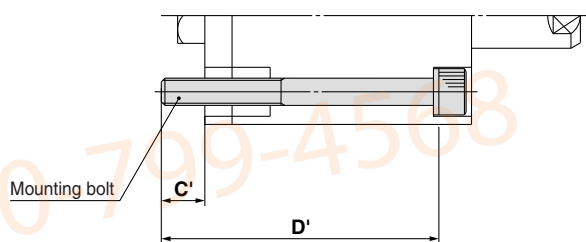
Ordering: Add the word "Bolt" in front of the bolts to be used.

**Example) Bolt M3 x 35L 2 pcs.**

### Round rod side mounting



### Non-rotating rod side mounting



Note) When mounting a cylinder with through-hole, be sure to use the attached plain washer.

Cylinder model	C	D	Mounting bolt size	C'	D'	Mounting bolt size
<b>CDQSKWB12-5D</b>	6.5	30	M3 x 35L	6.5	35	M3 x 40L
<b>-10D</b>		35	x 40L		40	x 45L
<b>-15D</b>		40	x 45L		45	x 50L
<b>-20D</b>		45	x 50L		50	x 55L
<b>-25D</b>		50	x 55L		55	x 60L
<b>-30D</b>		55	x 60L		60	x 65L
<b>CDQSKWB16-5D</b>	6.5	30	M3 x 35L	6.5	35	M3 x 40L
<b>-10D</b>		35	x 40L		40	x 45L
<b>-15D</b>		40	x 45L		45	x 50L
<b>-20D</b>		45	x 50L		50	x 55L
<b>-25D</b>		50	x 55L		55	x 60L
<b>-30D</b>		55	x 60L		60	x 65L
<b>CDQSKWB20-5D</b>	10	35	M5 x 45L	10	40	x 50L
<b>-10D</b>		40	x 50L		45	x 55L
<b>-15D</b>		45	x 55L		50	x 60L
<b>-20D</b>		50	x 60L		55	x 65L
<b>-25D</b>		55	x 65L		60	x 70L
<b>-30D</b>		60	x 70L		65	x 75L
<b>-35D</b>		65	x 75L		70	x 80L
<b>-40D</b>		70	x 80L		75	x 85L
<b>-45D</b>		75	x 85L		80	x 90L
<b>-50D</b>		80	x 90L		85	x 95L
<b>CDQSKWB25-5D</b>	7	40	M5 x 45L	7	45	M5 x 50L
<b>-10D</b>		45	x 50L		50	x 55L
<b>-15D</b>		50	x 55L		55	x 60L
<b>-20D</b>		55	x 60L		60	x 65L
<b>-25D</b>		60	x 65L		65	x 70L
<b>-30D</b>		65	x 70L		70	x 75L
<b>-35D</b>		70	x 75L		75	x 80L
<b>-40D</b>		75	x 80L		80	x 85L
<b>-45D</b>		80	x 85L		85	x 90L
<b>-50D</b>		85	x 90L		90	x 95L

Material: Chromium molybdenum steel  
Surface treatment: Nickel plated

# Compact Cylinder: Non-rotating Rod Type Double Acting, Double Rod **Series CQSKW**

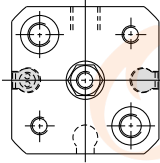
Dimensions:  $\phi 12$  to  $\phi 25$

Basic style (Through-hole/Both ends tapped common): CQSKW/CDQSKW

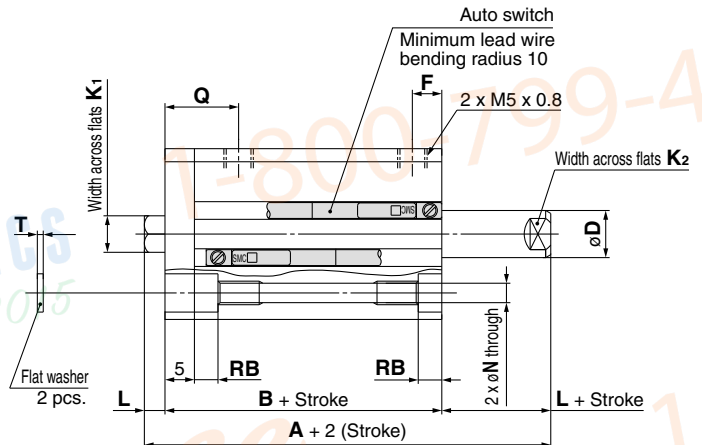
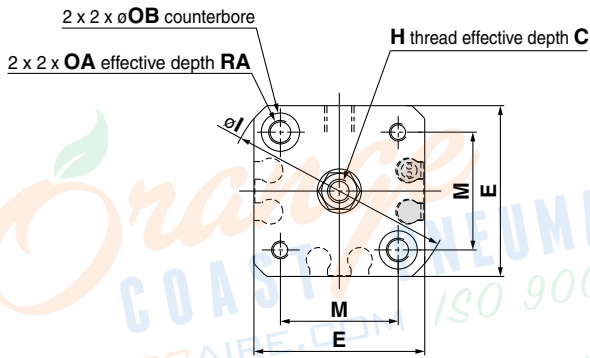


\* For the auto switch mounting position and its mounting height, refer to page 596.

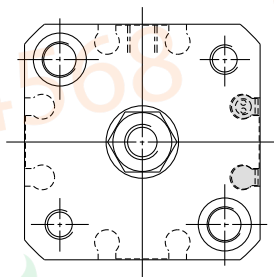
$\phi 12$



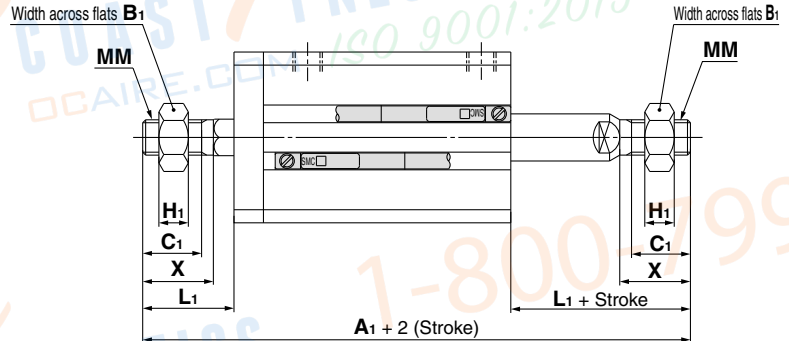
$\phi 16$



$\phi 20, \phi 25$



Rod end male thread



- CUJ**
- CU**
- CQS**
- CQ2**
- RQ**
- CQM**
- MU**

### Rod End Male Thread

Bore size (mm)	Without auto switch		With auto switch		B <sub>1</sub>	C <sub>1</sub>	H <sub>1</sub>	L <sub>1</sub>	MM	X
	A <sub>1</sub>	A <sub>1</sub>	A <sub>1</sub>	A <sub>1</sub>						
12	55	60	8	9	4	14	M5 x 0.8	10.5		
16	58	63	10	10	5	15.5	M6 x 1.0	12		
20	68	78	13	12	5	18.5	M8 x 1.25	14		
25	79	89	17	15	6	22.5	M10 x 1.25	17.5		

### Basic Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		C	D	E	F	H	I	K <sub>1</sub>	K <sub>2</sub>	L	M	N	OA	OB	Q	RA	RB	T
		A	B	A	B																	
12	5 to 30	34	27	39	32	6	6	25	7.5	M3 x 0.5	32	5.2	5	3.5	15.5	3.5	M4 x 0.7	6.5	12.5	7	4	0.5
16	5 to 30	34	27	39	32	8	8	29	7.5	M4 x 0.7	38	6.2	6	3.5	20	3.5	M4 x 0.7	6.5	12.5	7	4	0.5
20	5 to 50	40	31	50	41	7	10	36	9	M5 x 0.8	47	8.2	8	4.5	25.5	5.4	M6 x 1.0	9	14	10	7	1
25	5 to 50	44	34	54	44	12	12	40	11	M6 x 1.0	52	10.2	10	5	28	5.4	M6 x 1.0	9	16	10	7	1

Note 1) For basic style  $\phi 20$  and  $\phi 25$  with 5 stroke, through-hole is threaded over the entire length.

