

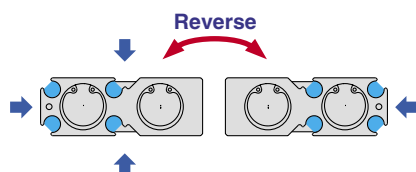
# Dual-Rod Cylinder Compact Type

**New**

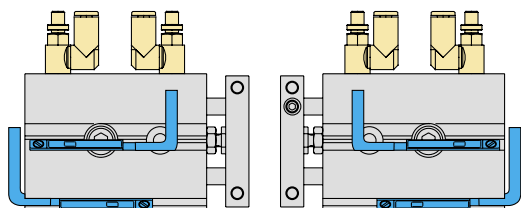
**Made to Order additionally released.** (For details, refer to page 22.)



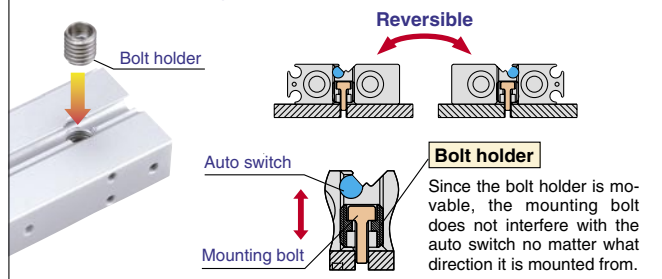
Auto switch can be installed from 3 directions.



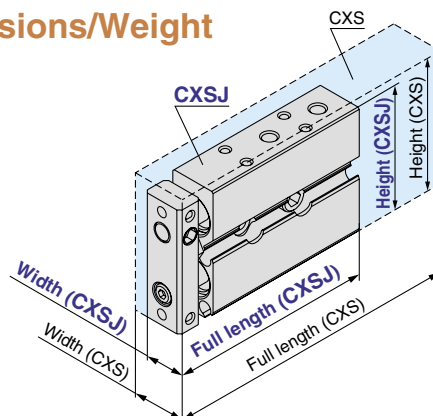
**Symmetric mounting**



**Reverse mounting mechanism**



**Dimensions/Weight**



Bore size (mm)	Series	Dimensions (mm)			Weight (kg)
		Height	Width	Full length	
ø6	CXSJ□6	13.4	32	42 + Stroke	0.057
	CXS□6	16	37	58.5 + Stroke	0.095
ø10	CXSJ□10	15	42	56 + Stroke	0.114
	CXS□10	17	46	72 + Stroke	0.170
ø15	CXSJ□15	19	54	70 + Stroke	0.219
	CXS□15	20	58	79 + Stroke	0.280
ø20	CXSJ□20	24	62	84 + Stroke	0.371
	CXS□20	25	64	94 + Stroke	0.440
ø25	CXSJ□25	29	73	87 + Stroke	0.544
	CXS□25	30	80	96 + Stroke	0.660
ø32	CXSJ□32	37	94	100.5 + Stroke	1.078
	CXS□32	38	98	112 + Stroke	1.230

Note) Slide bearing, 20 mm strokes

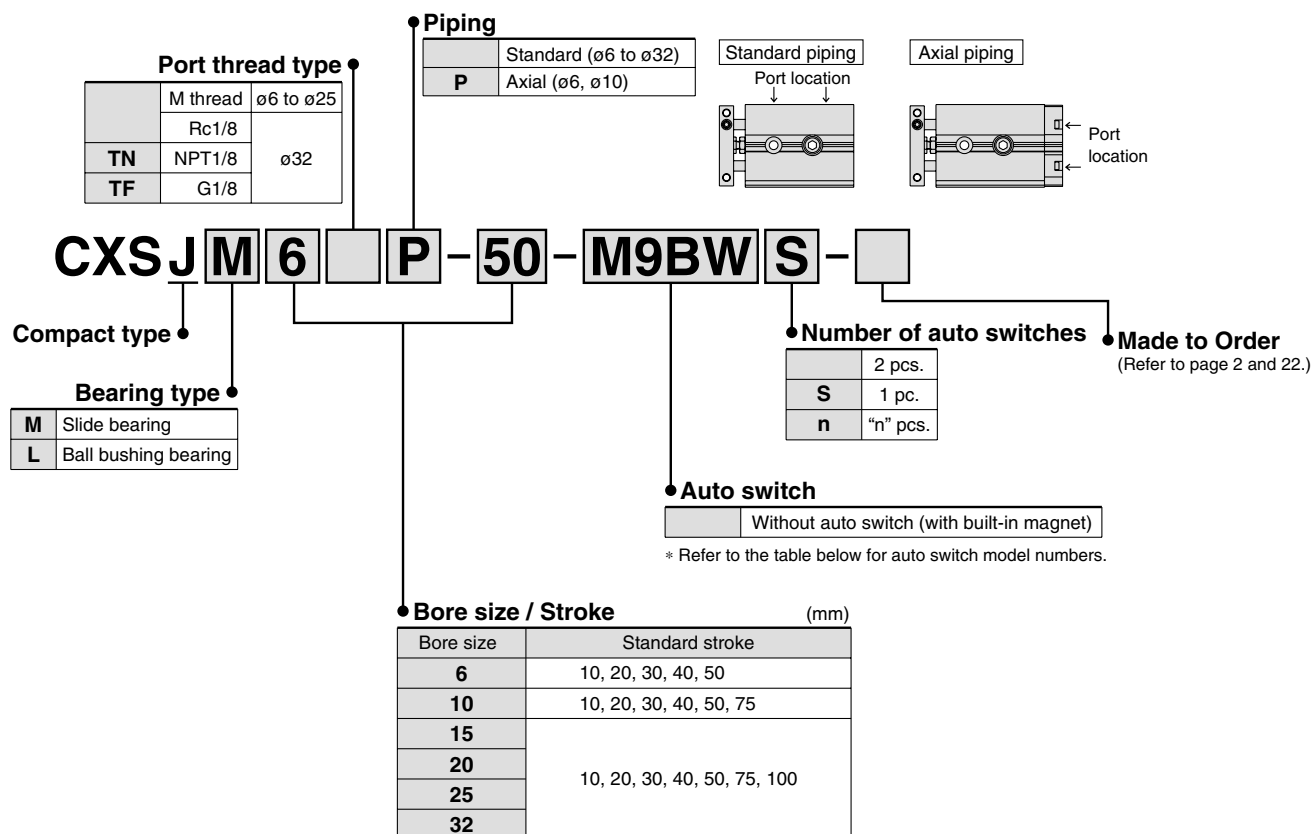
**Axial piping available (ø6, ø10)**

Allowable kinetic energy, allowable load and non-rotating accuracy are equivalent to those of the CXS basic type.

# Dual-Rod Cylinder Compact Type Series *CXSJ*

ø6, ø10, ø15, ø20, ø25, ø32

## How to Order



## Applicable Auto Switches/Refer to page 16 for detailed auto switch specifications.

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	Auto switch model		0.5	1 (M)	3 (L)	5 (Z)					
							Perpendicular	In-line									
Reed switch	—	Grommet	Yes	3-wire (NPN equiv.)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—	
				2-wire	24 V	12 V	100 V	A93V	A93	●	—	●	—	—	—		
			None			5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—	IC circuit		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	—	●	○	○	IC circuit	Relay, PLC	
				3-wire (PNP)		12 V		M9PV	M9P	●	—	●	○	○			
				2-wire				M9BV	M9B	●	—	●	○	○			
	Diagnostic indication (2-color display)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit		
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	○			
				2-wire				12 V	M9BWV	M9BW	●	●	●	○			○
									—	F9BA	—	—	●	○			○

\* Lead wire length symbols

0.5 m	Nil	(Example) M9N
1 m	M	M9NWM
3 m	L	M9NL
5 m	Z	M9NZ

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

- Since there are applicable auto switches other than listed, refer to page 15 for details.
- For details about switch with pre-wired connector, refer to SMC'S "Best Pneumatics" catalogue.
- \* Auto switches are included when shipped (but not assembled).



## Specifications

Bore size (mm)	6	10	15	20	25	32
Fluid	Air (Non-lube)					
Proof pressure	1.05 MPa					
Maximum operating pressure	0.7 MPa					
Minimum operating pressure	0.15 MPa	0.1 MPa		0.05 MPa		
Ambient and fluid temperature	−10 to 60°C (No freezing)					
Piston speed	30 to 800 mm/s		30 to 700 mm/s		30 to 600 mm/s	
Cushion	Rubber bumper on both ends					
Stroke adjustable range	0 to −5 mm compared to the standard stroke					
Port size	M3	M5				Rc (NPT, PF) 1/8

## Standard Stroke

Model	Standard stroke	Manufacturable stroke range (mm)
CXSJ□6	10, 20, 30, 40, 50	60 to 100
CXSJ□10	10, 20, 30, 40, 50, 75	80 to 150
CXSJ□15	10, 20, 30, 40, 50, 75, 100	110 to 150
CXSJ□20, 25, 32		110 to 200

\* Strokes beyond the standard stroke range are available as a special order.



**Made to Order**  
(For details, refer to page 22.)

Symbol	Specifications
<b>XB6</b>	Heat resistant cylinder (-10 to 150°C)
<b>XB13</b>	Low speed cylinder (5 to 50 mm/s)
<b>XC6</b> (Note)	Made of stainless steel
<b>XC19</b>	Intermediate stroke (with 5 mm width spacer)
<b>XC22</b>	Fluoro rubber seals

Note) Slide bearing type only

## Theoretical Output

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm <sup>2</sup> )	Operating pressure (MPa)								(N)
				0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7	
<b>CXS□6</b>	<b>4</b>	OUT	56	—	8.4	11.2	16.8	22.4	28.0	33.6	39.2	
		IN	31	—	4.6	6.2	9.3	12.4	15.5	18.6	21.7	
<b>CXS□10</b>	<b>6</b>	OUT	157	15.7	—	31.4	47.1	62.8	78.5	94.2	110	
		IN	100	10.0	—	20.0	30.0	40.0	50.0	60.0	70.0	
<b>CXS□15</b>	<b>8</b>	OUT	353	35.3	—	70.6	106	141	177	212	247	
		IN	252	25.2	—	50.4	75.6	101	126	151	176	
<b>CXS□20</b>	<b>10</b>	OUT	628	62.8	—	126	188	251	314	377	440	
		IN	471	47.1	—	94.2	141	188	236	283	330	
<b>CXS□25</b>	<b>12</b>	OUT	982	98.2	—	196	295	393	491	589	687	
		IN	756	75.6	—	151	227	302	378	454	529	
<b>CXS□32</b>	<b>16</b>	OUT	1608	161	—	322	482	643	804	965	1126	
		IN	1206	121	—	241	362	482	603	724	844	

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm<sup>2</sup>)

## Weight

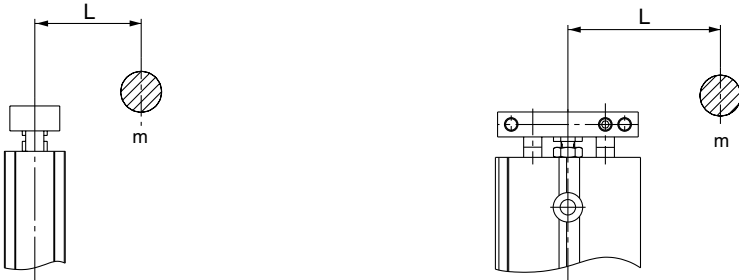
Model	Standard stroke (mm)							(kg)
	10	20	30	40	50	75	100	
<b>CXSJM6</b>	0.047	0.057	0.067	0.077	0.087	—	—	
<b>CXSJL6</b>	0.048	0.058	0.068	0.078	0.088	—	—	
<b>CXSJM10</b>	0.099	0.114	0.129	0.144	0.159	0.198	—	
<b>CXSJL10</b>	0.106	0.121	0.136	0.151	0.166	0.205	—	
<b>CXSJM15</b>	0.198	0.219	0.240	0.261	0.282	0.335	0.387	
<b>CXSJL15</b>	0.218	0.239	0.260	0.281	0.302	0.355	0.407	
<b>CXSJM20</b>	0.345	0.371	0.397	0.423	0.449	0.514	0.579	
<b>CXSJL20</b>	0.375	0.401	0.427	0.453	0.479	0.544	0.609	
<b>CXSJM25</b>	0.506	0.544	0.582	0.620	0.658	0.753	0.848	
<b>CXSJL25</b>	0.516	0.554	0.592	0.630	0.668	0.763	0.858	
<b>CXSJM32</b>	1.022	1.078	1.134	1.190	1.246	1.386	1.526	
<b>CXSJL32</b>	1.032	1.088	1.144	1.200	1.256	1.396	1.536	

Note) For axial piping of CXSJ□6P-□ and CXSJ□10P-□, please add the following weight.  
CXSJ□6P-□: 0.009 kg, CXSJ□10P-□: 0.014 kg

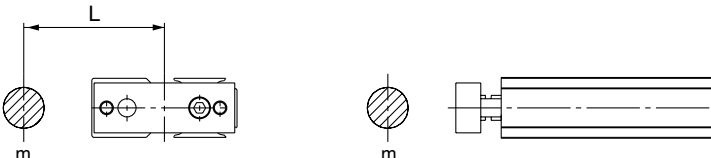
## Model Selection

**⚠ Caution** Theoretical output must be confirmed separately, referring to the table on page 2.

### Vertical Mounting

Mounting orientation					
Max. speed (mm/s)		Up to 200	Up to 400	Up to 600	Up to 800
Stroke (mm)		All strokes			
Selection graph	ø6	1	2	3	4
	ø10				
	ø15				
	ø20				
	ø25				
	ø32				

### Horizontal Mounting

Mounting orientation		 <p>* Refer to the caution notes below.</p>									
		Stroke (mm)		Up to 10		Up to 30		Up to 50		Up to 75	
Max. speed (mm/s)		Up to 400	Over 400	Up to 400	Over 400	Up to 400	Over 400	Up to 400	Over 400	Up to 400	Over 400
Selection graph	ø6	5		6		7		14		15	
	ø10	8	9	10	11	12	13				
	ø15										
	ø20										
	ø25										
	ø32										

\* The maximum speeds for ø6 to ø32 are: ø6, ø10: up to 800 mm/s; ø15, ø20: up to 700 mm/s; ø25, ø32: up to 600 mm/s

## ⚠ Caution

If the cylinder is horizontally mounted and the plate end does not reach the load's center of gravity, use the formula below to calculate the imaginary stroke  $L'$  that includes the distance between the load's center of gravity and the plate end. Select the graph that corresponds to the imaginary stroke  $L'$ .

Imaginary stroke  $L' = (\text{Stroke}) + k + L$

k: Distance between the center and end of the plate

ø6	2.75 mm
ø10	4 mm
ø15	5 mm
ø20	6 mm
ø25	
ø32	8 mm

(Example)

① When using CXSJM6-10 and  $L = 15$  mm:

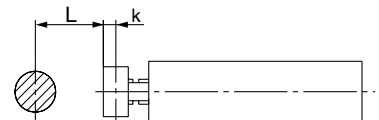
Imaginary stroke  $L' = 10 + 2.75 + 15 = 27.75$

Therefore, the graph used for your model selection should be the one for CXSJM6-30 [6].

