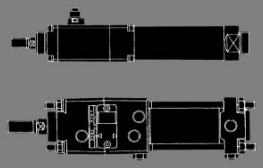


Fine Lock Cylinders
Lock-up Cylinder

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.

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.)

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. (The lock-up cylinder can operate at 50 to 200 mm/s.)

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	9-2-10
Series ***CLM2*** 	Double acting	Single rod	●	●	Both directions	●	●	●	20 25 32 40	25 to 300	9-2-17
Series ***CLG1*** 	Double acting	Single rod	●	●	Both directions	●	●	●	20	25 to 200	9-2-27
									25 32 40	25 to 300	
Lock-up cylinder											
Series ***CL1*** 	Double acting	Single rod	●	●	One direction	●	●	●	40	25 to 500	9-3-1
									50, 63	25 to 600	
									80, 100	25 to 700	
									125, 140 160	Up to 1600	

Fine Lock Cylinders/Lock-up Cylinder
Precautions

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 9-19-3 to 9-19-6.

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. 9-2-6). 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 9-6-113. 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.

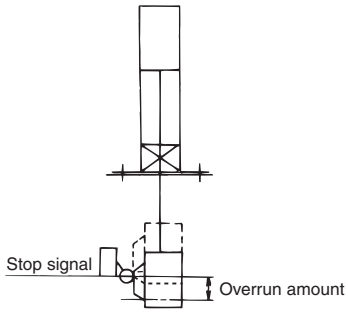
6. To effect an intermediate stop, take the cylinder's stopping precision and overrun amount into consideration.
Because the lock is applied by mechanical means, the piston will not stop immediately in response to a stopping signal, but only after a time lag. This lag determines the amount of the overrun 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. 9-2-12), Series CLM2 (P. 9-2-20), Series CLG1 (P. 9-2-30), and Series CL1 (P. 9-3-2) 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.



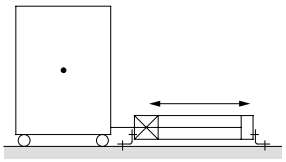
Mounting

⚠ Warning

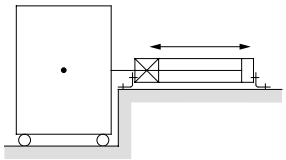
1. Be certain to connect the rod end to the load with the lock released.
- If this is performed with the lock engaged, a load that exceeds the allowable rotational force or holding force would be applied to the piston rod, which could damage the locking mechanism. The fine lock and Series CL1 with ø40 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 9-2-7 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.

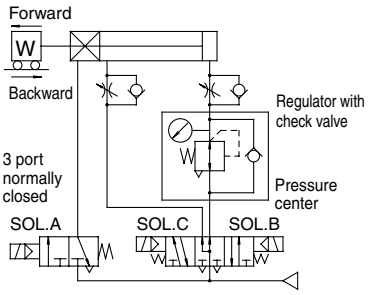
2. Adjust the mounting position of detections such as those of the auto switches. To effect an intermediate stop, adjust the mounting position of the auto switch detection by taking the amount of overrun into consideration in relation to the desired stopping position.

Pneumatic Circuit

⚠ Warning

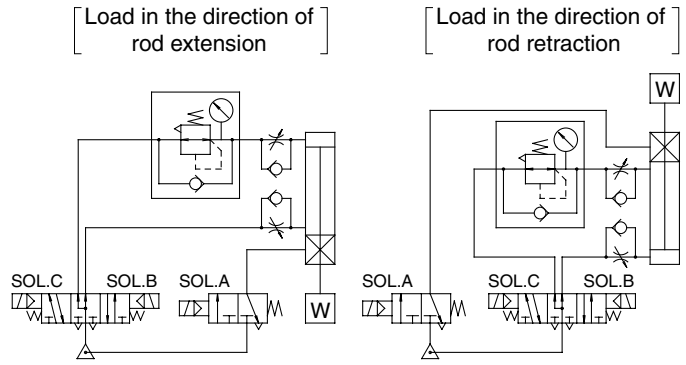
1. **Be certain to use an pneumatic circuit which will apply balancing pressure to both sides of the piston when in a locked stop.**
   In order to prevent cylinder lurching after a lock stop, when restarting or when manually unlocking, a circuit should be used to which will apply balancing pressure 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]



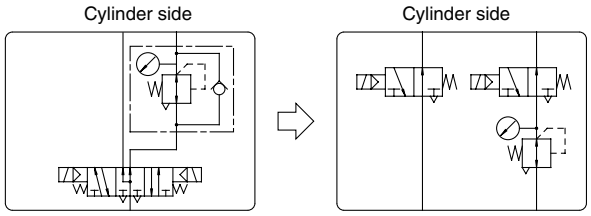
SOL.A	SOL.B	SOL.C	Action	
ON	ON	OFF	Forward	
OFF	OFF	OFF	Locked stop	0.5 s or more
ON	OFF	OFF	Unlocked	0 to 0.5 s
ON	ON	OFF	Forward	
ON	OFF	ON	Backward	
OFF	OFF	OFF	Locked stop	0.5 s or more
ON	OFF	OFF	Unlocked	0 to 0.5 s
ON	OFF	ON	Backward	

2) [Vertical]



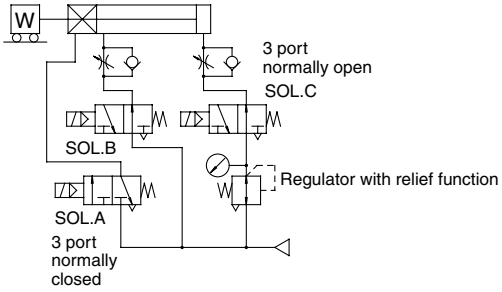
⚠ Caution

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.

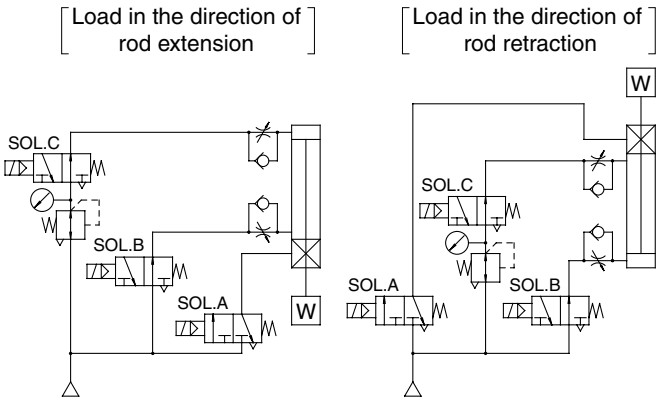


[Example]

1) [Horizontal]



2) [Vertical]



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.

