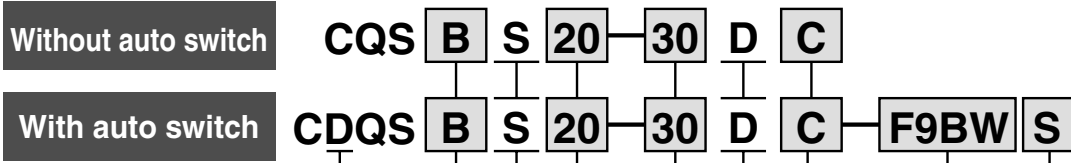




# Compact Cylinder: Anti-lateral Load Type Double Acting, Single Rod Series CQS□S

ø12, ø16, ø20, ø25

## How to Order



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

\* Mounting brackets are shipped together, (but not assembled).

Cushion

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

Bore size

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

Cylinder stroke (mm)

### Standard Stroke

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



• Manufacture of intermediate stroke  
Intermediate strokes are available by the 1 mm interval by using spacer in standard stroke cylinders. Overall length of cylinder is the same as the one of longer standard stroke.

Example) 3 mm width spacer is installed in the standard cylinder CQSBS25-50DC to make CQSBS25-47DC.

Number of auto switches

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

Auto switch

Nil	Without auto switch (Built-in magnet)
-----	---------------------------------------

\* 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

C	With rubber bumper Rod end female thread
CM	With rubber bumper Rod end male thread

Action

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

### 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-wire connector	Applicable load	
					DC	AC	Perpendicular	In-line	0.5 (Nil)	3 (L)	5 (Z)	Applicable load			
												IC circuit		Relay, PLC	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	●	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	A93V	A93	●	●	—	—	—	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)				F9NWV	F9NW	●	●	○	○		
				3-wire (PNP)				F9PWV	F9PW	●	●	○	○		
				2-wire				F9BWV	F9BW	●	●	○	○		
Water resistant (2-color indication)	—	F9BA	—	●	○	○	—	—							

\* 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: Anti-lateral Load Type Double Acting, Single Rod



## Standard Specifications

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 (No freezing) With auto switch: -10 to 60°C (No freezing)
Rubber bumper	Standard equipment
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

CUJ

CU

CQS

CQM

CQ2

RQ

MU

D-

-X

20-

Data

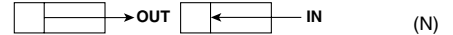
## Minimum Stroke for Auto Switch Mounting

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 (Note)	5	25 (Note)
1	10 (Note)	5	15 (Note)	5	25 (Note)

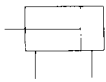
Note) Please consult with SMC for shorter stroke length than indicated in the table.

## 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



## JIS Symbol



## Allowable Kinetic Energy

(J)

Bore size (mm)	12	16	20	25
Allowable kinetic energy	0.043	0.075	0.11	0.18

## Minimum Operating Pressure

(MPa)

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

## 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

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 snap ring for axis, Body mounting bolt

## Manufacture of Intermediate Stroke

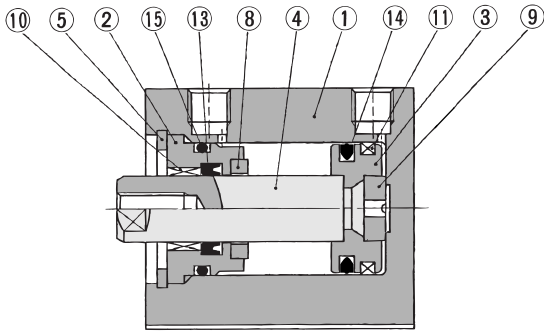
Description	Spacer is installed in the standard stroke body.		
Part no.	Refer to "How to Order" for the standard model no. (page at left)		
Standard stroke	Description	Intermediate strokes by the 1 mm interval are available by using spacers with standard stroke cylinders.	
	Stroke range	Bore size	Stroke range
		12, 16	1 to 29
20, 25	1 to 49		
Example	Part no.: CQSBS25-47D CQSBS25-50D with 3 mm width spacer inside. B dimension is 77.5 mm.		