② When using CXSJM25-50 and  $L = 10$  mm:

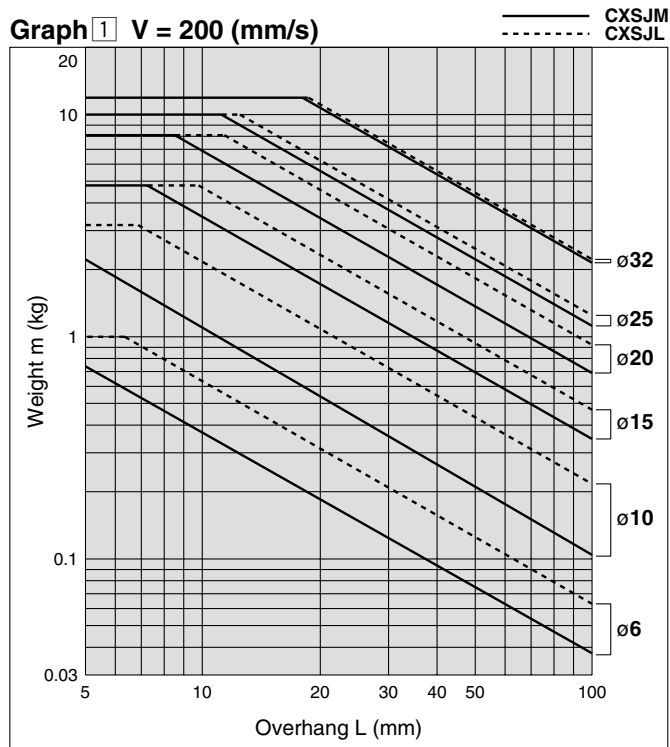
Imaginary stroke  $L' = 50 + 6 + 15 = 71$

Therefore, the graph used for your model selection should be the one for CXSJM25-75 [14].

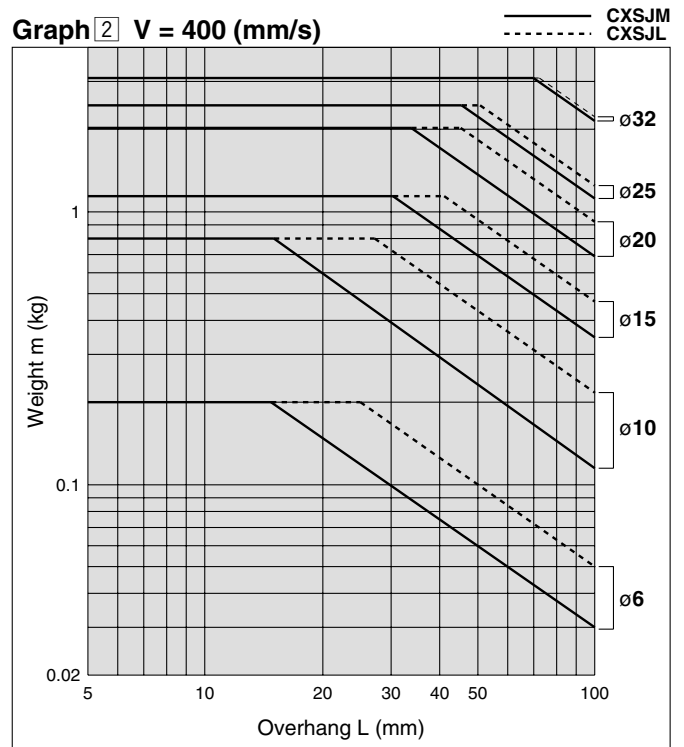


## Vertical Mounting

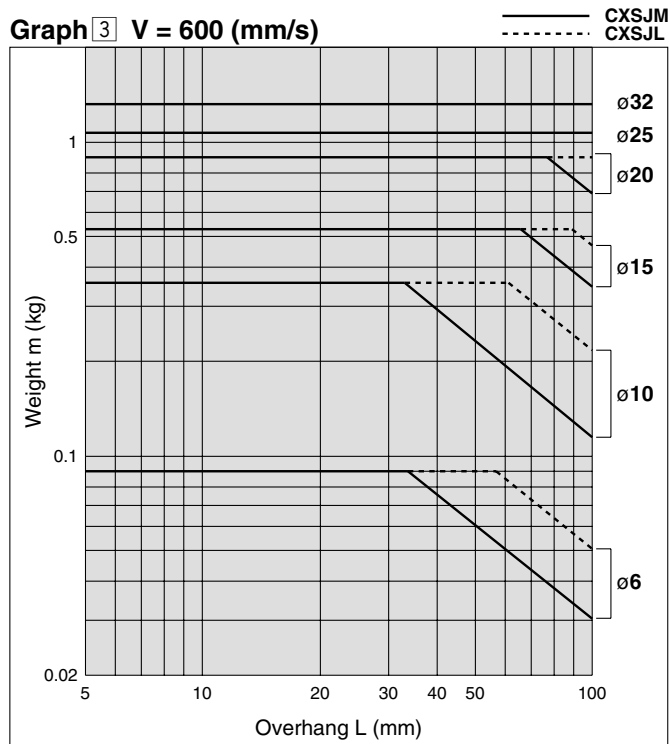
Graph 1 V = 200 (mm/s)



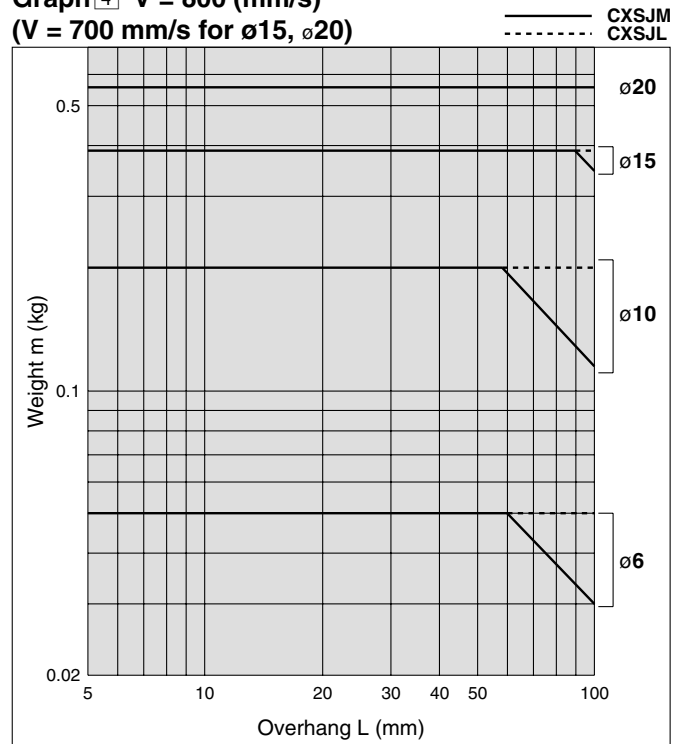
Graph 2 V = 400 (mm/s)



Graph 3 V = 600 (mm/s)



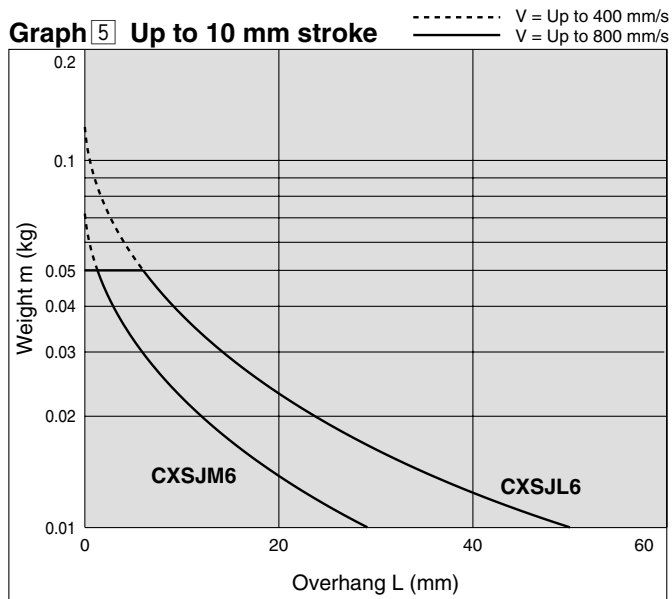
Graph 4 V = 800 (mm/s)  
(V = 700 mm/s for  $\phi 15$ ,  $\phi 20$ )



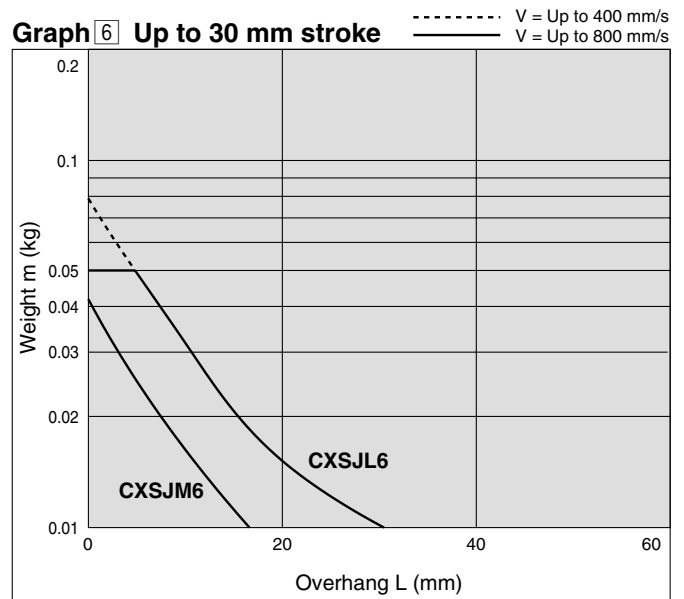
Note) V = 700 mm/s for  $\phi 15$ ,  $\phi 20$ .

## Horizontal Mounting

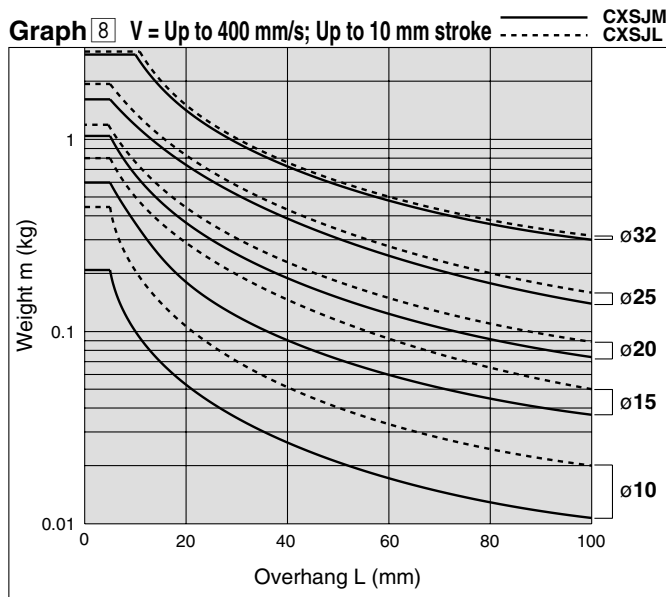
**Graph 5 Up to 10 mm stroke**



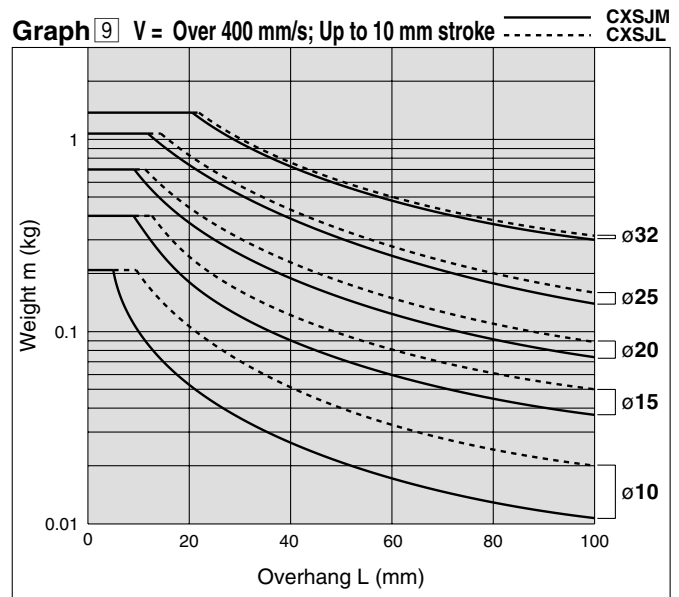
**Graph 6 Up to 30 mm stroke**



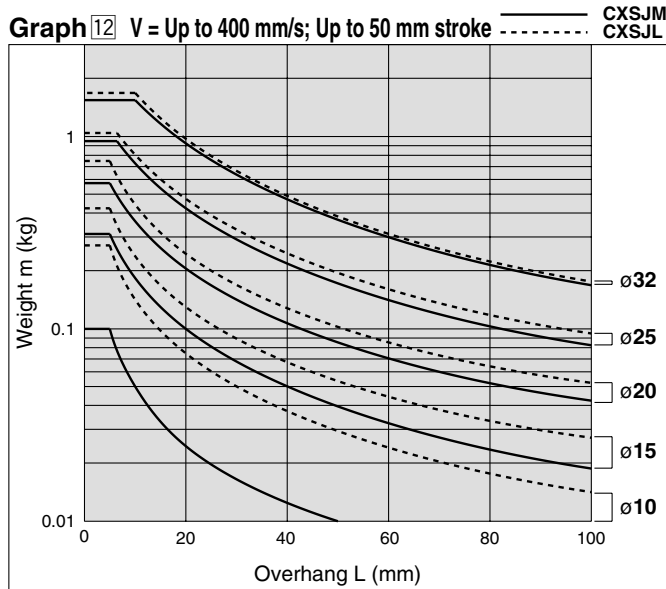
**Graph 8 V = Up to 400 mm/s; Up to 10 mm stroke**



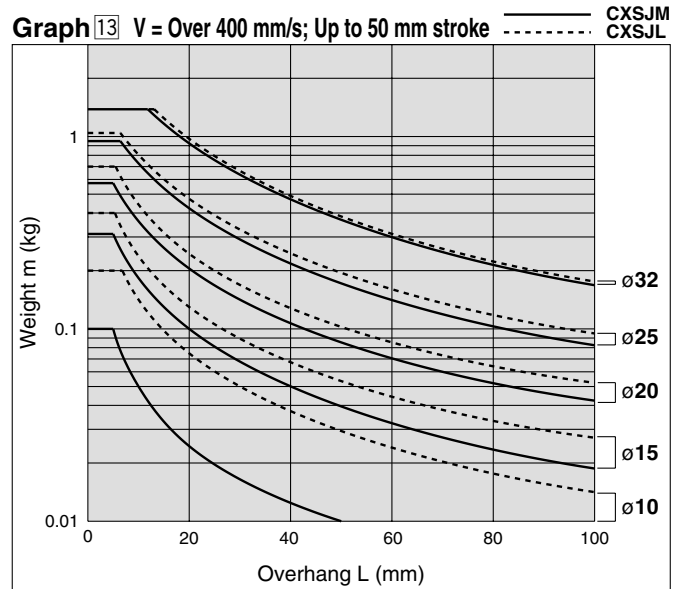
**Graph 9 V = Over 400 mm/s; Up to 10 mm stroke**