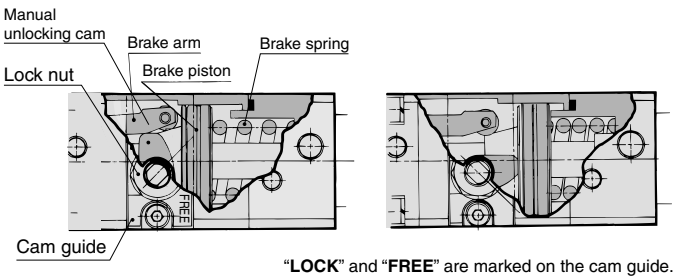
How to Change from Unlocked to Locked State

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.

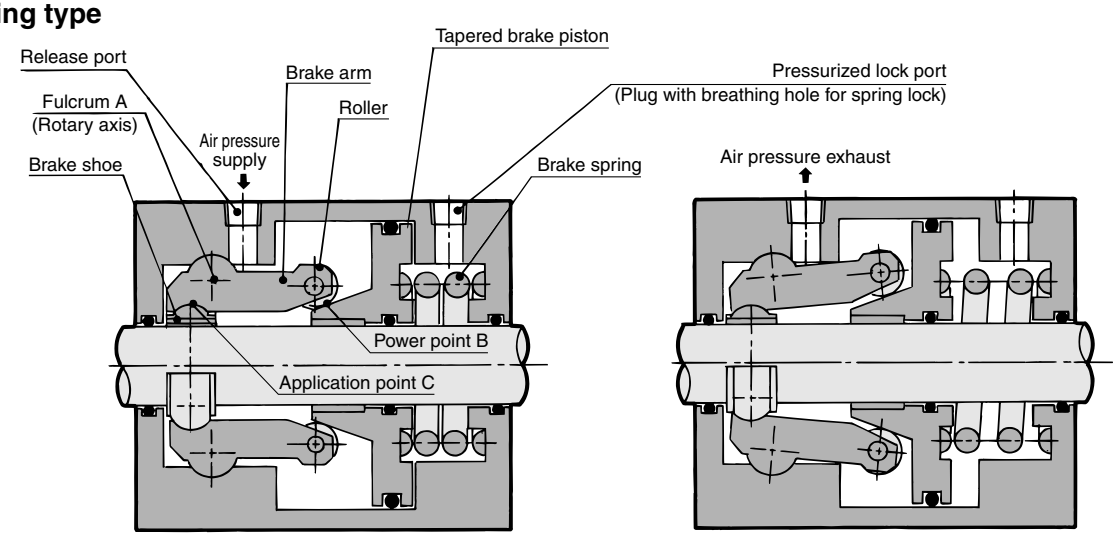
1. Series CLJ2, CLM2, CLG1

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.

Before Operation

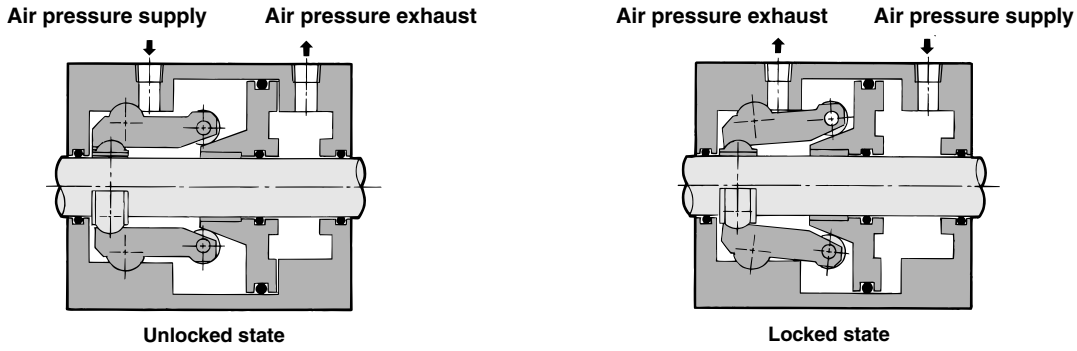
Construction Principle/Applicable Series: CLJ2, CLM2, CLG1, MLGC

Spring locking type



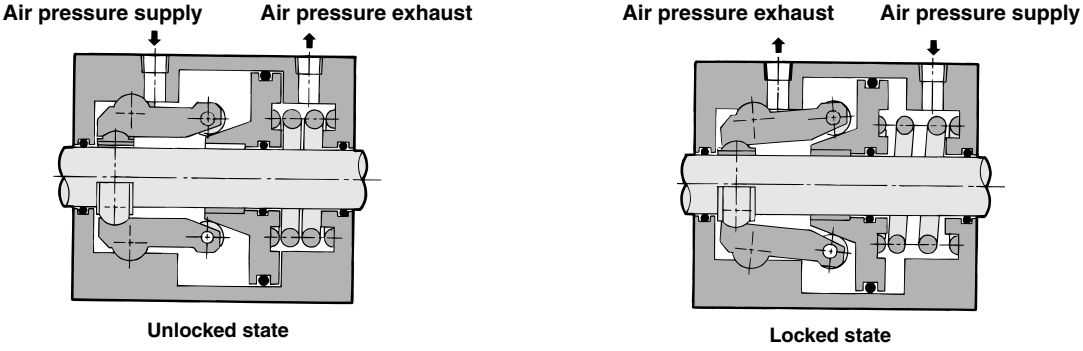
Spring locking (Exhaust locking)
The spring force that is applied to the tapered brake piston becomes amplified through the wedge effect. This force becomes further amplified to the power of AB/AC through the mechanical advantage of a lever and acts on the brake shoe, which in turn, applies a large force 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 CLJ2
ø16

How to Order

Without auto switch CLJ2 **L** **16** — **60** **R** — **E**

With auto switch CDLJ2 **L** **16** — **60** **R** — **E** — **H7BW** **□**

Built-in magnet

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
D	Double clevis style

Bore size

16	16 mm

Standard stroke (mm)

ø16	15, 30, 45, 60, 75, 100, 125, 150, 175, 200

Port location on head cover

Nil	Perpendicular to axis
R	Axial direction

Lock operation

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

Auto switch

Nil	Without auto switch (Built-in magnet)

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

Number of auto switches

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

Applicable Auto Switch/Refer to page 9-15-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**C76**	●	●	—	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	**C73**	●	●	●	—	—	—	Relay, PLC
		Connector					—	**C73C**	●	●	●	●	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**H7A1**	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				**H7A2**	●	●	○	—	○		
				2-wire		12 V		**H7B**	●	●	○	—	○	—	
		Connector						**H7C**	●	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**H7NW**	●	●	○	—	○	IC circuit	
				3-wire (PNP)				**H7PW**	●	●	○	—	○		
				2-wire		12 V		**H7BW**	●	●	○	—	○	—	
	Water resistant (2-color indication)							**H7BA**	—	●	○	—	○		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**H7NF**	●	●	○	—	○	IC circuit	

∗ Lead wire length symbols: 0.5 m ·····Nil (Example) C73C
1 m ·····L (Example) C73CL
5 m ·····Z (Example) C73CZ
None ·····N (Example) C73CN

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

• Since there are other applicable auto switches than listed, refer to page 9-2-16 for details.
• For details about auto switches with pre-wire connector, refer to page 9-15-66.

