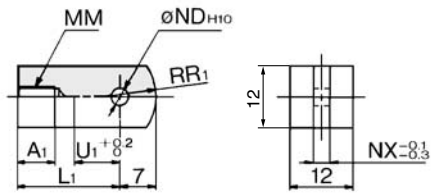
Accessory Bracket Dimensions (mm)

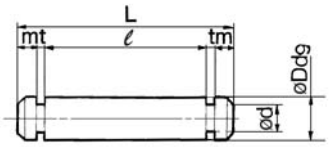
Single Knuckle Joint



Material: Rolled steel

Part no.	Applicable bore	A_1	L_1	MM	ND^{H10}	NX	R_1	U_1
I-J010B	**10**	8	21	M4 x 0.7	$3.3^{+0.048}_{0}$	3.1	8	9
I-J016B	**16**	8	25	M5 x 0.8	$5^{+0.048}_{0}$	6.4	12	14

Clevis Pin

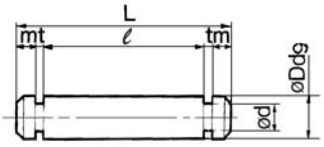


Material: Stainless steel

Part no.	Applicable bore	Dd9	d	L	ℓ	m	t	Applicable retaining ring
CD-J010	**10**	$3.3^{-0.030}_{-0.060}$	3	15.2	12.2	1.2	0.3	Type C 3.2
CD-Z015	**16**	$5^{-0.030}_{-0.060}$	4.8	22.7	18.3	1.5	0.7	Type C 5

∗ Retaining rings are packaged with clevis pins.

Knuckle Pin

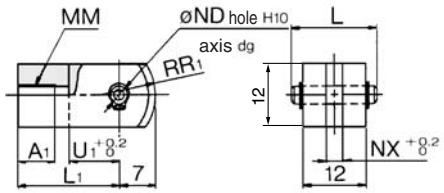


Material: Stainless steel

Part no.	Applicable bore	Dd9	d	L	ℓ	m	t	Applicable retaining ring
CD-J010	**10**	$3.3^{-0.030}_{-0.060}$	3	15.2	12.2	1.2	0.3	Type C 3.2
IY-J015	**16**	$5^{-0.030}_{-0.060}$	4.8	16.6	12.2	1.5	0.7	Type C 5

∗ For size ø10, clevis pin is diverted.
∗ Retaining rings are packaged with knuckle pins.

Double Knuckle Joint



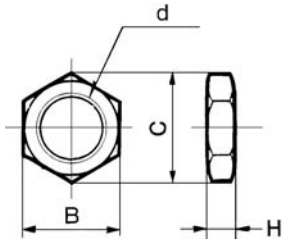
Material: Rolled steel

Part no.	Applicable bore	A_1	L	L_1	MM
Y-J010B	**10**	8	15.2	21	M4 x 0.7
Y-J016B	**16**	11	16.6	21	M5 x 0.8

Part no.	ND_{d9}	ND_{H10}	NX	R_1	U_1
Y-J010B	$3.3^{-0.030}_{-0.060}$	$3.3^{+0.048}_{0}$	3.2	8	10
Y-J016B	$5^{-0.030}_{-0.060}$	$5^{+0.048}_{0}$	6.5	12	10

∗ Knuckle pin and retaining ring are shipped together.

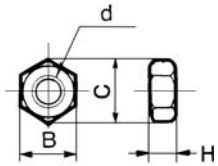
Mounting Nut



Material: Brass

Part no.	Applicable bore	B	C	d	H
SNJ-010B	**10**	11	12.7	M8 x 1.0	4
SNJ-016B	**16**	14	16.2	M10 x 1.0	4

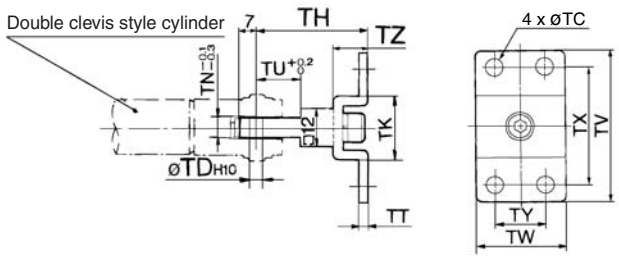
Rod End Nut



Material: Iron

Part no.	Applicable bore	B	C	d	H
NTJ-010A	**10**	7	8.1	M4 x 0.7	3.2
NTJ-015A	**16**	8	9.2	M5 x 0.8	4