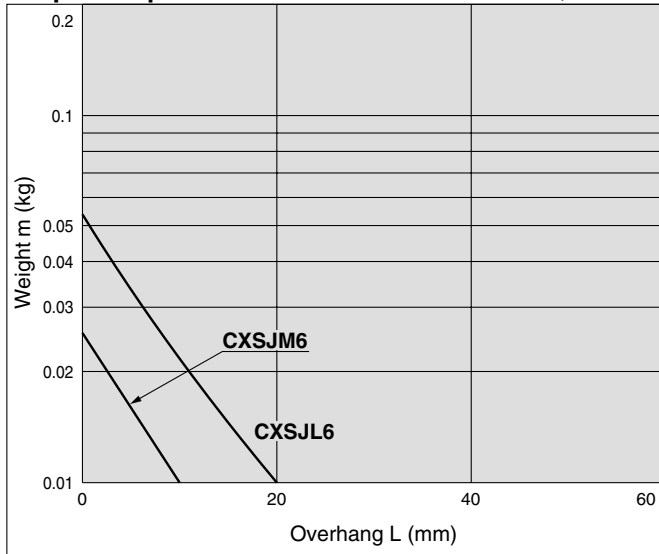
**Graph 12 V = Up to 400 mm/s; Up to 50 mm stroke**



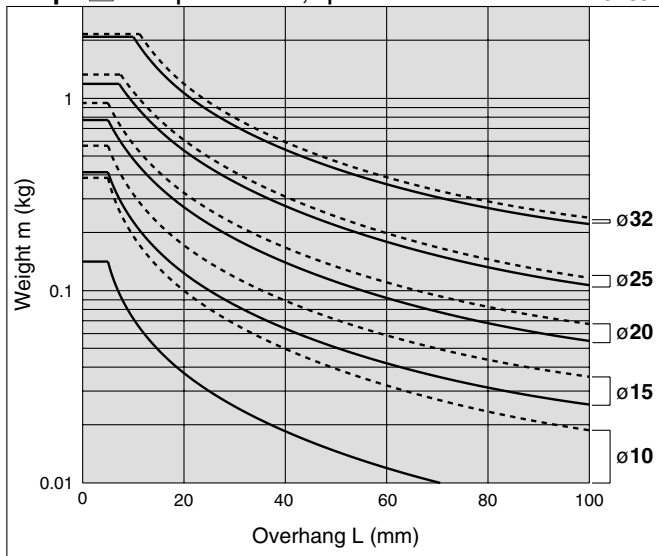
**Graph 13 V = Over 400 mm/s; Up to 50 mm stroke**



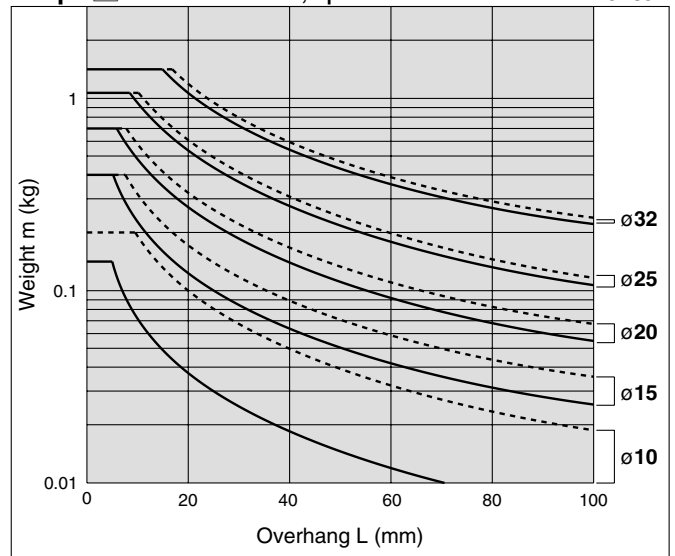
**Graph 7 Up to 50 mm stroke** ——— V = Up to 800mm/s



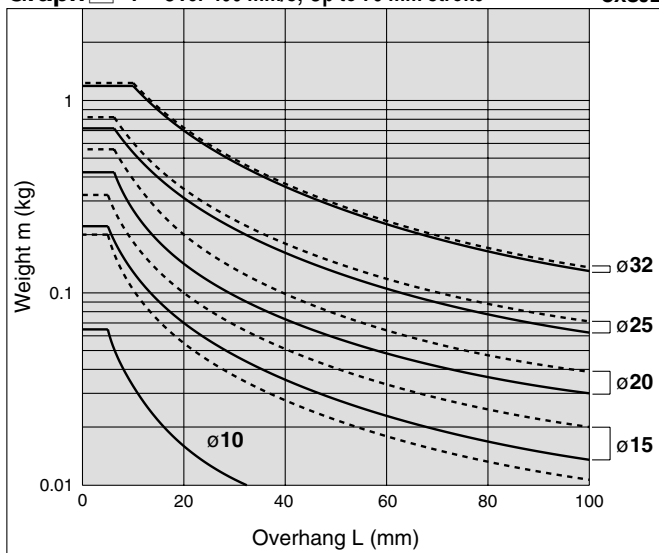
**Graph 10 V = Up to 400 mm/s; Up to 30 mm stroke** ——— CXSJM  
----- CXSJL



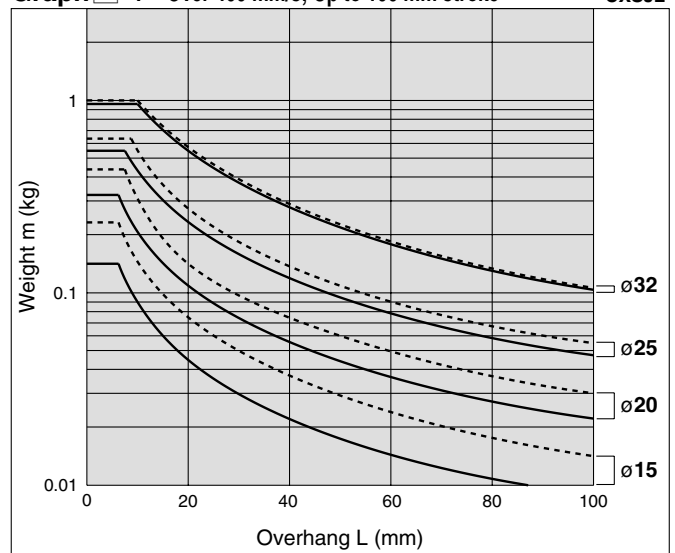
**Graph 11 V = Over 400 mm/s; Up to 30 mm stroke** ——— CXSJM  
----- CXSJL



**Graph 14 V = Over 400 mm/s; Up to 75 mm stroke** ——— CXSJM  
----- CXSJL



**Graph 15 V = Over 400 mm/s; Up to 100 mm stroke** ——— CXSJM  
----- CXSJL

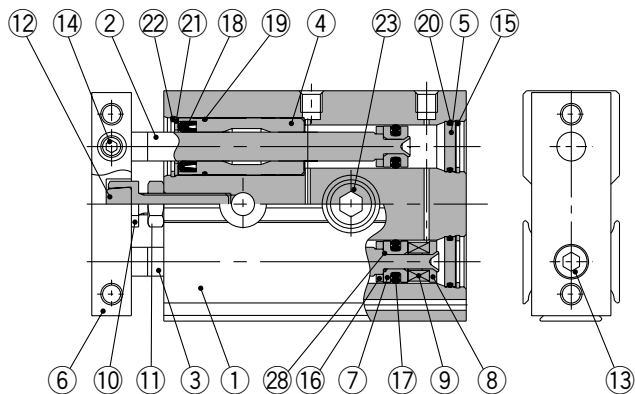


# Series CXSJ

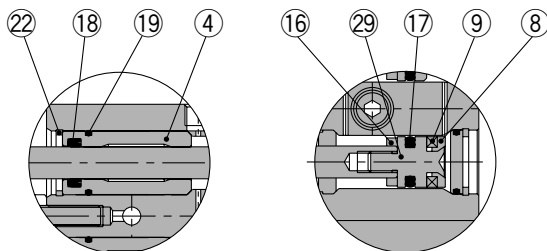
## Construction: Standard Piping

### CXSJM (Slide bearing)

#### CXSJM6



#### CXSJM10

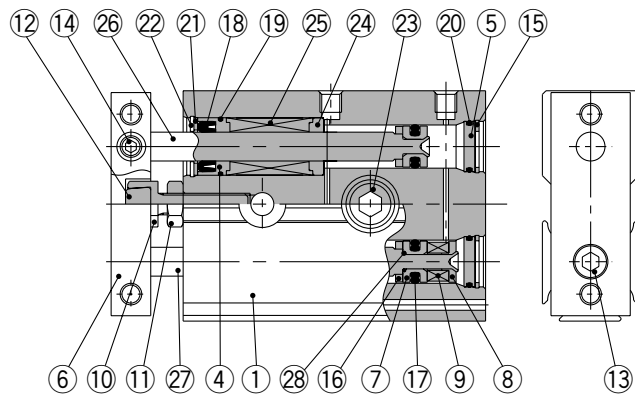


Rod cover

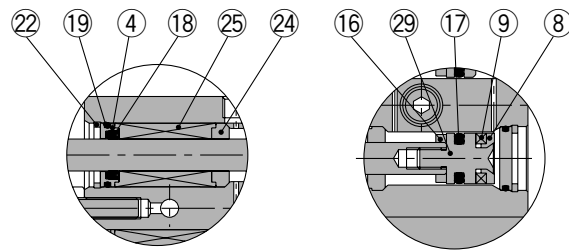
Piston rod B-side piston

### CXSJL (Ball bushing bearing)

#### CXSJL6



#### CXSJL10



Rod cover

Piston rod B-side piston

### Component Parts: Standard Piping

No.	Description	Material	Note
1	Housing	Aluminum alloy	Hard anodized
2	Piston rod A	Carbon steel (Note)	Hard chromium electroplated
3	Piston rod B	Carbon steel (Note)	Hard chromium electroplated
4	Rod cover	Aluminum bearing alloy	
5	Head cover	Aluminum alloy	Anodized
6	Plate	Aluminum alloy	Glossy, self-colouring hard anodized
7	Piston A	Aluminum alloy	Chromated
8	Piston B	Aluminum alloy	Chromated
9	Magnet	Magnetic material	
10	Bumper bolt	Carbon steel	Nickel plated
11	Hexagon nut	Carbon steel	Nickel plated
12	Bumper	Polyurethane	
13	Hexagon socket head cap screw	Chromium steel	Nickel plated
14	Hexagon socket head set screw	Chromium steel	Nickel plated
15	Retaining ring	Special steel	Nickel plated

Note) Stainless steel for CXSJM6.

No.	Description	Material	Note
16	Bumper B	Polyurethane	
17	Piston seal	NBR	
18	Rod seal	NBR	
19	O-ring	NBR	
20	O-ring	NBR	
21	Seal retainer	Stainless steel	
22	Retaining ring B	Special steel	Nickel plated
23	Bolt holder	Stainless steel	
24	Bearing spacer	Aluminum bearing alloy	
25	Ball bushing	—	
26	Piston rod A	Special steel	Hard chromium electroplated
27	Piston rod B	Special steel	Hard chromium electroplated
28	O-ring	NBR	
29	Piston C	Stainless steel	
30	Bumper holder	Resin	

### Replacement Parts: Seal Kit

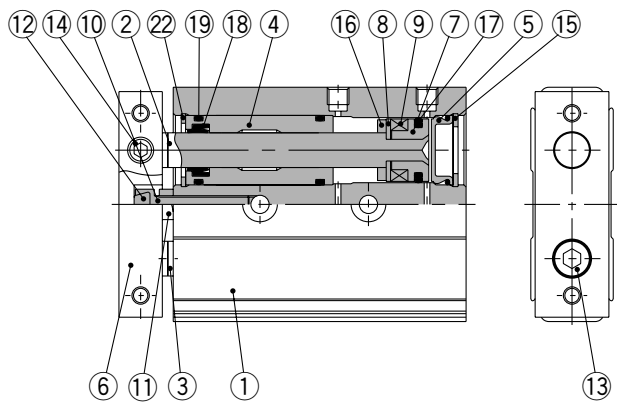
Model	Seal kit no.	Contents
CXSJM6	CXSJM6-PS	Items 17, 18, and 20 from the chart above
CXSJL6	CXSJL6-PS	
CXSJM10	CXSJM10-PS	
CXSJL10	CXSJL10-PS	



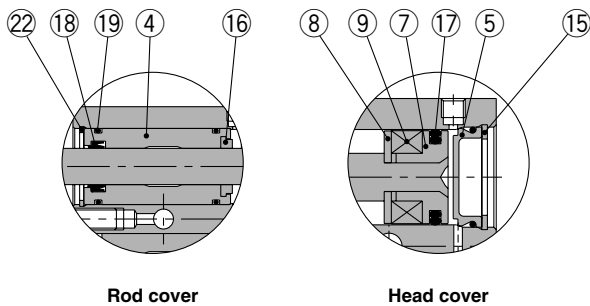
## Construction: Standard Piping

### CXSJM (Slide bearing)

#### CXSJM15

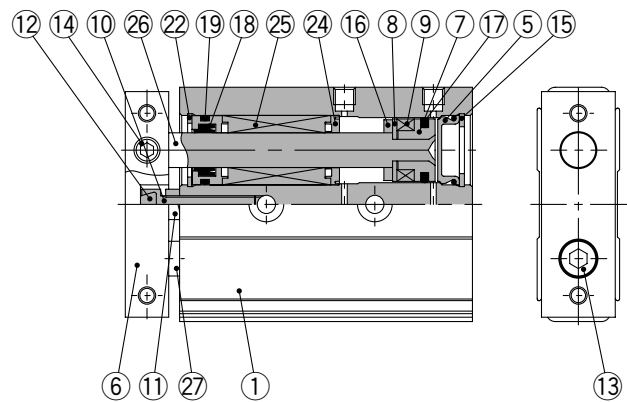


#### CXSJM20 to 32

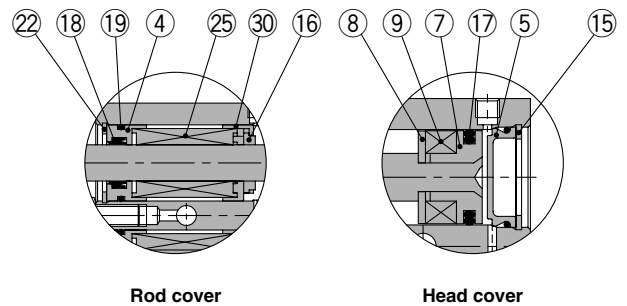


### CXSJL (Ball bushing bearing)

#### CXSJL15



#### CXSJL20 to 32



### Component Parts: Standard Piping

No.	Description	Material	Note
1	Housing	Aluminum alloy	Hard anodized
2	Piston rod A	Carbon steel	Hard chromium electroplated
3	Piston rod B	Carbon steel	Hard chromium electroplated
4	Rod cover	Aluminum bearing alloy	
5	Head cover	Special steel	
6	Plate	Aluminum alloy	Glossy, self-colouring hard anodized
7	Piston A	Aluminum alloy	Chromated
8	Piston B	Stainless steel	
9	Magnet	Magnetic material	
10	Bumper bolt	Carbon steel	Nickel plated
11	Hexagon nut	Carbon steel	Nickel plated
12	Bumper	Polyurethane	
13	Hexagon socket head cap screw	Chromium steel	Nickel plated
14	Hexagon socket head set screw	Chromium steel	Nickel plated
15	Retaining ring	Special steel	Nickel plated