Note 2) The positions of width across flats (K<sub>2</sub>) on both sides are not the same.

\* For details about the rod end nut and accessory brackets, refer to page 620.

D-□

-X□

Individual

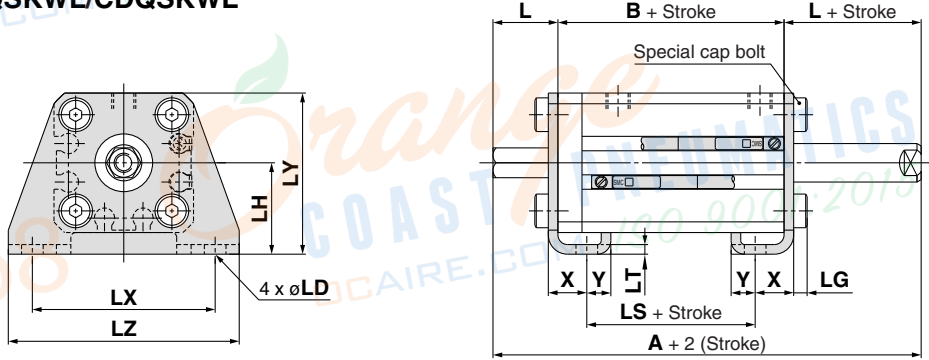
-X□

Technical data

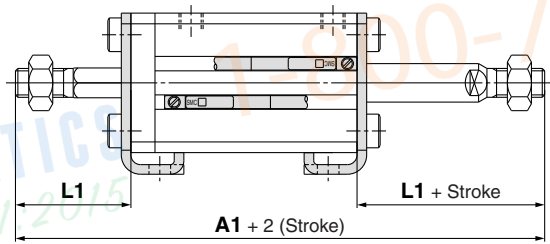
# Series CQSKW

Dimensions:  $\varnothing 12$  to  $\varnothing 25$

Foot style: CQSKWL/CDQSKWL



Rod end male thread

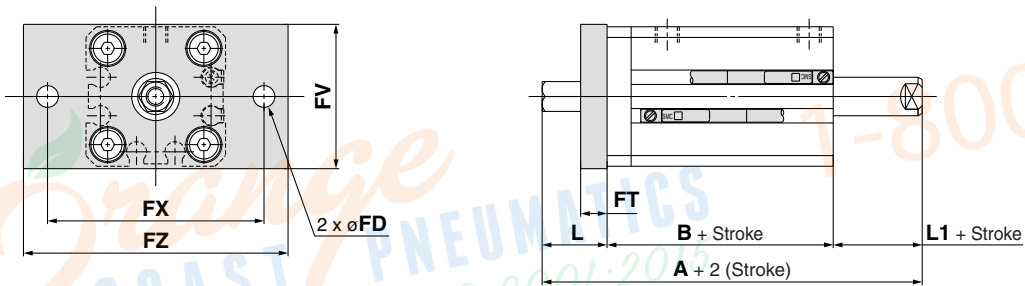


## Foot Style

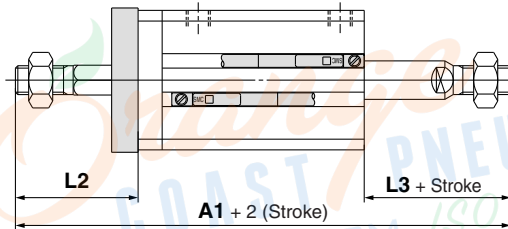
Bore size (mm)	Stroke range (mm)	Without auto switch				With auto switch				L	L1	LD	LG	LH	LT	LX	LY	LZ	X	Y
		A	A1	B	LS	A	A1	B	LS											
12	5 to 30	54	75	27	15	59	80	32	20	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5
16	5 to 30	54	78	27	15	59	83	32	20	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5
20	5 to 50	60	88	31	19	70	98	41	29	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8
25	5 to 50	64	99	34	19	74	109	44	29	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

Flange style: CQSKWF/CDQSKWF



Rod end male thread



## Flange Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch			FD	FT	FV	FX	FZ	L	L1	L2	L3
		A	A1	B	A	A1	B									
12	5 to 30	44	65	27	49	70	32	4.5	5.5	25	45	55	13.5	3.5	24	14
16	5 to 30	44	68	27	49	73	32	4.5	5.5	30	45	55	13.5	3.5	25.5	15.5
20	5 to 50	50	78	31	60	88	41	6.6	8	39	48	60	14.5	4.5	28.5	18.5
25	5 to 50	54	89	34	64	99	44	6.6	8	42	52	64	15	5	32.5	22.5

\* For details about the rod end nut and accessory brackets, refer to page 620.  
Note 1) The positions of piston rod width across flats (right side) are not constant.

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

# Compact Cylinder: Anti-lateral Load Type

## Series CQS□S

ø12, ø16, ø20, ø25

### How to Order

**CQS B S 20-30 D C -**

**With auto switch CDQS B S 20-30 D C - M9BW -**

**With auto switch (Built-in magnet)**

**Mounting style**

B	Through-hole/Both ends tapped common (Standard)
L	Foot style
F	Rod side flange style
G	Head side flange style
D	Double clevis style

**Cushion**

S	Anti-lateral load type
---	------------------------

**Bore size**

12	12 mm
16	16 mm
20	20 mm
25	25 mm

**Cylinder stroke (mm)**

Bore size (mm)	Standard stroke (mm)
12, 16	5, 10, 15, 20, 25, 30
20, 25	5, 10, 15, 20, 25, 30, 35, 40, 45, 50

For "Manufacture of Intermediate Strokes", refer to page 590.

**Auto switch**

Nil	Without auto switch
-----	---------------------

\* Refer to the table below for the applicable auto switch model.

**Body option**

C	With rubber bumper Rod end female thread
CM	With rubber bumper Rod end male thread
CF	With rubber bumper Boss on head side

**Action**

D	Double acting
---	---------------

**Number of auto switches**

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

**Made to Order**  
Refer to page 590 for details.

### Applicable Auto Switch/Refer to pages 1263 to 1371 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state switch	—	Grommet	No	3-wire (NPN)	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	
				3-wire (PNP)			M9PV	M9P	●	●	●	○			
				2-wire	12 V	M9BV	M9B	●	●	●	○	○			
				3-wire (NPN)	24 V	5 V, 12 V	M9NWV	M9NW	●	●	●	○	○		
	3-wire (PNP)	M9PWV	M9PW	●			●	●	○	○					
	Diagnostic indication (2-color indication)	Grommet	Yes	2-wire	12 V	M9BWW	M9BW	●	●	●	○	○	○		—
				3-wire (NPN)	5 V, 12 V	M9NAV	M9NA	○	○	●	○	○	○		IC circuit
	Water resistant (2-color indication)	Grommet	No	3-wire (PNP)		12 V	M9PAV	M9PA	○	○	●	○	○		
2-wire				M9BAV	M9BA		○	○	●	○	○	○			
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	—	A96V	A96	●	—	●	—	—	IC circuit	—
				2-wire	24 V	100 V	A93V	A93	●	—	●	—	—	—	Relay, PLC
			No	2-wire	24 V	100 V or less	A90V	A90	●	—	●	—	—	IC circuit	Relay, PLC

\* Lead wire length symbols: 0.5 m..... Nil (Example) M9NW  
 1 m..... M (Example) M9NWM  
 3 m..... L (Example) M9NWL  
 5 m..... Z (Example) M9NWZ

\* Since there are other applicable auto switches than listed, refer to page 597 for details.  
 \* For details about auto switches with pre-wired connector, refer to pages 1328 and 1329.  
 \* Auto switches are shipped together (not assembled).

Note) There is the case A9□V/M9□V/M9□WV/M9□AVL type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Consult with SMC for details.

