

# Compact Cylinder

## Series CQS

ø12, ø16, ø20, ø25

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

The "D-A9" and "D-F9" auto switches will not protrude from switch mounting groove.

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

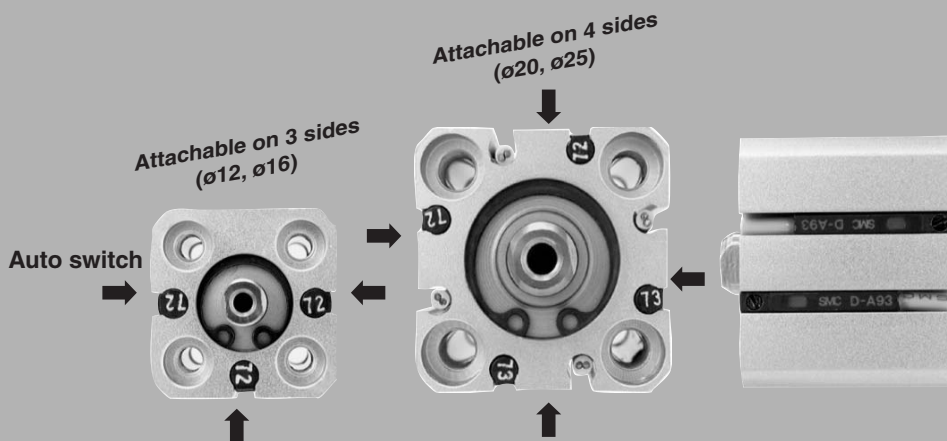
3 faces on ø12, ø16, and all 4 faces including port side on ø20, ø25.

**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.

**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°

CUJ

CU

CQS

CQM

CQ2

RQ

MU

D-

-X

20-

Data

### Series Variations

	Basic	Standard variations	Applicable auto switch	Bore size (mm)	Stroke (mm)	Page	
Standard	Series CQS 	Double acting Single rod	Reed switch D-A90/A90V D-A93/A93V D-A96/A96V	12, 16, 20, 25	Standard stroke ø12 — 5, 10, 15, 20 ø16 — 25, 30 ø20 — 5, 10, 15, 20 ø25 — 25, 30, 35, 40, 45, 50	7-4-4	
	Series CQSW 	Double rod			Long stroke ø12 — 35, 40, 45, 50, 75 ø16 — 100 ø20 — 75, 100, 125, 150, 175, 200 ø25 — 75, 100, 125, 150, 175, 200, 250, 300		
Non-rotating Rod	Series CQS 	Single acting Return/Extend	Solid state switch D-M9N/M9NV D-M9P/M9PV D-M9B/M9BV D-F9NW/F9NWW D-F9PW/F9PWW D-F9BW/F9BWW D-F9BAL	12, 16, 20, 25	ø12 — 5, 10 ø16 — 5, 10 ø20 — 5, 10 ø25 — 5, 10	7-4-12	
	Series CQSK 	Double acting Single rod			ø12 — 5, 10, 15, 20 ø16 — 25, 30 ø20 — 5, 10, 15, 20 ø25 — 25, 30, 35, 40, 45, 50		7-4-28
	Series CQS□S 	Double acting Single rod			ø12 — 5, 10, 15, 20 ø16 — 25, 30 ø20 — 5, 10, 15, 20 ø25 — 25, 30, 35, 40, 45, 50		

\* Non-rotating rod, double acting double rod is available, too.

Note 1) Standard equipment on long stroke type/anti-lateral load type  
Note 2) Standard stroke is only available.



# Compact Cylinder: Standard Type Double Acting, Double Rod Series **CQSW** ø12, ø16, ø20, ø25

## How to Order

**Without auto switch**

**CQSW** B 20 — 30 D C

**With auto switch**

**CDQSW** B 20 — 30 D C — F9BW S

**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).

**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

**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 (Built-in magnet)
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\* For the applicable auto switch model, refer to the table below.  
\* Auto switches are shipped together, (but not assembled).  
(Note) There is the case A9□V type, M9□V type auto switches cannot be mounted on the port surface, depending on the cylinder's stroke and the fitting size for piping. Please confirm SMC separately.

**Body option**

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

\* Combination of body options ("CM") is available.