No.	Description	Material	Note
16	Bumper B	Polyurethane	
17	Piston seal	NBR	
18	Rod seal	NBR	
19	O-ring	NBR	
20	O-ring	NBR	
21	Seal retainer	Stainless steel	
22	Retaining ring B	Special steel	Nickel plated
23	Bolt holder	Stainless steel	
24	Bearing spacer	Resin	
25	Ball bushing	—	
26	Piston rod A	Special steel	Hard chromium electroplated
27	Piston rod B	Special steel	Hard chromium electroplated
28	O-ring	NBR	
29	Piston C	Stainless steel	
30	Bumper holder	Resin	

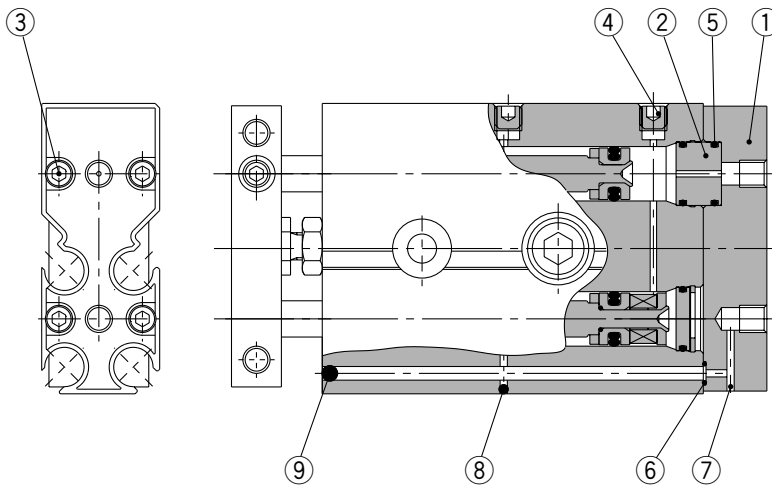
### Replacement Parts: Seal Kit

Model	Seal kit no.	Contents
CXSJM15	CXSM15-PS	Items 17, 18, and 19 from the chart above
CXSJM20	CXSM20-PS	
CXSJM25	CXSM25-PS	
CXSJM32	CXSM32-PS	
CXSJL15	CXSL15APS	
CXSJL20	CXSL20APS	
CXSJL25	CXSL25APS	
CXSJL32	CXSL32APS	

# Series CXSJ

## Construction: Axial Piping

CXSJ□6P, CXSJ□10P



### Component Parts: Axial Piping

No.	Description	Material	Note
1	Cover	Aluminum alloy	Hard anodized
2	Adapter	Aluminum alloy	Anodized
3	Hexagon socket head cap screw	Chromium steel	Nickel plated
4	Hexagon socket head plug	Chromium steel	Nickel plated
5	O-ring	NBR	
6	O-ring	NBR	
7	Steel ball	Special steel	Hard chromium electroplated
8	Steel ball	Special steel	Hard chromium electroplated
9	Steel ball	Special steel	Hard chromium electroplated

\* Parts other than those listed above are the same as those of CXSJ basic type.

## Clean Series

There are two types of cylinders, relieving type and vacuum type, available for a clean room environment. The relieving type specification with the double-seal construction of the rod section allows the cylinder to channel exhaust through the relief port directly to the outside of a clean room environment. The vacuum type specification allows the application of vacuum on the rod section while forced exhaust of air takes place through the vacuum port to the outside of a clean room environment.

### How to Order

**11** – CXSJ **M** **Bore size** – **Stroke** – **Auto switch**

● **Bore size / Stroke**

<b>6</b>	10, 20, 30, 40, 50
<b>10</b>	10, 20, 30, 40, 50

● **Bearing type**

<b>M</b>	Slide bearing
<b>L*</b>	Ball bushing bearing

\* Only ball bushing bearing is available for "clean room specification 12-".

● **Clean room specifications**

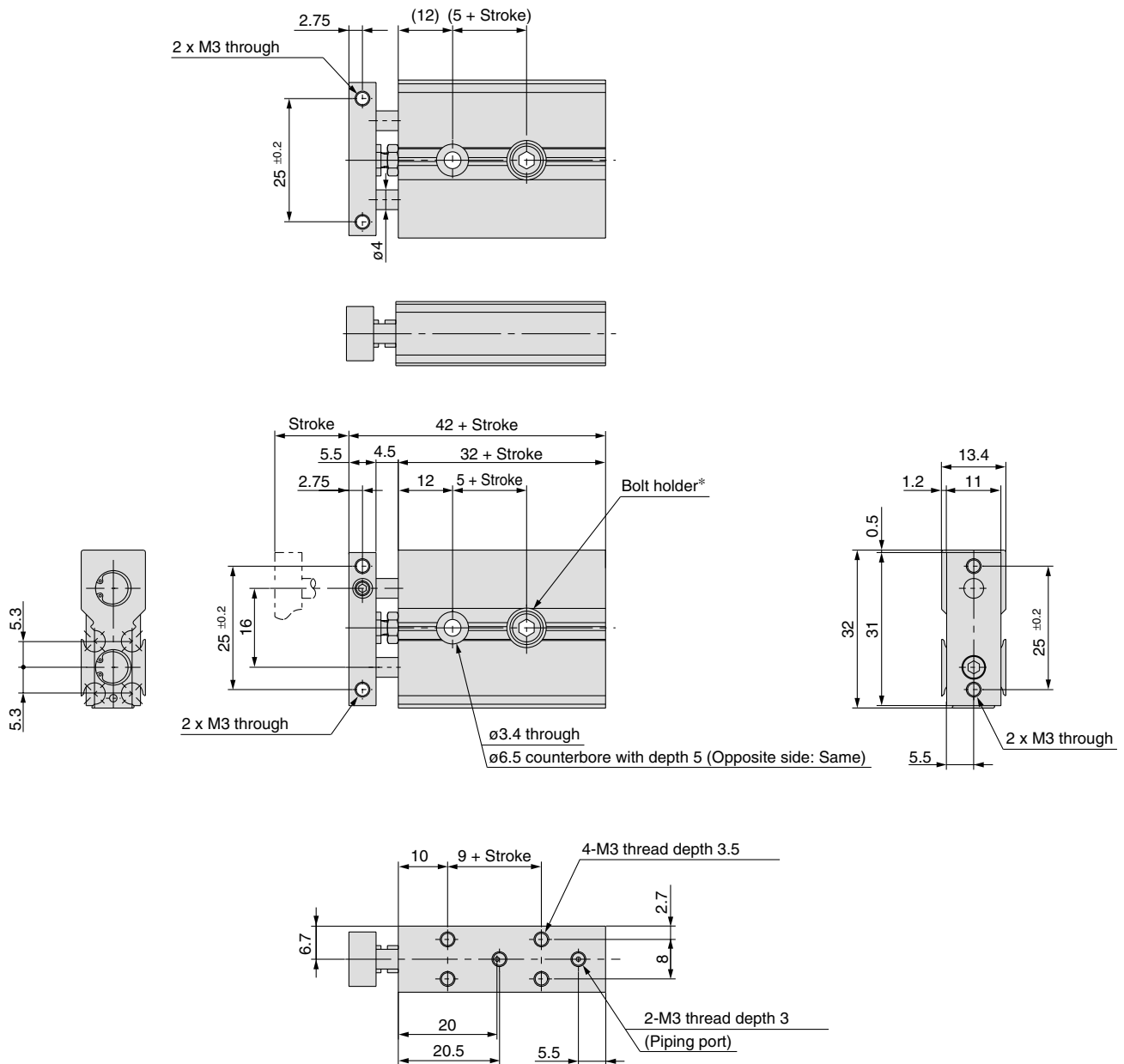
<b>11</b>	Vacuum type
<b>12</b>	Relieving type (with specially treated sliding parts)

### Specifications

Bore size (mm)	6	10
<b>Proof pressure</b>	1.05 MPa	
<b>Maximum operating pressure</b>	0.7 MPa	
<b>Minimum operating pressure</b>	0.15 MPa	0.1 MPa
<b>Ambient and fluid temperature</b>	-10 to 60°C (No freezing)	
<b>Piston speed</b>	30 to 400 mm/s	
<b>Stroke adjustable range</b>	0 to -5 mm compared to the standard stroke	
<b>Bearing type</b>	Slide bearing, Ball bushing bearing	

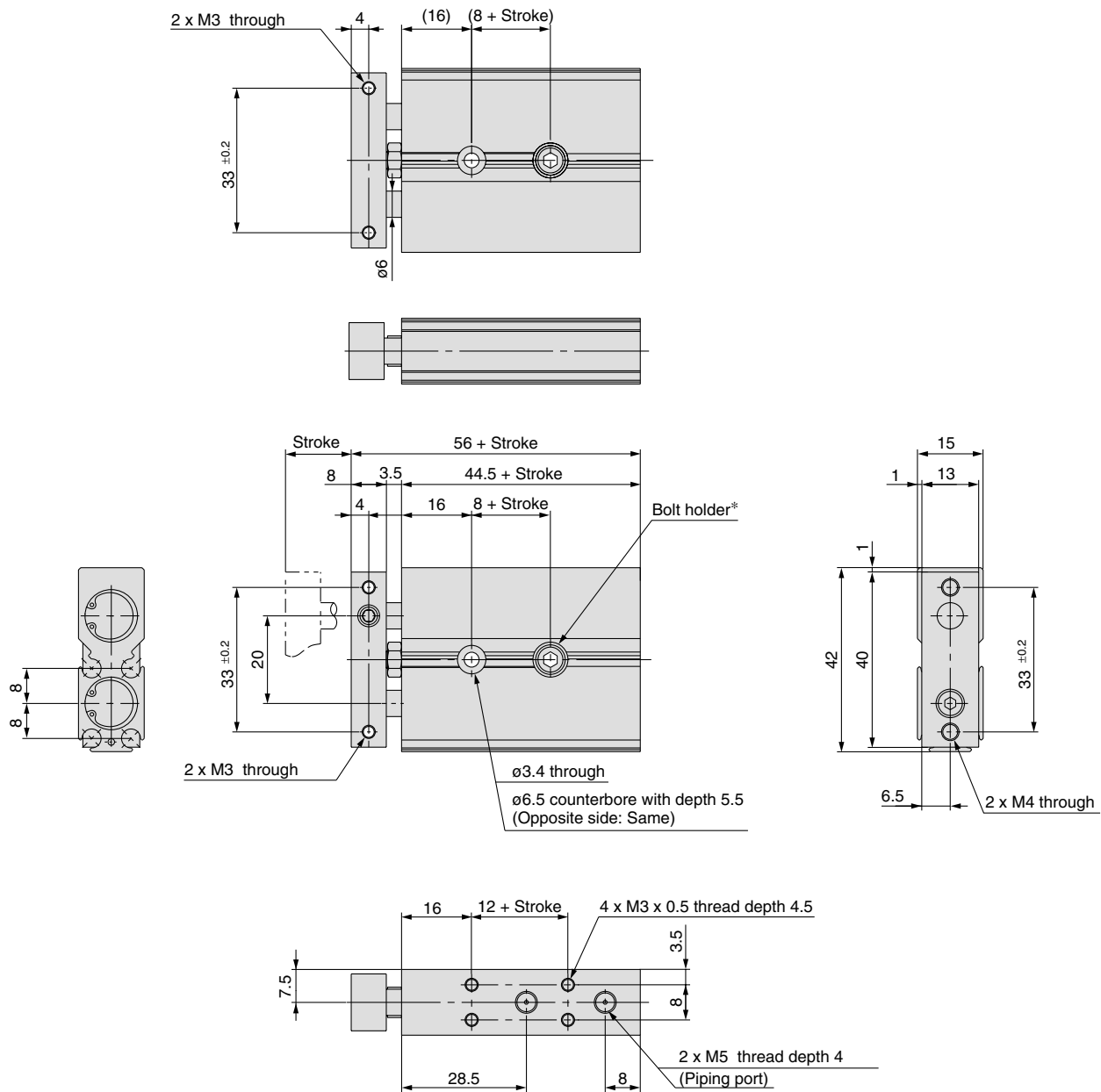
\* Refer to "SMC Clean Series" catalog for dimensions.

## Dimensions: $\varnothing 6$ Standard Piping



\* For bolt holder, refer to back page 6, "Mounting".