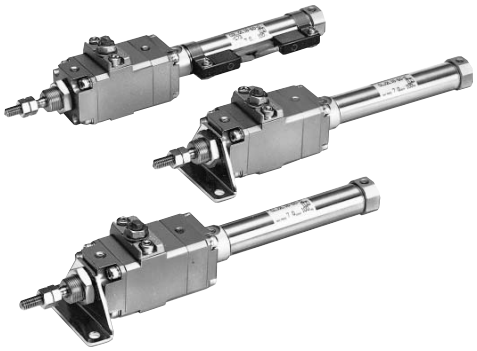
Provided with a compact lock mechanism, it is suitable for intermediate stop, emergency stop, and drop prevention.

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 9-16-1.)

Symbol	Specifications
-XA□	Change of rod end shape

Specifications

Bore size (mm)	16
Action	Double acting, Single rod
Type	Non-lube/Lube
Lock operation	Spring locking (Exhaust locking) Pneumatic locking (Pressure locking) Spring and pneumatic locking
Fluid	Air
Proof pressure	1.05 MPa
Maximum operating pressure	0.7 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)
Piston speed	50 to 500 mm/s *
Cushion	Rubber bumper
Thread tolerance	JIS Class 2
Stroke length tolerance	$^{+1.0}_{0}$
Mounting	Basic style, Axial foot style, Rod side flange style, Double clevis 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		

Standard Stroke

Bore size (mm)	Standard stroke
16	15, 30, 45, 60, 75, 100, 125, 150, 175, 200

Mounting Bracket and Accessory/For details, refer to page 9-2-16.

Mounting		Basic style	Axial foot style	Rod side flange style	Double clevis style
Standard equipment	Mounting nut	●	●	●	—
	Rod end nut	●	●	●	●
	Clevis pin	—	—	—	●
Option	Single knuckle joint	●	●	●	●
	Double knuckle (With pin)	●	●	●	●
	T-bracket	—	—	—	●

Mounting Bracket Part No.

Mounting bracket	Part no.
Foot	CLJ-L016B
Flange	CLJ-F016B
T-bracket *	CJ-T016B

* T-bracket is used with double clevis (D).

Auto Switch Mounting Bracket Part No.

Auto switch mounting bracket no.	Note
BJ2-016	For D-C7/C8/H7

* Mounting screws set made of stainless steel
The following set of mounting screws made of stainless steel is also available. Use it in accordance with the operating environment.
(A switch mounting band is not included, so please order it separately.)
BBA4: For D-C7/C8/H7
"D-H7BAL" switch is set on the cylinder with the stainless steel screws above when shipped. When only a switch is shipped independently, "BBA4" screws are attached.

Minimum Stroke for Auto Switch Mounting

Auto switch mounting style	Auto switch model	No. of auto switches mounted	Minimum cylinder stroke (mm)
Band mounting style	D-C7□ D-C80	2 (Same side)	50
		2 (Different sides)	15
		1	10
	D-H7□ D-H7□W D-H7NF D-H7BAL	2 (Same side)	60
		2 (Different sides)	15
		1	10
	D-C73C D-C80C D-H7C	2 (Same side)	65
		2 (Different sides)	15
		1	10

Weight

(g)

Bore size (mm)		16
Standard weight *		320
Additional weight per each 15 mm of stroke		6.5
Mounting bracket weight	Axial foot style	27
	Rod side flange style	21
	Double clevis style (With pin) **	10

* Mounting nut and rod end nut are included in the basic weight.
** Mounting nut is not included in double clevis style.

Calculation: (Example) CLJ2L16-60
- Basic weight·····320 (ø16)
- Additional weight·····6.5/15 stroke
- Cylinder stroke·····60 stroke

320 + 6.5/15 x 60 + 27 = 373 g

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

Lock type	Piston speed (mm/s)			
	50	100	300	500
Spring locking (Exhaust locking)	±0.4	±0.5	±1.0	±2.0
Pneumatic locking (Pressure locking) Spring and pneumatic locking	±0.2	±0.3	±0.5	±1.5

Condition: Load: 2 kg
Solenoid valve: Lock port mounting

Port Location on Head Cover

Either perpendicular to the cylinder axis or in-line with the cylinder axis is available for basic style.

Axial

Perpendicular

⚠Caution

Recommended Pneumatic Circuit/Caution on Handling

For detailed specifications of the fine lock cylinder, Series CLJ2 mentioned above, refer to pages 9-2-4 to 9-2-7.

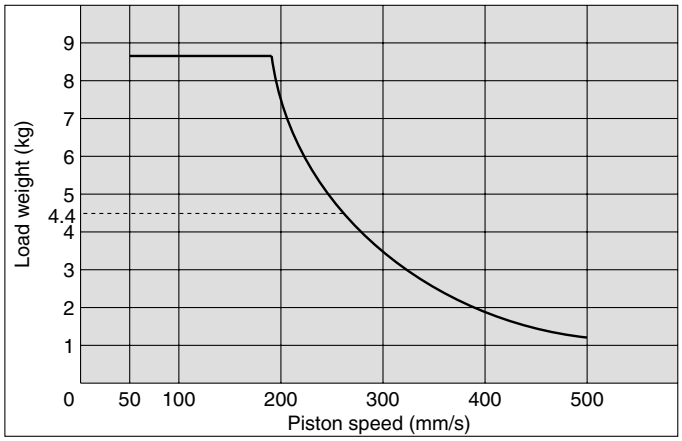
⚠Caution/Allowable Kinetic Energy when Locking

Bore size (mm)	16
Allowable kinetic energy (J)	0.17

1. In terms of specific load conditions, this allowable kinetic energy is equivalent to a load of 3.7 kg in weight, and a piston speed of 300 mm/sec. Therefore, if the operating conditions are below these values, there is no need to calculate.
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 weight (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 relationship between the speed and the load is indicated in the graph below. The area below the line is the allowable kinetic energy range.
5. During locking, the lock mechanism must sustain the thrust of the cylinder, in addition to absorbing the energy of the load. Therefore, 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.