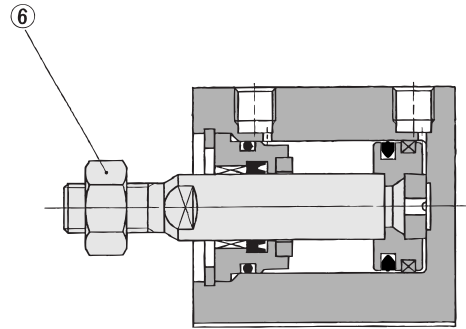
# Compact Cylinder: Anti-lateral Load Type Double Acting, Single Rod

## Construction

### Basic style

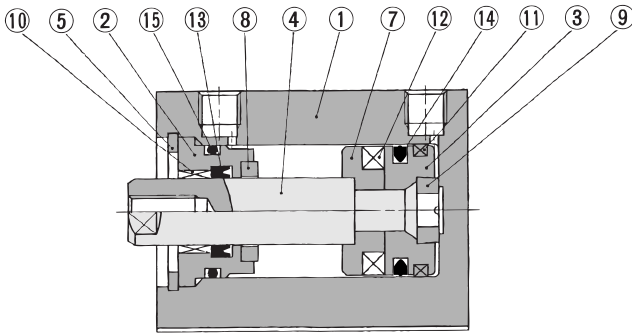


### Rod end male thread

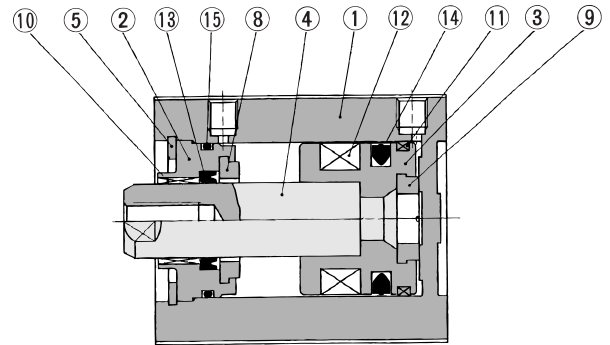


### With auto switch (Built-in magnet)

ø12, ø16



ø20, ø25



CUJ
CU
<b>CQS</b>
CQM
CQ2
RQ
<b>MU</b>
D-
-X
20-
Data

## 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	Snap 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

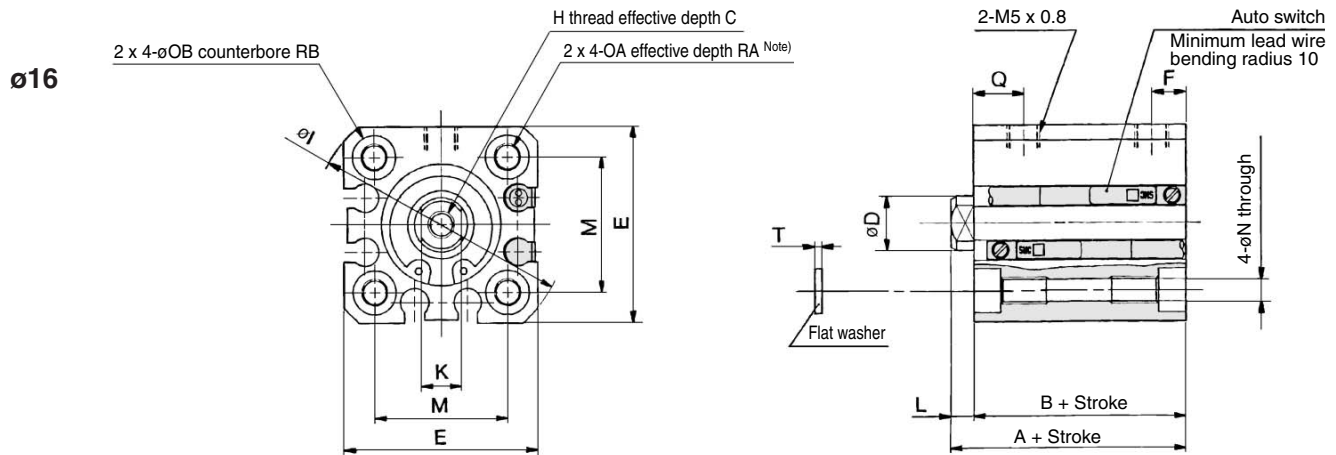
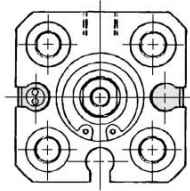
Bore size (mm)	Kit no.	Contents
12	CQSB12-PS	Set of nos. above ⑬, ⑭, ⑮.
16	CQSB16-PS	
20	CQSB20-PS	
25	CQSB25-PS	

