

Compact Cylinder: Standard Type

Double Acting, Single Rod

CQS Series

ø12, ø16, ø20, ø25

How to Order

CQS B 20-30 D - **CDQS B 20-30 D** - **M9BW**

With auto switch (Built-in magnet)

Mounting type

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

Bore size

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

Auto switch

NII	Without auto switch
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Body option

<Standard stroke>

NII	Standard
C	With rubber bumper
M	Rod end male thread
F	Boss on head end

<Long stroke>

C	With rubber bumper Rod end female thread (Standard)
CM	With rubber bumper Rod end male thread

Action

D	Double acting
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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 694.

Applicable Auto Switches/Refer to pages 1575 to 1701 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 auto 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)			M9NVV				M9NW	●	●	●	○	○			
	Diagnostic indication (2-color indicator)			3-wire (PNP)	M9PWV	M9PW	●	●	●	○	○	IC circuit				
	Water resistant (2-color indicator)			2-wire	M9BWV	M9BW	●	●	●	●	○		○			
				3-wire (NPN)	M9NAV ^{*1}	M9NA ^{*1}	○	○	○	●	●		○	IC circuit		
				3-wire (PNP)	M9PAV ^{*1}	M9PA ^{*1}	○	○	○	●	●		○			
2-wire		M9BAV ^{*1}	M9BA ^{*1}	○	○	○	●	●	○	—						
Magnetic field resistant (2-color indicator)	2-wire (Non-polar)	—	—	M9BWA ^{*1}	P3DWA ^{**}	●	—	●	●		○	○				
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—
				No	2-wire	24 V	12 V	100 V	A93V ^{*2}	A93	●	●	●	●	—	—
			100 V or less					A90V	A90	●	—	●	—	—	—	IC circuit

^{*1} Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.

Consult with SMC regarding water resistant types with the above model numbers.

^{*2} 1 m type lead wire is only applicable to D-A93.

^{*} Lead wire length symbols: 0.5 m..... Nil (Example) M9NW
1 m..... M (Example) M9NWM
3 m..... L (Example) M9NL
5 m..... Z (Example) M9NZ

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

^{**} Available only for ø25.

It is mounted away from the port side to avoid interference with fittings.

^{*} Since there are other applicable auto switches than listed, refer to page 749 for details.

^{*} For details about auto switches with pre-wired connector, refer to pages 1648 and 1649.

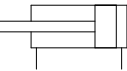
^{*} Auto switches are shipped together (not assembled).

Note) There is the case D-A9□V/M9□V/M9□V/M9□V/M9□V 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.

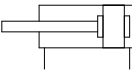


Symbol

Without cushion



Rubber bumper



Made to Order:
Individual Specifications
(For details, refer to pages 750 to 752)

Symbol	Specifications
-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

Made to Order Specifications

[Click here for details](#)

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
-XC85	Grease for food processing equipment
-XC92	Dust resistant cylinder

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.

Moisture Control Tube
IDK Series



When operating an actuator with a small diameter and a short stroke at a high frequency, the dew condensation (water droplet) may occur inside the piping depending on the conditions.

Simply connecting the moisture control tube to the actuator will prevent dew condensation from occurring. For details, refer to [the IDK series in the Best Pneumatics No. 6](#).

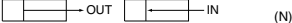
Specifications

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, Rubber bumper *			
Rod end thread		Female thread			
Stroke length tolerance		Standard stroke: $^{+1.0}_0$ Long stroke: $^{+1.4}_{-0}$ *			
Piston speed		50 to 500 mm/s			
Allowable kinetic energy (J)	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.

Theoretical Output



Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm ²)	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 693).		Suffix "-XB10" to the end of standard model no. (page 693).	
Standard stroke	Description	Intermediate strokes in 1 mm increments are available by using spacers with standard stroke cylinders.		Dealing with the stroke in 1 mm increments 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 in 1 mm increments are available by using spacers with standard stroke cylinders.		Dealing with the stroke in 1 mm increments 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 747 to 749 for cylinders with auto switches.

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

Allowable Kinetic Energy

Load Mass and Piston Speed

Load Mass and Piston Speed [J]				
Bore size (mm)	12	16	20	25
Standard/ Allowable kinetic energy: E_a	0.022	0.038	0.055	0.09
With rubber bumper/ Allowable kinetic energy: E_b	0.043	0.075	0.110	0.18

Kinetic energy E (J) = $\frac{(m_1+m_2)V^2}{2}$

m1: Mass of cylinder movable parts kg

m2: Load mass kg

V: Piston speed m/s

Mass of Movable Parts/Without Built-in Magnet: CQSB□-□D(C)(M) (g)

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	5	6	7	8	9	11	16	17	18	19	25	30	36	41	47	53	—	—	
16	8	10	12	14	16	18	28	30	32	34	44	54	64	74	84	94	—	—	
20	15	18	21	24	28	31	34	37	40	43	73	88	104	119	135	150	—	—	
25	23	28	32	37	41	46	50	55	59	64	112	135	157	179	202	224	269	314	

Mass of Movable Parts/With Built-in Magnet: CDQSB□-□D(C)(M) (g)

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	5	7	8	9	10	11	16	18	19	20	25	31	37	42	48	53	—	—	
16	9	11	13	15	17	19	29	31	33	35	45	55	65	75	85	95	—	—	
20	21	24	27	30	33	36	39	42	46	49	78	93	109	124	140	155	—	—	
25	37	42	46	51	55	59	64	68	73	77	118	141	165	186	208	230	275	320	