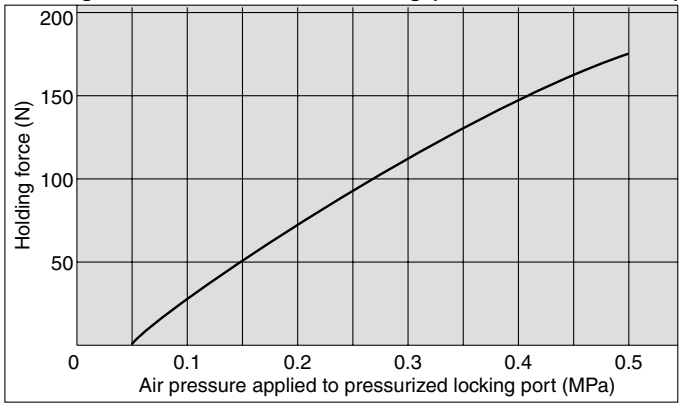


Holding Force of Spring Locking (Maximum static load)

Bore size (mm)	16
Holding force (N)	122

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

Holding Force of Pneumatic Locking (Maximum static load)



⚠Caution

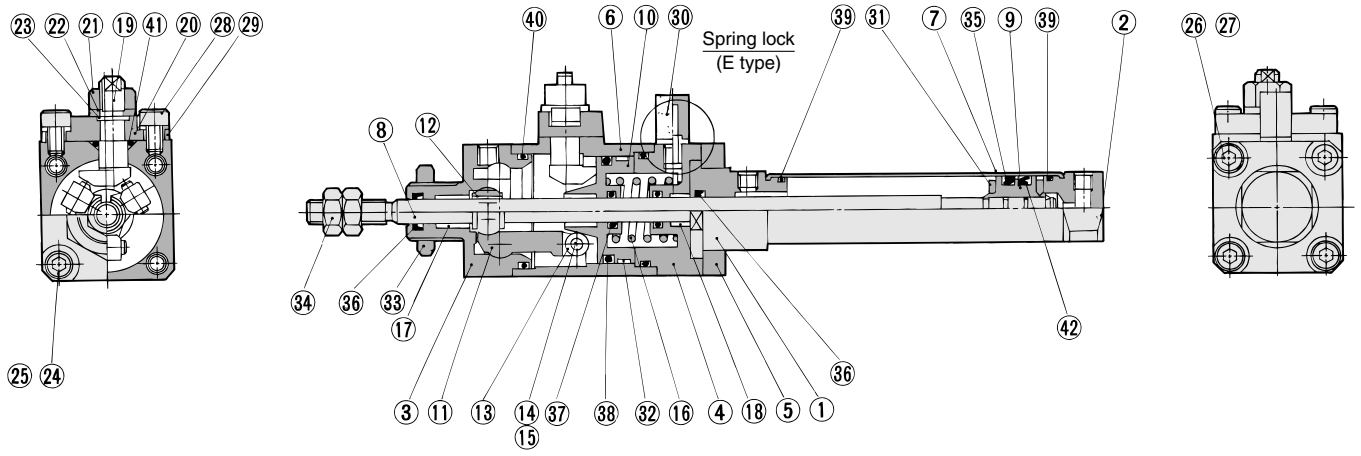
Caution when Locking

The holding force is the lock's ability to hold a static load that does not involve vibrations or impacts, when it is locked without a load. Therefore, when normally using the cylinder near the upper limit of the holding force, be aware of the points described below.

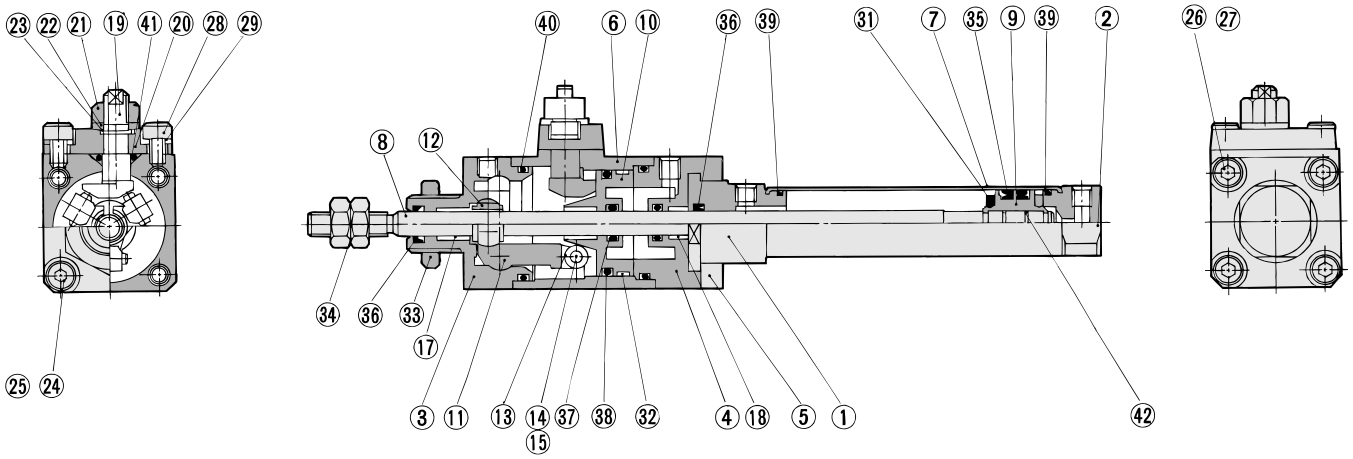
- If the piston rod slips because the lock's holding force has been exceeded, the brake shoe could be damaged, resulting in a reduced holding force or shortened life.
- To use the lock for drop prevention purposes, the load to be attached to the cylinder must be within 35% of the cylinder's holding force.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

Construction (Not able to disassemble.)

