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

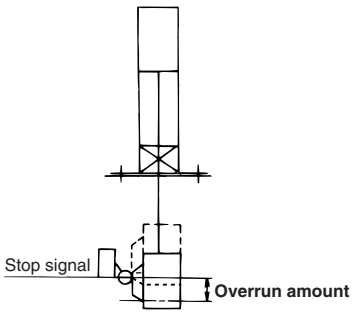
⚠ Warning

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.

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.

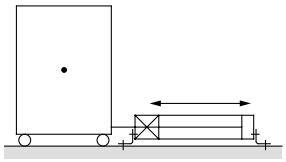
Mounting

⚠Warning

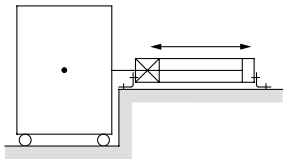
1. Be certain to connect the rod end to the load with the lock released.
- If this is performed with the lock engaged, a load that exceeds the allowable rotational force or holding force would be applied to the piston rod, which could damage the locking mechanism. The fine lock and Series CL1 with ø40 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.

Series CL
Specific Product Precautions 3

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.

Pneumatic Circuit

⚠ Warning

1. Be certain to use an pneumatic circuit which will apply balancing pressure to both sides of the piston when in a locked stop.
In order to prevent cylinder lurching after a lock stop, when restarting or when manually unlocking, a circuit should be used to which will apply balancing pressure to both sides of the piston, thereby canceling the force generated by the load in the direction of piston movement.

2. Use a solenoid valve for unlocking which has a large effective area, as a rule 50% or more of the effective area of the cylinder drive solenoid valve.
The larger the effective area is, the shorter the locking time will be (the overrun amount will be shorter), and stopping accuracy will be improved.

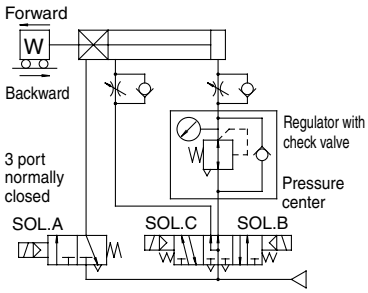
3. Place the solenoid valve for unlocking close to the cylinder, and no farther than the cylinder drive solenoid valve.
The shorter the distance from the cylinder (the shorter the piping), the shorter the overrun amount will be, and stopping accuracy will be improved.

4. Allow at least 0.5 seconds from a locked stop (intermediate stop of the cylinder) until release of the lock.
When the locked stop time is too short, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

5. When restarting, control the switching signal for the unlocking solenoid valve so that it acts before or at the same time as the cylinder drive solenoid valve.
If the signal is delayed, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

6. Basic circuit

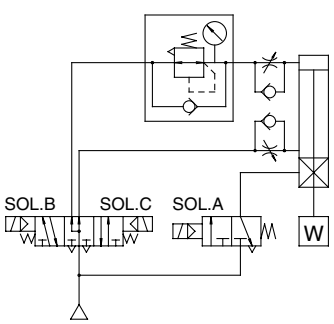
1) [Horizontal]



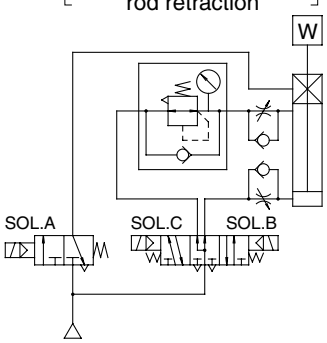
SOL.A	SOL.B	SOL.C	Action	
ON	ON	OFF	Forward	
OFF	OFF	OFF	Locked stop	0.5 s or more
ON	OFF	OFF	Unlocked	
ON	ON	OFF	Forward	0 to 0.5 s
ON	OFF	ON	Backward	
OFF	OFF	OFF	Locked stop	0.5 s or more
ON	OFF	OFF	Unlocked	
ON	OFF	ON	Backward	0 to 0.5 s

2) [Vertical]

[Load in the direction of rod extension]

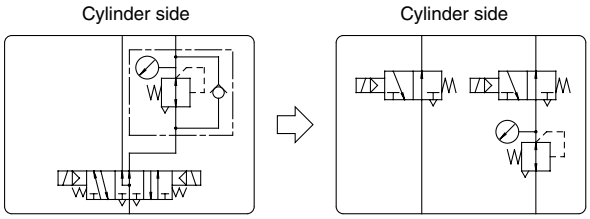


[Load in the direction of rod retraction]



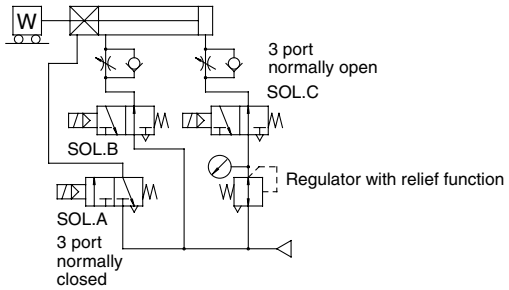
⚠ Caution

1. A 3 position pressure center solenoid valve and regulator with check valve can be replaced with two 3 port normally open valves and a regulator with relief function.



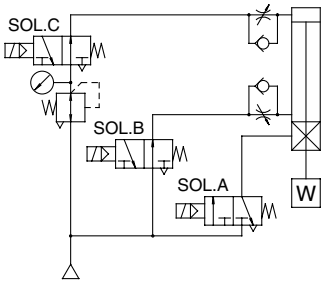
[Example]

1) [Horizontal]

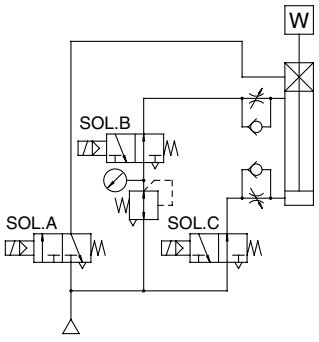


2) [Vertical]

[Load in the direction of rod extension]



[Load in the direction of rod retraction]



Series CL
Specific Product Precautions 4

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.

How to Manually Disengage the Lock and Change from the Unlocked to the Locked State

The lock is manually disengaged at the time the cylinder is shipped from the factory. Because the lock will not operate in this state, make sure to change it to the locked state before operation, after having adjusted the axial center for installation.

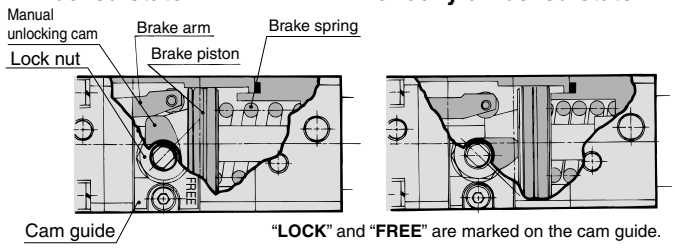
How to Change from Unlocked to Locked State

1. Series CLJ2, CLM2, CLG1

1) Loose locking nut.
2) Turn the wrench flats section of the manual unlocking cam to the LOCK position that is marked on the cam guide.
3) While keeping the wrench flats section in place, tighten the lock nut.

Note) The manual unlocking cam will rotate approximately 180°. Do not rotate the wrench flats section excessively.

Locked state **Manually unlocked state**



"**LOCK**" and "**FREE**" are marked on the cam guide.

Manually Unlocking

The lock of a fine lock series cylinder can be disengaged manually through the procedure described below. However, make sure to disengage the lock pneumatically before operating the cylinder.

Note) Manual disengagement of the lock could create a greater cylinder sliding resistance than pneumatic disengagement of the lock.

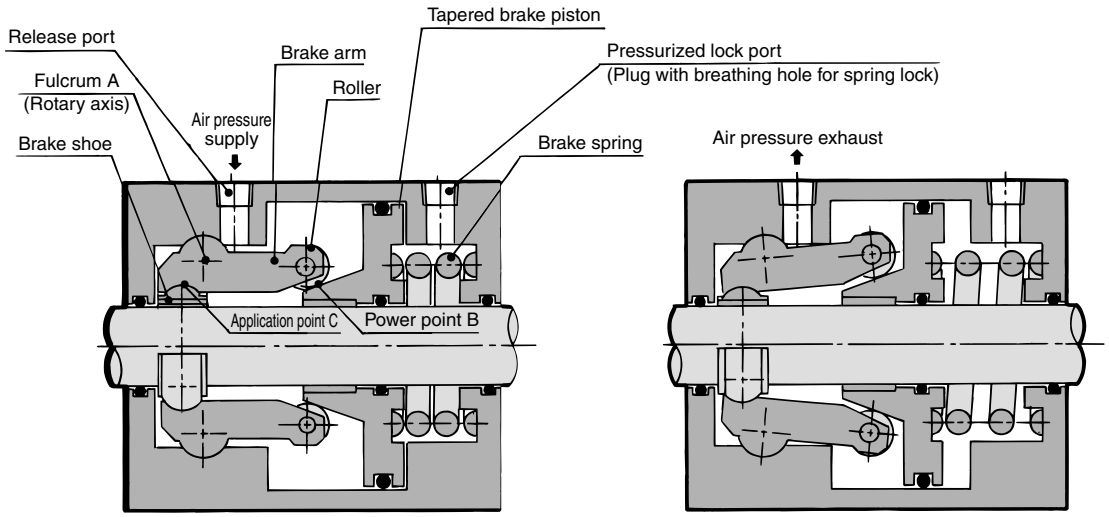
1. Series CLJ2, CLM2, CLG1

1) Loose locking nut.
2) Supply air pressure of 0.3 MPa or more to the lock release port.
3) Turn the wrench flats section of the manual unlocking cam until it stops at the FREE position that is marked on the cam guide.
4) While keeping the wrench flats section in place, tighten the lock nut.

Prior to Use

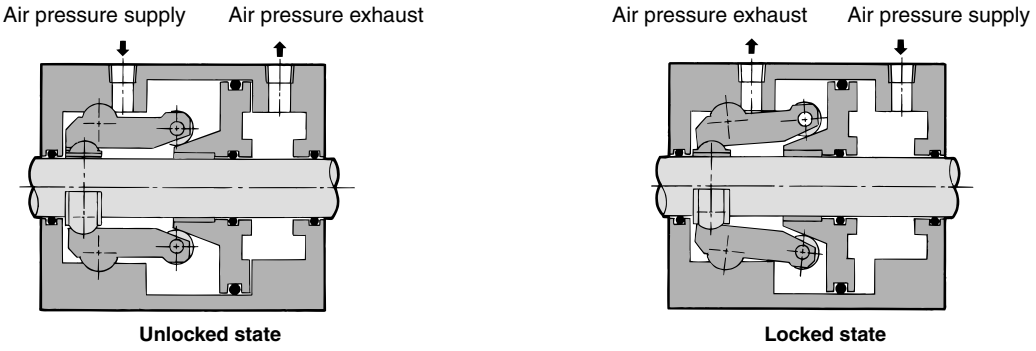
Construction Principle/Applicable Series: CLJ2, CLM2, CLG1, MLGC

Spring locking type



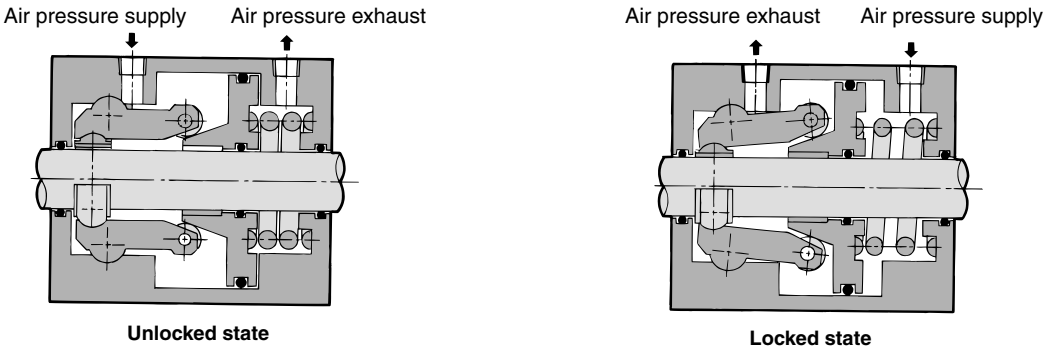
Spring locking (Exhaust locking)
The spring force that is applied to the tapered brake piston becomes amplified through the wedge effect. This force becomes further amplified to the power of AB/AC through the mechanical advantage of a lever and acts on the brake shoe, which in turn, applies a large force to tighten and lock the piston rod. To disengage the lock, air pressure is supplied through the unlocking port, thus disengaging the brake spring force.