T-bracket

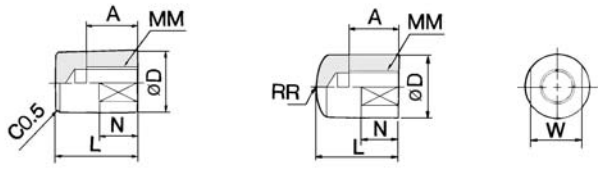


Part no.	Applicable bore	TC	TD_{H10}	TH	TK	TN	TT	TU	TV	TW	TX	TY	TZ
CJ-T010B	**10**	4.5	$3.3^{+0.048}_{0}$	29	18	3.1	2	9	40	22	32	12	8
CJ-T016B	**16**	5.5	$5^{+0.048}_{0}$	35	20	6.4	2.3	14	48	28	38	16	10

∗ T-bracket includes a T-bracket base, single knuckle joint, hexagon socket head cap screw and spring washer.

Rod End Cap

Flat type/CJ-CF□□□ **Round type/CJ-CR□□□**



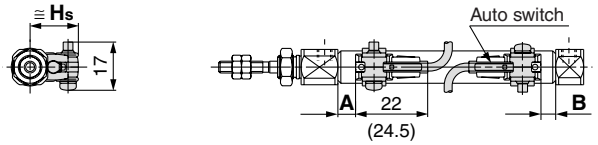
Material: Polyacetal

Part no.		Applicable bore	A	D	L	MM	N	R	W
Flat type	Round type								
CJ-CF010	**CJ-CR010**	10	8	10	13	M4 x 0.7	6	10	8
CJ-CF016	**CJ-CR016**	16	10	12	15	M5 x 0.8	7	12	10