CUJ  
CU  
CQS  
CQ2  
RQ  
CQM  
MU

D-□  
-X□  
Individual -X□  
Technical data

# Series CQS□S

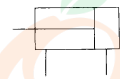


## Standard Specifications

Bore size (mm)	12	16	20	25
<b>Action</b>	Double acting, Single rod			
<b>Fluid</b>	Air			
<b>Lubrication</b>	Not required (Non-lube)			
<b>Proof pressure</b>	1.5 MPa			
<b>Maximum operating pressure</b>	1.0 MPa			
<b>Minimum operating pressure</b>	0.07 MPa	0.05 MPa		
<b>Ambient and fluid temperature</b>	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
<b>Cushion</b>	Rubber bumper*			
<b>Rod end thread</b>	Female thread			
<b>Stroke length tolerance</b>	+1.0 mm*			
<b>Mounting</b>	Through-hole/Both ends tapped common			
<b>Piston speed</b>	50 to 500 mm/s			
<b>Allowable kinetic energy (J)</b>	0.043	0.075	0.11	0.18

\* Stroke length tolerance does not include the deflection of the bumper.

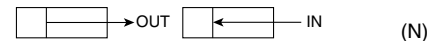
## JIS Symbol



**Made to Order Specifications**  
(For details, refer to pages 1401, 1426 and 1508.)

Symbol	Specifications
-XB10	Intermediate stroke (Using exclusive body)
-XC6	Piston rod, retaining ring, rod end nut made of stainless steel
-X271	Fluororubber seals
-X1876	With concave shape end boss on the cylinder tube head side

## Theoretical Output



Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)		
				0.3	0.5	0.7
12	6	IN	84.8	25	42	59
		OUT	113	34	57	79
16	8	IN	151	45	75	106
		OUT	201	60	101	141
20	10	IN	236	71	118	165
		OUT	314	94	157	220
25	12	IN	378	113	189	264
		OUT	491	147	245	344

## Body Option

Description	Application
Rod end male thread	Available for Double acting, Single rod models.

## Mounting Bracket Part No.

Bore size (mm)	Foot (1)	Flange	Double clevis
12	CQS-L012	CQS-F012	CQS-D012
16	CQS-L016	CQS-F016	CQS-D016
20	CQS-L020	CQS-F020	CQS-D020
25	CQS-L025	CQS-F025	CQS-D025



Note1) When ordering foot bracket, order 2 pieces per cylinder.

Note2) Parts belonging to each bracket are as follows.

Foot or Flange style: Body mounting bolt  
Double clevis style: Clevis pin, type C retaining ring for axis, Body mounting bolt

## Manufacture of Intermediate Stroke

Description	Spacer is installed in the standard stroke body.
Part no.	Refer to "How to Order" for the standard model no. (page 589).
Standard stroke	Description
	Stroke range
	Bore size
Example	Stroke range
	Bore size

Refer to pages 595 to 597 for cylinders with auto switches.

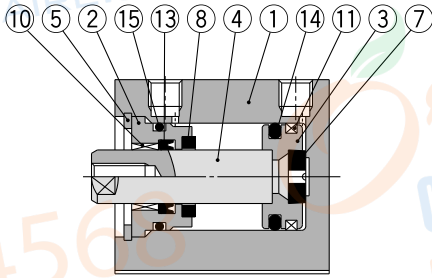
- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket/Part no.



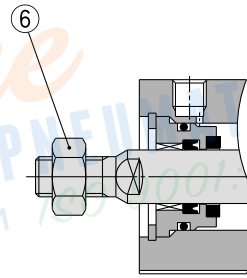
# Series CQS□S

## Construction

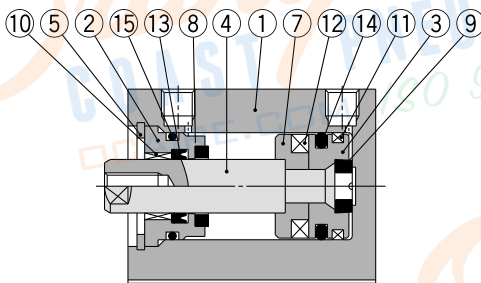
### Basic style



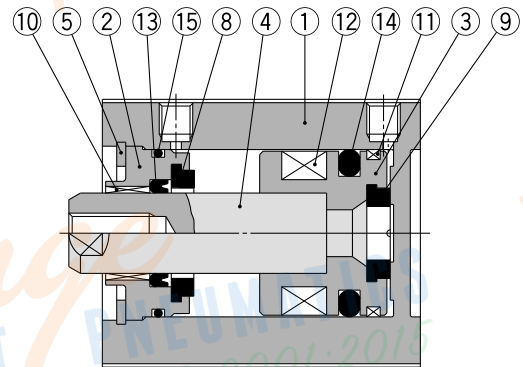
### Rod end male thread



### With auto switch (Built-in magnet) ø12, ø16



### ø20, ø25



### Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Collar	Aluminum alloy	Anodized
3	Piston	Aluminum alloy	Chromated
4	Piston rod	Stainless steel	
5	Retaining ring	Carbon tool steel	Phosphate coated
6	Rod end nut	Carbon steel	Nickel plated
7	Spacer for switch type	Aluminum alloy	Chromated
8	Bumper A	Urethane	
9	Bumper B	Urethane	
10	Bushing	Oil-impregnated sintered alloy	
11	Wear ring	Resin	
12	Magnet	—	
13*	Rod seal	NBR	
14*	Piston seal	NBR	
15*	Tube gasket	NBR	

### Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
12	CQSB12-PS	Set of nos. above ⑬, ⑭, ⑮.
16	CQSB16-PS	
20	CQSB20-PS	
25	CQSB25-PS	

\* Seal kit includes ⑬, ⑭, ⑮. Order the seal kit, based on each bore size.

\* Since the seal kit does not include a grease pack, order it separately.

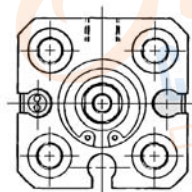
Grease pack part no.: GR-S-010 (10 g)

# Compact Cylinder: Anti-lateral Load Type **Series CQS□S**

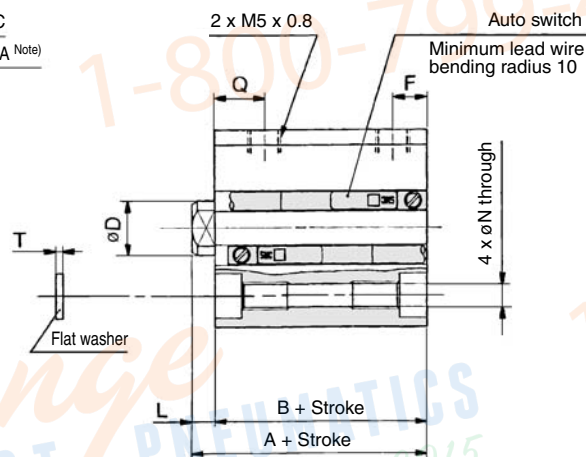
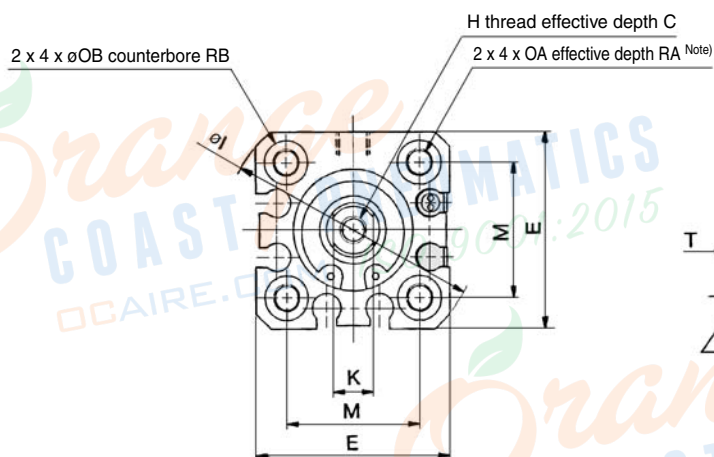
Dimensions:  $\phi 12$  to  $\phi 25$