Pneumatic locking type



Brake piston is operated by air pressure.

Spring and pneumatic locking type



Brake piston is operated by air pressure and spring force.

Fine Lock Cylinder
Double Acting, Single Rod
Series CLM2
ø20, ø25, ø32, ø40

How to Order

CLM2 □ **L** **25** □ – **100** □ – **E** – □

With auto switch **CDLM2** □ **L** **25** □ – **100** □ – **E** – **M9BW** □ – □

With auto switch (Built-in magnet)

Type

Nil	Pneumatic
H	Air-hydro

Port thread type

Nil	Rc
TN	NPT

Made to Order
Refer to page 612 for details.

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style

T	Head side trunnion style
E	Clevis integrated style
BZ	Boss-cut basic style
FZ	Boss-cut flange style

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm

Number of auto switches

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

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.

Cylinder stroke (mm)
Refer to "Standard Stroke" on page 612.

With rod boot

Nil	None
J	Nylon tarpaulin
K	Heat resistant tarpaulin

Lock operation

E	Spring locking (Exhaust locking)
P	Pneumatic locking (Pressure locking)
D	Spring and pneumatic locking

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDLM2F32-100-P

Applicable Auto Switch
/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V		M9N	●	●	●	○	○	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	○	○		
				2-wire	12 V		M9B	●	●	●	○	○	○	—	
		Connector					H7C	●	—	●	●	●	—		
		Terminal conduit		3-wire (NPN)	5 V, 12 V		G39A	—	—	—	—	●	—	IC circuit	
				2-wire	12 V	—	K39A	—	—	—	—	●	—	—	
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V,12 V		M9NW	●	●	●	○	○	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	○	○		
				2-wire	12V		M9BW	●	●	●	○	○	○	—	
	Water resistant (2-color indication)						H7BA	—	—	●	○	○	○		
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		H7NF	●	—	●	○	○	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5V	A96	●	—	●	—	—	—	IC circuit	—
			No	2-wire	24 V	100 V	A93	●	—	●	—	—	—	—	Relay, PLC
			Yes			100 V or less	A90	●	—	●	—	—	—	IC circuit	
			No			100 V, 200V	B54	●	—	●	●	—	—	—	
		Connector	Yes			200 V or less	B64	●	—	●	—	—	—		
			No			—	C73C	●	—	●	●	●	—		
		Terminal conduit	Yes			24 V or less	C80C	●	—	●	●	●	—	IC circuit	
						—	A33A	—	—	—	—	●	—	—	PLC
		DIN terminal				100 V, 200 V	A34A	—	—	—	—	●	—	—	Relay, PLC
							A44A	—	—	—	—	●	—		
	Diagnostic indication (2-color indication)	Grommet			—	—	B59W	●	—	●	—	—	—		

∗ Lead wire length symbols: 0.5 m ·····Nil (Example) M9NW
1 m ·····M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ
None ····· N (Example) H7CN

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ D-A9□V□/M9□V□/M9□WV□/M9□A(V)L types cannot be mounted.
∗ Do not indicate suffix "N" for no lead wire on D-A3□A/A44A/G39A/K39A models.

∗ Since there are other applicable auto switches than listed above, refer to page 624 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled at the time of shipment.)

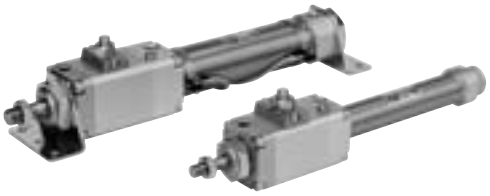
Provided with a compact lock mechanism, it is suitable for intermediate stop, emergency stop, and drop prevention.

Locking in both directions

The piston rod can be locked in either direction of its cylinder stroke.

Maximum piston speed: 500 mm/s

It can be used at 50 to 500 mm/s provided that it is within the allowable kinetic energy range.



Made to Order Specifications

(For details, refer to page 1836.)

Symbol	Specifications
—XA□	Change of rod end shape

Rod Boot Material

Symbol	Rod boot material	Maximum ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C *

* Maximum ambient temperature for the rod boot itself.

Refer to pages 621 to 624 for cylinders with auto switches.

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

Specifications

Bore size (mm)	20	25	32	40
Action	Double acting, Single rod			
Type	Air cylinder			
Lock operation	Spring locking (Exhaust locking) Pneumatic locking (Pressurized locking), Spring and pneumatic locking			
Fluid	Air			
Proof pressure	1.5 MPa			
Maximum operating pressure	1.0 MPa			
Minimum operating pressure	0.08 MPa			
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)			
Lubrication	Not required (Non-lube)			
Piston speed	50 to 500 mm/s *			
Cushion	Rubber bumper (Standard equipment)			
Stroke length tolerance	$^{+1.4}_{0}$			
Piping/Screw-in type	Rc 1/8			Rc 1/4
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Head side trunnion style, Clevis integrated style, Boss-cut basic style, Boss-cut flange style			

* Constraints associated with the allowable kinetic energy are imposed on the speeds at which the piston can be locked. The maximum speed of 750 mm/s can be accommodated if the piston is to be locked in the stationary state for the purpose of drop prevention.

Fine Lock Specifications

Lock operation	Spring locking (Exhaust locking)	Spring and pneumatic locking	Pneumatic locking (Pressure locking)
Fluid	Air		
Maximum operating pressure	0.5 MPa		
Unlocking pressure	0.3 MPa or more		0.1 MPa or more
Lock starting pressure	0.25 MPa or less		0.05 MPa or more
Locking direction	Both directions		

* Refer to page 614 for the allowable kinetic energy when locking, holding force of spring locking and stopping accuracy.

Standard Stroke / Refer to the minimum auto switch mounting stroke (page 623) for those with an auto switch.

Bore size (mm)	Standard stroke (1) (mm)	Maximum stroke (mm)
20	25, 50, 75, 100, 125, 150 200, 250, 300	1000
25		1500
32		2000
40		2000

Note 1) Intermediate strokes other than listed above are produced upon receipt of order. Manufacture of intermediate strokes at 1 mm intervals is possible. (Spacers are not used.)

Note 2) When exceeding 300 strokes, the allowable maximum stroke length is determined by the stroke selection table (technical data).

Mounting Bracket and Accessory

Mounting \ Accessory	Standard equipment			Option					
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double[3] knuckle joint	Clevis[4] pivot bracket	Rod boot	Pivot[6] bracket	Pivot[7] bracket pin
Basic style	●(1 pc.)	●	—	●	●	—	●	—	—
Axial foot style	●(2)	●	—	●	●	—	●	—	—
Rod side flange style	●(1)	●	—	●	●	—	●	—	—
Head side flange style	●(1)	●	—	●	●	—	●	—	—
Clevis integrated style	—(1)	●	—	●	●	●	●	—	—
Single clevis style	—(1)	●	—	●	●	—	●	●	●
Double clevis style[3]	—(1)	●	●(5)	●	●	—	●	—	—
Head side trunnion style	●(1)[2]	●	—	●	●	—	●	●	●
Boss-cut basic style	●(1)	●	—	●	●	—	●	—	—
Boss-cut flange style	●(1)	●	—	●	●	—	●	—	—
Note					With pin	With pin			

Note 1) Mounting nut is not equipped with clevis integrated style, single clevis style and double clevis style.
Note 2) Trunnion nuts are attached for head side trunnion style.
Note 3) Pin and retaining ring (ø40: cotter pin) are shipped together with double clevis and double knuckle joint.
Note 4) Pin and retaining ring are shipped together with clevis pivot bracket.
Note 5) Clevis pins come with retaining rings (cotter pins for ø40).
Note 6) Pivot brackets do not come with pins and retaining rings.
Note 7) Pivot bracket pins come with retaining rings.

Mass

(kg)

Bore size (mm)		20	25	32	40
Basic mass	Basic style	0.55	0.87	0.94	1.30
	Axial foot style	0.70	1.03	1.10	1.57
	Flange style	0.61	0.96	1.03	1.42
	Clevis integrated style	0.53	0.85	0.93	1.26
	Single clevis style	0.59	0.91	0.98	1.39
	Double clevis style	0.60	0.93	0.99	1.43
	Trunnion style	0.59	0.94	1.00	1.40
	Boss-cut basic style	0.54	0.85	0.92	1.27
	Boss-cut flange style	0.60	0.94	1.01	1.39
Additional mass per each 50 mm of stroke		0.04	0.06	0.08	0.13
Option bracket	Clevis bracket (With pin)	0.07	0.07	0.14	0.14
	Single knuckle joint	0.06	0.06	0.06	0.23
	Double knuckle joint (With pin)	0.07	0.07	0.07	0.20
	Pivot bracket	0.06	0.06	0.06	0.06
	Pivot bracket pin	0.02	0.02	0.02	0.03

Calculation: (Example) **CLM2L32-100-E**
- Basic mass ····· 1.10 (Foot, ø32)
- Additional mass ····· 0.08/50 stroke
- Cylinder stroke ····· 100 stroke 1.10 + 0.08 x 100/50 = 1.26 kg

Mounting Bracket Part No.

Bore size (mm)	20	25	32	40
Axial foot *	CM-L020B	CM-L032B		CM-L040B
Flange	CM-F020B	CM-F032B		CM-F040B
Single clevis	CM-C020B	CM-C032B		CM-C040B
Double clevis **	CM-D020B	CM-D032B		CM-D040B
Trunnion (with nut)	CM-T020B	CM-T032B		CM-T040B

* When ordering foot bracket, order 2 pieces per cylinder.
** Clevis pin and retaining ring (ø40: cotter pin) are shipped together with double clevis style.

Boss-cut style

Boss for the head side cover bracket is eliminated and the total length of cylinder is shortened.