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

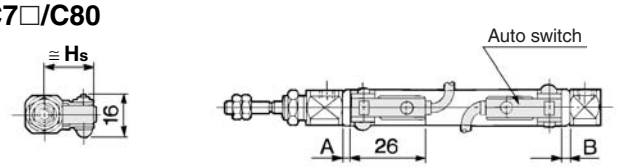
Reed auto switch
<Band mounting style>

D-A9□

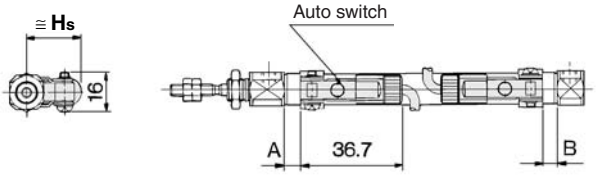


( ): For D-A93 type

D-C7□/C80

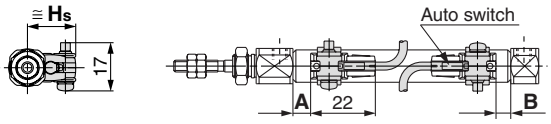


D-C73C□/C80C

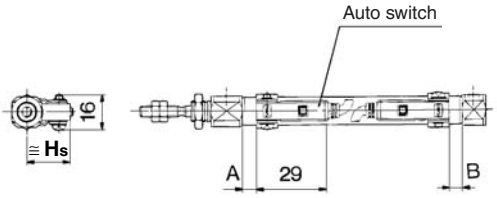


Solid state auto switch
<Band mounting style>

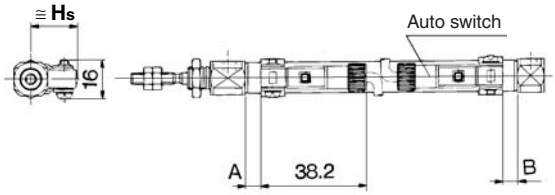
D-M9□
D-M9□W



D-H7□
D-H7□W
D-H7NF



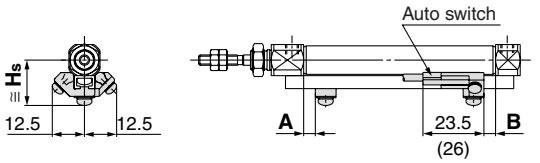
D-H7C



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

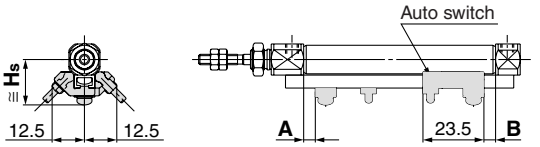
Reed auto switch <Band mounting style>

D-A9□

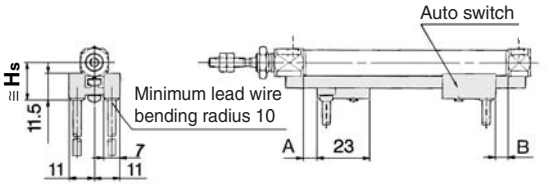


( ): For D-A93 type

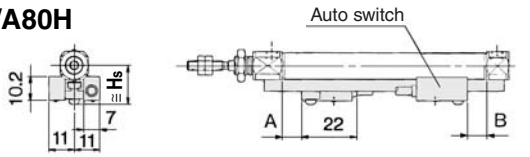
D-A9□V



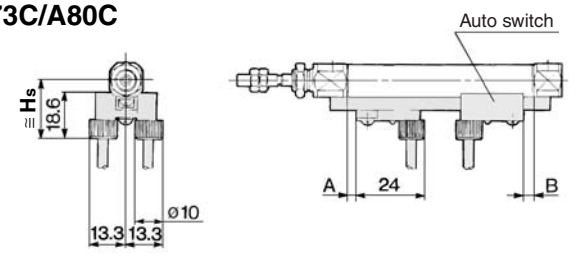
D-A7□/A80



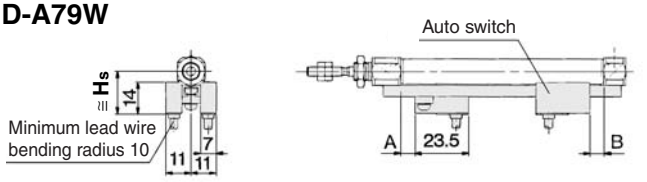
D-A7□H/A80H



D-A73C/A80C

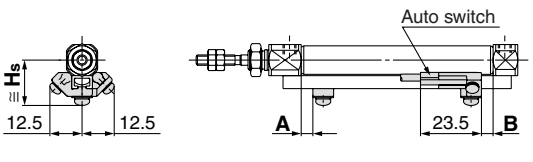


D-A79W

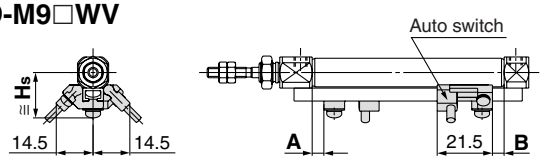


Solid state auto switch <Band mounting style>

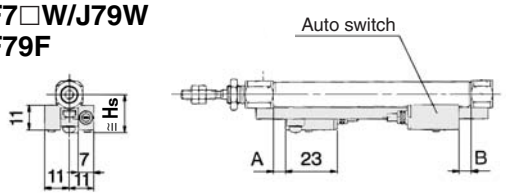
D-M9□
D-M9□W



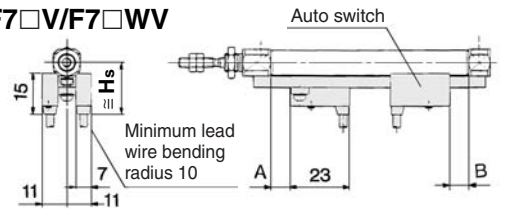
D-M9□V
D-M9□WV



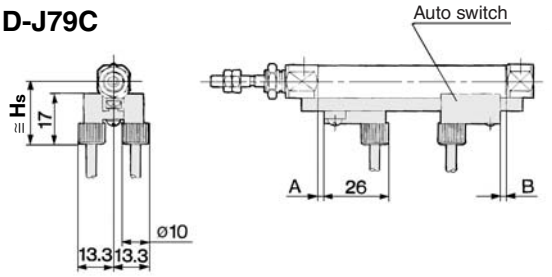
D-F7□/J79
D-F7□W/J79W
D-F79F



D-F7□V/F7□WV



D-J79C



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	Band mounting								Rail mounting											
	D-A9□		D-M9□ D-M9□W		D-C7□ D-C80 D-C73C D-C80C		D-H7□ D-H7C D-H7NF D-H7□W		D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV		D-A7□ D-A80		D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-F7□W/J79W D-F7□V/F7□WV D-F79F D-J79C		D-F7NTL		D-A79W	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
10	2	2	6	6	2.5	2.5	1.5	1.5	0.5	0.5	4.5	4.5	3	3	3.5	3.5	8.5	8.5	0.5	0.5
16	2.5	2.5	6.5	6.5	3	3	2	2	1	1	5	5	3.5	3.5	4	4	9	9	1	1

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

Auto Switch Mounting Height

(mm)