Basic style (Through-hole/Both ends tapped common): CQSBS/CDQSBS

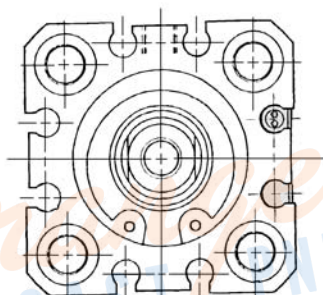
$\phi 12$



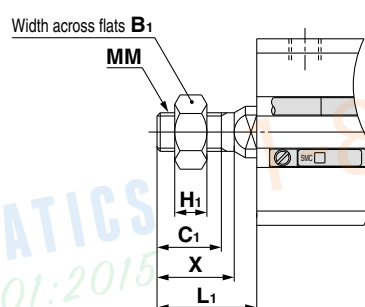
$\phi 16$



$\phi 20, \phi 25$



Rod end male thread



Rod End Male Thread

Bore size (mm)	$B_1$	$C_1$	$H_1$	$L_1$	MM	X
12	8	9	4	14	M5 x 0.8	10.5
16	10	10	5	15.5	M6 x 1.0	12
20	13	12	5	18.5	M8 x 1.25	14
25	17	15	6	22.5	M10 x 1.25	17.5

Basic Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		C	D	E	F	H	I	K	L	M	N	OA	OB	Q	RA	RB	T
		A	B	A	B																
12	5 to 30	25.5	22	30.5	27	6	6	25	5	M3 x 0.5	32	5	3.5	15.5	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
16	5 to 30	25.5	22	30.5	27	8	8	29	5	M4 x 0.7	38	6	3.5	20	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
20	5 to 50	29	24.5	39	34.5	7	10	36	5.5	M5 x 0.8	47	8	4.5	25.5	5.4	M6 x 1.0	9	9	10	7	1
25	5 to 50	32.5	27.5	42.5	37.5	12	12	40	5.5	M6 x 1.0	52	10	5	28	5.4	M6 x 1.0	9	11	10	7	1

Note) For basic style 5 to 10 stroke with  $\phi 20$  and 5 stroke with  $\phi 25$ , through-hole is threaded over the entire length.

\* For details about the rod end nut and accessory brackets, refer to page 620.

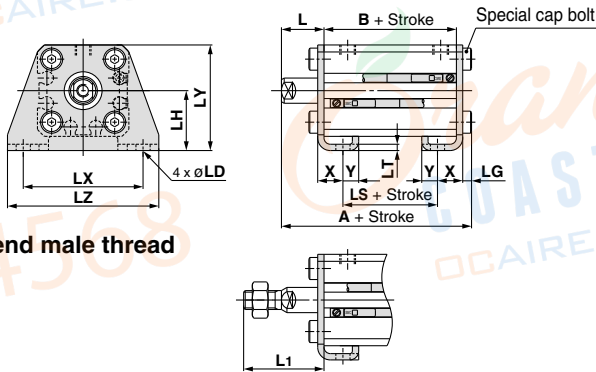
- CUJ
- CU
- CQS**
- CQ2
- RQ
- CQM
- MU

- D-□
- X□
- Individual
- X□
- Technical data

# Series CQS□S

Dimensions:  $\varnothing 12$  to  $\varnothing 25$

## Foot style: CQSL/CDQSL



Rod end male thread

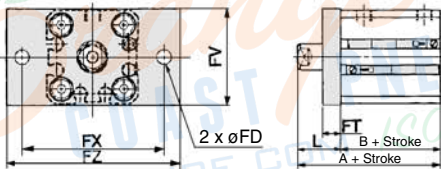
## Foot Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch		
		A	B	LS	A	B	LS
12	5 to 30	40.3	22	10	45.3	27	15
16	5 to 30	40.3	22	10	45.3	27	15
20	5 to 50	46.2	24.5	12.5	56.2	34.5	22.5
25	5 to 50	49.7	27.5	12.5	59.7	37.5	22.5

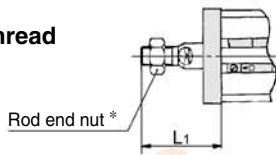
Bore size (mm)	L	L <sub>1</sub>	LD	LG	LH	LT	LX	LY	LZ	X	Y
12	13.5	24	4.5	2.8	17	2	34	29.5	44	8	4.5
16	13.5	25.5	4.5	2.8	19	2	38	33.5	48	8	5
20	14.5	28.5	6.6	4	24	3.2	48	42	62	9.2	5.8
25	15	32.5	6.6	4	26	3.2	52	46	66	10.7	5.8

Foot bracket material: Carbon steel  
Surface treatment: Nickel plated

## Rod side flange style: CQSFS/CDQSFS



Rod end male thread



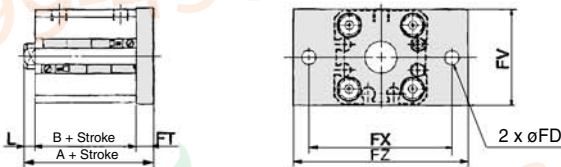
## Rod Side Flange Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch	
		A	B	A	B
12	5 to 30	35.5	22	40.5	27
16	5 to 30	35.5	22	40.5	27
20	5 to 50	39	24.5	49	34.5
25	5 to 50	42.5	27.5	52.5	37.5

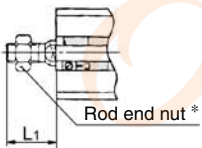
Bore size (mm)	FD	FT	FV	FX	FZ	L	L <sub>1</sub>
12	4.5	5.5	25	45	55	13.5	24
16	4.5	5.5	30	45	55	13.5	25.5
20	6.6	8	39	48	60	14.5	28.5
25	6.6	8	42	52	64	15	32.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

## Head side flange style: CQSGS/CDQSGS



Rod end male thread



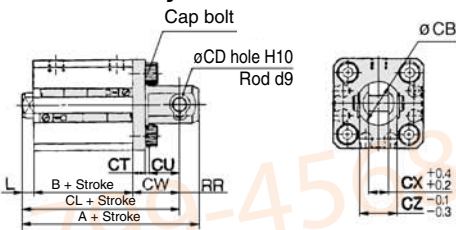
## Head Side Flange Style

Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch	
		A	B	A	B
12	5 to 30	31	22	36	27
16	5 to 30	31	22	36	27
20	5 to 50	37	24.5	47	34.5
25	5 to 50	40.5	27.5	50.5	37.5

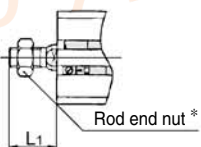
Bore size (mm)	FD	FT	FV	FX	FZ	L	L <sub>1</sub>
12	4.5	5.5	25	45	55	3.5	14
16	4.5	5.5	30	45	55	3.5	15.5
20	6.6	8	39	48	60	4.5	18.5
25	6.6	8	42	52	64	5	22.5

Flange bracket material: Carbon steel  
Surface treatment: Nickel plated

## Double clevis style: CQSDS/CDQSDS



Rod end male thread



## Double Clevis Style

Bore size (mm)	Stroke range (mm)	Without auto switch			With auto switch		
		A	B	CL	A	B	CL
12	5 to 30	45.5	22	39.5	50.5	27	44.5
16	5 to 30	46.5	22	40.5	51.5	27	45.5
20	5 to 50	56	24.5	47	66	34.5	57
25	5 to 50	62.5	27.5	52.5	72.5	37.5	62.5