Additional Mass of Movable Parts

Bore size (mm)		12	16	20	25
Rod end male thread	Male thread	2	3	6	13
	Nut	1	2	4	8
Rubber bumper (No need to add for long stroke)		0	-1	-2	-2
Foot type, Rod side flange type (No need to add for long stroke)		2	4	6	9

Calculation: (Example) **CQSB20-20DCM**

●Basic mass: CQSB20-20D 24 g

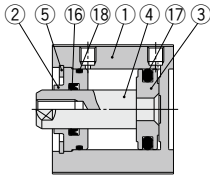
●Additional mass: Rod end male thread 10 g

: With rubber bumper	-2 g
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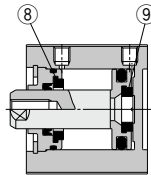
Total 32 g

Construction

Basic type

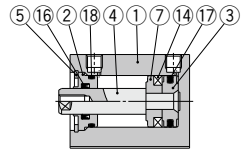


With rubber bumper

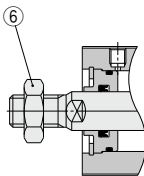


With auto switch (Built-in magnet)

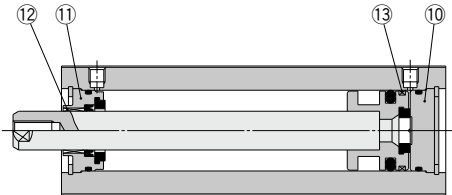
ø12, ø16



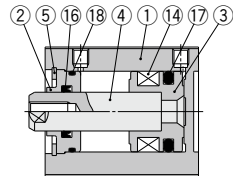
Rod end male thread



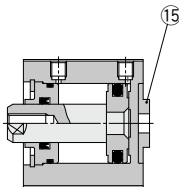
Long stroke



ø20, ø25



With boss on head end



Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Collar	Aluminum alloy	Anodized
3	Piston	Aluminum alloy	
4	Piston rod	Stainless steel	
5	Retaining ring	Carbon tool steel	Phosphate coated
6	Rod end nut	Carbon steel	Zinc chromated
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	Centering location ring	Aluminum alloy	Anodized
16*	Rod seal	NBR	
17*	Piston seal	NBR	
18*	Tube gasket	NBR	

Replacement Parts: Seal Kit (Basic type)

Bore size (mm)	Kit no.	Contents
12	CQSB12-PS	Set of nos. above 16, 17, 18
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 16, 17, 18
16	CQSB16-L-PS	
20	CQSB20-L-PS	
25	CQSB25-L-PS	

* Seal kit includes 16, 17, 18. 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.

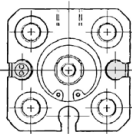
Grease pack part no.: GR-S-010 (10 g)

Dimensions: ø12 to ø25

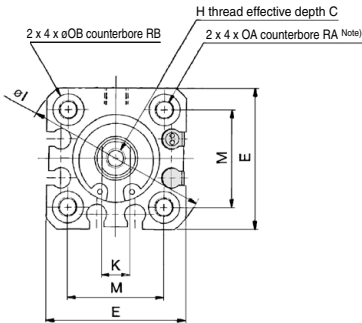
Basic type (Through-hole/Both ends tapped common): CQSB/CDQSB

* For the auto switch mounting position and its mounting height, refer to page 747.

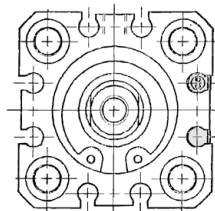
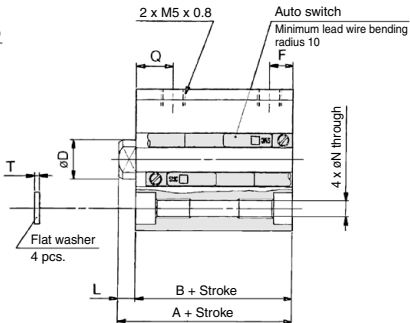
ø12



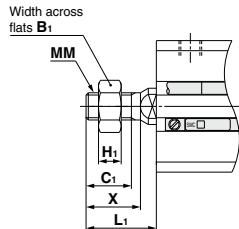
ø16



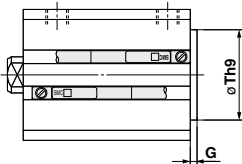
ø20, ø25



Rod end male thread



With boss on head end



- 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.

Rod End Male Thread

Bore size (mm)	B1	C1	H1	Standard stroke		Long stroke	MM	X
				L1	L1			
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	

With Boss on Head End (mm)

Bore size (mm)	G	Th9
12	1.5	15 ⁰ _{-0.043}
16	1.5	20 ⁰ _{-0.052}
20	2	13 ⁰ _{-0.043}
25	2	15 ⁰ _{-0.043}

Note1) The product with boss on head end is applicable to only the standard stroke.
Note2) With boss on rod end : Option (Suffix "-XC36" to the end of part number.)
Note that only bore sizes ø12 and ø16 are applicable to the long stroke.

Basic Type

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	8	14.5	7	10	36	M5 x 0.8	47	8	25.5	5.4	M6 x 1.0	9	8	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	9	15	12	12	40	M6 x 1.0	52	10	28	5.4	M6 x 1.0	9	9	10	7	1				

Note 1) For the following bore/stroke sizes through-hole is threaded over the entire length: Basic type ø12 and ø16; 5 stroke, ø20; 5 to 15 stroke, ø25; 5 to 10 stroke, ø20 with auto switch built-in magnet; 5 stroke.
Note 2) Rubber bumper part has the same dimensions as those indicated above.
* For details about the rod end nut and accessory brackets, refer to page 796.