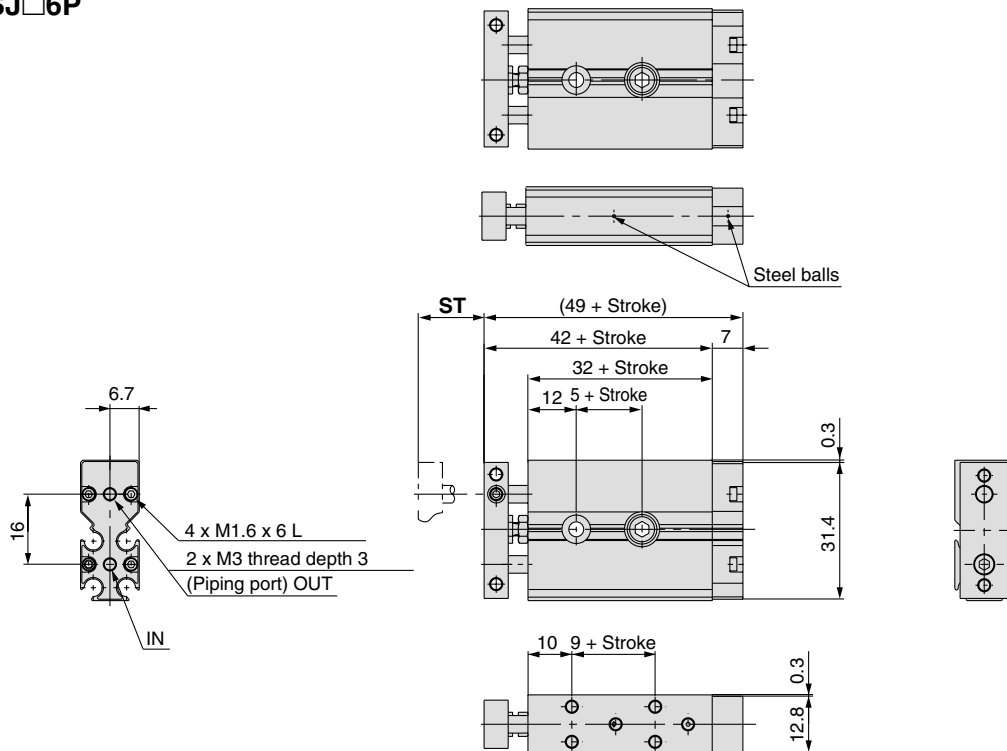
## Dimensions: $\varnothing 10$ Standard Piping



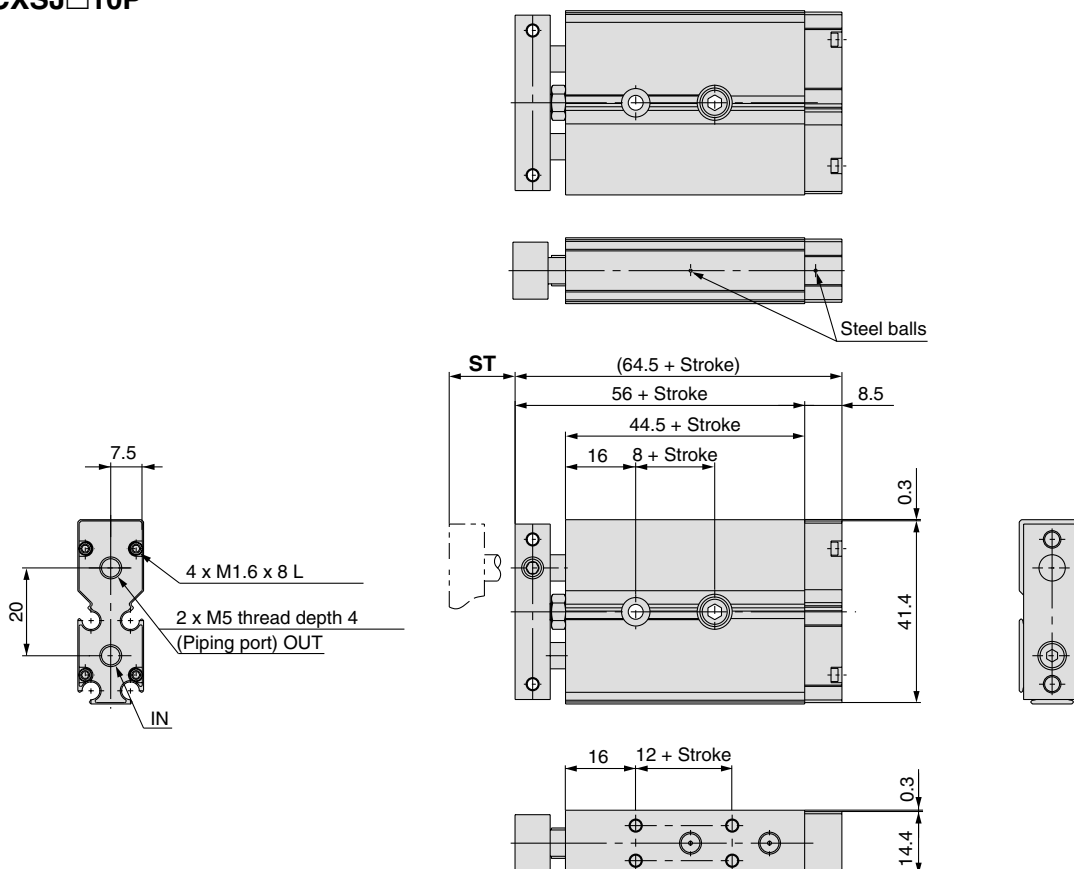
\* For bolt holder, refer to back page 6, "Mounting".

## Dimensions: $\varnothing 6$ , $\varnothing 10$ Axial Piping

### CXSJ□6P

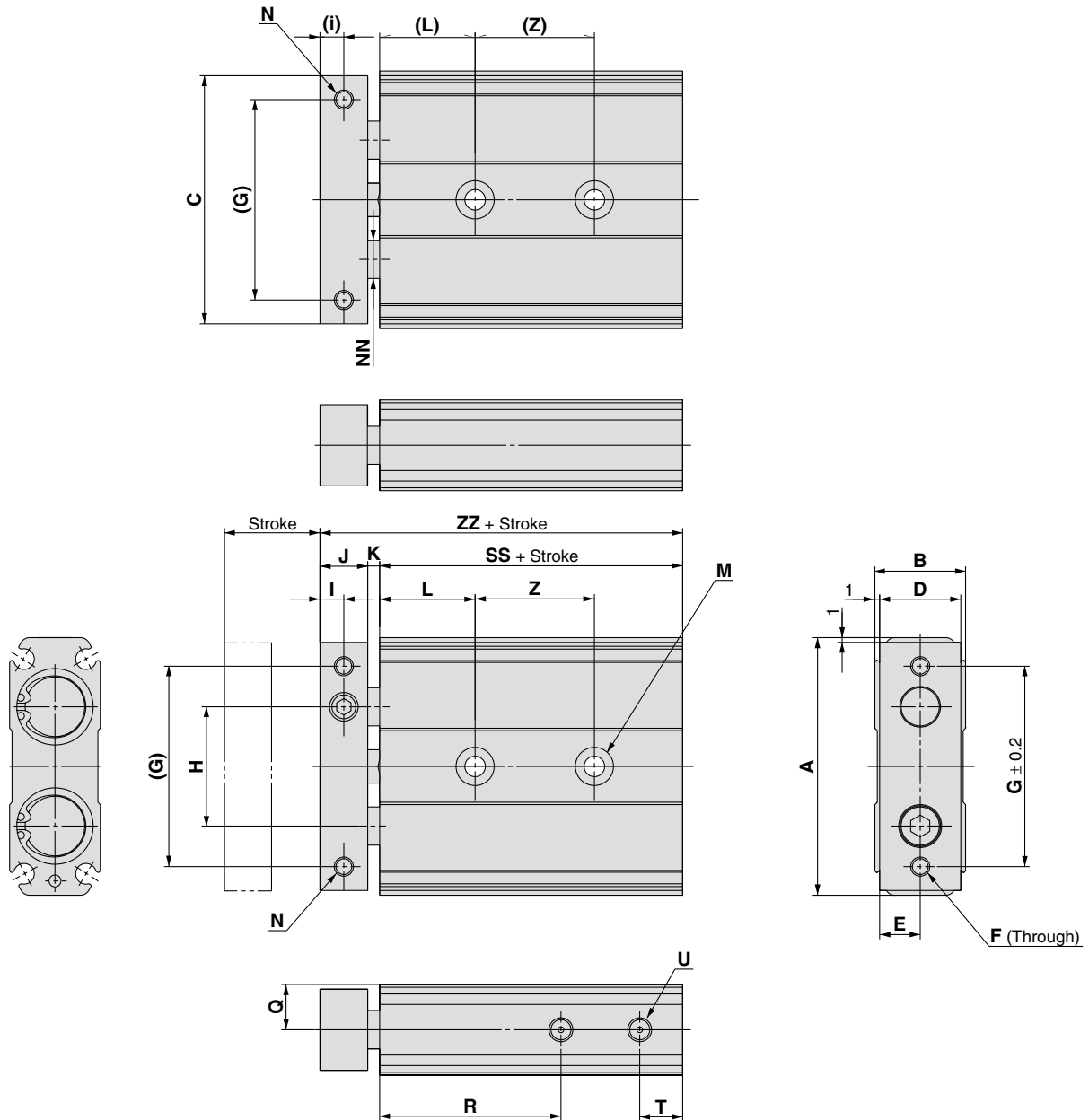


### CXSJ□10P



# Series CXSJ

## Dimensions: Ø15 to 32 Standard Piping

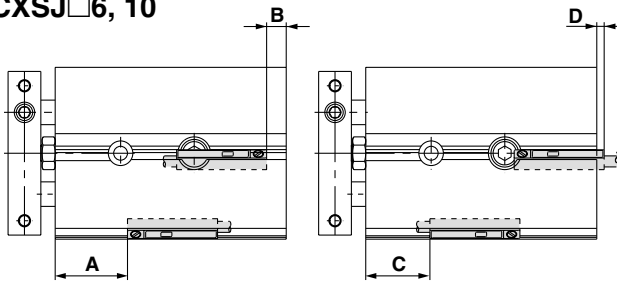


Bore size (mm)	A	B	ZZ	C	D	E	F	G	H	I	J	K	L	M	N	NN	Q	R	T	U	SS
15	54	19	70	52	17	8.5	2 x M5	42	25	5	10	2.5	20	2 x 2 x Ø4.3 through 2 x 2 x Ø8 counterbore with depth 4.3	2 x M4 with thread depth 6	Ø8	9.5	38	9	2 x M5 with thread depth 4	57.5
20	62	24	84	60	22	11	2 x M5	50	29	6	12	4.5	25	2 x 2 x Ø5.5 through 2 x 2 x Ø9.5 counterbore with depth 5.3	2 x M4 with thread depth 6	Ø10	12	45	9	2 x M5 with thread depth 4	67.5
25	73	29	87	71	27	13.5	2 x M6	60	35	6	12	4.5	30	2 x 2 x Ø6.5 through 2 x 2 x Ø11 counterbore with depth 6.3	2 x M5 with thread depth 7.5	Ø12	14.5	46	9	2 x M5 with thread depth 4	70.5
32	94	37	100.5	92	35	17.5	2 x M6	75	45	8	16	4	30	2 x 2 x Ø6.5 through 2 x 2 x Ø11 counterbore with depth 6.3	2 x M5 with thread depth 7.5	Ø16	18.5	56	10	2 x Rc1/8 with thread depth 5	80.5

Symbol	Z			
Stroke	10-20	30-40-50	75	100
15	25	35	45	55
20	30	40	60	60
25	30	40	60	60
32	40	50	70	70

## Auto Switch Proper Mounting Position for Stroke End Detection

### CXSJ□6, 10

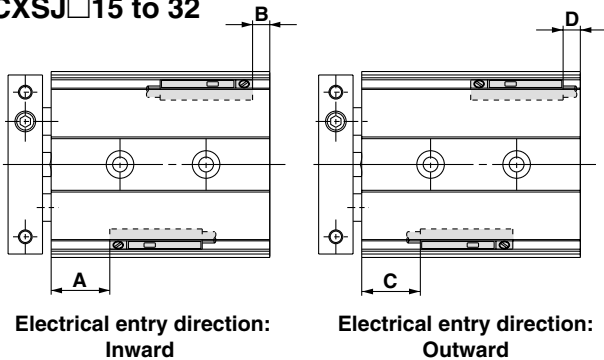


#### Operating Range

Auto switch model	Bore size (mm)					
	6	10	15	20	25	32
D-A9□, D-A9□V	5	6	6	7.5	8	9
D-F9BAL	2.5	3.5	3.5	5	5	5
D-M9□, D-M9□V	2	2	2	2.5	2.5	2.5
D-M9□W, D-M9□WV	2.5	3	3.5	4.5	4.5	5

\* The operating ranges are provided as guidelines including hystereses and are not guaranteed values (assuming approximately ±30% variations). They may vary significantly with different environments.

### CXSJ□15 to 32



Bore size (mm)	D-A90, D-A96				D-A93				D-M9□, D-M9□W				D-M9□V, D-M9□WV			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
6	15.5	—	13.5	5.5	15.5	—	11	8	19.5	0.5	9.5	9.5	19.5	0.5	11.5	7.5
10	25.5	—	23.5	3	25.5	—	21	5.5	29.5	3	19.5	7	29.5	3	21.5	5
15	31.5	6	29.5	4	31.5	6	27	1.5	35.5	10	25.5	0	35.5	10	27.5	2
20	39	9	37	7	39	9	34.5	4.5	43	13	33	3	43	13	35	5
25	40	11	38	9	40	11	35.5	6.5	44	15	34	5	44	15	36	7
32	49	11.5	47	9.5	49	11.5	44.5	7	53	15.5	43	5.5	53	15.5	45	7.5

Bore size (mm)	D-F9BAL			
	A	B	C	D
6	18.5	—	0.5	18.5
10	28.5	2	10.5	16
15	34.5	9	16.5	-9
20	42	12	24	-6
25	43	14	25	-4
32	52	14.5	34	-3.5

Note 1) ø6: D-A90, A96, A93, F9BAL

ø10: D-A90, A96, A93

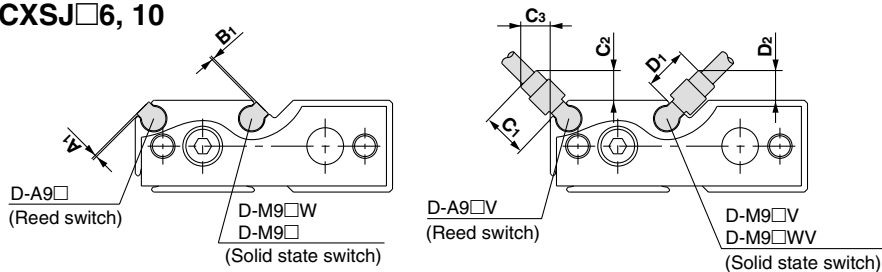
Only outward electrical entry (D dimension) is available.

Note 2) Minus value in D column (ø15, ø20, ø25, ø32) means that the auto switches are to be mounted beyond the cylinder body edges.

Note 3) When setting an auto switch, confirm the operation and adjust its mounting position.