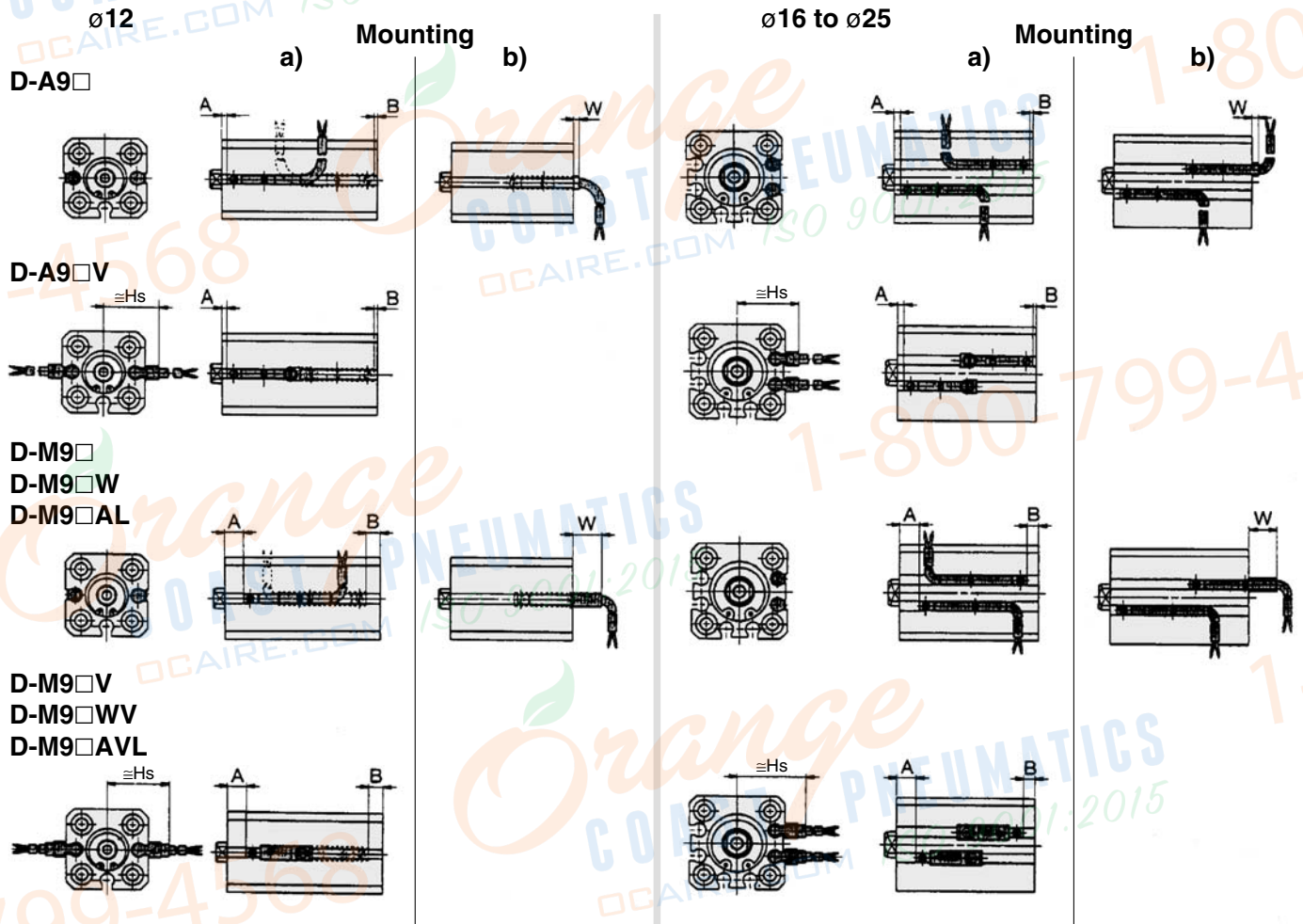
Bore size (mm)	CB	CD	CT	CU	CW	CX	CZ	L	L <sub>1</sub>	RR
12	12	5	4	7	14	5	10	3.5	14	6
16	14	5	4	10	15	6.5	12	3.5	15.5	6
20	20	8	5	12	18	8	16	4.5	18.5	9
25	24	10	5	14	20	10	20	5	22.5	10

Double clevis bracket material: Carbon steel  
Surface treatment: Nickel plated

\* For details about the rod end nut and accessory brackets, refer to page 620.

**Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height**

● Double acting: Single rod, Single acting: Single rod, Spring return/Spring extend; Long stroke type, Anti-lateral load type, ● Double acting: Double rod



**Proper Auto Switch Mounting Position (Detection at stroke end)**

● Double acting: Single rod, Single acting: Single rod, Spring return/Spring extend; Long stroke type, Anti-lateral load type, ● Double acting: Double rod

**Proper Auto Switch Mounting Position**

Auto switch model Bore size (mm)	D-A9 □			D-A9 □ V			D-M9 □ / M9 □ W			D-M9 □ V / M9 □ WV / M9 □ AVL			D-M9 □ AL		
	A	B	W	A	B	Hs	A	B	W	A	B	Hs	A	B	W

**Double Acting, Single Rod; Single Acting, Single Rod, Spring Return/Spring Extend**

[ ]: Denotes the values of D-A93. ( ): Denotes the values of type T.

12	1.5 (2.5)	0	1.5 [4] (2.5 [5])	1.5 (2.5)	0	17	5.5 (6.5)	3.5 (4.5)	5.5 (6.5)	5.5 (6.5)	3.5 (4.5)	19.5	5.5 (6.5)	3.5 (4.5)	7.5 (8.5)
16	2	0	2 [4.5]	2	0	19	6	4	6	6	4	21.5	6	4	8
20	6	3.5	-1.5 [1]	6	3.5	22.5	10	7.5	2.5	10	7.5	25	10	7.5	4.5
25	7	5.5	-3.5 [-1]	7	5.5	24.5	11	9.5	0.5	11	9.5	27	11	9.5	2.5

**Long Stroke**

12	5	7	-5 [-2.5]	5	7	17	9	11	-1	9	11	19.5	9	11	1
16	5.5	6	-4.5 [-2]	5.5	6	19	9.5	10.5	-0.5	9.5	10.5	21.5	9.5	10.5	1.5
20	9	12	-10 [-7.5]	9	12	22.5	13	16	-6	13	16	25	13	16	-4
25	10	14	-12 [-9.5]	10	14	24.5	14	18	-8	14	18	27	14	18	-6

**Anti-lateral Load Type**

12	6	1	1 [3.5]	6	1	17	10	5	5	10	5	19.5	10	5	7
16	5.5	5	0.5 [3]	5.5	5	19	9.5	9	4.5	9.5	9	21.5	9.5	9	6.5
20	9	5.5	-3.5 [-1]	9	5.5	22.5	13	9.5	0.5	13	9.5	25	13	9.5	2.5
25	10	7.5	-5.5 [-3]	10	7.5	24.5	14	11.5	-1.5	14	11.5	27	14	11.5	0.5

**Double Acting, Double Rod**

12	1.5	5.5	3.5 [6]	1.5	5.5	17	5.5	9.5	0.5	5.5	9.5	19.5	5.5	9.5	2.5
16	2	5	3 [5.5]	2	5	19	6	9	1	6	9	21.5	6	9	3
20	6	10	8 [10.5]	6	10	22.5	10	14	-4	10	14	25	10	14	-2
25	7	12	10 [12.5]	7	12	24.5	11	16	-6	11	16	27	11	16	-4

- Note 1) The product is shipped out of the factory in installation state "a". To change the electrical entry direction of the switch on the head, refer to installation state "b".
- Note 2) Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.
- Note 3) The D-M9 □ / M9 □ W and M9 □ AL cannot be installed on the single acting; single rod type.
- Note 4) Adjust the auto switch after confirming the operating conditions in the actual setting.