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

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

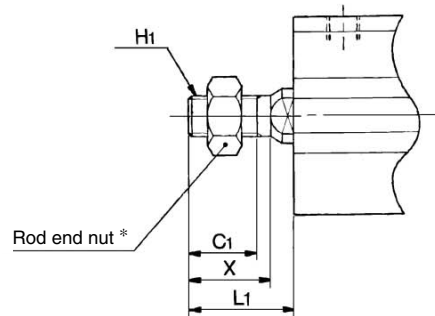
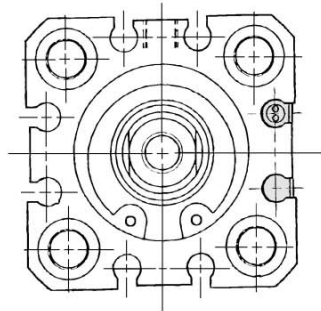
### Basic style (Through-hole/Both ends tapped common): CQSBS/CDQSBS

$\phi 12$



$\phi 20, \phi 25$

#### Rod end male thread



#### Rod End Male Thread

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

#### Basic Style

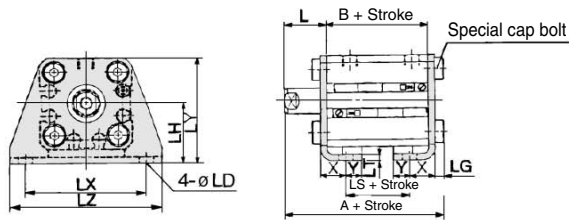
Bore size (mm)	Stroke range (mm)	Without auto switch		With auto switch		C	D	E	F	H	I	K	L	M	N	OA	OB	Q	RA	RB	T
		A	B	A	B																
12	5 to 30	25.5	22	30.5	27	6	6	25	5	M3 x 0.5	32	5	3.5	15.5	3.5	M4 x 0.7	6.5	7.5	7	4	0.5
16	5 to 30	25.5	22	30.5	27	8	8	29	5	M4 x 0.7	38	6	3.5	20	3.5	M4 x 0.7	6.5	7.5	7	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  $\phi 20$ , through-hole is threaded over the entire length.

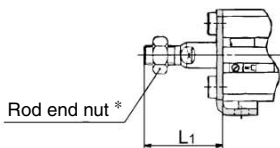
\* For details about the rod end nut and accessory brackets, refer to page 7-6-20.