**Action**

<b>D</b>	Double acting
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### Applicable Auto Switch/Refer to page 7-9-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator/light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length (m) *			Pre-wired connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	3 (L)	5 (Z)	IC circuit		Relay, PLC	
															24 V
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
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	<b>M9NV</b>	<b>M9N</b>	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				<b>M9PV</b>	<b>M9P</b>	●	●	○	○		
				2-wire				<b>M9BV</b>	<b>M9B</b>	●	●	○	○		
				3-wire (NPN)				<b>F9NWV</b>	<b>F9NW</b>	●	●	○	○		
				3-wire (PNP)				<b>F9PWV</b>	<b>F9PW</b>	●	●	○	○		
				2-wire				<b>F9BWV</b>	<b>F9BW</b>	●	●	○	○		
Water resistant (2-color indication)	—	<b>F9BA</b>	—	●	○	○	—	—							

\* Lead wire length symbols: 0.5 m.....Nil (Example) A93  
3 m.....L (Example) A93L  
5 m.....Z (Example) F9NWZ

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

- Since there are other applicable auto switches than listed, refer to page 7-4-45 for details.
- For details about auto switches with pre-wire connector, refer to page 7-9-36.

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



JIS Symbol



## ⚠ Caution

### Snap Ring Installation/Removal

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

### Mounting

- When removing a load, be sure to secure the wrench flats of the piston rod on the load side.
- If this is done without securing the piston rod on the load side, be aware that the coupled (screwed-in) portion of the piston rod could become loosened.

### Minimum Operating Pressure (MPa)

Bore size (mm)	12	16	20	25
Minimum operating pressure	0.07	0.07	0.05	0.05

### Allowable Kinetic Energy (J)

Bore size (mm)	12	16	20	25
Standard	0.022	0.038	0.055	0.09
With rubber bumper	0.043	0.075	0.11	0.18

### 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

### Standard Specifications

Type	Pneumatic (Non-lube)
Action	Double acting, Double 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 (No freezing) With auto switch: -10 to 60°C (No freezing)
Rubber bumper	None
Rod end thread	Female thread
Rod end thread tolerance	JIS Class 2
Stroke length tolerance	+1.0 0
Mounting	Through-hole/Both ends tapped common
Piston speed	50 to 500 mm/s

### Minimum Stroke for Auto Switch Mounting (mm)

No. of auto switches mounted	D-A9□, D-F9□WV	D-A9□V	D-M9□, D-F9□W	D-M9□V	D-F9BAL
2	10	10	15 <sup>Note)</sup>	5	25 <sup>Note)</sup>
1	10 <sup>Note)</sup>	5	15 <sup>Note)</sup>	5	25 <sup>Note)</sup>

Note) Please consult with SMC for shorter stroke length than indicated in the table.

### Theoretical Output (N)

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.	
Part no.	Refer to "How to Order" for the standard model no. (page at left)		
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.: CQSWB25-47D CQSWB25-50D with 3 mm width spacer inside. B dimension is 79 mm.		

# Series CQSW

## Weight/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

Calculation: (Example) CQSWF12-10DM

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

109 g

## Weight/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 Weight

(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

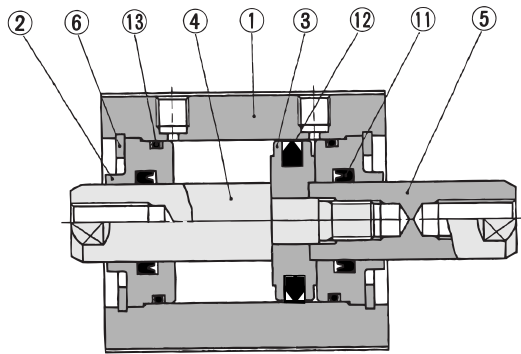


## Made to Order Specifications (For details, refer to page 7-10-1.)

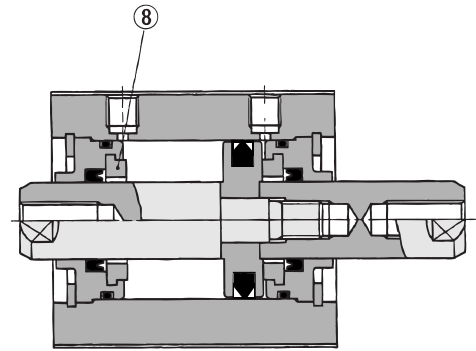
Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat resistant cylinder (150°C)
-XB7	Cold resistant cylinder
-XB9	Low speed cylinder (10 to 50 mm/s)
-XB10	Intermediate stroke (Using exclusive body)
-XB13	Low speed cylinder (5 to 50 mm/s)
-XC6	Piston rod and rod end nut made of stainless steel
-XC36	With boss in rod side
-X235	Change of piston rod end of double rod cylinder
-X271	Fluoro rubber for seals
-X633	Intermediate stroke of double rod cylinder