Comparison of the full length dimension (Versus standard type)

(mm)

ø20	ø25	ø32	ø40
▲13	▲13	▲13	▲16

Mounting style

■ Boss-cut basic style **(BZ)** ■ Boss-cut flange style **(FZ)**

Air-hydro

CLM2H | Mounting style | Bore size | — | Stroke | Rod boot |

Air-hydro

Low hydraulic cylinder 1 MPa or less
Through the concurrent use of a CC series air-hydro unit, it is possible to operate at a constant or low speeds or to effect an intermediate stop, just like a hydraulic unit, while using pneumatic equipment such as a valve.

Specifications

Fluid	Turbine oil (Lock portion is air)
Action	Double acting, Single rod
Bore size (mm)	ø20, ø25, ø32, ø40
Maximum operating pressure	1.0 MPa
Minimum operating pressure	0.2 MPa
Piston speed	15 to 300 mm/s
Cushion	Rubber bumper (Standard equipment)
Piping	Screw-in type
Mounting	Basic style, Axial foot style, Rod side flange style Head side flange style, Single clevis style Double clevis style, Head side trunnion style Clevis integrated style, Boss-cut style

* Auto switch capable
- For an exterior dimension diagram to identify the mounting support types, refer to pages 616 to 620 as the dimensions are identical to those of standard.

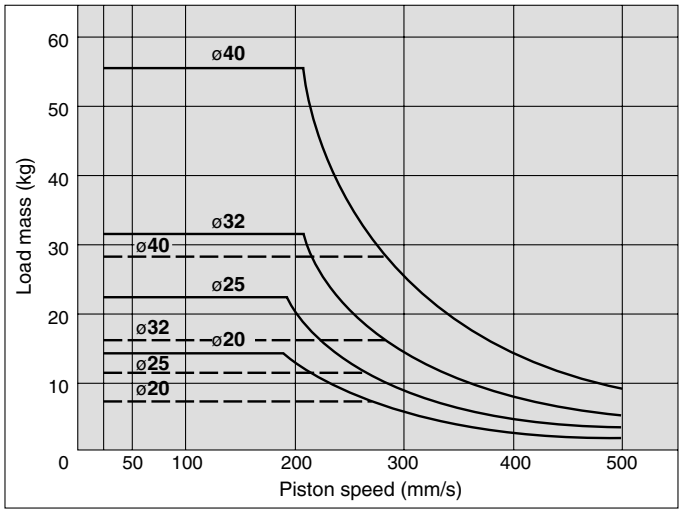
⚠ Caution/Allowable Kinetic Energy when Locking

Bore size (mm)	20	25	32	40
Allowable kinetic energy (J)	0.26	0.42	0.67	1.19

1. In terms of specific load conditions, the allowable kinetic energy indicated in the table above is equivalent to a 50% load ratio at 0.5 MPa, and a piston speed of 300 mm/sec. Therefore, if the operating conditions are below these values, calculations are unnecessary.
2. Apply the following formula to obtain the kinetic energy of the load.

$Ek = \frac{1}{2} m\upsilon^2$ Ek: Kinetic energy of load (J)
m: Load mass (kg)
υ: Piston speed (m/s)

3. The piston speed will exceed the average speed immediately before locking. To determine the piston speed for the purpose of obtaining the kinetic energy of load, use 1.2 times the average speed as a guide.
4. The relation between the speed and the load of the respective tube bores is indicated in the diagram below. Use the cylinder in the range below the line.
5. During locking, the lock mechanism must sustain the thrust of the cylinder itself, in addition to absorbing the energy of the load. Therefore, even within a given allowable kinetic energy level, there is an upper limit to the size of the load that can be sustained. Thus, a horizontally mounted cylinder must be operated below the solid line, and a vertically mounted cylinder must be operated below the dotted line.



Stopping Accuracy (Not including tolerance of control system.) (mm)

Locking method	Piston speed (mm/s)				
	20 *	50	100	300	500
Spring locking (Exhaust locking)	±0.3	±0.4	±0.5	±1.0	±2.0
Pneumatic locking (Pressure locking) Spring and pneumatic locking	±0.15	±0.2	±0.3	±0.5	±1.5

Conditions: Load: 25% of thrust force at 0.5 MPa
Solenoid valve: Mounted to the lock port
20 mm/s marked with the asterisk is in the case of actuating hydraulically by means of air-hydro type.

⚠ Caution

Recommended Pneumatic Circuit/Caution on Handling

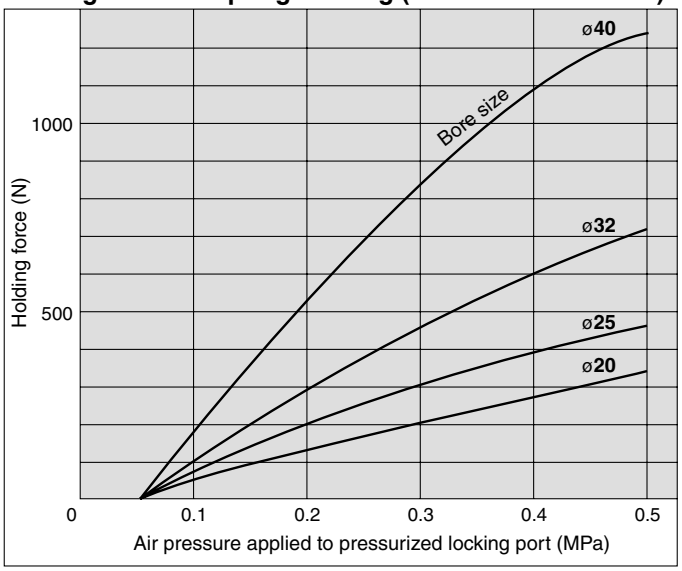
For detailed speceifications of the fine lock cylinder, Series CLM2 mentioned above, refer to pages 596 to 599.

Holding Force of Spring Locking (Maximum static load)

Bore size (mm)	20	25	32	40
Holding force (N)	196	313	443	784

Note) Holding force at piston rod extended side decreases approximately 15%.

Holding Force of Spring Locking (Maximum static load)



* When selecting cylinders, refer to the Precautions and allowable kinetic energy when locking on page 596, and then select a cylinder.

⚠ Caution

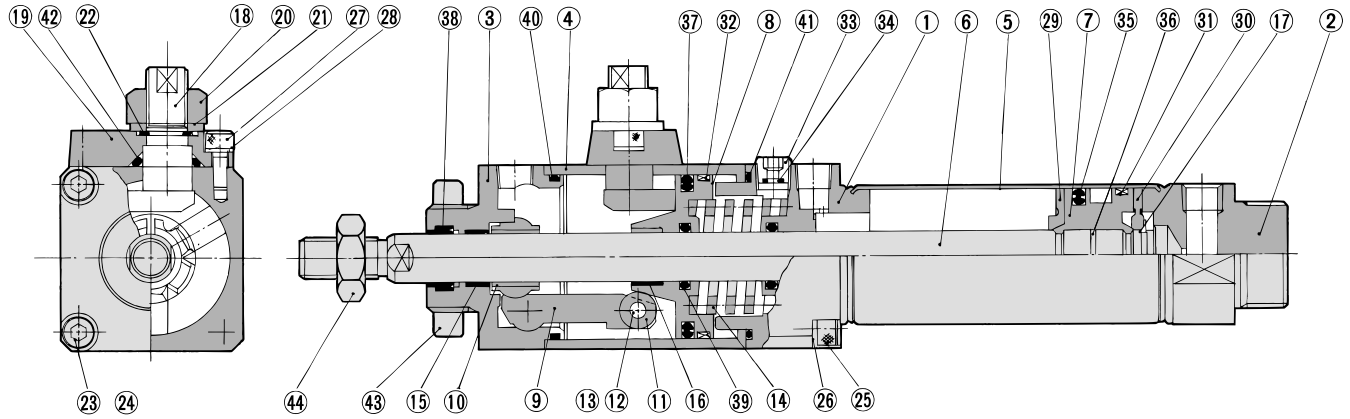
Caution when Locking

Holding force is the force which can hold a static load, given no vibration or impact in a locked state. Therefore, do not use cylinders around the maximum holding force. Note the following points.

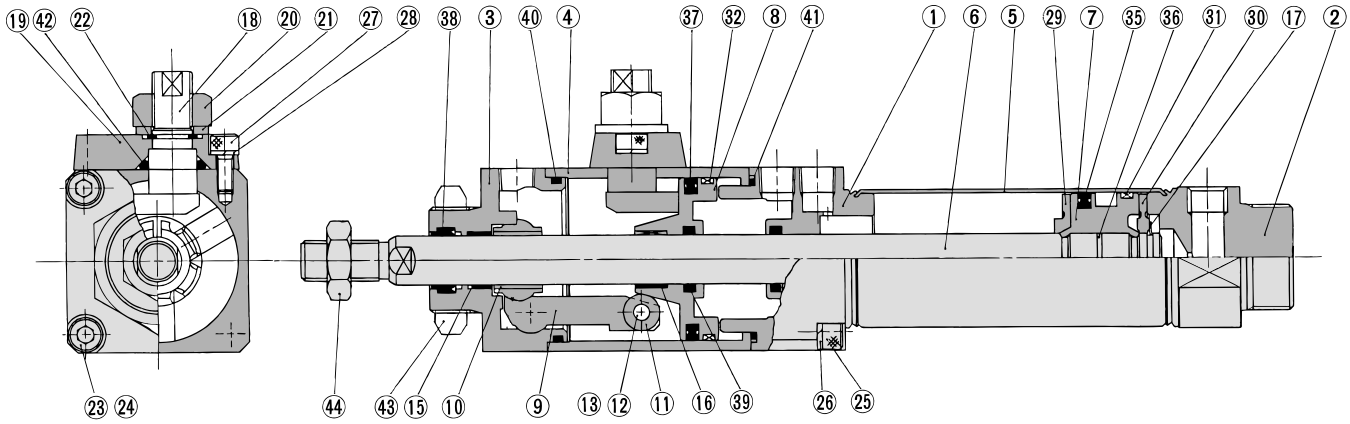
- If the piston rod slips because the lock's holding force has been exceeded, the brake shoe could be damaged, resulting in a reduced holding force or shortened life.
- Do not use the cylinder in the locked state to sustain a load that involves impact.
- To use the lock for drop prevention purposes, the load to be attached to the cylinder must be within 35% of the cylinder's holding force.