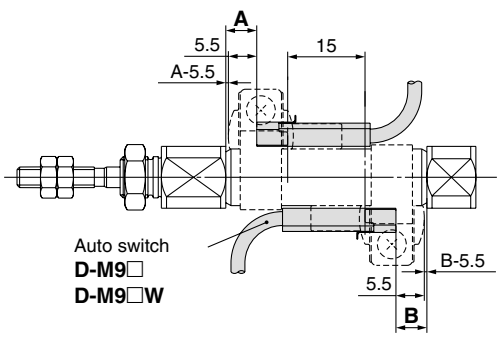
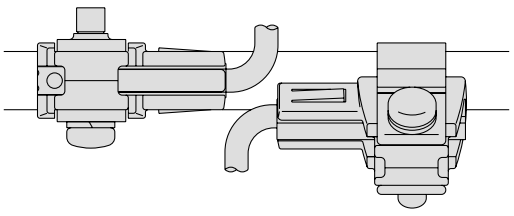
Auto switch model / Bore size (mm)	Band mounting				Rail mounting						
	D-A9□ D-M9□ D-M9□W	D-C7□ D-C80 D-H7□ D-H7□W D-H7NF	D-C73C D-C80C	D-H7C	D-A7□ D-A80	D-A9□ D-A9□V D-M9□ D-M9□V D-M9□W D-M9□WV	D-A7□H/A80H D-F7□/J79 D-F7□W/J79W D-F79F D-F7NTL	D-A73C D-A80C	D-F7□V D-F7□WV	D-J79C	D-A79W
	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs
10	16.5	17	19.5	20	16.5	17.5	17.5	23.5	20	23	19
16	20	20.5	23	23.5	19.5	21	20.5	26.5	23	26	22

Minimum Auto Switch Mounting Stroke

(mm)

Auto switch mounting	Auto switch model	No. of auto switch mounted				
		1 pc.	2 pcs.		n pcs. (n: No. of auto switch)	
			Different surfaces	Same surface	Different surfaces	Same surface
Band mounting	**D-A9□ D-M9□ D-M9□W**	10	15 Note)	45 Note)	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···)	45 + 15 (n-2)
	D-C7□ D-C80	10	15	50	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 20 (n-2)
	D-H7□/H7□W D-H7NF	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	60 + 22.5 (n-2)
	D-C73C D-C80C D-H7C	10	15	65	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 27.5 (n-2)
Rail mounting	**D-M9□V**	5	—	5	—	10 + 10 (n-2) (n = 4, 6···)
	D-A9□V	5	—	10	—	10 + 15 (n-2) (n = 4, 6···)
	D-M9□ D-A9□	10	—	10	—	15 + 15 (n-2) (n = 4, 6···)
	D-M9□WV	10	—	15	—	15 + 15 (n-2) (n = 4, 6···)
	D-M9□W	15	—	15	—	20 + 15 (n-2) (n = 4, 6···)
	D-A7□/A80 D-A7□H/A80H D-A73C/A80C	5	—	10	—	15 + 10 (n-2) (n = 4, 6···)
	D-A7□H D-A80H	5	—	10	—	15 + 15 (n-2) (n = 4, 6···)
	D-A79W	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)
	D-F7□ D-J79	5	—	5	—	15 + 15 (n-2) (n = 4, 6···)
	D-F7□V D-J79C	5	—	5	—	10 + 10 (n-2) (n = 4, 6···)
	D-F7□W/J79W D-F79F D-F7NTL	10	—	15	—	15 + 20 (n-2) (n = 4, 6···)
	D-F7□WV	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)

Note) When 2 D-A93/M9□/M9□W auto switches are included.

Auto switch model	With 2 auto switches	
	Different surfaces	Same surface
	 The proper auto switch mounting position is 5.5 mm inward from the switch holder edge.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	Less than 50 strokes
D-M9□ D-M9□W	Less than 20 strokes	Less than 55 strokes

Operating Range

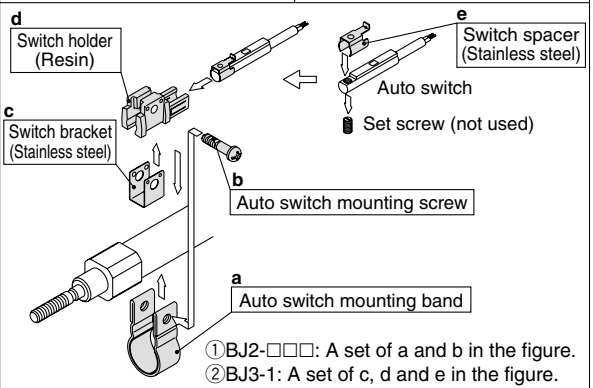
(mm)

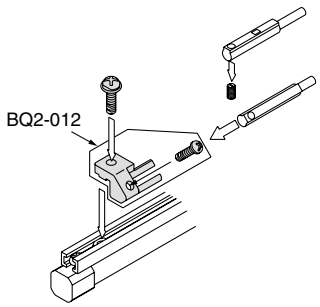
	Auto switch model	Bore size (mm)	
		10	16
Band mounting	D-A9□	6	7
	D-M9□ D-M9□W	2.5	3
	D-C7□/C80/C73C/C80C	7	7
	D-H7□/H7□W D-H7NF	4	4
	D-H7C	8	9
Rail mounting	D-A9□/A9□V	6	6.5
	D-M9□/M9□V D-M9□W/M9□WV	3	3.5
	D-A7□/A80/A7H/A80H D-A73C/A80C	8	9
	D-A79W	11	13
	D-F7□/J79/F7□W/J79W D-F7□V/F7□WV/F79F D-J79C D-F7NTL	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.