## Construction

### Basic style

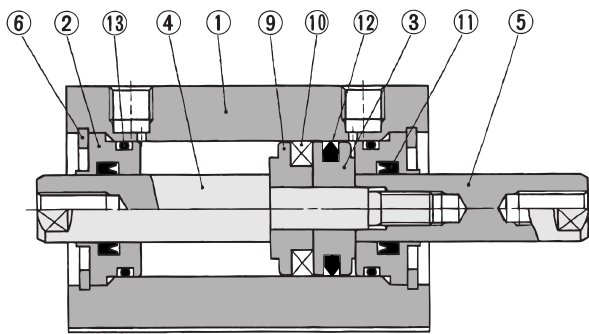


### With rubber bumper

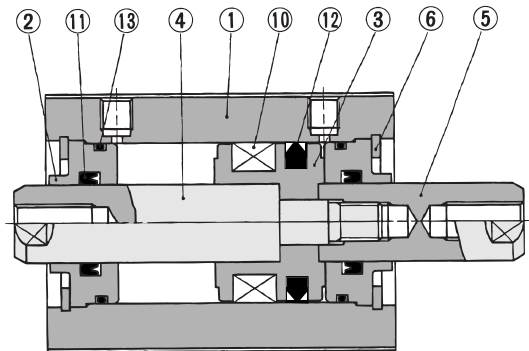


### With auto switch (Built-in magnet)

ø12, ø16



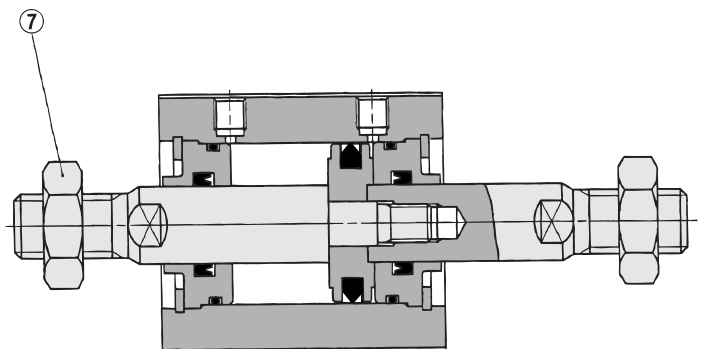
ø20, ø25



## 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	Snap 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 ①, ⑫, ⑬
16	CQSWB16-PS	
20	CQSWB20-PS	
25	CQSWB25-PS	

\* Seal kit includes ①, ⑫, ⑬. Order the seal kit, based on each bore size.

CUJ

CU

**CQS**

CQM

CQ2

RQ

MU

D-

-X

20-

Data

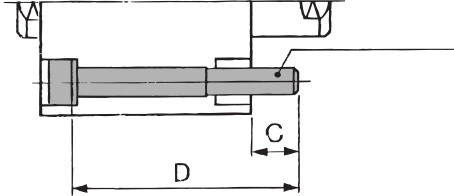
# Series CQSW

## 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.



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

Model	C	D	Mounting bolt
<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

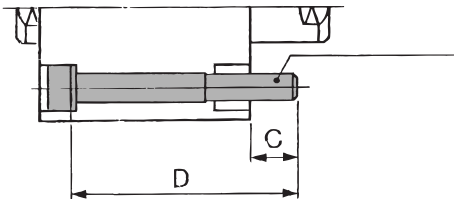
Model	C	D	Mounting bolt
<b>CQSWB20-25D</b>	10	55	M5 x 55ℓ
<b>-30D</b>		60	x 60ℓ
<b>-35D</b>		65	x 65ℓ
<b>-40D</b>		70	x 70ℓ
<b>-45D</b>		75	x 75ℓ
<b>-50D</b>		80	x 80ℓ
<b>CQSWB25-5D</b>	7	35	M5 x 35ℓ
<b>-10D</b>		40	x 40ℓ
<b>-15D</b>		45	x 45ℓ
<b>-20D</b>		50	x 50ℓ
<b>-25D</b>		55	x 55ℓ
<b>-30D</b>	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