Construction (Not able to disassemble)

Spring locking (Exhaust locking)
Spring and pneumatic locking



Pneumatic locking (Pressure locking)



Component Parts

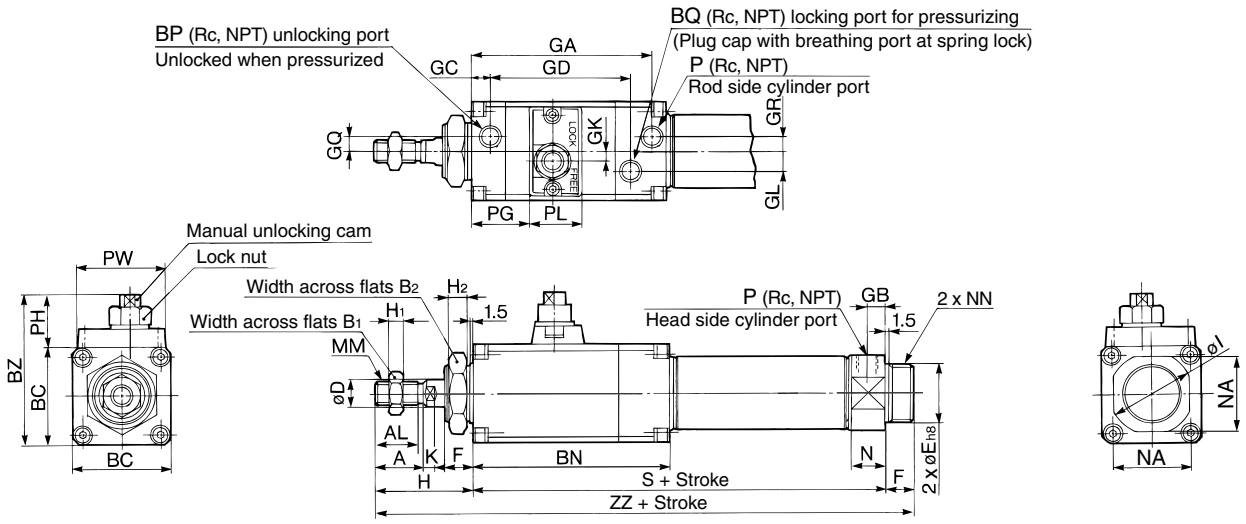
No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cover**	Carbon steel	Nitrided, chrome plated
4	**Intermediate cover**	Aluminum alloy	Hard anodized
5	**Cylinder tube**	Stainless steel	
6	**Piston rod**	Carbon steel	Hard chrome plated
7	**Piston**	Aluminum alloy	Chromated
8	**Brake piston**	Carbon steel	Nitrided
9	**Brake arm**	Carbon steel	Nitrided
10	**Brake shoe**	Special friction material	
11	**Roller**	Carbon steel	
12	**Pin**	Carbon steel	
13	**Retaining ring**	Carbon tool steel	
14	**Brake spring**	Spring steel wire	Anti-corrosive treatment
15	**Bushing**	Oil-impregnated sintered alloy	
16	**Bushing**	Oil-impregnated sintered alloy	
17	**Retaining ring**	Stainless steel	
18	**Manual lock release cam**	Chromium molybdenum steel	Nickel plated
19	**Cam guide**	Carbon steel	Nitrided, painted
20	**Lock nut**	Rolled steel	Nickel plated
21	**Flat washer**	Rolled steel	Nickel plated
22	**Retaining ring**	Carbon tool steel	
23	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated

No.	Description	Material	Note
24	**Spring washer**	Steel wire	Nickel plated
25	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated
26	**Spring washer**	Steel wire	Nickel plated
27	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated
28	**Spring washer**	Steel wire	Nickel plated
29	**Bumper A**	Urethane	
30	**Bumper B**	Urethane	
31	**Wear ring**	Resin	
32	**Wear ring**	Resin	
33	**Hexagon socket head plug**	Carbon steel	Type E only
34	**Element**	Bronze	Type E only
35	**Piston seal**	NBR	
36	**Piston gasket**	NBR	
37	**Brake piston seal**	NBR	
38	**Rod seal A**	NBR	
39	**Rod seal B**	NBR	
40	**Middle cover gasket A**	NBR	
41	**Middle cover gasket B**	NBR	
42	**Cam gasket**	NBR	
43	**Mounting nut**	Carbon steel	Nickel plated
44	**Rod end nut**	Carbon steel	Nickel plated

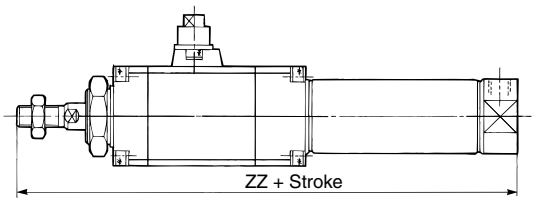
Basic Style (B)

CLM2B Bore size — Stroke

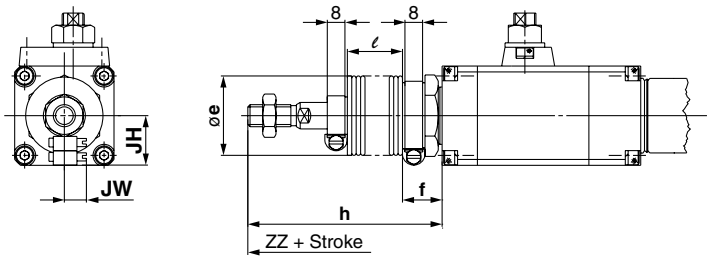
Standard style



Boss-cut style



With rod boot



(mm)

Bore (mm)	Stroke range	A	AL	B1	B2	BC	BN	BP	BQ	BZ	D	E	F	GA	GB	GC	GD	GK	GL	GQ	GR	H	H1	H2	I
20	Up to 300	18	15.5	13	26	38	80	1/8	1/8	57.5	8	$20^{0}_{-0.033}$	13	73.5	8	8	55	3.5	6	4	4	41	5	8	28
25	Up to 300	22	19.5	17	32	45	90	1/8	1/8	69	10	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7	7	45	6	8	33.5
32	Up to 300	22	19.5	17	32	45	90	1/8	1/8	69	12	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7	7	45	6	8	37.5
40	Up to 300	24	21	22	41	52	100.5	1/8	1/8	76	14	$32^{0}_{-0.039}$	16	90.5	11	8	70	4	11	8	7	50	8	10	46.5

(mm)

Bore (mm)	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	ZZ
20	5	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	127	181
25	5.5	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	137	195
32	5.5	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	139	197
40	7	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	167	233

Boss-cut

Bore (mm)	ZZ
20	168
25	182
32	184
40	217

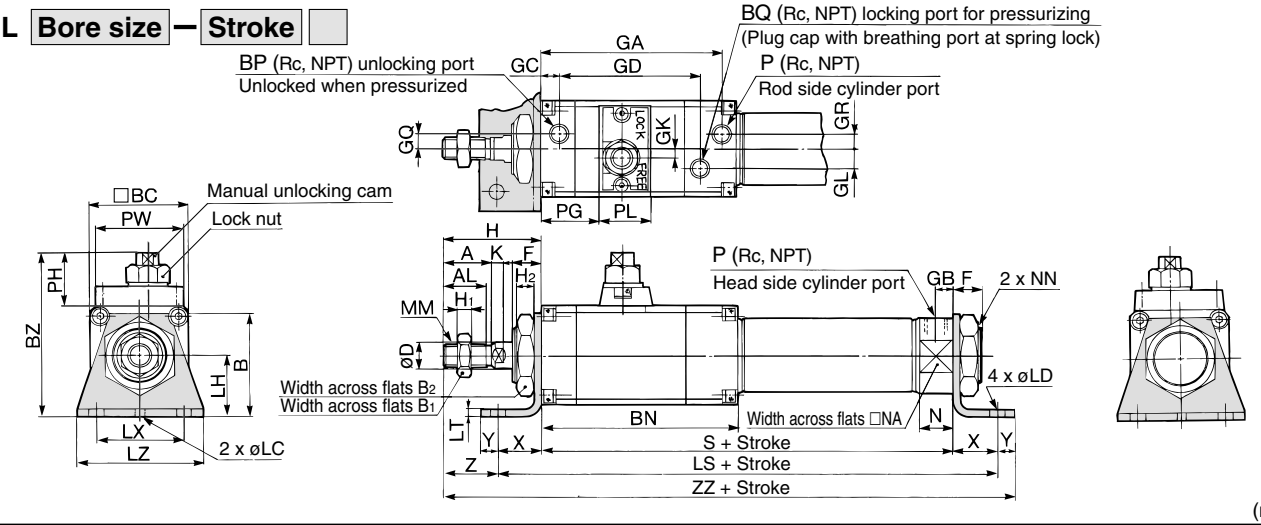
With Rod Boot

(mm)

Bore (mm)	e	f	h					ℓ					ZZ					JH	JW
			1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	(Reference)	(Reference)
20	36	17	68	81	93	106	131	12.5	25	37.5	50	75	208	221	233	246	271	23.5	10.5
25	36	17	72	85	97	110	135	12.5	25	37.5	50	75	222	232	247	260	285	23.5	10.5
32	36	17	72	85	97	110	135	12.5	25	37.5	50	75	224	237	249	262	287	23.5	10.5
40	46	19	77	90	102	115	140	12.5	25	37.5	50	75	260	273	285	298	323	23.5	10.5

Axial Foot Style (L)

CLM2L **Bore size** — **Stroke** □



(mm)

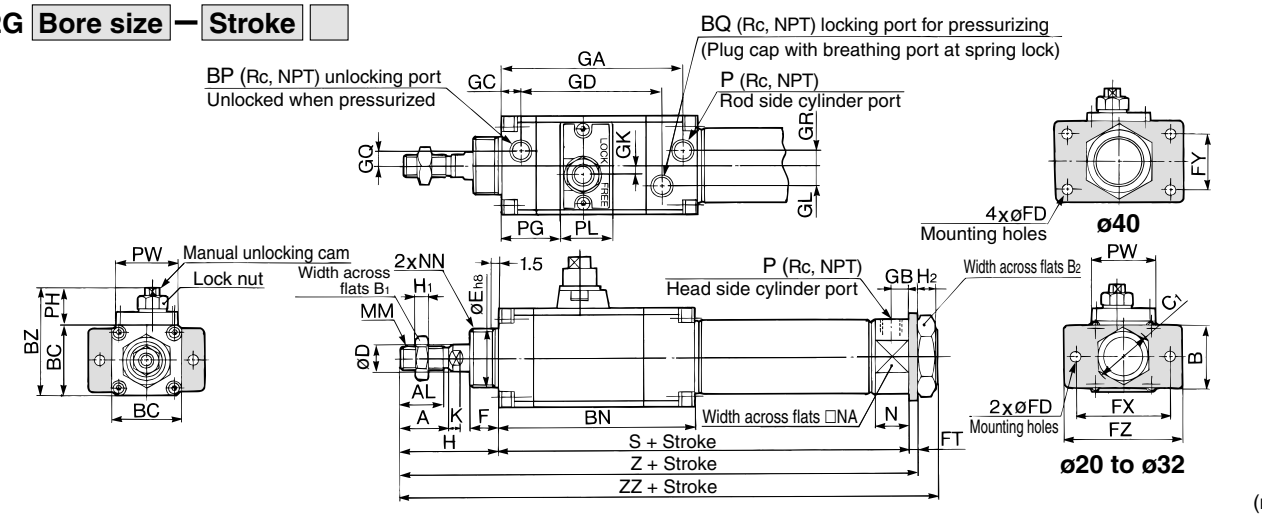
Bore (mm)	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	D	F	GA	GB	GC	GD	GK	GL	GQ	GR	H	H_1	H_2
20	Up to 400	18	15.5	40	13	26	38	80	1/8	1/8	63.5	8	13	73.5	8	8	55	3.5	6	4	4	41	5	8
25	Up to 450	22	19.5	47	17	32	45	90	1/8	1/8	74.5	10	13	83.5	8	9	64.5	4	9	7	7	45	6	8
32	Up to 450	22	19.5	47	17	32	45	90	1/8	1/8	74.5	12	13	83.5	8	9	64.5	4	9	7	7	45	6	8
40	Up to 500	24	21	54	22	41	52	100.5	1/8	1/8	80	14	16	90.5	11	8	70	4	11	8	7	50	8	10