CUJ  
CU  
CQS  
CQ2  
RQ  
CQM  
MU

D-□  
-X□  
Individual  
-X□  
Technical data

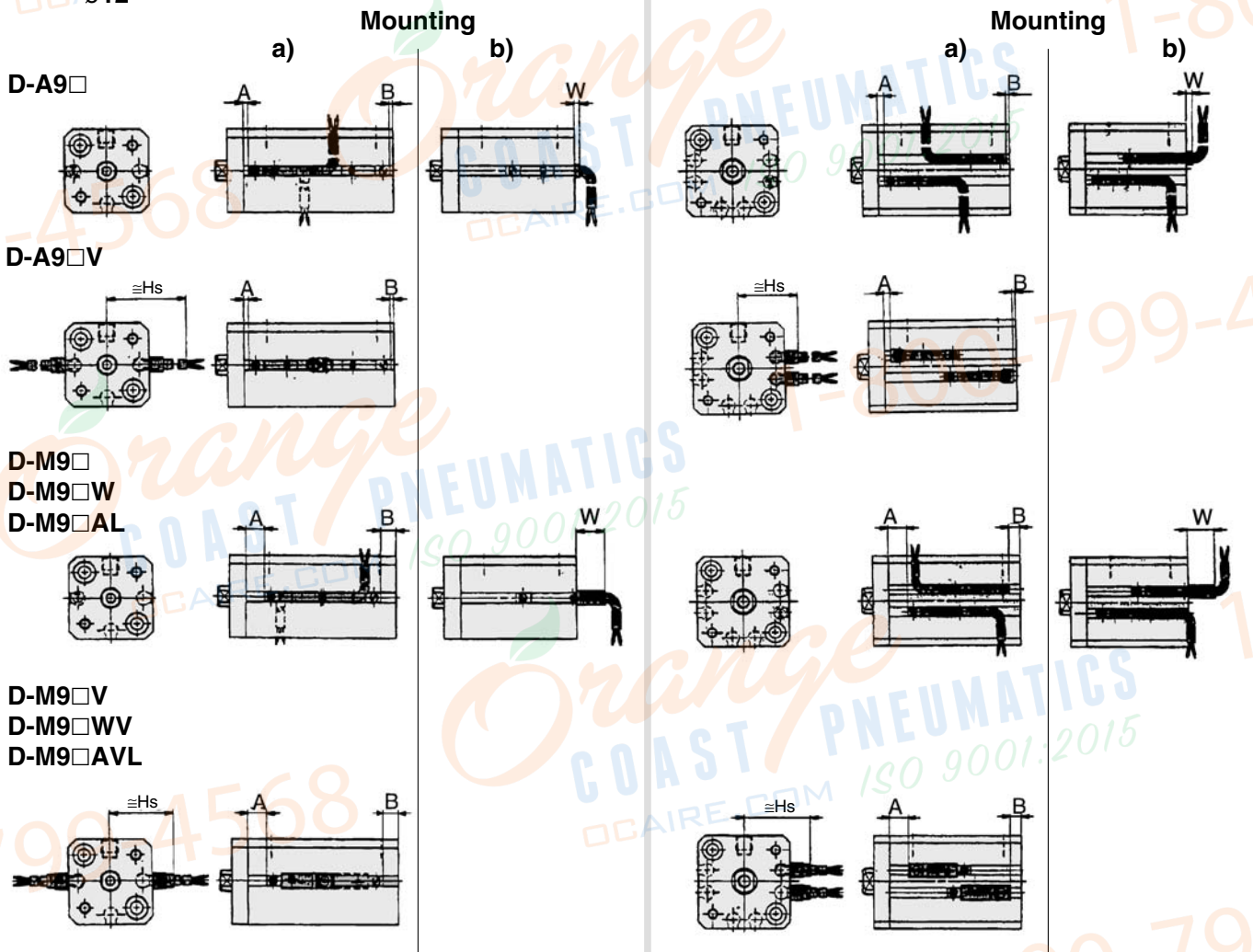
# Series CQS□S

## Proper Auto Switch Mounting Position (Detection at stroke end)

Non-rotating rod

∅12

∅16 to ∅25



### Proper Auto Switch Mounting Position

Auto switch model Bore size (mm)	D-A9□			D-A9□V			D-M9□/M9□W			D-M9□V/M9□WV/M9□AVL		
	A	B	W	A	B	Hs	A	B	W	A	B	Hs
12	1.5	0	1.5 (4)	1.5	0	17	5.5	4.5	5.5	5.5	4.5	19.5
16	2	0	2 (4.5)	2	0	19	6	4	6	6	4	21.5
20	6	3.5	-1.5 (1)	6	3.5	22.5	10	7.5	2.5	10	7.5	25
25	7	5.5	-3.5 (-1)	7	5.5	24.5	11	9.5	0.5	11	9.5	27

( ): Denotes the values of D-A93.

Auto switch model Bore size (mm)	D-M9□AL		
	A	B	W
12	5.5	4.5	7.5
16	6	4	8
20	10	7.5	4.5
25	11	9.5	2.5

Note 1) The product is shipped out of the factory in installation state "a)". To change the electrical entry direction of the switch on the head, refer to installation state "b)".

Note 2) Adjust the auto switch after confirming the operating conditions in the actual setting.

**Operating Range**

Auto switch model	Bore size (mm)			
	12	16	20	25
D-A9□/A9□V	6	7.5	10	10
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	3	4	5.5	5.5

\* Since this is a guideline including hysteresis, not meant to be guaranteed. (assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

**Minimum Auto Switch Mounting Stroke**

No. of auto switch mounted	(mm)			
	D-M9□V	D-A9□ D-M9□WV D-M9□AVL	D-A9□V	D-M9□ D-M9□W D-M9□AL
1 pc.	5	10 <sup>(1)</sup>	5	15 <sup>(1)</sup>
2 pcs.	5	10	10	15 <sup>(1)</sup>

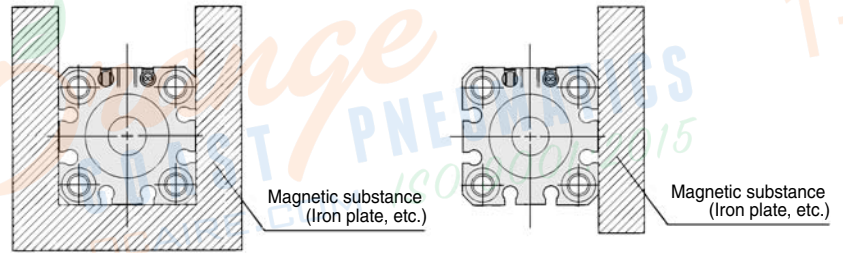
Note 1) When the cylinder is used under the strokes indicated, consult with SMC.

Note 2) The D-M9□/M9□W and M9□AL cannot be installed on the single acting; single rod type.

**⚠ Precautions**

**Be sure to read before handling.**  
**Refer to front matters 54 and 55 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.**

• If the cylinder is used in an application in which a magnetic material is placed in close contact around the cylinder as shown in the graph on the right (including cases in which even one of the sides is in close contact) the operation of auto switches could become unstable. Therefore, please check with SMC for this type of application.



Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted.  
 \* Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H type, and D-F8 type) are also available. For details, refer to pages 1289 and 1290.  
 \* For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1328 and 1329 for details.

- CUJ
- CU
- CQS
- CQ2
- RQ
- CQM
- MU

- D-□
- X□
- Individual -X□
- Technical data

# Series 10-11-CQSX

Low speed cylinder  
 ø12, ø16, ø20, ø25

## How to Order

### Clean series

10	Relief type
11	Vacuum suction type

10 — C D QSX B 20 — 30 D — M9B

### Built-in magnet

Nil	No
D	With auto switch (Built-in magnet)

### Low speed cylinder

### Mounting

B	Through-hole/Both ends tapped (Standard)
---	---

### Bore size

12	12mm
16	16mm
20	20mm
25	25mm

### Cylinder stroke (mm)

Bore size (mm)	Standard stroke (mm)
12, 16	5, 10, 15, 20, 25, 30
20	5, 10, 15, 20, 25,
25	30, 35, 40, 45, 50

•Manufacturing of intermediate stroke  
 Intermediate strokes by the 1mm interval are available by using spacers with standard stroke cylinders. The overall length of cylinder will be the same as the standard stroke with a longer one.

Example) 10-CQSXB25-47D : Install a 3mm width spacer in a standard stroke cylinder, 10-CQSXB25-50D.