## 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.



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

Model	C	D	Mounting bolt
<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

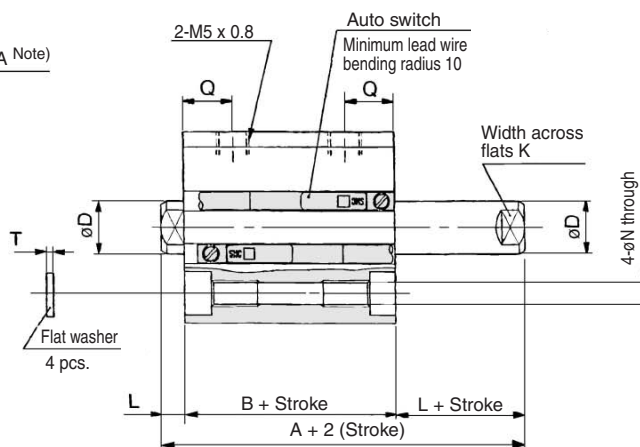
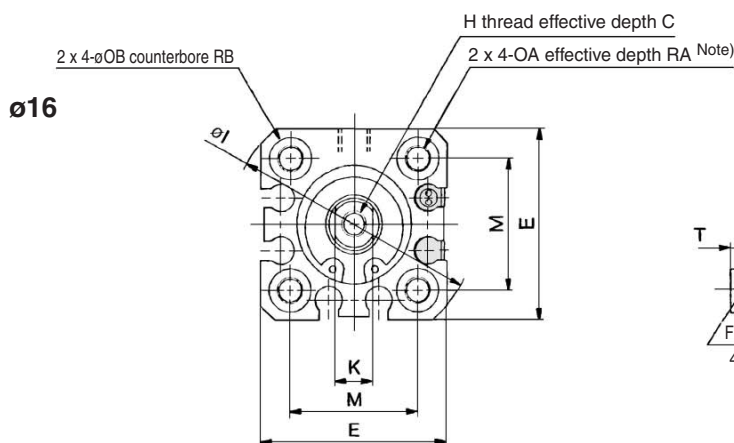
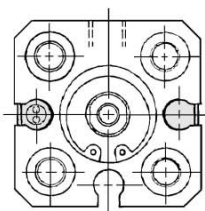
Model	C	D	Mounting bolt
<b>CDQSWB20-25D</b>	10	65	M5 x 65ℓ
<b>-30D</b>		70	x 70ℓ
<b>-35D</b>		75	x 75ℓ
<b>-40D</b>		80	x 80ℓ
<b>-45D</b>		85	x 85ℓ
<b>-50D</b>		90	x 90ℓ
<b>CDQSWB25-5D</b>	7	45	M5 x 45ℓ
<b>-10D</b>		50	x 50ℓ
<b>-15D</b>		55	x 55ℓ
<b>-20D</b>		60	x 60ℓ
<b>-25D</b>		65	x 65ℓ
<b>-30D</b>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

# Series CQSW

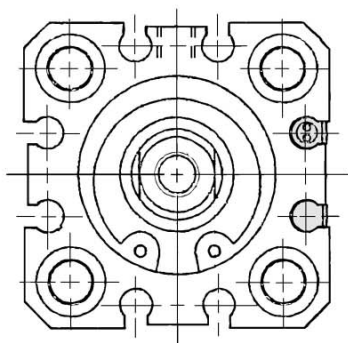
Dimensions:  $\phi 12$  to  $\phi 25$

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

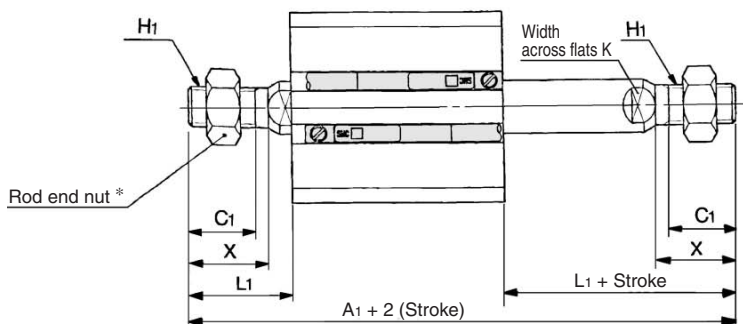
$\phi 12$



$\phi 20, \phi 25$



Rod end male thread



Rod End Male Thread

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

\* For details about the rod end nut and accessory brackets, refer to page 7-6-20.