Auto Switch Mounting Bracket/Part No.

Auto switch mounting	Auto switch model	Bore size ø10	Bore size ø16
Band mounting	D-A9□ D-M9□ D-M9□W	Note 1), Note 2) ①BJ2-010 ②BJ3-1	Note 1), Note 2) ①BJ2-016 ②BJ3-1
	D-C7□/C80 D-C73C/C80C D-H7□/H7□W D-H7NF	BJ2-010	BJ2-016
Rail mounting	D-A9□ D-A9□V D-M9□ D-M9□V D-M9□W D-M9□WV	Note 3) BQ2-012	Note 3) BQ2-012





Note 1) Two kinds of auto switch mounting brackets are used as a set.
Note 2) Auto switch mounting brackets are shipped together with cylinders.
Note 3) When mounting a compact auto switch on the ø10 or ø16 rail mounting type, order auto switch mounting bracket shown in the table above. Order it separately from the cylinder.
Example
CDJ2BX10-60-A ····· 1 unit
D-M9BWV ····· 2 pcs.
BQ2-012 ····· 2 pcs.

Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted. For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry (Direction)	Features
Reed	D-C73, C76	Grommet (in-line)	—
	D-C80		Without indicator light
Solid state	D-H7A1, H7A2, H7B		—
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color indication)

∗ With pre-wired connector is available for solid state auto switches. For details, refer to pages 1784 to 1785.
∗ Normally closed (NC = b contact), solid state auto switches (D-F9G, F9H type) are also available. For details, refer to page

Related Products:
Speed Controller for Low Speed Operation

The effective area of controlled flow is approximately 1/10 of the standard type.
These controllers are suitable for controlling the speed of microspeed cylinders.
The dual type speed controller is especially suitable for cylinders with a small bore size.

Elbow/Universal Type

Air Flow/Effective Area

Model		AS12□1FM-M5 AS13□1FM-M5	AS22□1FM-□01 AS23□1FM-□01		AS22□1FM-□02 AS23□1FM-□02		
Tubing O.D.	Metric size	ø3.2, ø4, ø6	ø3.2, ø4	ø6, ø8	ø4	ø6	ø8, ø10
	Inch size	ø1/8", ø5/32", ø3/16" ø1/4"	ø1/8", ø5/32"	ø3/16", ø1/4" ø5/16"	ø5/32"	ø3/16"	ø1/4", ø5/16" ø3/8"
Controlled flow	Air flow (ℓ/min (ANR))	7	12		38		
	Effective area (mm²)	0.1	0.2		0.6		
Free flow	Flow rate (ℓ/min (ANR))	100	180	230	260	390	460
	Effective area (mm²)	1.5	2.7	3.5	4	6	7

Note) Supply pressure: 0.5 MPa, Temperature: 20°C

In-line Type

Air Flow/Effective Area

Model		AS1001FM	AS2001FM		AS2051FM	
Tubing O.D.	Metric size	ø3.2, ø4, ø6	ø4	ø6	ø6	ø8
	Inch size	ø1/8", ø5/32", ø3/16" ø1/4"	ø5/32"	ø3/16", ø1/4"	ø3/16"	ø1/4", ø5/16"
Controlled flow	Air flow (ℓ/min (ANR))	7	12		38	
	Effective area (mm²)	0.1	0.2		0.6	
Free flow	Flow rate (ℓ/min (ANR))	100	130	230	290	460
	Effective area (mm²)	1.5	2	3.5	4.5	7

Note) Supply pressure: 0.5 MPa, Temperature: 20°C

Elbow Type (Metal body)

Air Flow/Effective Area

Model			AS12□0M		AS22□0M-□01		AS22□0M-□02	
Port size		Cylinder side	M5 x 0.8	10-32 UNF	R 1/8	NPT 1/8	R 1/4	NPT 1/4
		Tube side			Rc 1/8		Rc 1/4	
Controlled flow	Air flow (ℓ/min (ANR))		7		12		38	
	Effective area (mm²)		0.1		0.2		0.6	
Free flow	Flow rate (ℓ/min (ANR))		105		280		420	
	Effective area (mm²)		1.6		4.3		6.5	