# Compact Cylinder: Anti-lateral Load Type Double Acting, Single Rod

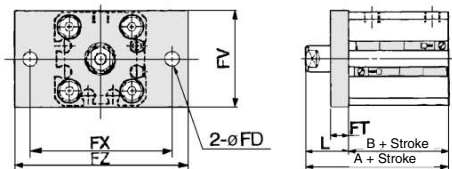
## Foot style: CQSLs/CDQSLs



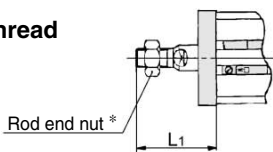
### Rod end male thread



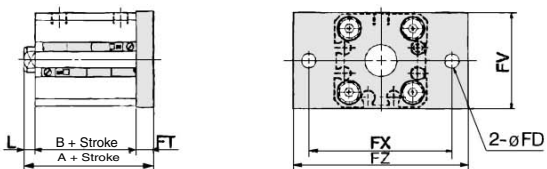
## Rod side flange style: CQSFS/CDQSFS



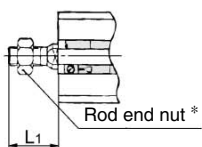
### Rod end male thread



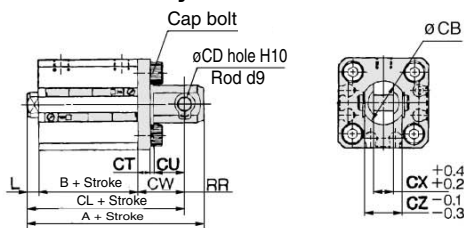
## Head side flange style: CQSGS/CDQSGS



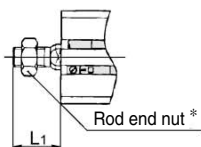
### Rod end male thread



## Double clevis style: CQSDS/CDQSDS



### 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

## 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

## 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

## 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

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

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

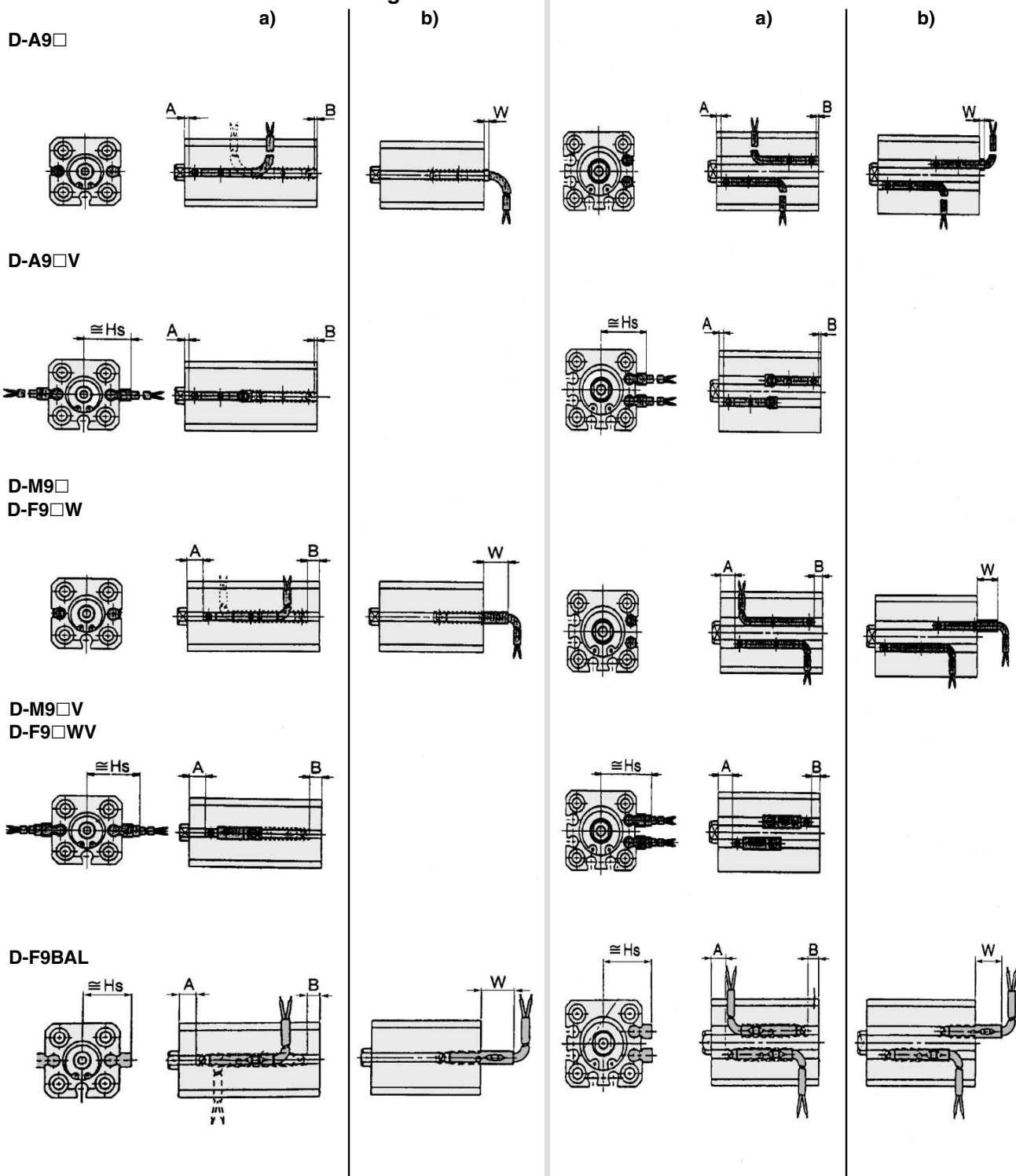
● Double acting: Single rod, Single acting: Single rod, Spring return/Spring extend; Long stroke type, Anti-lateral load type, V Double acting: Double rod