(mm)

Bore (mm)	K	LC	LD	LH	LS	LT	LX	LZ	MM	N	NA	NN	P	PG	PH	PL	PW	S	X	Y	Z	ZZ
20	5	4	6.8	25	167	3.2	40	55	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	127	20	8	21	196
25	5.5	4	6.8	28	177	3.2	40	55	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	137	20	8	25	210
32	5.5	4	6.8	28	179	3.2	40	55	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	139	20	8	25	212
40	7	4	7	30	213	3.2	55	75	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	167	23	10	27	250

Head Side Flange Style (G)

CLM2G **Bore size** — **Stroke** □



(mm)

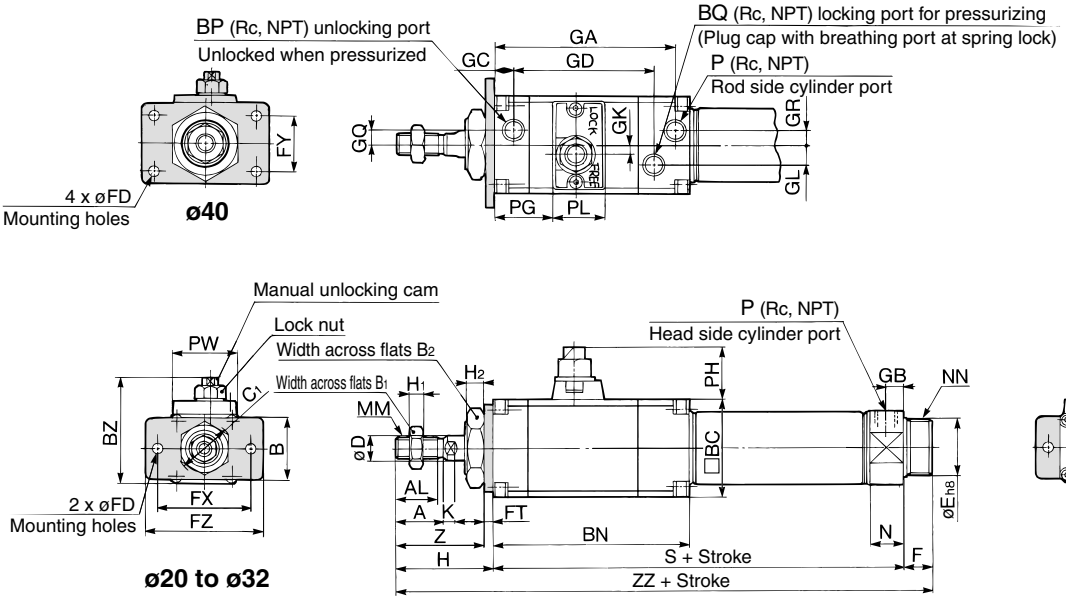
Bore (mm)	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	C_1	D	E	F	FD	FT	FX	FY	FZ	GA	GB
20	Up to 300	18	15.5	34	13	26	38	80	1/8	1/8	57.5	30	8	$20^{0}_{-0.033}$	13	7	4	60	—	75	73.5	8
25	Up to 300	22	19.5	40	17	32	45	90	1/8	1/8	69	37	10	$26^{0}_{-0.033}$	13	7	4	60	—	75	83.5	8
32	Up to 300	22	19.5	40	17	32	45	90	1/8	1/8	69	37	12	$26^{0}_{-0.033}$	13	7	4	60	—	75	83.5	8
40	Up to 300	24	21	52	22	41	52	100.5	1/8	1/8	76	47.3	14	$32^{0}_{-0.039}$	16	7	5	66	36	82	90.5	11

(mm)

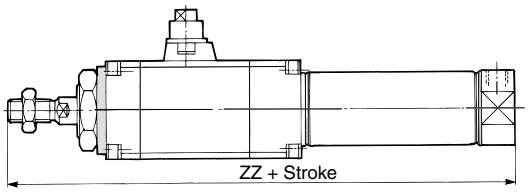
Bore (mm)	GB	GC	GD	GK	GL	GQ	GR	H	H_1	H_2	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	Z	ZZ
20	8	55	3.5	6	4	4	4	41	5	8	5	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	127	172	181
25	9	64.5	4	9	7	7	7	45	6	8	5.5	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	137	186	195
32	9	64.5	4	9	7	7	7	45	6	8	5.5	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	139	188	197
40	8	70	4	11	8	7	7	50	8	10	7	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	167	222	233

Rod Side Flange Style (F)

CLM2F Bore size — Stroke



Boss-cut style



(mm)

Bore (mm)	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	C_1	D	E	F	FD	FT	FX	FY	FZ	GA	GB	GC	GD	GK
20	Up to 400	18	15.5	34	13	26	38	80	1/8	1/8	57.5	30	8	$20^{0}_{-0.033}$	13	7	4	60	—	75	73.5	8	8	55	3.5
25	Up to 450	22	19.5	40	17	32	45	90	1/8	1/8	69	37	10	$26^{0}_{-0.033}$	13	7	4	60	—	75	83.5	8	9	64.5	4
32	Up to 450	22	19.5	40	17	32	45	90	1/8	1/8	69	37	12	$26^{0}_{-0.033}$	13	7	4	60	—	75	83.5	8	9	64.5	4
40	Up to 500	24	21	52	22	41	52	100.5	1/8	1/8	76	47.3	14	$32^{0}_{-0.039}$	16	7	5	66	36	82	90.5	11	8	70	4

(mm)

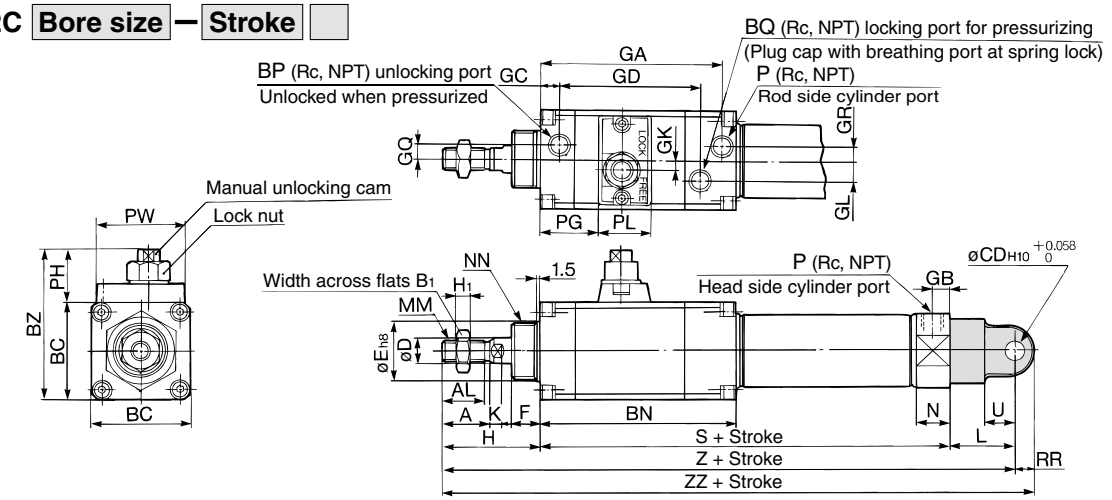
Bore (mm)	GL	GQ	GR	H	H_1	H_2	I	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	Z	ZZ
20	6	4	4	41	5	8	28	5	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	127	37	181
25	9	7	7	45	6	8	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	137	41	195
32	9	7	7	45	6	8	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	139	41	197
40	11	8	7	50	8	10	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	167	45	233

Boss-cut

Bore (mm)	ZZ
20	168
25	182
32	184
40	217

Single Clevis Style (C)

CLM2C **Bore size** — **Stroke** □



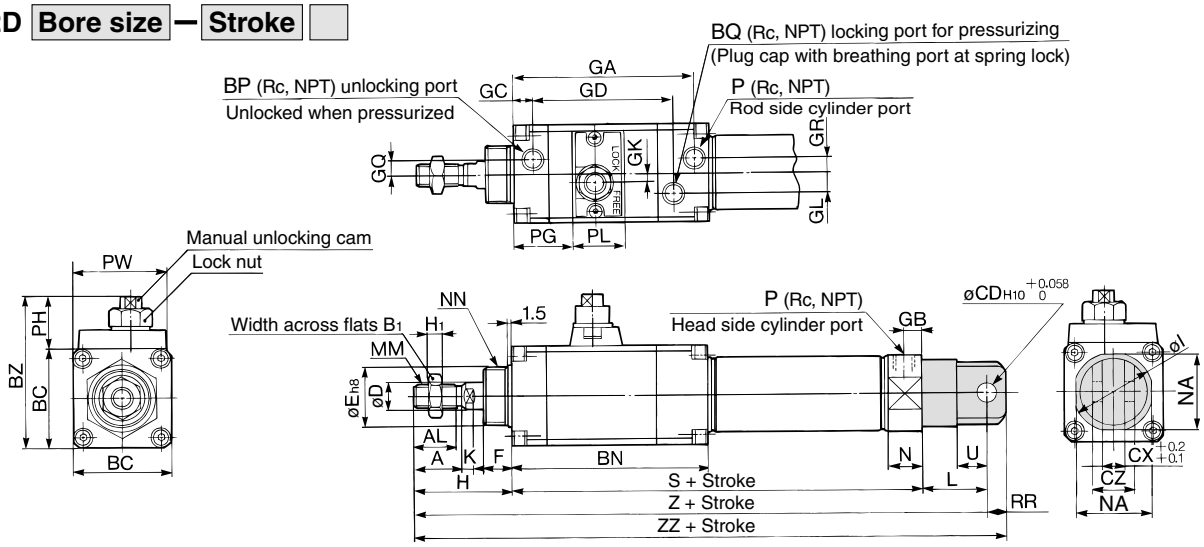
(mm)

Bore (mm)	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	Up to 300	18	15.5	13	38	80	1/8	1/8	57.5	9	10	8	$20^{0}_{-0.033}$	13	73.5	8	8	55	3.5	6	4
25	Up to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	10	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
32	Up to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	12	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
40	Up to 300	24	21	22	52	100.5	1/8	1/8	76	10	15	14	$32^{0}_{-0.039}$	16	90.5	11	8	70	4	11	8

Bore (mm)	GR	H	H1	I	K	L	MM	N	NA	NN	P	PG	PH	PL	PW	RR	S	U	Z	ZZ
20	4	41	5	28	5	30	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	9	127	14	198	207
25	7	45	6	33.5	5.5	30	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	9	137	14	212	221
32	7	45	6	37.5	5.5	30	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	9	139	14	214	223
40	7	50	8	46.5	7	39	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	11	167	18	256	267

Double Clevis Style (D)

CLM2D **Bore size** — **Stroke** □



(mm)