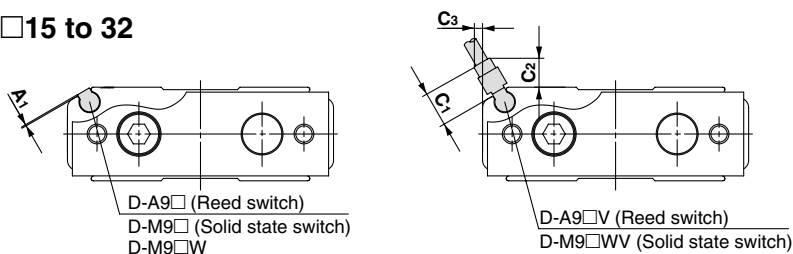
## Auto switch mounting dimensions

### CXSJ□6, 10



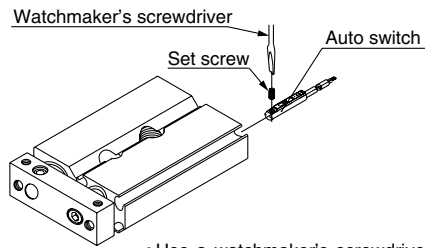
Auto switch model	Symbol	Bore size (mm)	
		6	10
D-A9□	A <sub>1</sub>	1	1
D-M9□, D-M9□W	B <sub>1</sub>	1	1
D-A9□V	C <sub>1</sub> , D <sub>1</sub>	5.5	5.5
	C <sub>2</sub> , C <sub>3</sub> , D <sub>2</sub>	4	4
D-M9□V, D-M9□WV	C <sub>1</sub> , D <sub>1</sub>	8	8
	C <sub>2</sub> , C <sub>3</sub> , D <sub>2</sub>	6	6

### CXSJ□15 to 32



Auto switch model	Symbol	Bore size (mm)			
		15	20	25	32
D-M9□, D-M9□W	A <sub>1</sub>	1	1	1	1
D-A9□V D-M9□WV	C <sub>1</sub>	5.5	5.5	5.5	5.5
	C <sub>2</sub>	4.5	4.5	4.5	4.5
	C <sub>3</sub>	1	—	—	—

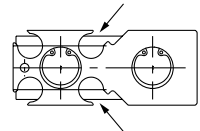
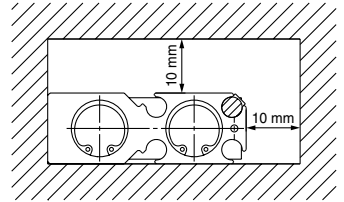
## Auto Switch Mounting



- Use a watchmaker's screwdriver with a handle 5 to 6 mm in diameter when tightening the auto switch mounting screw.
- Tightening torque should be approximately 0.10 to 0.20 N·m.

### ⚠ Caution

- ① **Avoid proximity to magnetic objects.**  
When magnetic substances such as iron (including flange brackets) are in close proximity to an auto switch cylinder (switch mounting side), be sure to provide a clearance between the magnetic substance and the cylinder body as shown in the drawing below. If the clearance is less than 10 mm, the auto switch may not function properly.
- ② **For CXSJ□6/10, the switch cannot be attached or detached from the plate side if the middle groove (indicated by arrows in the figure on the right) is used. (It will interfere with the bumper bolt at the end of the groove.)**



Apart from the applicable auto switches listed in "How to Order," the following auto switches can be mounted.

\* Normally closed (N.C. = b contact), solid state switches (D-F9G and D-F9H type) are also available. For details, refer to "Best Pneumatics" catalogue.



# Auto Switch Specifications

## Auto Switch Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100 $\mu$ A or less 2-wire: 0.8 mA or less
Operating time	1.2 ms	up to 1 ms
Impact resistance	300 m/s <sup>2</sup>	1000 m/s <sup>2</sup>
Insulation resistance	50 M $\Omega$ or more at 500 VDC Mega (between the lead wire and the case)	
Withstand voltage	1500 VAC for 1 minute (between the lead wire and the case)	1000 VAC for 1 minute (between the lead wire and the case)
Ambient temperature	-10 to 60°C	
Enclosure	IEC529 standard IP67, JIS C 0920 waterproof construction	
Standard	Conforming to CE Standards	

## Lead Wire Length

Lead wire length indication

(Example) **D-M9BW** **L**

Lead wire length

Nil	0.5 m
M	1 m
L	3 m
Z	5 m

Note 1) Applicable auto switch with 5 m lead wire "Z"

Solid state switch: Manufactured upon receipt of order as standard.

Note 2) To designate solid state switches with flexible specifications, add "-61" after the lead wire length. Flexible cable is used for D-M9□(V), D-M9□W(V) as standard. There is no need to place the suffix -61 to the end of part number.

(Example) **D-F9BAL-** **61**

Flexible specification

Note 3) 1 m (M): D-M9□W(V) only.

Note 4) Lead wire tolerance

Lead wire length	Tolerance
0.5 m	±15 mm
1 m	±30 mm
3 m	±90 mm
5 m	±150 mm

## Contact Protection Boxes: CD-P11, CD-P12

### <Applicable switch model>

D-A9/A9□V type

The auto switches below do not have a built-in contact protection circuit. Therefore, please use a contact protection box with the switch in any of the following cases:

- ① Where the operation load is an inductive load.
- ② Where the wiring length to load is greater than 5 m.
- ③ Where the load voltage is 100 VAC.

The contact life may be shortened (due to permanent energising conditions). Since the solid state auto switch is a semiconductor switch which has no contacts, no contact protection box is needed.

### Specifications

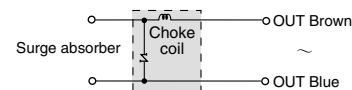
Part no.	CD-P11	CD-P12
Load voltage	100 VAC	200 VAC
Max. load current	25 mA	12.5 mA
		50 mA

\* Lead wire length — Switch connection side 0.5 m  
Load connection side 0.5 m

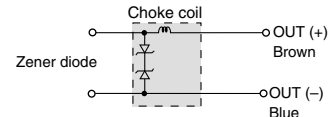


### Internal Circuit

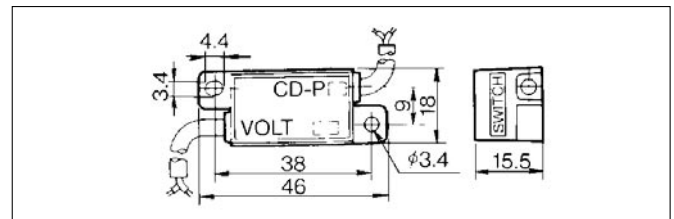
#### CD-P11



#### CD-P12



### Dimensions



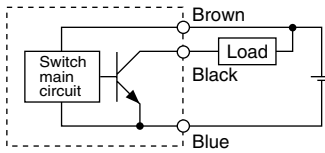
### Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 meter.

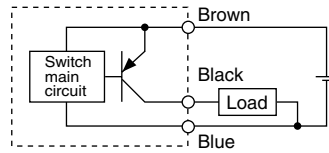
# Auto Switch Connections and Examples

## Basic Wiring

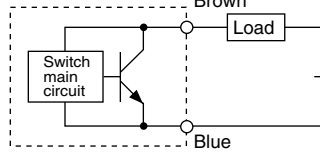
### Solid state 3-wire, NPN



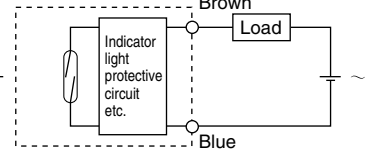
### Solid state 3-wire, PNP



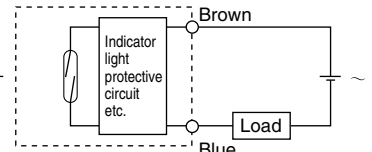
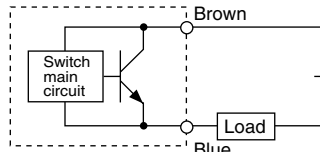
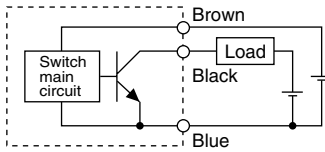
### 2-wire (Solid state)



### 2-wire (Reed)

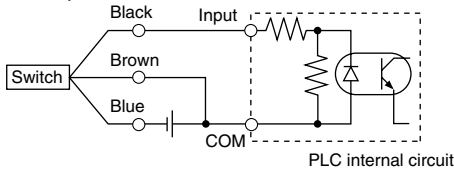


(Power supplies for switch and load are separate.)

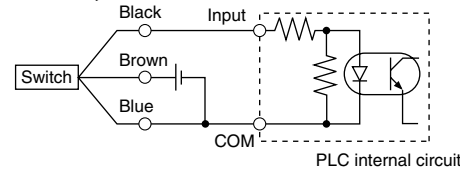


## Example of Connection to PLC (Programmable Logic Controller)

### • Sink input specification 3-wire, NPN

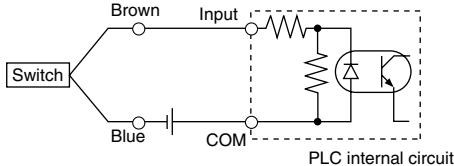


### • Source input specification 3-wire, PNP

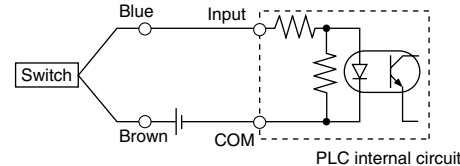


Connect according to the applicable PLC input specifications, since the connection method will vary depending on the PLC input specifications.

### 2-wire



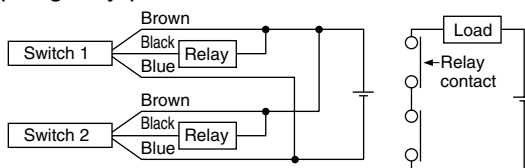
### 2-wire



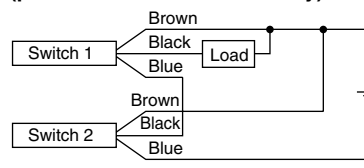
## Example of AND (Serial) and OR (Parallel) Connection

### • 3-wire

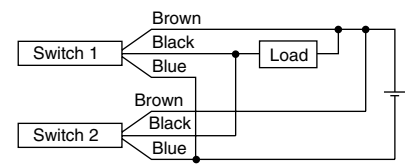
#### AND connection for NPN output (using relays)



#### AND connection for NPN output (performed with switches only)

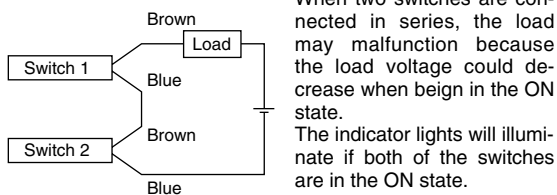


#### OR connection for NPN output



The indicator lights will illuminate when both switches are turned ON.

### 2-wire with 2-switch AND connection

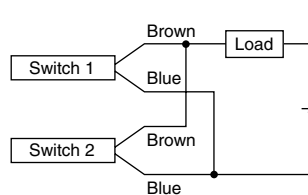


When two switches are connected in series, the load may malfunction because the load voltage could decrease when beign in the ON state. The indicator lights will illuminate if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Residual voltage} \times 2 \text{ pcs.} \\ &= 24 \text{ V} - 4 \text{ V} \times 2 \text{ pcs.} \\ &= 16 \text{ V} \end{aligned}$$

Example: The Power supply is 24 VDC.  
The Internal voltage drop in the switch is 4 V.

### 2-wire with 2-switch OR connection



#### (Solid state)

When two switches are connected in parallel, a malfunction may occur because the load voltage could increase when beign in the OFF state.

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \\ &\quad \times \text{Load impedance} \\ &= 1 \text{ mA} \times 2 \text{ pcs.} \times 3 \text{ k}\Omega \\ &= 6 \text{ V} \end{aligned}$$

Example: The Load impedance is 3 k $\Omega$ .  
The Leakage current from the switch is 1 mA.

#### (Reed)

Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light because of the dispersion and reduction of the current flowing to the switches.

# Reed Switch: Direct Mounting Style

## D-A90(V)/D-A93(V)/D-A96(V) (C €)

### Grommet



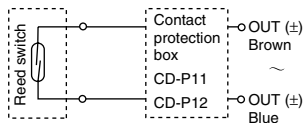
### Caution

#### Operating Precautions

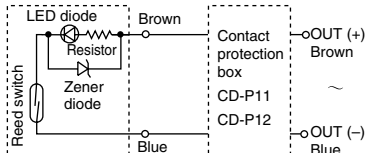
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied is used.

### Auto Switch Internal Circuit

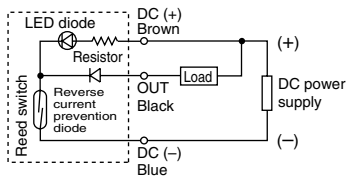
#### D-A90(V)



#### D-A93(V)



#### D-A96(V)



- Note) ① In case the operation load is an inductive load.  
 ② In case the wiring load is greater than 5 m.  
 ③ In case the load voltage is 100 VAC.

Use the auto switch with a contact protection box in any of the above mentioned cases. (For details about the contact protection box, refer to page 16.)

### Auto Switch Specifications

PLC: Programmable Logic Controller

D-A90/D-A90V (Without indicator light)						
Auto switch part no.	D-A90	D-A90V	D-A90	D-A90V	D-A90	D-A90V
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Applicable load	IC circuit, Relay, PLC					
Load voltage	24 VAC/DC or less		48 VAC/DC or less		100 VAC/DC or less	
Maximum load current	50 mA		40 mA		20 mA	
Contact protection circuit	None					
Internal resistance	1 Ω or less (including lead wire length of 3 m)					
Standard	Conforming to CE Standards					
D-A93/D-A93V/D-A96/D-A96V (With indicator light)						
Auto switch part no.	D-A93	D-A93V	D-A93	D-A93V	D-A96	D-A96V
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Applicable load	Relay, PLC				IC circuit	
Load voltage	24 VDC		100 VAC		4 to 8 VDC	
Load current range and max. load current	5 to 40 mA		5 to 20 mA		20 mA	
Contact protection circuit	None					
Internal voltage drop	D-A93 — 2.4 V or less (to 20 mA)/3 V or less (to 40 mA) D-A93V — 2.7 V or less				0.8 V or less	
Indicator light	Red LED illuminates when turned ON.					
Standard	Conforming to CE Standards					

#### Lead wires

D-A90(V)/D-A93(V) — Oilproof heavy-duty vinyl cable:  $\phi 2.7$ , 0.18 mm<sup>2</sup> x 2 cores (Brown, Blue), 0.5 m

D-A96(V) — Oilproof heavy-duty vinyl cable:  $\phi 2.7$ , 0.15 mm<sup>2</sup> x 3 cores (Brown, Black, Blue), 0.5 m

Note 1) Refer to page 16 for reed switch common specifications.

Note 2) Refer to page 16 for lead wire lengths.

### Weight

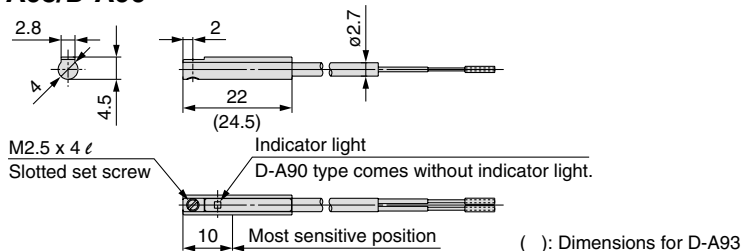
Unit: g

Auto switch part no.	D-A90(V)	D-A93(V)	D-A96(V)
Lead wire length (m)	0.5	6	8
	3	30	41

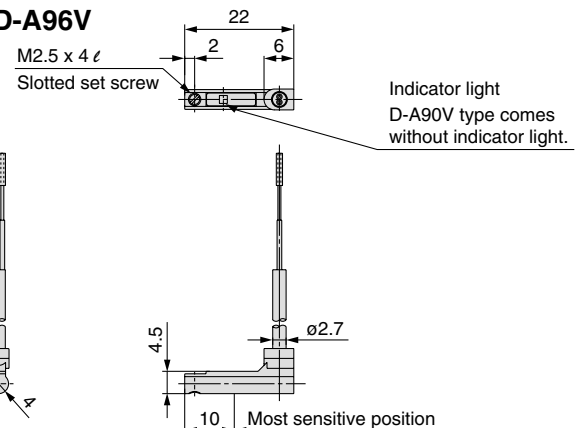
### Dimensions

Unit: mm

#### D-A90/D-A93/D-A96



#### D-A90V/D-A93V/D-A96V



# Solid State Switch: Direct Mounting Style D-M9N(V)/D-M9P(V)/D-M9B(V)

## Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- Lead-free
- UL certified lead cable (style 2844) is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.