Spring locking (Exhaust locking)
Spring and pneumatic locking



Pneumatic locking (Pressure locking)



Component Parts

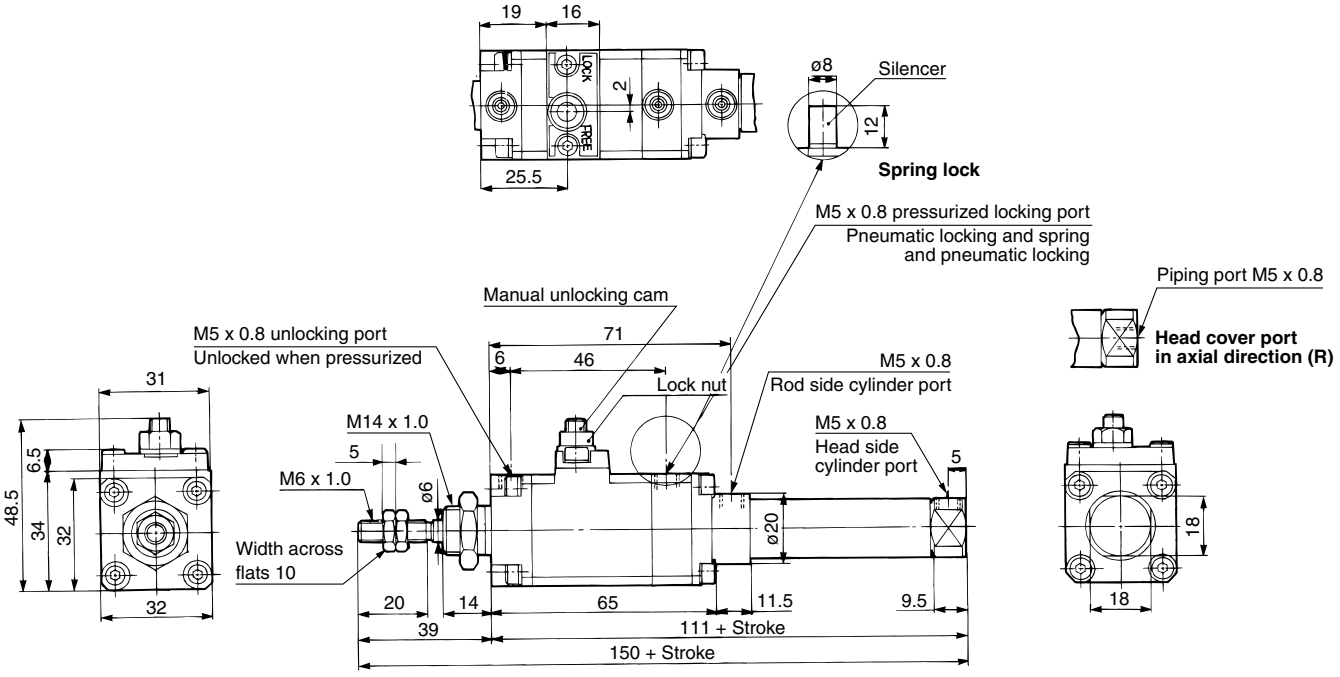
No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Clear anodized
②	Head cover	Aluminum alloy	Clear anodized
③	Cover A	Carbon steel	Nitrided, nickel chrome plated
④	Cover B	Aluminum alloy	Hard anodized
⑤	Cover C	Aluminum alloy	Hard anodized
⑥	Intermediate cover	Aluminum alloy	Hard anodized
⑦	Cylinder tube	Stainless steel	
⑧	Piston rod	Stainless steel	Hard chrome plated
⑨	Piston	Brass	
⑩	Brake piston	Carbon steel	Nitrided
⑪	Brake arm	Carbon steel	Nitrided
⑫	Brake shoe	Special friction material	
⑬	Roller	Carbon steel	Nitrided
⑭	Pin	Carbon steel	Heat treated
⑮	Snap ring	Carbon tool steel	Nickel plated
⑯	Brake spring	Steel wire	Zinc chromated
⑰	Bushing A	Oil-impregnated sintered alloy	
⑱	Bushing B	Oil-impregnated sintered alloy	
⑲	Manual lock release cam	Chromium molybdenum steel	Nitrided
⑳	Cam guide	Carbon steel	Nitrided, platinum silver painted
㉑	Lock nut	Rolled steel	Nickel plated

No.	Description	Material	Note
㉒	Plain washer	Rolled steel	Nickel plated
㉓	Snap ring	Carbon tool steel	Nickel plated
㉔	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉕	Spring washer	Steel wire	Nickel plated
㉖	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉗	Spring washer	Steel wire	Nickel plated
㉘	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉙	Spring washer	Steel wire	Nickel plated
㉚	Silencer	Bronze	Type E only
㉛	Bumper	Urethane	
㉜	Wear ring	Resin	
㉝	Mounting nut	Brass	Nickel plated
㉞	Rod end nut	Rolled steel	Nickel plated
㉟	Piston seal	NBR	
㊱	Rod seal A	NBR	
㊲	Rod seal B	NBR	
㊳	Brake piston seal	NBR	
㊴	Cylinder tube gasket	NBR	
㊵	Intermediate cover gasket	NBR	
㊶	Cam gasket	NBR	
㊷	Piston gasket	NBR	

Series CLJ2

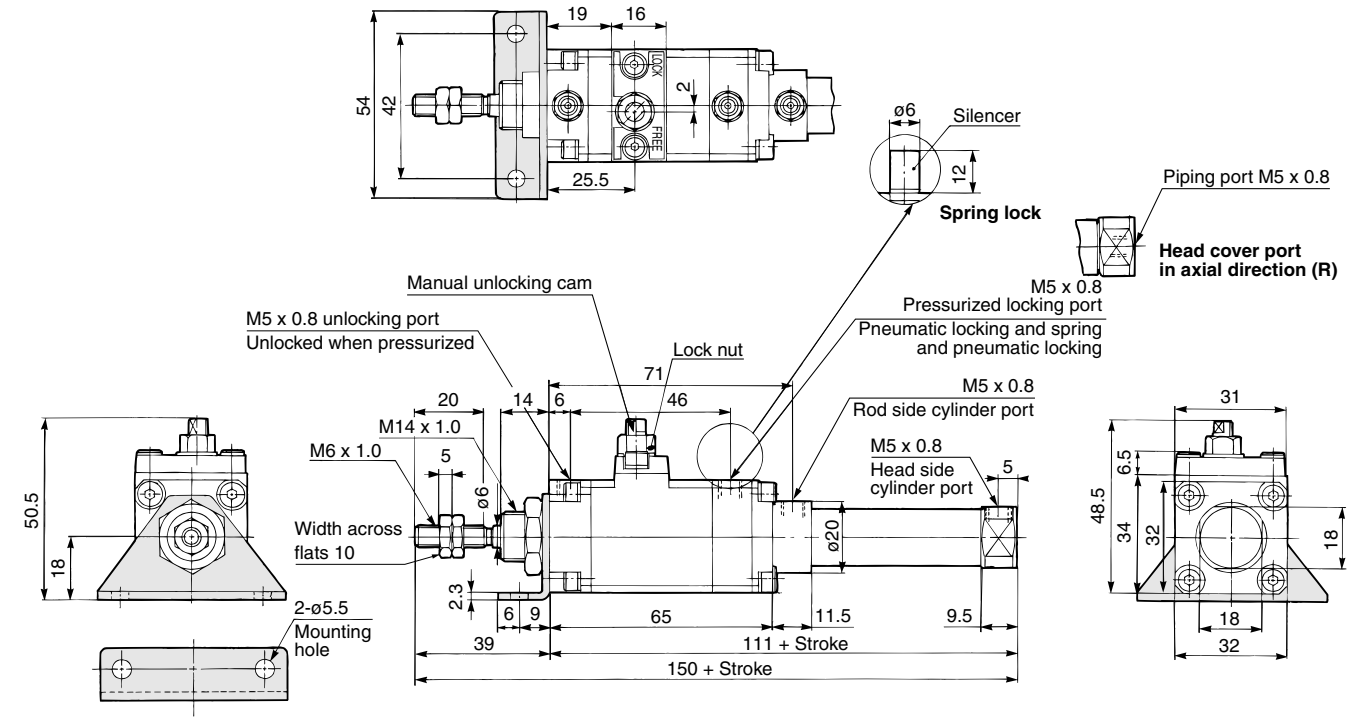
Basic Style (B)