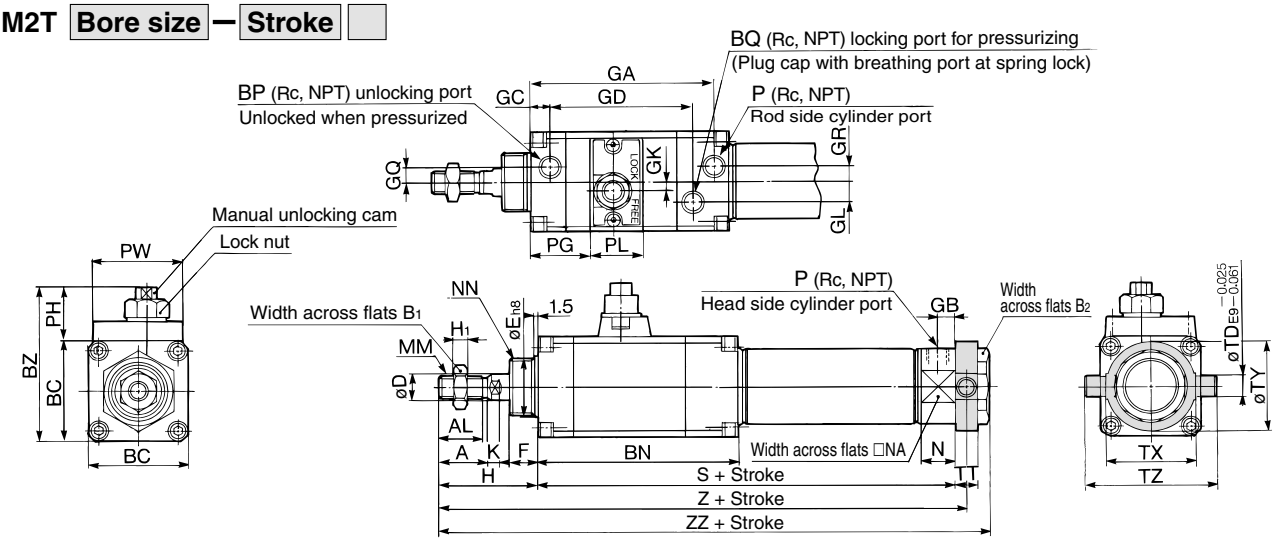
Bore (mm)	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	CZ	D	E	F	GA	GB	GC	GD	GK	GL
20	Up to 300	18	15.5	13	38	80	1/8	1/8	57.5	9	10	19	8	$20^{0}_{-0.033}$	13	73.5	8	8	55	3.5	6
25	Up to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	19	10	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9
32	Up to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	19	12	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9
40	Up to 300	24	21	22	52	100.5	1/8	1/8	76	10	15	30	14	$32^{0}_{-0.039}$	16	90.5	11	8	70	4	11

Bore (mm)	GQ	GR	H	H1	I	K	L	MM	N	NA	NN	P	PG	PH	PL	PW	RR	S	U	Z	ZZ
20	4	4	41	5	28	5	30	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	9	127	14	198	207
25	7	7	45	6	33.5	5.5	30	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	9	137	14	212	221
32	7	7	45	6	37.5	5.5	30	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	9	139	14	214	223
40	8	7	50	8	46.5	7	39	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	11	167	18	256	267

∗ Clevis pin and snap ring (ø40: cotter pin) are shipped together.

Head Side Trunnion Style (T)

CLM2T Bore size — Stroke



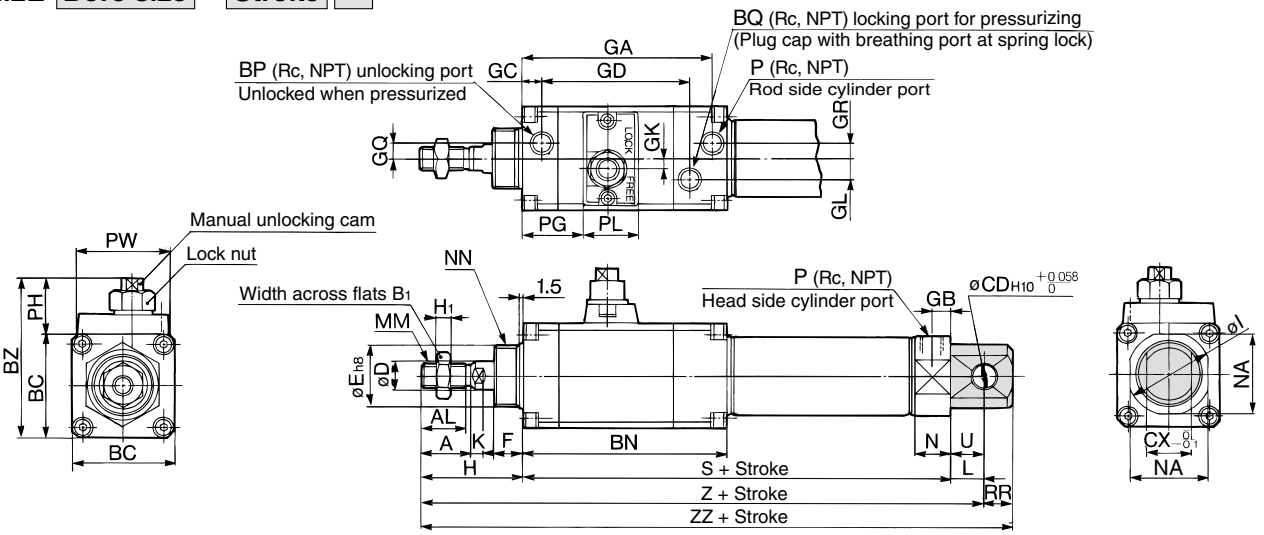
(mm)

Bore (mm)	Stroke range	A	AL	B1	B2	BC	BN	BP	BQ	BZ	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	Up to 300	18	15.5	13	26	38	80	1/8	1/8	57.5	8	$20^{0}_{-0.033}$	13	73.5	8	8	55	3.5	6	4
25	Up to 300	22	19.5	17	32	45	90	1/8	1/8	69	10	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
32	Up to 300	22	19.5	17	32	45	90	1/8	1/8	69	12	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
40	Up to 300	24	21	22	41	52	100.5	1/8	1/8	76	14	$32^{0}_{-0.039}$	16	90.5	11	8	70	4	11	8

Bore (mm)	GR	H	H1	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	TD	TT	TX	TY	TZ	Z	ZZ
20	4	41	5	5	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	127	8	10	32	32	52	173	183
25	7	45	6	5.5	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	137	9	10	40	40	60	187	197
32	7	45	6	5.5	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	139	9	10	40	40	60	189	199
40	7	50	8	7	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	167	10	11	53	53	77	222.5	233

Clevis Integrated Style (E)

CLM2E Bore size — Stroke



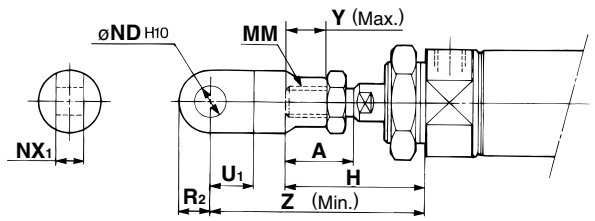
(mm)

Bore (mm)	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	Up to 300	18	15.5	13	38	80	1/8	1/8	57.5	8	12	8	$20^{0}_{-0.033}$	13	73.5	8	8	55	3.5	6	4
25	Up to 300	22	19.5	17	45	90	1/8	1/8	69	8	12	10	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
32	Up to 300	22	19.5	17	45	90	1/8	1/8	69	10	20	12	$26^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
40	Up to 300	24	21	22	52	100.5	1/8	1/8	76	10	20	14	$32^{0}_{-0.039}$	16	90.5	11	8	70	4	11	8

Bore (mm)	GR	H	H1	I	K	L	MM	N	NA	NN	P	PG	PH	PL	PW	RR	S	U	Z	ZZ
20	4	41	5	28	5	12	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	9	127	11.5	180	189
25	7	45	6	33.5	5.5	12	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	9	137	11.5	194	203
32	7	45	6	37.5	5.5	15	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	12	139	14.5	199	211
40	7	50	8	46.5	7	15	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	12	167	14.5	232	244

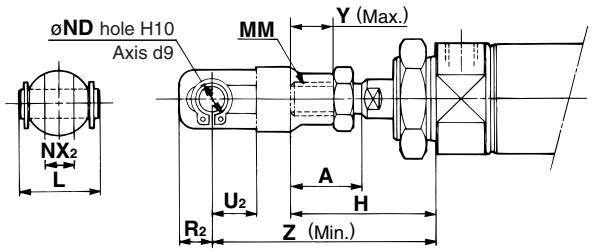
Accessory Bracket Dimensions

Single Knuckle Joint (mm)



Bore size	A	H	MM	ND H10	NX1	U1	R2	Y	Z
20	18	41	M8 x 1.25	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$	14	10	11	66
25, 32	22	45	M10 x 1.25	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$	14	10	14	69
40	24	50	M14 x 1.5	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$	20	14	13	92

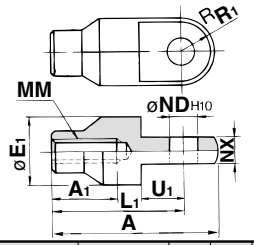
Double Knuckle Joint (mm)



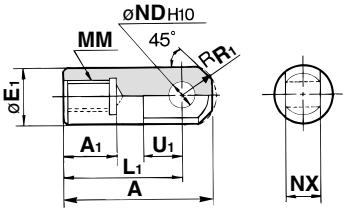
Bore size	A	H	L	MM	ND	NX2	R2	U2	Y	Z
20	18	41	25	M8 x 1.25	9	$9^{+0.2}_{+0.1}$	10	14	11	66
25, 32	22	45	25	M10 x 1.25	9	$9^{+0.2}_{+0.1}$	10	14	14	69
40	24	50	49.7	M14 x 1.5	12	$16^{+0.3}_{+0.1}$	13	25	13	92

Single Knuckle Joint (mm)

I-020B/032B Material: Rolled steel



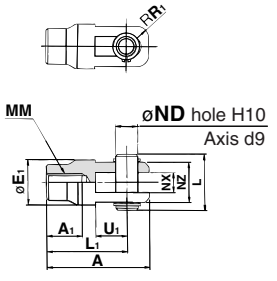
I-040B Material: Free cutting sulfur steel



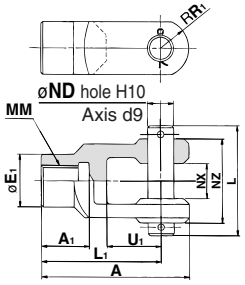
Part no.	Applicable bore size	A	A1	E1	L1	MM	ND H10	NX	R1	U1
I-020B	20	46	16	20	36	M8 x 1.25	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$	10	14
I-032B	25, 32	48	18	20	38	M10 x 1.25	$9^{+0.058}_{0}$	$9^{-0.1}_{-0.2}$	10	14
I-040B	40	69	22	24	55	M14 x 1.5	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$	15.5	20

Double Knuckle Joint (mm)

Y-020B/Y-032B Material: Rolled steel



Y-040B Material: Cast iron



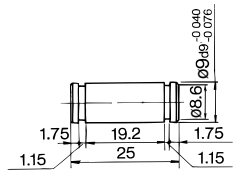
Part no.	Applicable bore size	A	A1	E1	L	L1	MM	ND	NX	NZ	R1	U1	Applicable pin part number	Retaining ring Cotter pin size
Y-020B	20	46	16	20	25	36	M8 x 1.25	9	$9^{+0.2}_{+0.1}$	18	5	14	CDP-1	Type C 9 for axis
Y-032B	25, 32	48	18	20	25	38	M10 x 1.25	9	$9^{+0.2}_{+0.1}$	18	5	14	CDP-1	Type C 9 for axis
Y-040B	40	68	22	24	49.7	55	M14 x 1.5	12	$16^{+0.3}_{+0.1}$	38	13	25	CDP-3	ø3 x 18ℓ

∗ Clevis pin and retaining ring (cotter pin for 40) are attached.