ø12

ø16 to ø25

## Mounting

## Mounting



## Compact Cylinder: Anti-lateral Load Type Double Acting, Single Rod

Auto switch model	D-A9□			D-A9□V			D-M9□, D-F9□W			D-M9□V, D-F9□WV		
Symbol	A	B	W	A	B	HS	A	B	W	A	B	HS

### Double Acting, Single Rod;

### Single Acting, Single Rod, Spring Return/Spring Extend [ ]: Denotes the values of D-A93. ( ): Denotes the values of type T.

Bore size (mm)	12	1.5 (2.5)	0	1.5 [4] (2.5 [5])	1.5 (2.5)	0	17	5.5	4.5	5.5	5.5 (6.5)	4.5 (3.5)	19
	16	2	0	2 [4.5]	2	0	19	6	4	6	6	4	21
	20	6	3.5	-1.5 [1]	6	3.5	22.5	10	7.5	2.5	10	7.5	24.5
	25	7	5.5	-3.5 [-1]	7	5.5	24.5	11	9.5	0.5	11	9.5	26.5

### Long Stroke

Bore size (mm)	12	5	7	-5 [-2.5]	5	7	17	9	11	-1	9	11	19.5
	16	5.5	6	-4.5 [-2]	5.5	6	19	9.5	10.5	-0.5	9.5	10.5	21.5
	20	9	11.5	-10 [-7.5]	9	11.5	22.5	13	16	-6	13	16	25
	25	10	13.5	-12 [-9.5]	10	13.5	24.5	14	18	-8	14	18	27

### Anti-lateral Load Type

Bore size (mm)	12	6	0.5	1 [3.5]	6	0.5	17	10	5	5	10	5	19.5
	16	5.5	1	0.5 [3]	5.5	1	19	9.5	5.5	4.5	9.5	5.5	21.5
	20	9	5	-3.5 [-1]	9	5	22.5	13	9.5	0.5	13	9.5	25
	25	10	7	-5.5 [-3]	10	7	24.5	14	11.5	-1.5	14	11.5	27

### Double Acting, Double Rod

Bore size (mm)	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
	16	2	5	3 [5.5]	2	5	19	6	9	1	6	9	21.5
	20	6	10	8 [10.5]	6	10	22.5	10	14	-4	10	14	25
	25	7	12	10 [12.5]	7	12	24.5	11	16	-6	11	16	27

Auto switch model	D-F9BAL			
Symbol	A	B	W	HS

### Double Acting, Single Rod;

### Single Acting, Single Rod, Spring Return/Spring Extend

Bore size (mm)	12	4.5	3.5	14.5	16.5
	16	5	3	15	18.5
	20	9	6.5	11.5	22
	25	10	8.5	9.5	24

### Long Stroke

Bore size (mm)	12	8	10	8	16.5
	16	8.5	9.5	8.5	18.5
	20	12	15	3	22
	25	13	17	1	24

### Anti-lateral Load Type

Bore size (mm)	12	9	4	14	16.5
	16	8.5	4.5	13.5	18.5
	20	12	8.5	9.5	22
	25	13	10.5	7.5	24

### Double Acting, Double Rod

Bore size (mm)	12	4.5	8.5	9.5	16.5
	16	5	8	10	18.5
	20	9	13	5	22
	25	10	15	3	24



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-M9N/M9B/M9P/F9□W and F9BAL cannot be installed on the single acting: single rod type.