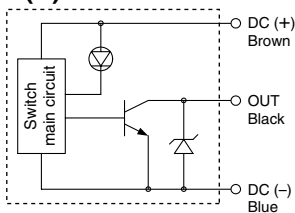
## Caution

### Operating Precautions

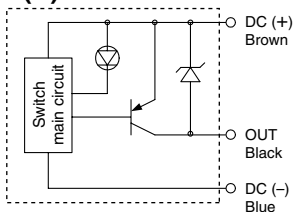
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied is used.

## Auto Switch Internal Circuit

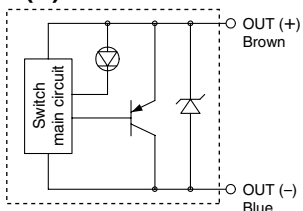
### D-M9N(V)



### D-M9P(V)



### D-M9B(V)



## Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□/D-M9□V (With indicator light)						
Auto switch part no.	D-M9N	D-M9NV	D-M9P	D-M9PV	D-M9B	D-M9BV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)				—	
Current consumption	10 mA or less				—	
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less				2.5 to 40 mA	
Internal voltage drop	0.8 V or less				4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less	
Indicator light	Red LED illuminates when turned ON.					
Standard	Conforming to CE Standards					

- Lead wires — Oilproof flexible heavy-duty vinyl cable:  $\phi 2.7 \times 3.2$  ellipse  
D-M9B(V) 0.15 mm<sup>2</sup> x 2 cores  
D-M9N(V), D-M9P(V) 0.15 mm<sup>2</sup> x 3 cores

Note 1) Refer to page 16 for solid state switch common specifications.

Note 2) Refer to page 16 for lead wire lengths.

## Weight

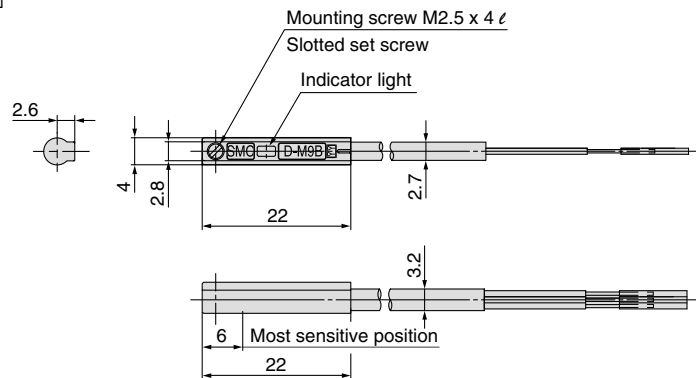
Unit: g

Auto switch part no.		D-M9N(V)	D-M9P(V)	D-M9B(V)
Lead wire length (m)	0.5	8	8	7
	3	41	41	38
	5	68	68	63

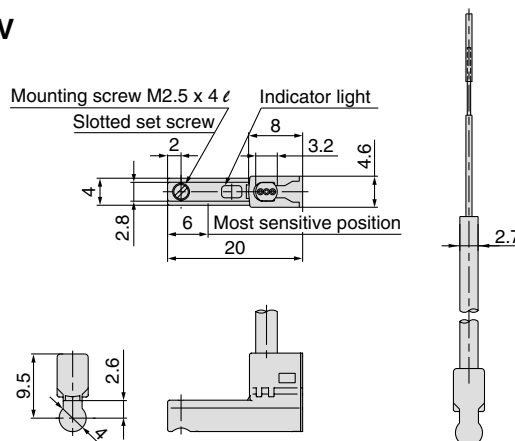
## Dimensions

Unit: mm

### D-M9□



### D-M9□V



# 2-Colour Indication Solid State Switch: Direct Mounting Style

## D-M9NW(V)/D-M9PW(V)/D-M9BW(V)



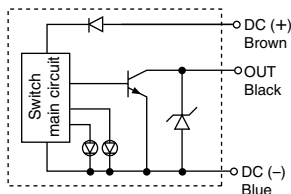
### Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- RoHS compliant
- UL certified lead cable (style 2844) is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.
- The optimum operating position can be determined by the colour of the light. (Red → Green → Red)

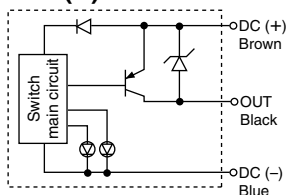


### Auto Switch Internal Circuit

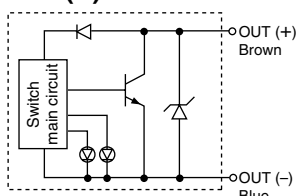
#### D-M9NW(V)



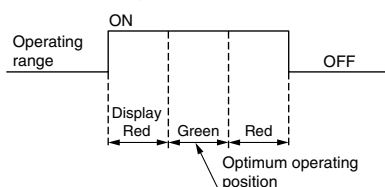
#### D-M9PW(V)



#### D-M9BW(V)



### Indicator light / Display method



### Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□W/D-M9□WV (With indicator light)						
Auto switch part no.	D-M9NW	D-M9NWV	D-M9PW	D-M9PWV	D-M9BW	D-M9BWV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)				—	
Current consumption	10 mA or less				—	
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less				2.5 to 40 mA	
Internal voltage drop	0.8 V or less at 10 mA (2 V or less at 40 mA)				4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less	
Indicator light	Operating position ..... Red LED illuminates. Optimum operating position ..... Green LED illuminates.					
Standard	Conforming to CE Standards					

- Lead wires — Oilproof flexible heavy-duty vinyl cable:  $\phi 2.7 \times 3.2$  ellipse  
D-M9BW(V) 0.15 mm<sup>2</sup> x 2 cores  
D-M9NW(V), D-M9PW(V) 0.15 mm<sup>2</sup> x 3 cores

Note 1) Refer to page 16 for solid state switch common specifications.

Note 2) Refer to page 16 for lead wire lengths.

### Weight

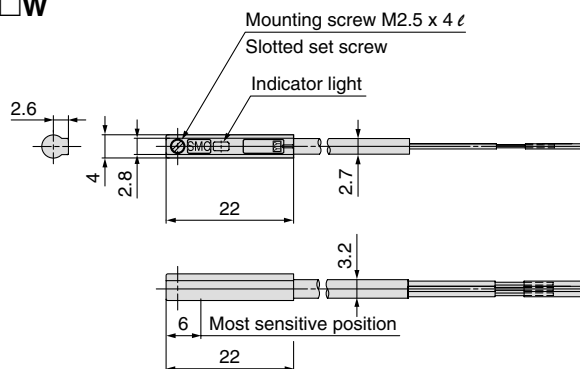
Unit: g

Auto switch part no.	D-M9NW(V)	D-M9PW(V)	D-M9BW(V)
Lead wire length (m)			
0.5	8	8	7
1	14	14	13
3	41	41	38
5	68	68	63

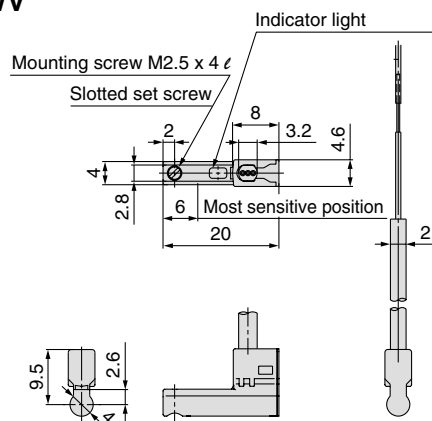
### Dimensions

Unit: mm

#### D-M9□W



#### D-M9□WV

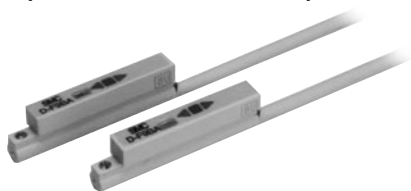


# Water Resistant 2-Colour Indication Solid State Switch: Direct Mounting Style D-F9BAL



## Grommet

- Water (coolant) resistant type
- The optimum operating position can be determined by the colour of the light. (Red → Green → Red)



## ⚠ Caution

### Operating Precautions

Please consult SMC if using a coolant liquid other than a water based solution.

## Auto Switch Specifications

PLC: Programmable Logic Controller

D-F9BAL (With indicator light)	
Auto switch part no.	<b>D-F9BAL</b>
Wiring type	2-wire
Output type	—
Applicable load	24 VDC relay, PLC
Power supply voltage	—
Current consumption	—
Load voltage	24 VDC (10 to 28 VDC)
Load current	5 to 30 mA
Internal voltage drop	5 V or less
Leakage current	1 mA or less at 24 VDC
Indicator light	Operating position ..... Red LED illuminates. Optimum operating position ..... Green LED illuminates.
Standard	Conforming to CE Standards

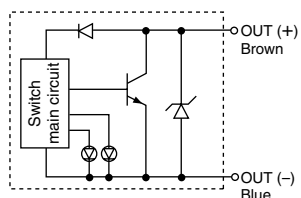
- Lead wires — Oilproof heavy-duty vinyl cable:  $\phi 2.7$ , 2 cores (Brown, Blue) x 0.18 mm<sup>2</sup>, 3 m
- Note 1) Refer to page 16 for solid state switch common specifications.  
Note 2) Refer to page 16 for lead wire lengths.

## Weight

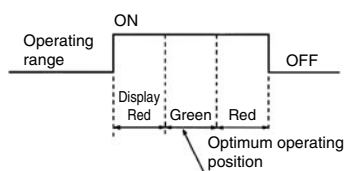
Unit: g

Auto switch part no.	D-F9BA	
Lead wire length (m)	0.5	—
	3	37
	5	57

## Auto Switch Internal Circuit

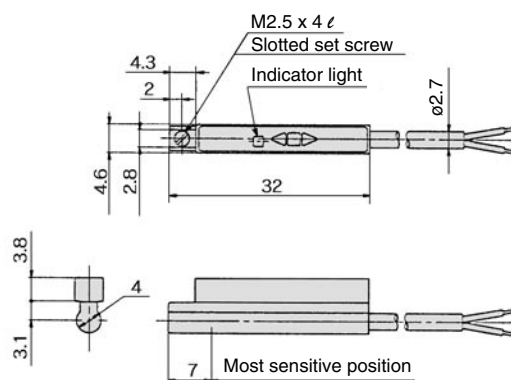


## Indicator light / Display method



## Dimensions

Unit: mm



# Made to Order

## 1 Heat Resistant Cylinder (−10 to 150°C) Symbol XB6

The air cylinder has been changed the seal material and grease, so that it could be used even at higher temperatures up to 150°C from −10°C.

### How to Order

Standard model no. **—XB6**  
Heat resistant cylinder ●

### Specifications

Ambient temperature range	−10 to 150°C
Seal material	Fluoro rubber
Grease	Heat resistant grease
Specifications other than above and external dimensions	Same as standard product



- Note 1) Operate without the lubrication of a pneumatic system lubricator.  
 Note 2) Please contact SMC for details on the maintenance intervals for this cylinder, which differs from those of the standard cylinder.  
 Note 3) It is impossible to make the built-in magnet type and the one with auto switch. (Please contact SMC for the availability with auto switch.)  
 Note 4) Piston speed is ranged from 50 to 500 mm/s.

### ⚠ Warning Precautions

Be aware that smoking cigarettes, etc. after your hands have come into contact with the grease used in this cylinder can create a gas that is hazardous to humans.

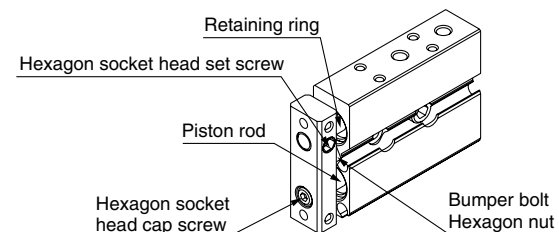
## 3 Made of Stainless Steel Symbol XC6

### How to Order

CXSJM Standard model no. **—XC6**  
Made of stainless steel ●

### Specifications

Parts changed to stainless steel	Piston rod, Retaining ring, Hexagon socket head cap screw, Hexagon socket head set screw, Bumper bolt, Hexagon nut
Specifications other than above and external dimensions	Same as standard product



Note) Spring steel is used for the retaining ring on the head cover for ø6. (Stainless steel is not used.)

## 5 Fluoro Rubber Seals Symbol XC22

The seal material is changed to fluoro rubber that has high chemical resistance.

### How to Order

Standard model no. **—XC22**  
Fluoro rubber seals ●

### Specifications

Rod seal, Piston seal, O-ring	Fluoro rubber
-------------------------------	---------------

- Specifications and dimensions other than above are the same as for the standard product.

## 2 Low Speed Cylinder Symbol XB13

Even if driving at lower speeds of 5 to 50 mm/s (CY1: 7 to 50 mm/s), there will be no stick-slip phenomenon and it will run smoothly.

### How to Order

Standard model no. **—XB13**  
Low speed cylinder ●

### Specifications

Piston speed	5 to 50 mm/s
External dimensions	Same as standard product
Specifications other than above	Same as standard product



- Note 1) Operate without the lubrication of a pneumatic system lubricator.  
 Note 2) For speed adjustment, use speed controllers at lower speeds. (Series AS-FM/AS-M)

## 4 Intermediate Stroke (Spacer type) Symbol XC19

The intermediate stroke is achieved by installing a spacer within the standard stroke cylinder.

### How to Order

Standard model no. **—XC19**  
Intermediate stroke (Spacer type) ●

### Applicable Stroke

ø6	15, 25, 35, 45
ø10	15, 25, 35, 45, 70
ø15	15, 25, 35, 45, 70, 95
ø20	
ø25	
ø32	

- Dealing with it by installing a 5 mm width spacer within the standard stroke cylinder.
- Specifications other than above are the same as those for standard type.
- External dimensions are the same as for the standard stroke products plus adding 5mm to the required stroke length.
- Please consult SMC when a stroke other than the applicable stroke is required.






**Series CXSJ**

# Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 <sup>Note 1)</sup>, JIS B 8370 <sup>Note 2)</sup> and other safety practices.