Double Clevis Pin/Material: Carbon steel (mm)

Bore size/ø20, ø25, ø32

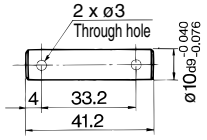
CDP-1



Retaining ring: Type C9 for axis

Bore size/ø40

CDP-2



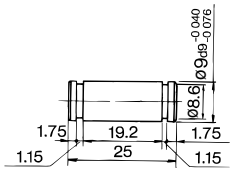
Cotter pin
ø3 x 18ℓ

∗ Retaining rings (cotter pins for ø40) are attached.

Double Knuckle Pin/Material: Carbon steel (mm)

Bore size/ø20, ø25, ø32

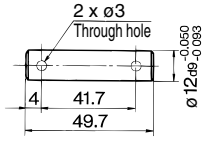
CDP-1



Retaining ring: Type C9 for axis

Bore size/ø40

CDP-3

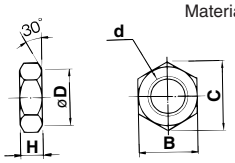


Cotter pin
ø3 x 18ℓ

∗ Retaining rings (cotter pins for ø40) are attached.

Rod End Nut (mm)

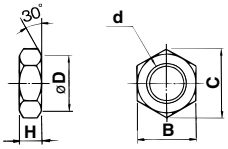
Material: Carbon steel



Part no.	Applicable bore size	B	C	D	d	H
NT-02	**20**	13	15.0	12.5	M8 x 1.25	5
NT-03	**25, 32**	17	19.6	16.5	M10 x 1.25	6
NT-04	**40**	22	25.4	21.0	M14 x 1.5	8

Mounting Nut (mm)

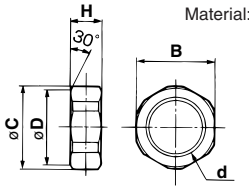
Material: Carbon steel



Part no.	Applicable bore size	B	C	D	d	H
SN-020B	**20**	26	30	25.5	M20 x 1.5	8
SN-032B	**25, 32**	32	37	31.5	M26 x 1.5	8
SN-040B	**40**	41	47.3	40.5	M32 x 2.0	10

Trunnion Nut (mm)

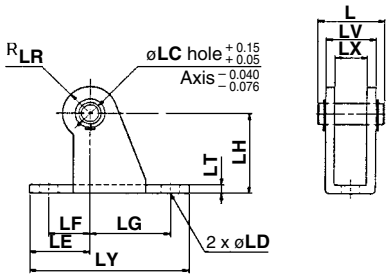
Material: Carbon steel



Part no.	Applicable bore size	B	C	D	d	H
TN-020B	**20**	26	28	25.5	M20 x 1.5	10
TN-032B	**25, 32**	32	34	31.5	M26 x 1.5	10
TN-040B	**40**	41	45	40.5	M32 x 2	10

Clevis Pivot Bracket (For CLM2E) (mm)

Material: Rolled steel plate

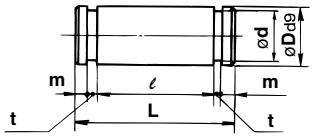


Part no.	Applicable bore size	L	LC	LD	LE	LF	LG	LH	LR	LT	LX	LY	LV	Applicable pin part no.
CM-E020B	**20, 25**	24.5	8	6.8	22	15	30	30	10	3.2	12	59	18.4	CD-S02
CM-E032B	**32, 40**	34	10	9	25	15	40	40	13	4	20	75	28	CD-S03

Note 1) Clevis pins and retaining rings (cotter pins for ø40) are attached.
Note 2) It cannot be used for single clevis style (CM2C) and double clevis style (CM2D).

Clevis Pin (For CLM2E) (mm)

Material: Carbon steel

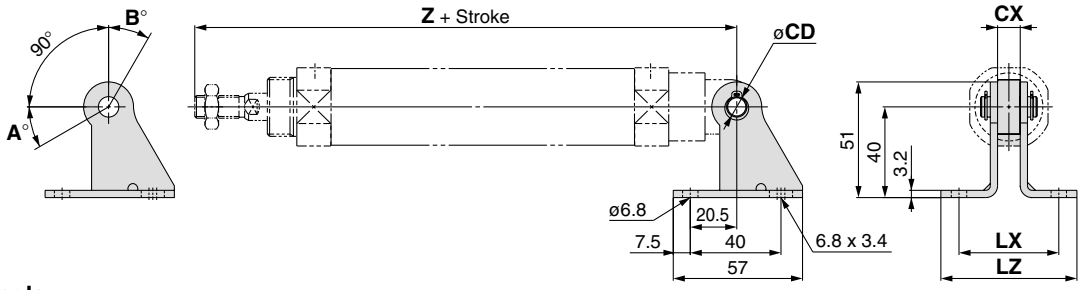


Part no.	Applicable bore size	D_{d9}	d	L	ℓ	m	t	Applicable retaining ring part no.
CD-S02	**20, 25**	$8^{-0.040}_{-0.076}$	7.6	24.5	19.5	1.6	0.9	Type C 8 for axis
CD-S03	**32, 40**	$10^{-0.040}_{-0.076}$	9.6	34	29	1.35	1.15	Type C 10 for axis

Note) Retaining rings are attached.

Regarding mounting bracket, accessory made of stainless steel (Some are not available.), refer to page 1864 for -XB12, External stainless steel cylinder.

Single Clevis



Rotation Angle

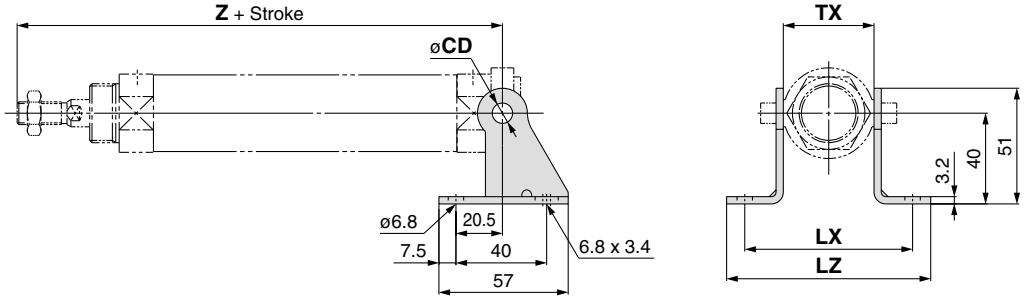
Bore size (mm)	A°	B°	A° + B° + 90°
20	25	85	200
25, 32	21	81	192
40	26	86	202

(mm)

Mounting	Part no.	Applicable bore size	CX	Z + Stroke	CD	LX	LZ
CLM2C (Single clevis style)	CM-B032	**20**	10	198	9	44	60
		25		212			
		32		214			
	CM-B040	**40**	15	256	10	49	65

Note) Pivot brackets do not come with pivot bracket pins and retaining rings.

Head Side Trunnion



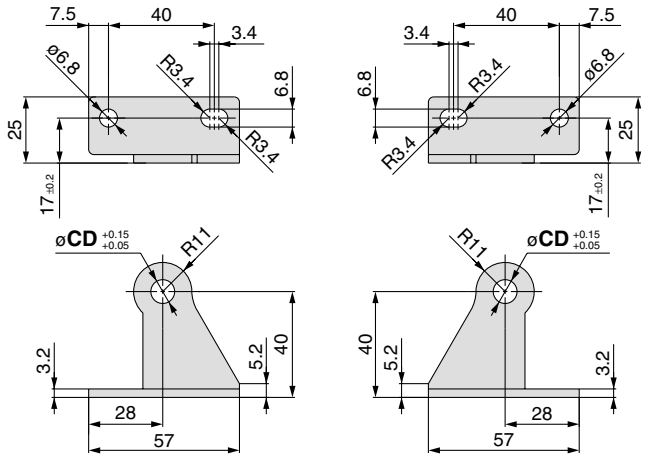
(mm)

Mounting	Part no.	Applicable bore size	TX	Head side trunnion Z + Stroke	CD	LX	LZ
CLM2T (Head side trunnion)	CM-B020	**20**	32	173	8	66	82
	CM-B032	**25**	40	187	9	74	90
		32		189			
	CM-B040	**40**	53	222.5	10	87	103

Note) Pivot brackets do not come with pivot bracket pins and retaining rings.

Pivot Bracket

∗ 2 brackets per set

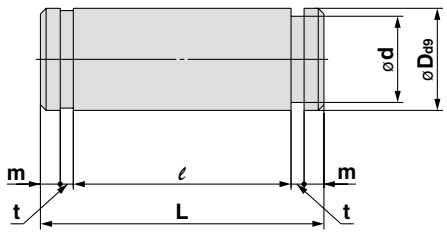


(mm)

Part no.	CD
CM-B020 (2)	8
CM-B032	9
CM-B040	10

Note 1) Pivot brackets do not come with pivot bracket pins and retaining rings.
Note 2) Only for trunnion type

Pivot Bracket Pin (For CM2C)



(mm)

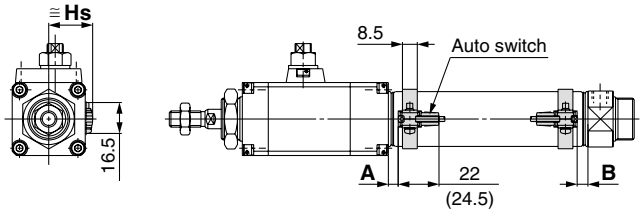
Applicable bore size	Part no.	D_{d9}	d	L	ℓ	m	t	Applicable retaining ring part no.
20 to 32	CDP-1	$9^{-0.040}_{-0.076}$	8.6	25	19.2	1.75	1.15	Type C 9 for axis
40	CD-S03	$10^{-0.040}_{-0.076}$	9.6	34	29	1.75	1.15	Type C 10 for axis

Note) Pivot bracket pins come with retaining rings.