CUJ

CU

CQS

CQM

CQ2

RQ

MU

D-

-X

20-

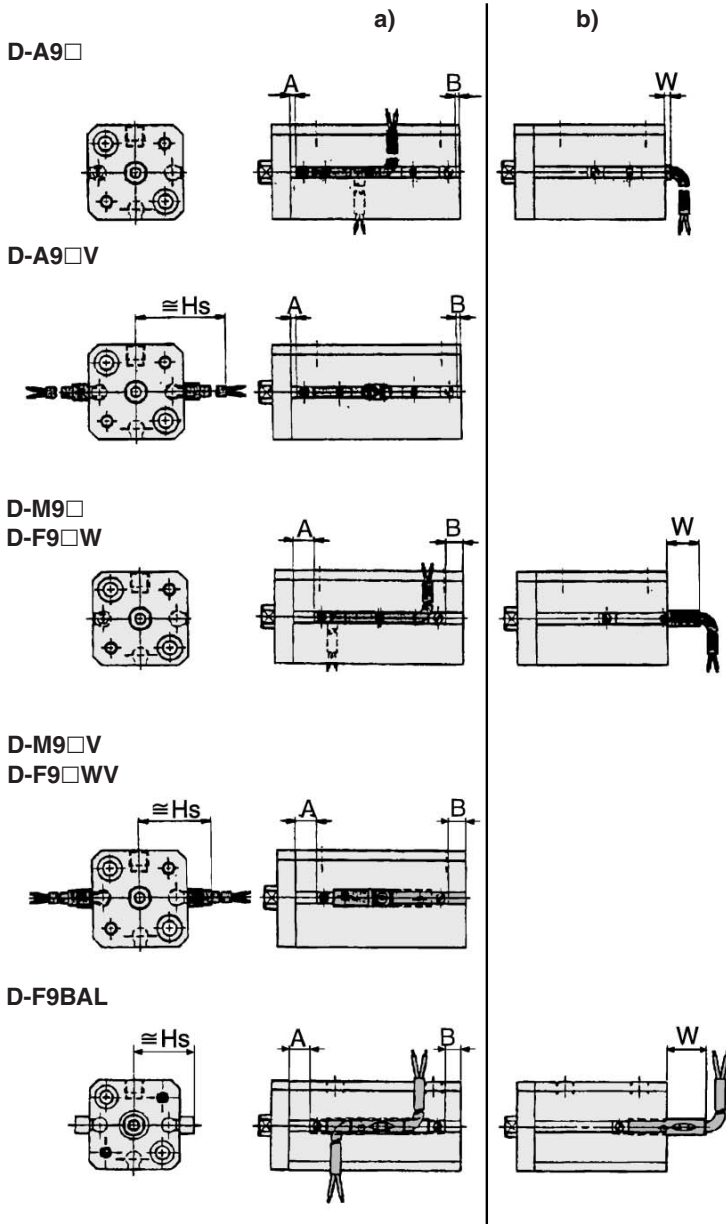
Data



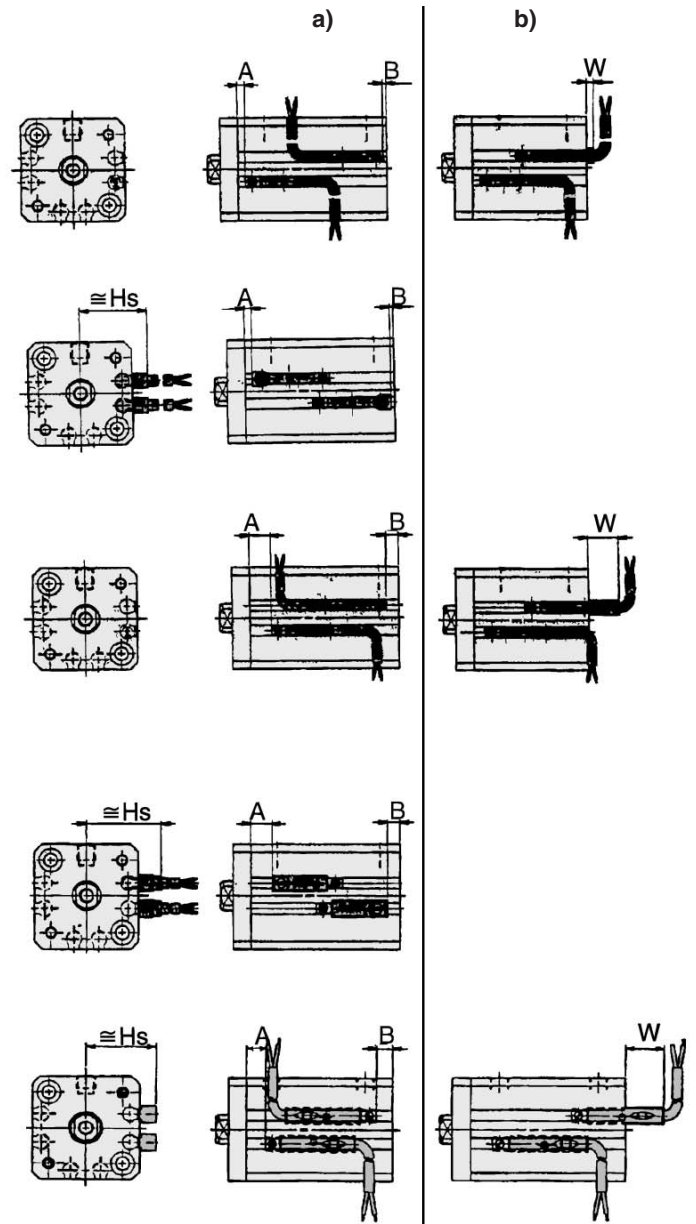
# Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height (Non-rotating rod)

ø12

## Mounting



## Mounting



Auto switch model	D-A9□			D-A9□V			D-M9□, D-F9□W			D-M9□V, D-F9□WV			
Symbol	A	B	W	A	B	Hs	A	B	W	A	B	Hs	
Bore size (mm)	12	1.5	0	1.5 (4)	1.5	0	17	5.5	4.5	5.5	5.5	4.5	19
	16	2	0	2 (4.5)	2	0	19	6	4	6	6	4	21
	20	6	3.5	-1.5 (1)	6	3.5	22.5	10	7.5	2.5	10	7.5	24.5
	25	7	5.5	-3.5 (-1)	7	5.5	24.5	11	9.5	0.5	11	9.5	26.5

( ): Denotes the values of D-A93.

Auto switch model	D-F9BAL				
Symbol	A	B	W	Hs	
Bore size (mm)	12	4.5	3.5	14.5	16.5
	16	5	3	15	18.5
	20	9	6.5	11.5	22
	25	10	8.5	9.5	24

Note) 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".