Note) Supply pressure: 0.5 MPa, Temperature: 20°C

Dual Type

Air Flow/Effective Area

Model		ASD230FM-M5	ASD330FM-□01	ASD430FM-□02	
Tubing O.D.	Metric size	ø4, ø6	ø6, ø8	ø6	ø8, ø10
	Inch size	ø1/8", ø5/32" ø3/16", ø1/4"	ø3/16", ø1/4"	—	ø1/4", ø5/16" ø3/8"
Controlled flow (Free flow)	Air flow (ℓ/min (ANR))	7	12	38	
	Effective area (mm²)	0.1	0.2	0.6	

Note) Supply pressure: 0.5 MPa, Temperature: 20°C

Low Speed Cylinder Specific Product Precautions

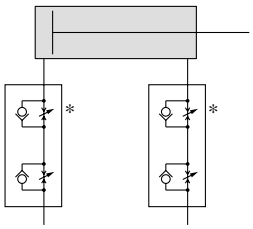
Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Recommended Pneumatic Circuit

⚠Warning

Horizontal Operation

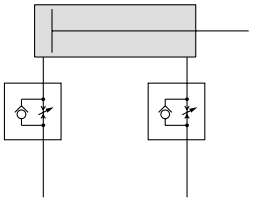
I



Dual speed controller

Speed is controlled by meter-out circuit. Using concurrently the meter-in circuit can alleviate the stick-slip. More stable low speed operation can be achieved than meter-in circuit alone.

II

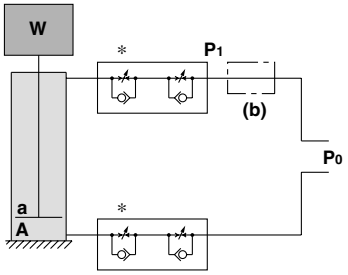


Meter-in speed controller

Meter-in speed controllers can reduce lurching while controlling the speed. The two adjustment needles facilitate adjustment.

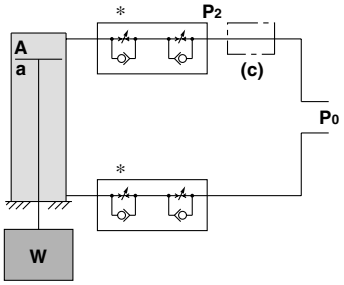
Vertical Operation

I



(1) Speed is controlled by meter-out circuit. Using concurrently the meter-in circuit can alleviate the stick-slip.*
(2) Depending on the size of the load, installing a regulator with check valve at position **(b)** can deduce lurching during descent and operation delay during ascent.
As a guide,
when **W + P0a>P0A**,
adjust **P1** to make **W + P1a = P0A**.

II



(1) Speed is controlled by meter-out circuit. Using concurrently the meter-in circuit can alleviate the stick-slip.*
(2) Installing a regulator with check valve at position **(c)** can reduce lurching during descent and operation delay during ascent.
As a guide,
adjust **P2** to make **W + P2A = P0a**.

W: Load (N) **P0**: Operating pressure (MPa) **P1, P2**: Reduced pressure (MPa) **a**: Rod side piston area (mm^2) **A**: Head side piston area (mm^2)

⚠Warning

Since **C□J2X**, **C□UX10** are subject to internal leakage due to their construction, the speed may not be fully controlled with the meter-out controller (*) during low speed operation.

Selection

⚠Caution

1. **Operate within the standard strokes.**
   Operating with the stroke exceeding the standard stroke may cause malfunction.
2. **Provide a construction that does not apply a lateral load to the cylinder.**
   Applying a lateral load to the cylinder may cause malfunction.
3. **Do not use the product at a high frequency.**
   Use it at 30 cpm or less as a guideline.
4. **Do not wipe out the grease in the sliding part of the air cylinder.**
   Doing so forcefully may cause malfunction.

Pneumatic Circuit

⚠Caution

1. **The piping length between the speed controller and the cylinder port must be kept as short as possible.**
   If the speed controller and the cylinder port are far apart, speed adjustment may be unstable.
2. **Use a low speed controller to easily adjust for low speed operation or a dual speed controller (Series ASD) to prevent cylinders from popping out.**
   (When the low speed controller is used, the maximum speed may be limited.)

Fine Lock Cylinders/Lock-up Cylinder

Series CL

ø16, ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100, ø125, ø140, ø160

Locking method	Spring locking	Pneumatic locking	Spring and pneumatic locking
Features	• Unlocking Discharging the air causes the lock to operate.	• Pressure locking The holding power can be varied according to the air pressure that is applied to the port.	• Pressure locking The holding power can be varied according to the air pressure that is applied to the port. • Unlocking Discharging the air causes the lock to operate.

(Lock-up cylinders are spring locking only.)