### Rod end thread

Nil	Standard (Rod end female thread)
M	Rod end male thread

### Action

D	Double acting
---	---------------

### Number of auto switches

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

### Type of auto switch

Reed switch	A93
Solid state switch	F9B, F91



## Model

	Model	Bore size (mm)	Port size	Lubrication	Action	Standard stroke (mm)	Auto switch mounting	Cushion	
								Rubber	Air
Relief type	10-CQSXB12	12	M5 x 0.8	Non-lube	Double acting single rod	5, 10, 15, 20, 25, 30	○	—	—
	10-CQSXB16	16							
	10-CQSXB20	20							
	10-CQSXB25	25							
Vacuum suction type	11-CQSXB12	12							
	11-CQSXB16	16							
	11-CQSXB20	20							
	11-CQSXB25	25							

**Specifications**

Bore size (mm)	10- (Relief type)				
	12	16	20	25	
<b>Fluid</b>	Air				
<b>Proof pressure</b>	1.5MPa				
<b>Max. operating pressure</b>	1.0MPa				
<b>Min. operating pressure</b>	0.04MPa		0.035MPa		
<b>Ambient and fluid temperature</b>	Without auto switch : -10 to 70°C (With no freezing) With auto switch : -10 to 60°C (With no freezing)				
<b>Piston speed</b>	1 to 200 mm/s				
<b>Piston rod diameter</b>	ø6	ø8	ø10	ø12	
<b>Rod end thread</b>	Female thread	M3 x 0.5	M4 x 0.7	M5 x 0.8	M6 x 1.0
	Male thread	M5 x 0.8	M6 x 1.0	M8 x 1.25	M10 x 1.25
<b>Rod end thread tolerance</b>	JIS Class 2				
<b>Stroke tolerance</b>	+1.0 0 mm				
<b>Port size</b>	M5 x 0.8				
<b>Relief port</b>	M5 x 0.8				
<b>Grease</b>	Fluorine grease				
<b>Particle generation grade</b>	Grade 2				

Bore size (mm)	11- (Vacuum suction type)				
	12	16	20	25	
<b>Fluid</b>	Air				
<b>Proof pressure</b>	1.5MPa				
<b>Max. operating pressure</b>	1.0MPa				
<b>Min. operating pressure</b>	0.03MPa		0.025MPa		
<b>Ambient and fluid temperature</b>	Without auto switch : -10 to 70°C With auto switch : -10 to 60°C				
<b>Piston speed</b>	1 to 200 mm/s		0.5 to 200 mm/s		
<b>Piston rod diameter</b>	ø6	ø8	ø10	ø12	
<b>Rod end thread</b>	Female thread	M3 x 0.5	M4 x 0.7	M5 x 0.8	M6 x 1.0
	Male thread	M5 x 0.8	M6 x 1.0	M8 x 1.25	M10 x 1.25
<b>Rod end thread tolerance</b>	JIS Class 2				
<b>Stroke tolerance</b>	+1.0 0 mm				
<b>Port size</b>	M5 x 0.8				
<b>Vacuum suction port</b>	M5 x 0.8				
<b>Grease</b>	Fluorine grease				
<b>Particle generation grade</b>	Grade 1				
<b>Suction flow rate (Reference values)</b>	5 ℓ/min(ANR)				



External dimensions and applicable auto switches are the same as 10-/11- CQS. Please refer to pages 56 to 63.

Air cylinder

Rotary actuator

Air gripper

Directional control valve

Flow control equipment

Filter, Pressure control equipment

Fittings & Tubing

Air preparation equipment

Pressure switch

Clean gas filter



# Actuator / Common Precautions 1

Be sure to read before handling. Refer to the main text for precautions for each series.

## Precaution on designing

### Warning

1. **There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.**

In such cases, personal injury by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

2. **A protective cover is recommended to minimize the risk of personal injury.**

If a driven object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

3. **Securely tighten all stationary parts and connected parts so that they will not become loose.**

Particularly when a cylinder operates at a high frequency or is installed in a place where there is a lot of vibration, ensure that all parts remain secure.

4. **A deceleration circuit may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning to relieve the impact.

In this case, the rigidity of the machinery should also be examined.

5. **Consider a possible drop in circuit pressure due to a power outage, etc.**

When a cylinder is used in a clamping mechanism, there is a danger of workpiece dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and personal injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

6. **Consider a possible loss of power source.**

Measures should be taken to avoid personal injury and equipment damage in the event that there is a loss of power to equipment controlled by pneumatics, electricity, or hydraulics.

7. **Design circuitry to prevent the sudden lurching of driven objects.**

When a cylinder is driven by an exhaust center type directional control valve or when it is started up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will lurch when the cylinder is operated at high speed if pressure is applied to one side of the cylinder, due to the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits should be designed to prevent this sudden lurching, because there is a danger of personal injury and/or damage to equipment when this occurs.

8. **Consider emergency stops.**

Design the machinery so that personal injury and/or damage to machinery and equipment will not occur when the machinery is stopped by a safety device under abnormal conditions, such as a power outage or a manual emergency stop.

9. **Consider the action when operation is restarted after an emergency stop or abnormal stop.**

Design the machinery so that personal injury or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the start position, install safety manual control equipment.

## Selection

### Warning

1. **Confirm the specifications.**

The products featured in this catalog are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunctions may occur. Do not use in these conditions. (Refer to the specifications). Please consult with SMC if you use a fluid other than compressed air.

2. **Intermediate Stops**

With a 3-position closed center type valve, it is difficult to accurately and precisely stop a piston at the required position in the same way as can be done with hydraulic pressure due to the compressibility of air.

Furthermore, since valves and cylinders, etc. are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Please contact with SMC when it is necessary to hold a stopped position for an extended period of time.

### Caution

1. **Operate within the limits of the maximum feasible stroke.**

Operation that exceeds the maximum stroke may damage a piston rod. Refer to the air cylinder model selection procedures for the maximum feasible strokes.

2. **Operate a cylinder within a range such that collision damage will not occur to a piston at the stroke end.**

Operate a cylinder within a range so that a piston having inertial force will not be damaged when it collides against the cover at the stroke end. Refer to the air cylinder model selection procedures for the maximum feasible strokes.

3. **Use a speed controller to adjust the cylinder speed, gradually increasing from a low speed to the desired speed setting.**

4. **Provide intermediate supports for long stroke cylinders.**

An intermediate support should be provided in order to prevent damage to a long stroke cylinder, due to problems such as sagging of the rod, deflection of the cylinder tube, vibration and external load.



# Actuator / Common Precautions 2

Be sure to read before handling. Refer to the main text for precautions for each series.

## Mounting

### ⚠ Caution

1. **Be certain to match the rod shaft center with the load and direction of movement when connecting.**

When not properly matched, problems may arise with the rod and tube, and damage may be caused due to friction on areas such as the inner tube surface, bushings, rod surface, and seals.

2. **When using an external guide, connect the rod end and the load in such a way that there is no interference at any point within the stroke.**

3. **Do not scratch or gouge the sliding portion of the cylinder tube or the piston rod by striking it with an object, or squeezing it.**

The tube bore is manufactured under precise tolerances. Thus, even a slight deformation could lead to a malfunction.

Moreover, scratches or gouges, etc. in the piston rod may lead to damaged seals and cause air leakage.

4. **Do not use until you verify that the equipment can operate properly.**

After mounting, repairs, or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak tests.

5. **Instruction manual**

Install the products and operate them only after reading the instruction manual carefully and understanding its contents.

Also keep the manual where it can be referred to as necessary.

## Cushion

### ⚠ Caution

1. **Readjust with a cushion needle.**

Cushions are adjusted at the time of shipment; however, the cushion needle on the cover should be readjusted, when the product is put into service based on factors such as the size of the load and the operating speed. When the cushion needle is turned clockwise, the restriction becomes smaller and the cushion's effectiveness is increased. Tighten the lock nut securely after adjustment is performed.

2. **Do not operate the actuator with the cushion needle fully closed.**

This could damage the seals.

## Air Supply

### ⚠ Warning

1. **Use clean air.**

Do not use compressed air which contains chemicals, synthetic oil containing organic solvents, salts or corrosive gases, etc. as this may cause damage or malfunction.

### ⚠ Caution

1. **Install air filters.**

Install air filters close to valves at their upstream side. A filtration degree of 5 $\mu$ m or less should be selected.

2. **Install an aftercooler, air dryer, or water separator (Drain Catch).**

Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or water separator (drain catch), etc.

3. **Use the product within the specified range of fluid and ambient temperature.**

Take measures to prevent freezing at temperature below 5°C, since moisture in circuits may freeze and cause damage to seals and lead to malfunctions.

Air cylinder

Rotary actuator

Air gripper

Directional control valve

Flow control equipment

Filter, Pressure control equipment

Fittings & Tubing

Air preparation equipment

Pressure switch

Clean gas filter



# Actuator / Common Precautions 3

Be sure to read before handling. Refer to the main text for precautions for each series.