## Compact Cylinder: Anti-lateral Load Type Double Acting, Single Rod

### Operating Range

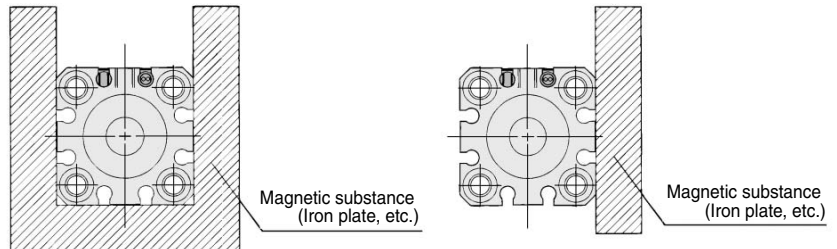
Auto switch model	Bore size (mm)			
	12	16	20	25
D-A9□, D-A9□V	6	7.5	10	10
D-M9□, D-M9□V	2	2.5	3.5	3.5
D-F9□W, D-F9□WV D-F9BAL	3	4	5	5.5

\* 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.

### ⚠ Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions refer to pages 7-13-3 to 7-13-6.

- 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. For detailed specifications, refer to page 7-9-1.

Type	Model	Electrical entry (Fetching direction)	Features
Reed switch	D-A90	Grommet (In-line)	Without indicator light
	D-A90V	Grommet (Perpendicular)	

- Normally closed (NC = b contact), solid state switch (D-F9G/F9H type, and D-F8 type) are also available. For details, refer to pages 7-9-23 and 7-9-21.

CUJ

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