CLJ2B16-□□-$\frac{E}{D}$P



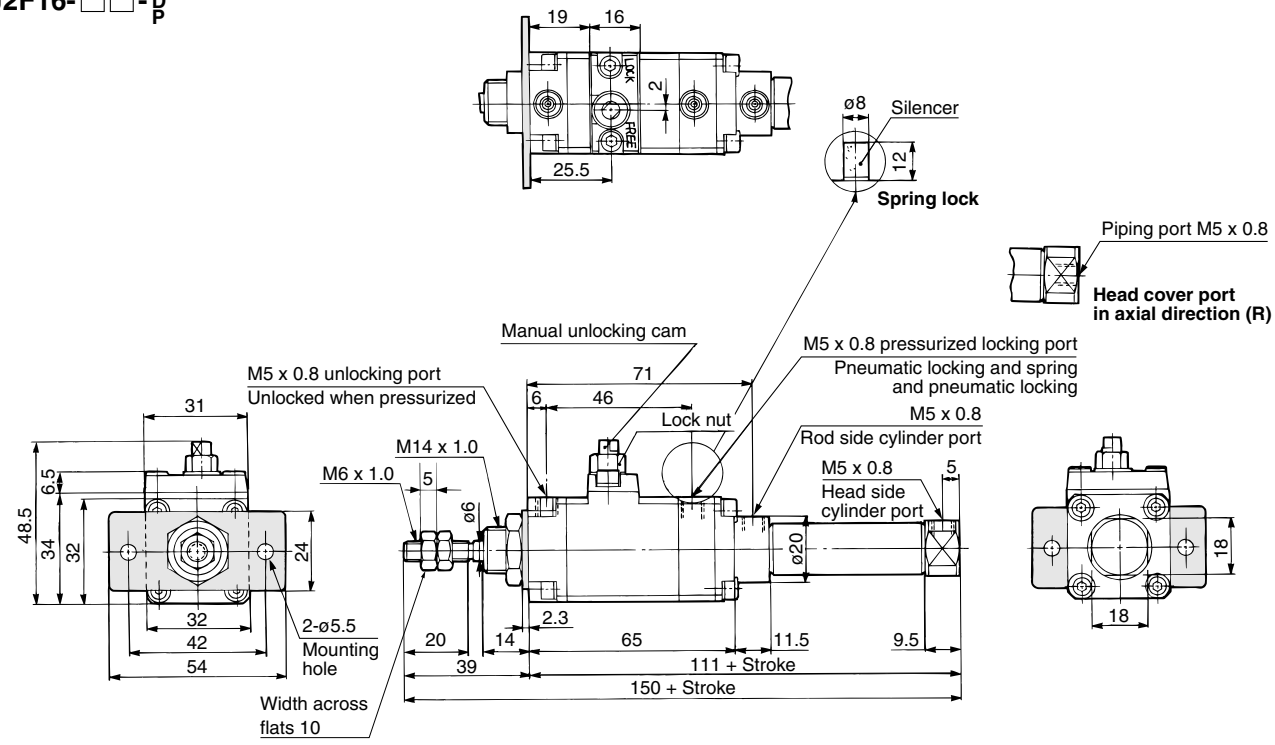
Axial Foot Style (L)

CLJ2L16-□□-$\frac{E}{D}$P



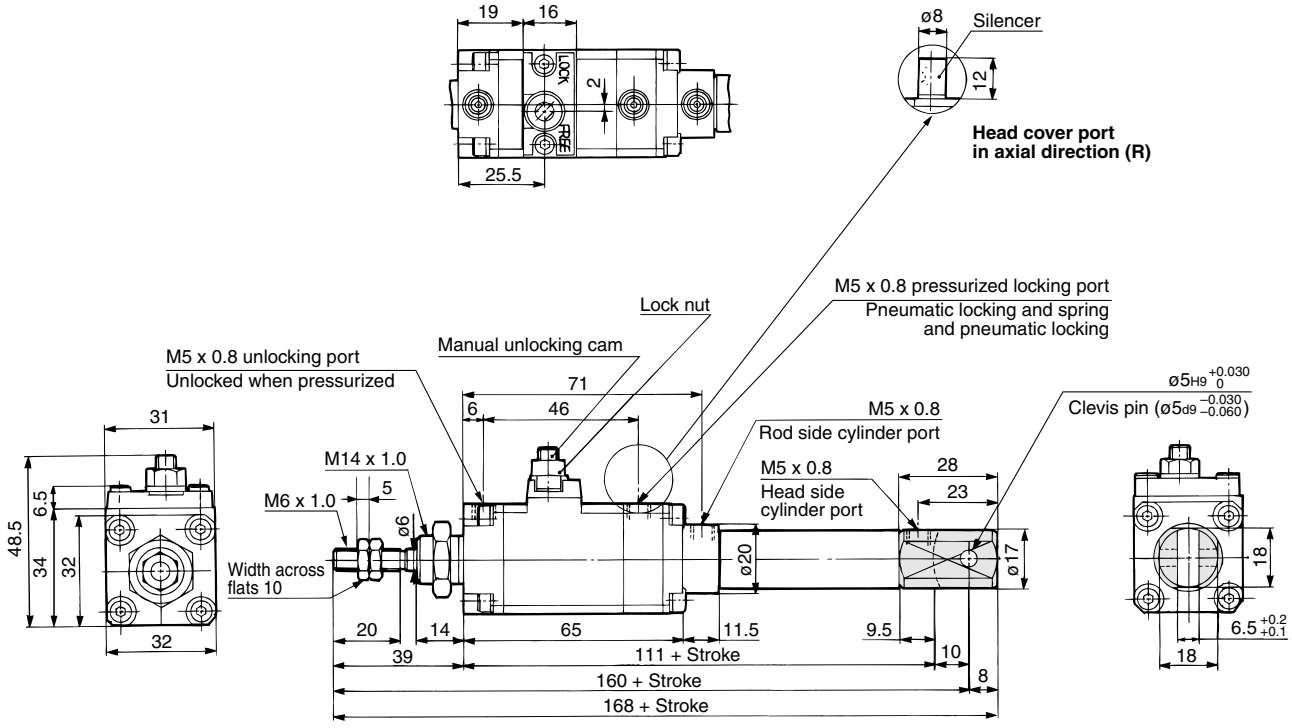
Rod Side Flange Style (F)

CLJ2F16-□□-E/D/P



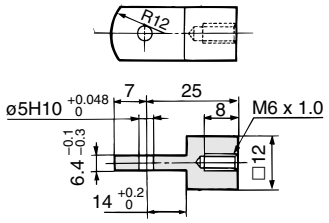
Double Clevis Style (D) * Clevis pin and set ring are shipped together.