## ■ Explanation of the Labels

Labels	Explanation of the labels
 <b>Danger</b>	In extreme conditions, there is a possible result of serious injury or loss of life.
 <b>Warning</b>	Operator error could result in serious injury or loss of life.
 <b>Caution</b>	Operator error could result in injury <sup>Note 3)</sup> or equipment damage. <sup>Note 4)</sup>

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Note 3) Injury indicates light wounds, burns and electrical shocks that do not require hospitalization or hospital visits for long-term medical treatment.

Note 4) Equipment damage refers to extensive damage to the equipment and surrounding devices.

## ■ Selection/Handling/Applications

### 1. The compatibility of the pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or post analysis and/or tests to meet the specific requirements. The expected performance and safety assurance are the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

### 2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators. (Understanding JIS B 8370 General Rules for Pneumatic Equipment, and other safety rules are included.)

### 3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven objects have been confirmed.
2. When equipment is removed, confirm that safety process as mentioned above. Turn off the supply pressure for this equipment and exhaust all residual compressed air in the system, and release all the energy (liquid pressure, spring, condenser, gravity).
3. Before machinery/equipment is restarted, take measures to prevent quick extension of a cylinder piston rod, etc.

### 4. If the equipment will be used in the following conditions or environments, please contact SMC first and be sure to take all necessary safety precautions.

1. Conditions and environments beyond the given specifications, or if the product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, and/or property, requiring special safety analysis.
4. If the products are used in an interlock circuit, prepare a double interlock style circuit with a mechanical protection function for the prevention of a breakdown. And, examine the devices periodically whether they function normally or not.

## ■ Exemption from Liability

### 1. SMC, its officers and employees shall be exempted from liability for any loss or damage arising out of earthquakes or fire, action by a third person, accidents, customer error with or without intention, product misuse, and any other damages caused by abnormal operating conditions.

### 2. SMC, its officers and employees shall be exempted from liability for any direct or indirect loss or damage, including consequential loss or damage, loss of profits, or loss of chance, claims, demands, proceedings, costs, expenses, awards, judgments and any other liability whatsoever including legal costs and expenses, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.

### 3. SMC is exempted from liability for any damages caused by operations not contained in the catalogues and/or instruction manuals, and operations outside of the specification range.

### 4. SMC is exempted from liability for any loss or damage whatsoever caused by malfunction of its products when combined with other devices or software.





# Series CXSJ Auto Switches Precautions 1

Be sure to read this before handling.

## Design and 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 out of the range of specifications of current load, voltage, temperature or impact. We do not guarantee any damage in any case the product is used out of the specification range.

#### 2. Pay attention to the time a switch is ON at an intermediate stroke position.

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. However if the speed is too high, the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

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

#### 3. Keep wiring as short as possible.

##### <Reed switch>

In case of an auto switch with no contact protection circuit: As the length of the wiring to the 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.) Use a contact protection box when the wire length is 5 m or longer.

##### <Solid state switch>

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

If the wiring is longer it will likely increase noise although the length is less than 100 m.

When the wire is long, we recommend attaching a ferrite core to both ends of the cable to prevent excess noise.

#### 4. Do not use a load that generates surge voltage. If surge voltage is generated, the discharge occurs at the contact, possibly resulting in the shortening of product life.

##### <Reed switch>

If driving a load such as a relay that generates a surge voltage, use a contact protection box.

##### <Solid state switch>

Although a zener diode for surge protection is connected at 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. Since the solid state auto switch is a semiconductor switch which has no contacts, no contact protection box is needed.

#### 5. Cautions for using 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 using another switch (sensor) together with the auto switch. Also perform periodic maintenance and confirm proper operation.

#### 6. Do not make any modifications (including exchanging the printed circuit boards) to the product.

It may cause injuries to humans and damage.

### Caution

#### 1. Take precautions when multiple actuators are used close together.

When two or more actuators are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40 mm.

(When the allowable interval is specified for each cylinder series, use the indicated value.) The auto switches may malfunction due to the interference from the magnetic fields.

#### 2. Take note of the internal voltage drop of the switch.

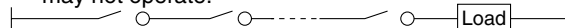
##### <Reed switch>

##### 1) Switches with an indicator light (Except D-A96, A96V)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of the 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.]

Even though an auto switch operates normally, the load may not operate.



- In the same way, when operating under a specified voltage, although an auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

##### 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Model D-A90, A90V).

##### <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). For details, refer to "Example of AND (serial) and OR (parallel) connection" on page 17.

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

#### 3. Pay attention to 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.

$$\text{Operating current of load (OFF condition)} > \text{Leakage current}$$

If the criteria given in the above formula are not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification is not be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel. Refer to page 17.



# Series CXSJ Auto Switches Precautions 2

Be sure to read this before handling.

## Design and Selection

### ⚠ Caution

#### 4. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

#### 5. Use the cylinder and switch in proper combination.

The auto switch is pre-adjusted to activate properly an auto-switch-capable SMC cylinder.

If the auto switch is mounted improperly, used for another brand of cylinders or used after the alternation of the machine installation, the switch may not activate properly.

## Mounting and Adjustment

### ⚠ Warning

#### 1. 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.

#### 2. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300 m/s<sup>2</sup> or more for reed switches and 1000 m/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 malfunction.

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

When a switch is tightened beyond the range of fastening torque, the mounting screws, mounting bracket or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position. (For mounting and moving auto switches, tightening torque, etc., refer to each series.)

#### 4. Mount a switch at the centre 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 position shown in the catalogue indicates the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline between ON and OFF), operation will be unstable or the service life will be shortened.

##### <D-M9□(V)>

When the D-M9□(V) auto switch is used to replace an old series auto switch, it may not activate depending on the operating condition because of its shorter operating range.

Such as

- Applications in which the stop position of the actuator may vary and exceed the operating range of the auto switch, for example, pushing, pressing, clamping operation, etc.
- Applications in which the auto switch is used for detecting an intermediate stop position of the actuator. (In this case the detecting time will be reduced.)

In these applications, set the auto switch to the centre of the required detecting range.

## Mounting and Adjustment

### ⚠ Caution

#### 1. Do not carry an actuator by the auto switch lead wires.

Never carry a cylinder (actuator) 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.

#### 2. Fix the switch with appropriate screw installed on the switch body. If using other screws, switch may be damaged.

## Wiring

### ⚠ Warning

#### 1. Confirm proper insulation of wiring.

Be sure 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.

#### 2. 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 noise from these other lines.

### ⚠ Caution

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

Repeated bending or tensile force applied to the lead wire may cause the sheath to fall off or disconnection of the wire.

If bending or tensile force are not avoidable, fix the lead wire close to the switch and allow a bend radius of R40 to 80 mm or larger. Please consult SMC for details. Stress and tensile force applied to the connection between the cable and switch increases the possibility of the sheath to fall off or disconnection.

Fix the cable in the middle so that it is not movable in the area where it connects with the switch.

#### 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 the excess current.

It is the same case as when the 2-wire brown cord (+, output) is directly connected to the (+) power supply terminal.



# Series CXSJ Auto Switches Precautions 3

Be sure to read this before handling.

## Wiring

### ⚠ Caution

#### 3. Do not allow short circuit of the 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 the excess current flow into the switch.

##### <Solid state switch>

Model D-M9□(V), F9BA□ and all PNP output type switch models do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged, as in case of reed switches.

Take special care to avoid reverse wiring of the power supply line (brown) and the output line (black) on 3-wire type switches.

The 2-wire type brown lead wire is the output, and the 3-wire type lead wire with the same brown colour is the + power supply line. If the 2-wire type brown lead wire is connected to a location where the 3-wire type brown lead wire has been wired, a load short (no load) will result, causing overcurrent and damage to the switch.

#### 4. Avoid incorrect wiring.

##### <Reed switch>

A 24 VDC switch with indicator light has polarity. The brown lead wire is (+) and the blue lead wire is (–).

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

Also note that a current greater than that specified will damage a light emitting diode and it will no longer operate.

Applicable models:

D-A93, A93V

##### <Solid state switch>

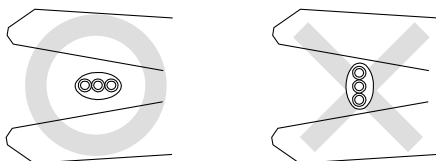
1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

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□(V)>

The D-M9□(V) does not have built-in short circuit protection circuit. Be aware if the power supply connection is reversed (e.g. (+) power supply wire and (–) power supply wire connection is reversed), the switch will be damaged.

#### 5. When the cable sheath is stripped, confirm the stripping direction. The insulator may be split or damaged depending on the direction. (D-M9□(V) only)



#### Recommended Tool

Model name	Model no.
Wire stripper	D-M9N-SWY

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

## Operating Environment

### ⚠ Warning

#### 1. Never use in an atmosphere of explosive gases.

The construction of auto switches is not intended to prevent explosions. Never use in an atmosphere with an explosive gas since this may cause a explosion.

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

Auto switches will malfunction or magnets inside actuators will become demagnetised.

#### 3. Do not use in an environment where the auto switch will be in water or constantly exposed to water.

Although switches satisfy IEC standard IP67 construction (JIS C 0920: waterproof construction), do not use switches in applications in which they are constantly exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

#### 4. Do not use in an environment with oil or chemicals.

Please consult 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, malfunction due to swelling of the potting resin or hardening of the lead wires.

#### 5. Do not use in an environment with temperature cycles.

Please consult SMC if the switches are going 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 an environment 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 will malfunction and generate or cut off the signal momentarily (1 ms or less). Please consult SMC regarding the need to use a solid state switch depending on the environment.

#### 7. Do not use in an areas where surges are generated.

##### <Solid state switch>

When there are units (solenoid type lifter, high frequency induction furnace, motor, radio equipment etc.) which generate large surges or electromagnetic waves in the area surrounding the actuators with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.



# Series CXSJ Auto Switches Precautions 4

Be sure to read this before handling.

## Operating Environment

### Caution

**1. Avoid the accumulation of iron debris or close contact with magnetic substances.**

When a large amount of ferrous debris such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity to an auto switch actuator, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the actuator.

**2. Please consult SMC concerning water resistance, elasticity of lead wires, usage at welding sites, etc.**

**3. Do not use under direct sunlight.**

**4. Do not mount the product in locations where it is exposed to radiant heat.**

## 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 them after readjusting the mounting position.

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

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

**3) Confirm the lighting of the green light on the 2-colour indicator type switch.**

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

**2. Maintenance procedures are outlined in the operation manual.**

Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.

**3. Removal of equipment and supply/exhaust of compressed air**

Before any machinery or equipment is removed, first ensure that the appropriate measures are taken to prevent the fall or erratic movement of driven objects and equipment. Then cut off the electric power and reduce the pressure in the system to zero. Only then should you proceed with the removal of any machinery and equipment.

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



# Series CXSJ Specific Product Precautions

Be sure to read this before handling.

## Mounting

### ⚠ Caution

1. **Make sure that the surface on which the cylinder is to be mounted is flat (reference value for flatness: 0.05 or less).**

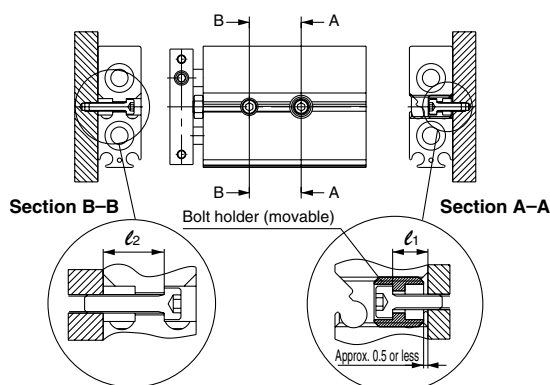
Dual-rod cylinders can be mounted from 3 directions, however, make sure that the surface on which the cylinder is to be mounted is flat (reference value for flatness: 0.05 or less). Otherwise, the accuracy of the piston rod operation is not achieved and malfunction can occur.

2. **The piston rod must be retracted when mounting the cylinder.**

Scratches or gouges in the piston rod may lead to damaged bearings and seals and cause malfunction or air leakage.

3. **CXSJ (ø6, ø10)**

Adjust the bolt holder using a hexagon wrench 3 mm in width across flats so that it does not protrude from the cylinder surface (approx. 0.5 mm depth from the cylinder surface to the top of the holder). If the bolt holder is not properly adjusted, it can interfere with the switch rail, hindering the auto switch mounting. The required length of the mounting bolt for a bolt holder and mounting hole in the rod cover side varies depending on the bearing surface position for the mounting bolt. Refer to dimensions  $\ell_1$  and  $\ell_2$  provided below to select the appropriate mounting bolt length.



	$\ell_1$ (mm)	$\ell_2$ (mm)	Applicable mounting bolt size
CXSJ□6	5	8.4	M3
CXSJ□10	5	9.5	M3

Be sure to mount the cylinder to the bolt holder. If it is operated without using the bolt holder, the bolt holder may drop.

## Piping

### ⚠ Caution

1. **For axial piping, the side port of the standard cylinder is plugged. However, a plugged port can be switched according to the operating conditions. When switching the plugged port, check the air leakage. If small air leakage is detected, order the plugs below, and reassemble it.**

Plug part no.: (ø6) MTS08-08-P6830  
(ø10) CXS10-08-28747A

## Stroke Adjustment

### ⚠ Caution

1. **After adjusting the stroke, make sure to tighten the hexagon nut to prevent it from loosening.**

Dual-rod cylinders have a bolt to adjust 0 to -5 mm strokes on the retracted end (IN).

Loosen the hexagon nut to adjust the stroke; however, make sure to tighten the hexagon nut after making an adjustment.

2. **Never operate a cylinder with its bumper bolt removed. Also, do not attempt to tighten the bumper bolt without using a nut.**

If the bumper bolt is removed, the piston hits the head cover causing damage to the cylinder. Therefore, do not use a cylinder without a bumper bolt.

Furthermore, if the bumper bolt is tightened without a nut, the piston seal is caught in the leveled part, damaging the seal.

3. **A bumper at the end of the bumper bolt is replaceable.**

In case of a missing bumper, or bumper which have a permanent settling, use the following part numbers for ordering.

Bore size (mm)	6	10-15	20-25	32
Part no.	CXS06-34 -A5157	CXS10-34A 28747	CXS20-34A 28749	CXS32-34A 28751
Qty.	1			

## Disassembly and Maintenance

### ⚠ Caution

1. **Never use a cylinder with its plate removed.**

When removing the hexagon socket head cap screw on the end plate, the piston rod must be secured to prevent from rotating. However, if the sliding parts of the piston rod are scratched and gouged, malfunction may occur.

2. **When disassembling and reassembling the cylinder, contact SMC or refer to the separate instruction manual.**

### ⚠ Warning

1. **Take precautions when your hands are near the plate and housing.**

When the cylinder is operated, take extra precautions to avoid getting your hands and fingers caught between the plate and housing, as that can cause injuries to the human body.

## Operating Environment

### ⚠ Caution

1. **Do not operate the cylinder in a pressurized environment.**

The pressurized air may flow inside the cylinder due to its construction.