Locking in both directions is possible.
Locking in either side of cylinder stroke is possible, too.
(The lock-up cylinder can be locked only in one direction.)

Series Variations

Series	Action	Rod	Standard variations: Auto switch built-in magnet	Standard variations: With rod boot	Locking direction	Locking method: Spring locking	Locking method: Pneumatic locking	Locking method: Spring and Pneumatic locking	Bore size (mm)	Standard stroke (mm)	Page
Fine lock cylinders											
Series CLJ2 	Double acting	Single rod	●	●	Both directions	●	●	●	16	15 to 200	601
Series CLM2 	Double acting	Single rod	●	●	Both directions	●	●	●	20, 25, 32, 40	25 to 300	611
Series CLG1 	Double acting	Single rod	●	●	Both directions	●	●	●	20	25 to 200	625
									25, 32, 40	25 to 300	
Lock-up cylinder											
Series CL1 	Double acting	Single rod	●	●	One direction	●	●	●	40	25 to 500	636
									50, 63	25 to 600	
									80, 100	25 to 700	
									125, 140	Up to 1000	
									160	Up to 1200	

Series CL
Specific Product Precautions 1

Be sure to read before handling.
The precautions on these pages are for the fine lock cylinders and the lock-up cylinders.
For general actuator precautions, refer to Actuator Precautions on pages 3 to 7.

Design of Equipment and Machinery

⚠ Warning

1. Construct so that the human body will not come into direct contact with driven objects or the moving parts of locking cylinders.
   If there is a risk of contact, provide safety measures such as a cover or a system that uses sensors that will activate an emergency stop before contact is made.
2. Use a balance circuit in which lurching of the piston is taken into consideration. If the lock is applied at a desired position of a stroke and compressed air is applied to only one side of the cylinder, the piston will lurch at a high speed the moment the lock is disengaged. In such a situation, there is a risk of injury to humans, or equipment damage. To prevent the piston from lurching, use a balance circuit such as the recommended pneumatic circuit (P. 598). If an air-hydro fine lock cylinder is used, make sure to operate the lock portion through air pressure. Never use oil on the lock-up cylinder because the lock-up cylinder is a non-lube style. Failure to observe this could cause the lock to malfunction.

Selection

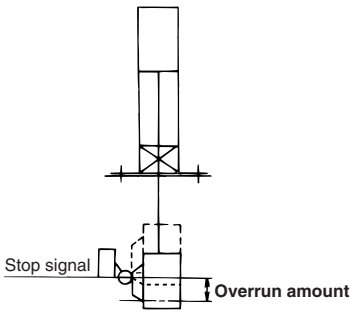
⚠ Warning

Refer to the following criteria for the maximum load in the locked state, and set.

When a cylinder is in a no-load and locked state, the holding force (maximum static load) is the lock's ability to hold a static load that does not involve vibrations or shocks. To ensure braking force, the maximum load must be set as described below.

1. For constant static loads, such as for drop prevention:
   - Fine lock series (Series CLJ2/CLM2/CLG1)
     35% or less of the holding force (maximum static load)
     Note) For applications such as drop prevention, consider situations in which the air source is shut off, and make selections based on the holding force of the spring locked state. Do not use the pneumatic lock for drop prevention purposes.
   - Lock-up series (Series CL1)
     50% or less of the holding force (maximum static load)
2. When kinetic energy acts upon the cylinder, such as when effecting an intermediate stop, there are constraints in terms of the allowable kinetic energy that can be applied to the cylinder in a locked state. Therefore, refer to the allowable kinetic energy of the respective series. Furthermore, during locking, the mechanism must sustain the thrust of the cylinder itself, in addition to absorbing the kinetic energy. Therefore, even within a given allowable kinetic energy level, there is an upper limit to the amount of the load that can be sustained.
   - Fine lock series (Series CLJ2/CLM2/CLG1)
     Maximum load at horizontal mounting: 70% or less of the holding force (Maximum static load) for spring lock
     Maximum load at vertical mounting: 35% or less of the holding force (Maximum static load) for spring lock
   - Lock-up series (Series CL1)
     Maximum load at horizontal mounting: 50% or less of the holding force (Maximum static load)
     Maximum load at vertical mounting: 25% or less of the holding force (Maximum static load)
3. In a locked state, do not apply impacts, strong vibrations or rotational forces.
   Do not apply a impacts, strong vibrations or rotational forces from external sources, because this could damage or shorten the life of the lock unit.
4. The locking of the fine lock cylinder is directional.
   Although the fine lock cylinder can be locked in both directions, be aware that its holding force is smaller in one of the directions.
   CLJ2/CLM2/CLG1···· Holding force at piston rod extended side decreases approx. 15%.
5. The locking of the lock-up cylinder is unidirectional.
   Because the locking direction of the lock-up cylinder is unidirectional, select the locking direction in accordance with the particular operating conditions. It is also possible to manufacture a bidirectional lock-up cylinder. For details, refer to "Made to Order" on page 1989. Due to the nature of its construction, a lock-up cylinder has a play of approximately 0.5 mm to 1 mm in the axial direction. Therefore, if an external stopper is used to stop the piston rod and the lock is engaged, the piston rod will shift in the amount of its axial play.
6. To effect an intermediate stop, take the cylinder's stopping precision and overrun amount into consideration.
   Because the lock is applied by mechanical means, the piston will not stop immediately in response to a stopping signal, but only after a time lag. This lag determines the amount of the overrun of the piston stroke. Thus, the range of the maximum and minimum amounts of the overrun is the stopping precision.
   - Place the limit switch before the desired stopping position, only in the amount of the overrun.
   - The limit switch must have a detection length (dog length) of the overrun amount + α.
   - For SMC's auto switches, the operating range are between 8 and 14 mm. (It varies depending on a switch model.) When the overrun amount exceeds this range, self-holding of the contact should be performed at the switch load side.