CLJ2D16-□□-E/D/P



Accessory Bracket Dimensions

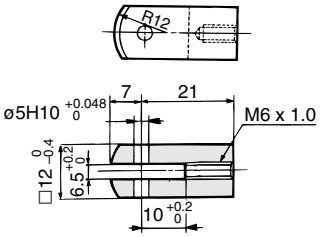
Single Knuckle Joint: I-LJ016B



Material: Rolled steel

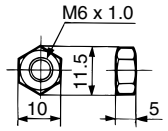
Double Knuckle Joint: Y-LJ016B

∗ Knuckle pin and snap ring are shipped together.



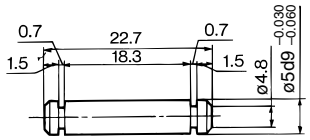
Material: Rolled steel

Rod End Nut: NT-015A



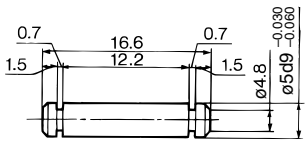
Material: Rolled steel

Clevis Pin: CD-Z015



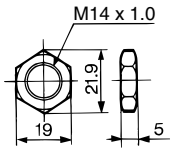
Material: Stainless steel

Knuckle Pin: IY-J015A



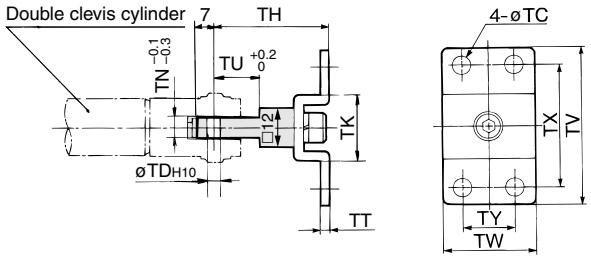
Material: Stainless steel

Mounting Nut: SNLJ-016B



Material: Brass

T-bracket: CJ-T016B



Material: Rolled steel

Part no.	Bore size (mm)	TC	TD_{H10}	TH	TK	TN	TT	TU	TV	TW	TX	TY
CJ-T016B	**16**	5.5	$5\ ^{+0.048}_{0}$	35	20	6.4	2.3	14	48	28	38	16

Regarding the installation position and the mounting height of the auto switch, refer to page of Series CDJ2 air cylinder (Double acting, Single rod), since the dimensions are the same.

Note) Applicable auto switches for Fine lock cylinder Series CLJ2 are the band mounting style only.
Use care that auto switch for rail mounting style is not available.

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

How to Order

Without auto switch CLM2 H L 25 — 100 J — E

With auto switch CDLM2 H L 25 — 100 J — E — H7BW ☐

Built-in magnet

Type

Nil	Pneumatic
H	Air-hydro

Mounting style

B	Basic style	T	Head side trunnion style
L	Axial foot style	E	Clevis integrated style
F	Rod side flange style	BZ	Boss-cut basic style
G	Head side flange style	FZ	Boss-cut flange style
C	Single clevis style		
D	Double clevis style		

Bore size

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

Cylinder stroke (mm)
Refer to "Standard Stroke" on page 9-2-18.

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

Auto switch

Nil	Without auto switch (Built-in magnet)

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

Number of auto switches

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

Applicable Auto Switch/Refer to page 9-15-1 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)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	C76	●	●	—	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V	C73	●	●	●	—	—	—	Relay, PLC
							100 V, 200 V	B54	●	●	●	—	—		
		Connector					—	C73C	●	●	●	●	—		
		Terminal conduit					—	A33A	—	—	—	●	—		
							100 V, 200 V	A34A	—	—	—	●	—		
		DIN terminal						A44A	—	—	—	●	—		
	Diagnostic indication (2-color indication)	Grommet				—	—	B59W	●	●	—	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	H7A1	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				H7A2	●	●	○	—	○		
				2-wire		12 V		H7B	●	●	○	—	○	—	
		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		H7NW	●	●	○	—	○	IC circuit	
				3-wire (PNP)				H7PW	●	●	○	—	○		
				2-wire		12 V		H7BW	●	●	○	—	○	—	
	Water resistant (2-color indication)							H7BA	—	●	○	—	○		
	With diagnostic output (2-color indication)			3-wire (NPN)		5 V, 12 V		H7NF	●	●	○	—	○	IC circuit	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) C73C
1 m ····· L (Example) C73CL
5 m ····· Z (Example) C73CZ
None ····· N (Example) C73CN

∗ Solid state switches marked with "○" are produced upon receipt of order.
∗ 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, refer to page 9-2-20 for details.
• For details about auto switches with pre-wire connector, refer to page 9-15-66.

Series CLM2

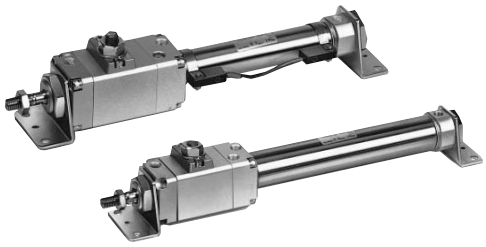
Provided with a compact lock mechanism, it is suitable for intermediate stop, emergency stop, and drop prevention.

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 7-16-1.)

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.

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 *			
Thread tolerance	JIS Class 2			
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 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		

Standard Stroke

Bore size (mm)	Standard stroke (1) (mm)	Long stroke (2) (mm)	Maximum stroke (mm)
20	25, 50, 75, 100, 125, 150, 200, 250, 300	400	1000
25		450	
32		450	
40		500	

Note 1) Intermediate stroke is available, too.
Note 2) The long stroke style is applicable to the axial foot style and the rod side flange style.
For other applications that exceed the mounting support bracket and long stroke limitations, the maximum stroke that can be used is determined by the stroke selection table (reference edition).