## Operating Environment

### Warning

1. Do not use in atmospheres or locations where corrosion hazards exist.  
Refer to the construction drawings regarding cylinder materials.
2. In locations where ultrapure water or cleaning solvent, etc. splashes on the equipment, take suitable measures to protect the rod.

## Maintenance

### Warning

1. Perform maintenance procedures as shown in the instruction manual.  
Improper handling may result in malfunction and damage of machinery or equipment.

### 2. Removal of equipment, and supply / exhaust of compressed air

Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the fall or erratic movement of driven objects and equipment, then cut off the electric power and release the compressed air in the system.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent cylinders from sudden movement.

### Caution

1. Drain flushing  
Remove drainage from air filters regularly.



# Auto switch / Common Precautions 1

Be sure to read before handling. Refer to the main text for precautions for each series.

## Design/Selection

### Warning

#### 1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the specifications of current voltage, temperature or impact.

#### 2. Use caution when multiple cylinders are used in close proximity to each other.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

#### 3. Use caution to the ON time of a switch at the intermediate position of stroke.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too fast, the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is :

$$V \text{ (mm/s)} = \frac{\text{Auto switch operation range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

In cases of high piston speed, the use of an auto switch (D-F5NT, F7NT, G5NT and M5□T) with a built-in OFF delay timer (approx. 200ms) makes it possible to extend the load operating time.

#### 4. Wiring should be kept as short as possible.

<Reed switch>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time).

- 1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5m or longer.
- 2) Even if an auto switch has a built-in contact protection circuit, when the wiring is more than 30m long, it is not able to adequately absorb the rush current and its life may be reduced. It is again necessary to connect a contact protection box in order to extend its life. Please contact SMC in this case.

<Solid state switch>

- 3) Although wire length should not affect switch function, use a wire 100m or shorter.

#### 5. Use caution to internal voltage drop of a switch.

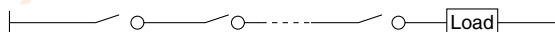
<Reed switch>

1. Switches with an indicator light (except D-A56/A76H/ A96/A96 V/C76/E76A/Z76)

• If auto switches are connected in series as shown below, please note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

• [The voltage drop will be "n" times larger when "n" auto switches are connected.]

The load may be ineffective even though the auto switch function is normal.



- Similarly, when operating below a specified voltage, it is possible that the load may be ineffective even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

Power voltage – Internal voltage drop of switch > Minimum operating voltage of load

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (D-A6□, A80, A80H, A90, A90V, C80, R80, 90, E80A, Z80).

<Solid state switch>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also please note that a 12VDC relay is not applicable.

#### 6. Use caution to the leakage current.

<Solid state switch>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

Current to operate load (OFF condition) > Leakage current  
If the condition given in the above formula is not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

#### 7. Do not use a load that generates surge voltage.

<Reed switch>

When driving a load such as a relay that generates a surge voltage, use a switch with a built-in contact protection circuit or a contact protection box.

<Solid state switch>

Although a zener diode for surge protection is connected to the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

#### 8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also perform periodic maintenance inspections and confirm proper operation.

#### 9. Ensure sufficient space for maintenance activities.

When designing an application, be sure to allow sufficient space for maintenance and inspection.



# Auto switch / Common Precautions 2

Be sure to read before handling. Refer to the main text for precautions for each series.

## Mounting/Adjustment

### ⚠ Warning

#### 1. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (300m/s<sup>2</sup> or more for reed switches and 1000m/s<sup>2</sup> or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

#### 2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

#### 3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of tightening torque, the mounting screws or switch may be damaged.

On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position.

#### 4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalog indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), the operation will be unstable.

<D-M9□>

If this auto switch replaces the conventional model, it may not function depending on the application (shown below) because its operation range is shorter.

• **Applications where at the end, the stopping position shifting range is larger than the operation range**

e.g. Workpiece pushing, pressing into a hole, or clamping

• **Applications where an auto switch is used to detect intermediate stopping positions (Detecting time is shortened).**

As indicated above, mount a switch at the center of the operating range.

## Wiring

### ⚠ Warning

#### 1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to lead wires.

#### 2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned on when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

#### 3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

#### 4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits, including auto switches, may malfunction due to

## Wiring

### ⚠ Warning

#### 5. Do not allow short circuiting of loads.

<Reed switch>

If the power is turned on with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switch>

Models M-F9□(V), F9□W(V), J51, G5NB and all models of PNP output switches do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged.

Use caution to avoid reverse wiring with the brown power supply line and the black output line on 3-wire type switches.

#### 6. Avoid incorrect wiring.

<Reed switch>

A 24VDC switch with indicator light has polarity. The brown lead wire or terminal No.1 is (+), and the blue lead wire or terminal No.2 is (-).

[In the case of model D-97, the side without indicator is (+) and the blue line side is (-).]

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also please note that a current greater than the maximum specified one will damage a light emitting diode and make it inoperable.

Applicable models

D-A73, A73H, A73C, C73, C73C, E73A, Z73, R73

D-97, 93A, A93, A93V

D-A33, A34, A33A, A34A, A44, A44A

D-A53, A54, B53, B54

2) However, when using a 2 color indication auto switch (D-A79W, A59W, B59W), be aware that the switch will constantly remain ON if the connections are reversed.

<Solid state switch>

1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

2) If connections are reversed (power supply line (+) and power supply line (-) on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue wire and the power supply line (-) is connected to the black wire, the switch will be damaged.

<D-M9□>

D-M9□ does not have built-in short-circuit prevention circuits. Reverse connection of power supply line (+) and (-) may damage the switch.



# Auto switch / Common Precautions 3

Be sure to read before handling. Refer to the main text for precautions for each series.

## Environment

### Warning

#### 1. Never use in the presence of explosive gases.

Our auto switches are not explosion proof. Never use them in the presence of explosive gas, as this may cause a serious explosion.

#### 2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Please consult with SMC regarding the availability of a magnetic field resistant auto switch.)

#### 3. Do not use in environments where the auto switches will be constantly exposed to water.

Although switches except D-A3□/A44□/G39□/K39□ satisfy the IEC standard IP67 structure (JIS C 0920: anti-immersion structure), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

#### 4. Do not use in environments with oil or chemicals.

Please consult with SMC if auto switches will be used in an environment with coolants, cleaning solvents, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.

#### 5. Do not use in environments with temperature cycles.

Please consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

#### 6. Do not use in environments where there is excessive impact shock.

##### <Reed switch>

When excessive impact (300 m/s<sup>2</sup> or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1ms or less). Please consult with SMC regarding the need to use a solid state switch depending on the environment.

#### 7. Do not use in locations where surges are generated.

##### <Solid state switch>

When there are units (solenoid type lifters, high frequency induction furnaces, motors, etc.) which generate a large amount of surge in the area around cylinders with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.

#### 8. Avoid close contact with magnetic substances.

When a magnetic substance (substance attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.

## Maintenance

### Warning

#### 1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

##### 1) Securely tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten screws securely after readjusting the mounting position.

##### 2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires if damage is discovered.

##### 3) Confirm that the green light on the 2-color indicator type switch lights up.

Confirm that the green LED is ON when stopped at the set position. If the red LED is ON when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

## Other

### Warning

#### 1. Please consult with SMC concerning water resistance, elasticity of lead wires, etc.

##### \*Lead wire color changes

Lead wire colors of SMC auto switches have been changed in order to meet NECA (Nippon Electric Control Equipment Industries Association) Standard 0402 for production beginning September, 1996 and thereafter. Special care should be taken regarding wire polarity during the time that both old and new colors exist.

##### 2-wire system

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

##### 3-wire system

	Old	New
Power supply +	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

##### Solid state with diagnostic output

	Old	New
Power supply +	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

##### Solid state with latch type diagnostic output

	Old	New
Power supply +	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange

### Caution

#### 1. When stripping the cable clad, take care with the orientation of the cable being stripped. The insulator may accidentally be torn or damaged depending on the orientation.(D-M9□ only)



Recommended tools are shown below.

Manufacturer	Model name	Model no.
VESSEL	Wire stripper	No 3000G
TOKYO IDEAL	Strip master	45-089

\* Stripper for round cable (ø2.0) can be used for a 2-wire type cable.