   * For stopping accuracy, refer to Series CLJ (P. 603), Series CLM2 (P. 614), Series CLG1 (P. 627), and Series CL1 (P. 637) respectively.



7. In order to further improve stopping accuracy, the time from the stop signal to the operation of the lock should be shortened as much as possible.
   To accomplish this, use a device such as a highly responsive electric control circuit or solenoid valve driven by direct current, and place the solenoid valve as close as possible to the cylinder.
8. Be aware that the stopping accuracy is influenced by changes in the piston speed.
   The variance in the stopping position increases if the piston speed changes, such as due to load fluctuations during the reciprocal movement of the piston. Therefore, take measures to ensure a constant piston speed immediately preceding the stopping position. Furthermore, the variances in the stopping position increases when the piston is effecting a cushioning stroke or during acceleration after starting its movement.
9. When unlocking is performed, if the thrust is applied to the piston, unlocking will not be easily done. To avoid that, ensure that unlocking should be performed before the thrust is applied to the piston.

Series CL
Specific Product Precautions 2

Be sure to read before handling.
The precautions on these pages are for the fine lock cylinders and the lock-up cylinders.
For general actuator precautions, refer to Actuator Precautions on pages 3 to 7.

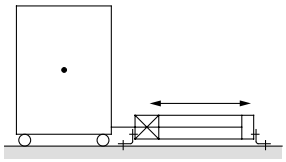
Mounting

⚠Warning

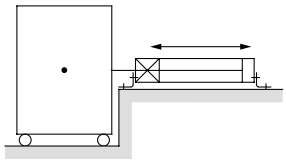
1. Be certain to connect the rod end to the load with the lock released.
- If this is performed with the lock engaged, a load that exceeds the allowable rotational force or holding force would be applied to the piston rod, which could damage the locking mechanism. The fine lock and Series CL1 with ø40 to ø100 cylinders have a built-in manual unlocking mechanism. Therefore, they can be maintained in the unlocked state without supplying air. For Series CL1 with ø125 to ø160 cylinders, simply connect piping to the lock-up port, and supply air pressure of 0.2 MPa or more to disengage the lock in order to attach a load.

⚠Caution

1. Do not apply offset loads on the piston rod.
- Pay particular attention to aligning the center of gravity of the load with the axial center of the cylinder. If there is a large amount of deviation, the piston rod could become unevenly worn or damaged due to the inertial moment that is created when the piston rod is stopped by the lock.



X Load center of gravity and cylinder shaft center are not matched.



○ Load center of gravity and cylinder shaft center are matched.

Note) Can be used if all of the generated moment is absorbed by an effective guide.

Adjustment

⚠Caution

1. Place it in the locked position. (Excluding the series CL1 ø125 to ø160.)
- The locks are manually disengaged at the time the cylinders are shipped from the factory. Therefore, make sure to change them to the locked state before using the cylinders. For procedures to effect the change, refer to page 599 for the fine lock series. Be aware that the lock will not operate properly if the change is not performed correctly.
- Adjust the cylinder's air balance. In the state in which a load is attached to the cylinder, disengage the lock and adjust the air pressure at the rod side and the head side of the cylinder to obtain a load balance. By maintaining a proper air balance, the piston rod can be prevented from lurching when the lock is disengaged.

2. Adjust the mounting position of detections such as those of the auto switches. To effect an intermediate stop, adjust the mounting position of the auto switch detection by taking the amount of overrun into consideration in relation to the desired stopping position.