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

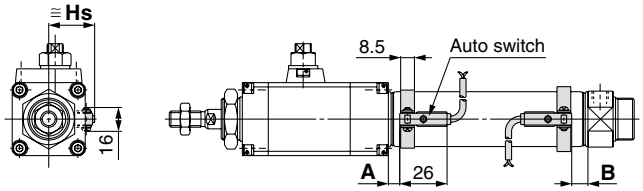
Reed auto switch

D-A9□

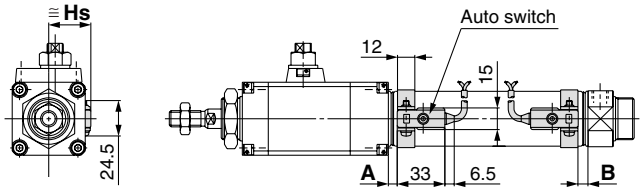


( ): For D-A93

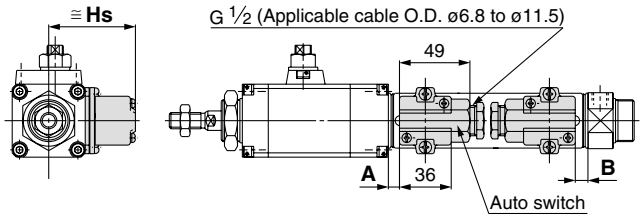
D-C7/C8



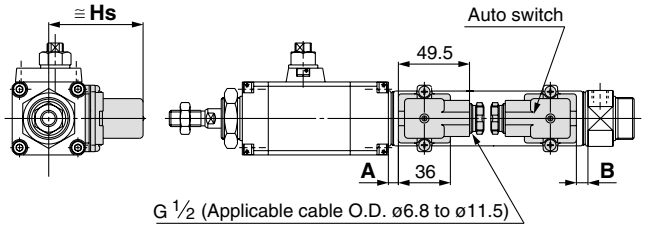
D-B5/B6/B59W



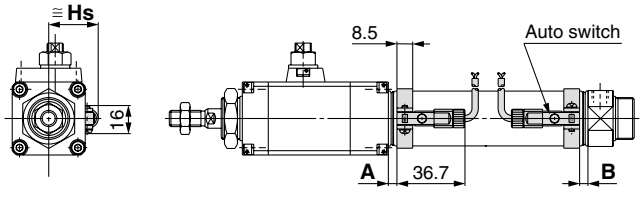
D-A33A/A34A



D-A44A

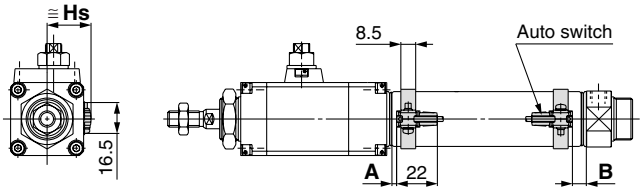


D-C73C/C80C

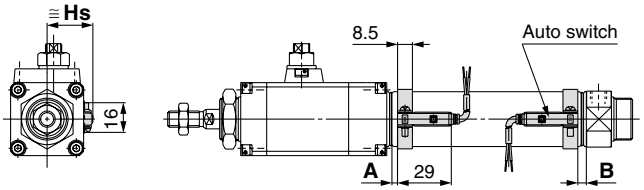


Solid state auto switch

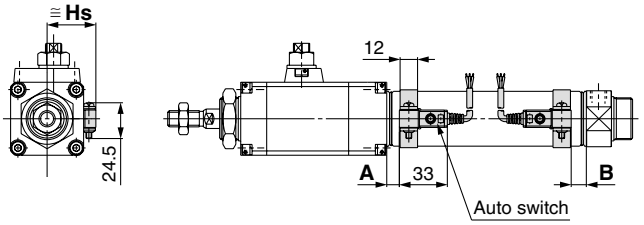
D-M9□
D-M9□W



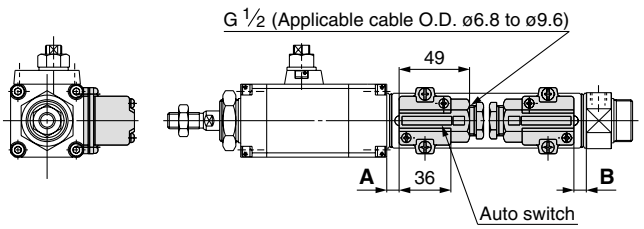
D-H7□/H7□W/H7NF/H7BAL



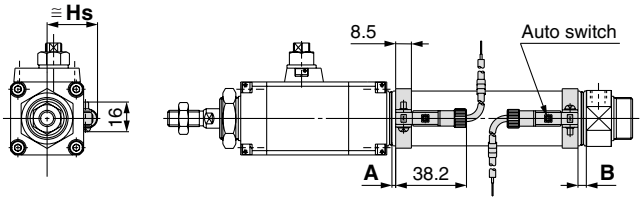
D-G5NTL



D-G39A/K39A



D-H7C



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)	D-A9□		D-M9□ D-M9□W		D-B5□ D-B64		D-C7□ D-C80 D-C73C D-C80C		D-B59W		D-A3□A D-G39A D-K39A D-A44A		D-H7□ D-H7C D-H7□W D-H7BAL D-H7NF		D-G5NTL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	6.5	5.5	10.5	9.5	1	0	7	6	4	3	0.5	0	6	5	2.5	1.5
25	6.5	5.5	10.5	9.5	1	0	7	6	4	3	0.5	0	6	5	2.5	1.5
32	7.5	6.5	11.5	10.5	2	1	8	7	5	4	1.5	0.5	7	6	3.5	2.5
40	13.5	11.5	17.5	15.5	7	6	13	12	10	9	6.5	5.5	12	11	8.5	7.5

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

Auto Switch Mounting Height

(mm)

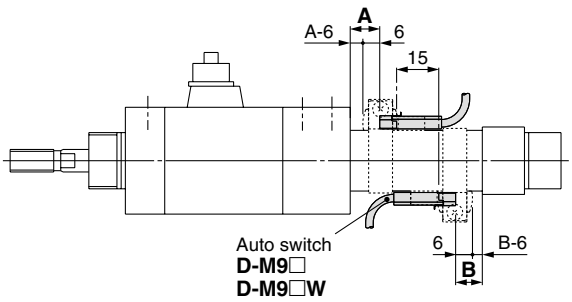
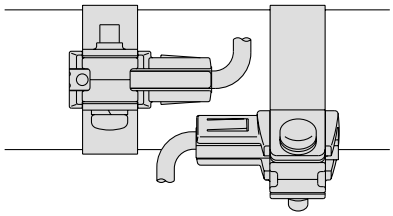
Auto switch model / Bore size (mm)	D-A9□ D-M9□ D-M9□W	D-B5□ D-B64 D-B59W D-G5NTL D-H7C	D-C7□ D-C80 D-H7□ D-H7□W D-H7BAL D-H7NF	D-C73C D-C80C	D-A3□A D-G39A D-K39A	D-A44A
	Hs	Hs	Hs	Hs	Hs	Hs
20	22	25.5	22.5	25	60	69.5
25	24.5	28	25	27.5	62.5	72
32	28	31.5	28.5	31	66	75.5
40	32	35.5	32.5	35	70	79.5

Minimum Auto Switch Mounting Stroke

n: No. of auto switches (mm)

Auto switch model	No. of auto switches mounted				
	1	2		n	
		Different surfaces	Same surface	Different surfaces	Same surface
D-A9□ D-M9□ D-M9□W	10	15 Note 1)	45 Note 1)	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	45 + 45 (n – 2)
D-C7□ D-C80	10	15	50	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 45 (n – 2)
D-H7□ D-H7□W D-H7BAL/H7NF	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	60 + 45 (n – 2)
D-C73C D-C80C D-H7C	10	15	65	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	65 + 50 (n – 2)
D-B5□/B64 D-G5NTL	10	15	75	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	75 + 55 (n – 2)
D-B59W	15	20	75	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	75 + 55 (n – 2)
D-A3□A/G39A D-K39A/A44A	10	35	100	35 + 30 (n – 2)	100 + 100 (n – 2)

Note 1) Auto switch mounting (The adjustment as shown in the figures below is required with the following stroke ranges.)

Auto switch model	With 2 auto switches	
	Different surfaces Note 1)	Same surface Note 1)
	 The proper auto switch mounting position is 6 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	—	45 to less than 50 stroke
D-M9□ D-M9□W	15 to less than 20 stroke	45 to less than 55 stroke

Operating Range

(mm)

Auto switch model	Bore size (mm)			
	20	**25**	**32**	**40**
D-A9□	6	6	6	6
D-M9□ D-M9□W	3.5	3	3.5	3
D-C7□/C80 D-C73C/C80C	7	8	8	8
D-B5□/B64 D-A3□A/A44A	8	8	9	9
D-B59W	12	12	13	13
D-H7□/H7□W/H7BAL D-G5NTL/H7NF	4	4	4.5	5
D-H7C	7	8.5	9	10
D-G39A/K39A	8	9	9	9

* Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)			
	ø20	ø25	ø32	ø40
D-A9□ D-M9□ D-M9□W	① BM2-020 (1) ② BJ3-1	① BM2-025 (1) ② BJ3-1	① BM2-032 (1) ② BJ3-1	① BM2-040 (1) ② BJ3-1
D-C7□/C80 D-C73C/C80C D-H7□ D-H7□W D-H7BAL D-H7NF	BM2-020	BM2-025	BM2-032	BM2-040
D-B5□/B64 D-B59W D-G5NTL D-G5NBL	BA2-020	BA2-025	BA2-032	BA2-040
D-A3□A/A44A D-G39A/K39A	BM3-020	BM3-025	BM3-032	BM3-040

Note 1) Two kinds of auto switch mounting brackets are used as a set.

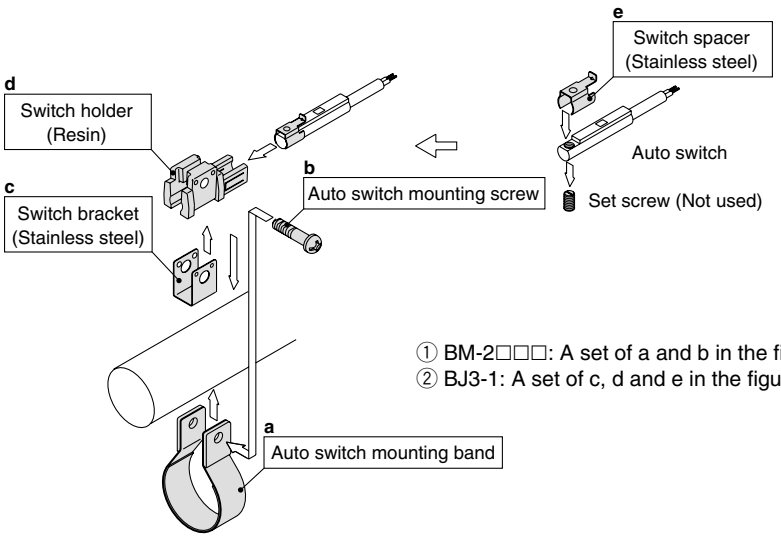
[Mounting screw set made of stainless steel]

The following set of mounting screws made of stainless steel is available. Use it in accordance with the operating environment. (Please order the auto switch mounting bracket separately, since it is not included.)

BBA4: For D-C7/C8/H7 types

Note 2) Refer to page 1814 for the details of BBA4.

D-H7BAL auto switch is set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA4 is attached.



Besides the models listed in How to Order, the following auto switches are applicable.
Refer to pages 1719 to 1827 for the detailed specifications.

Auto switch type	Part no.	Electrical entry (Fetching direction)	Features
Reed	D-B53, C73, C76	Grommet (In-line)	—
	D-C80		Without indicator light
Solid state	D-H7A1, H7A2, H7B		—
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color)
	D-G5NTL		With timer

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.
∗ Wide range detection type, solid state auto switches (D-G5NBL type) are also available. Refer to page 1776 for details.