Minimum Stroke for Auto Switch Mounting

(mm)

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

Mounting Bracket and Accessory

Accessory / Mounting	Standard equipment			Option			
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double[3] knuckle joint	Clevis[4] pivot bracket	Rod boot
Basic style	● (1pc.)	●	—	●	●	—	●
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]	●	●	●	●	—	●
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 snap ring (ø40: cotter pin) are shipped together with double clevis and double knuckle joint.
Note 4) Pin and snap ring are shipped together with clevis pivot bracket.

Weight

(kg)

Bore size (mm)		20	25	32	40
Basic weight	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 weight 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

Calculation: (Example) CLM2L32-100
- Basic weight····· 1.10 (Foot, ø32)
- Additional weight ···· 0.08/50 stroke
- Cylinder stroke····· 100 stroke

1.10 + 0.08 x 100/50 = 1.26 kg

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)			
	20	25	32	40
D-C7□/C80 D-H7□	BM2-020	BM2-025	BM2-032	BM2-040
D-B5□/B64 D-G5□	BA2-020	BA2-025	BA2-032	BA2-040
D-A3□A/A44A D-G39A/K39A	BM3-020	BM3-025	BM3-032	BM3-040

[Mounting screws set made of stainless steel]
The following set of mounting screws made of stainless steel is also available. Use it in accordance with the operating environment.
(A switch mounting band is not included, so please order it separately.)
BBA3: For D-B5/B6/G5
BBA4: For D-C7/C8/H7
"D-H7BAL" switch is set on the cylinder with the stainless steel screws above when shipped.
When only a switch is shipped independently, "BBA4" screws are attached.

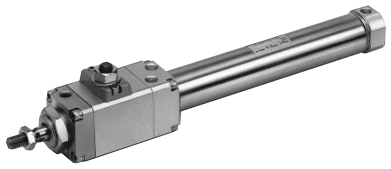
Mounting Bracket Part No.

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 snap 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)	20, 25, 32, 40
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 9-2-22 to 9-2-26 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.

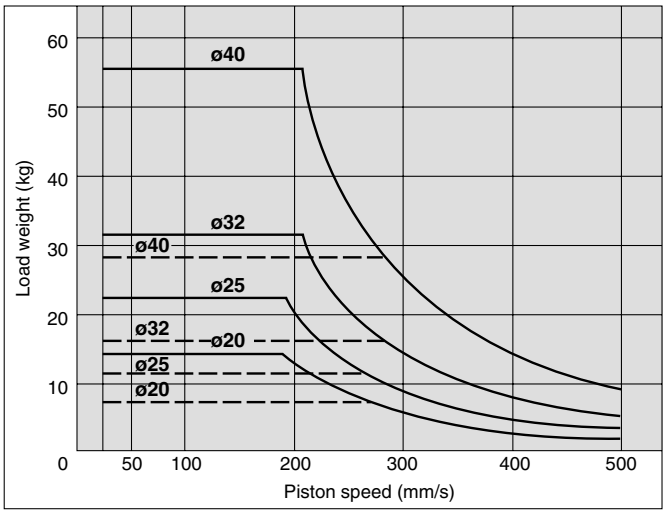
$$Ek = \frac{1}{2} m\upsilon^2$$

Ek: Kinetic energy of load (J)
m: Load weight (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 9-2-4 to 9-2-7.

Accessory

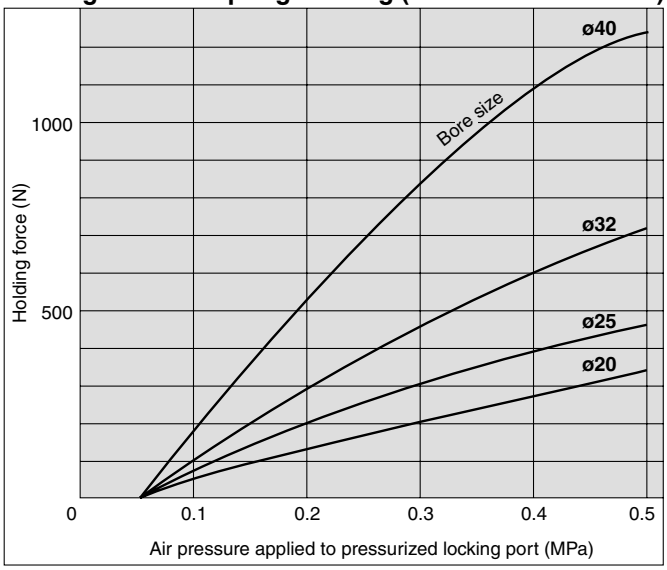
For accessory dimensions, refer to Best Pneumatics Vol. 6, since it is same as Series CM2.

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)



⚠ Caution

Caution when Locking

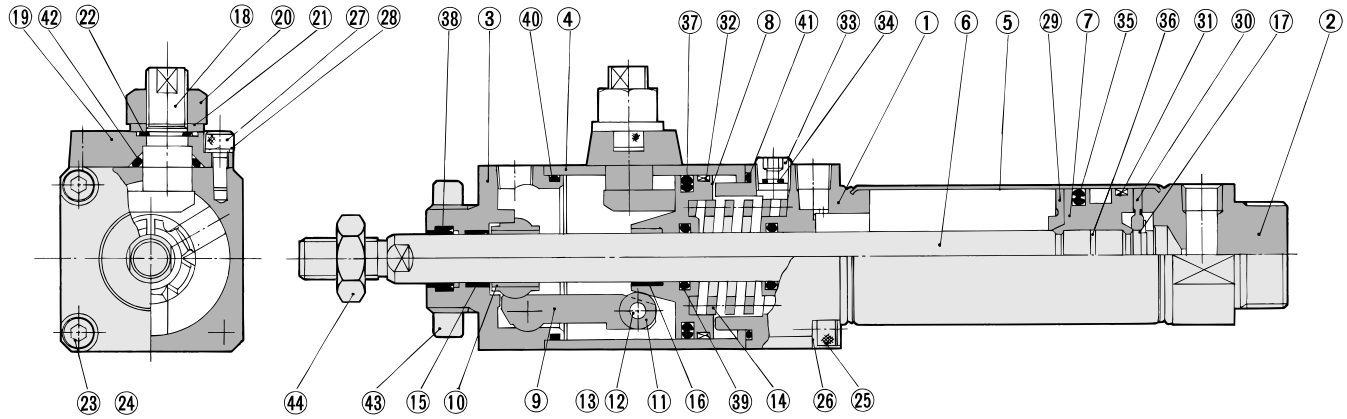
The holding force is the lock's ability to hold a static load that does not involve vibrations or impacts, when it is locked without a load. Therefore, when normally using the cylinder near the upper limit of the holding force, be aware of the points described below.

- 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.

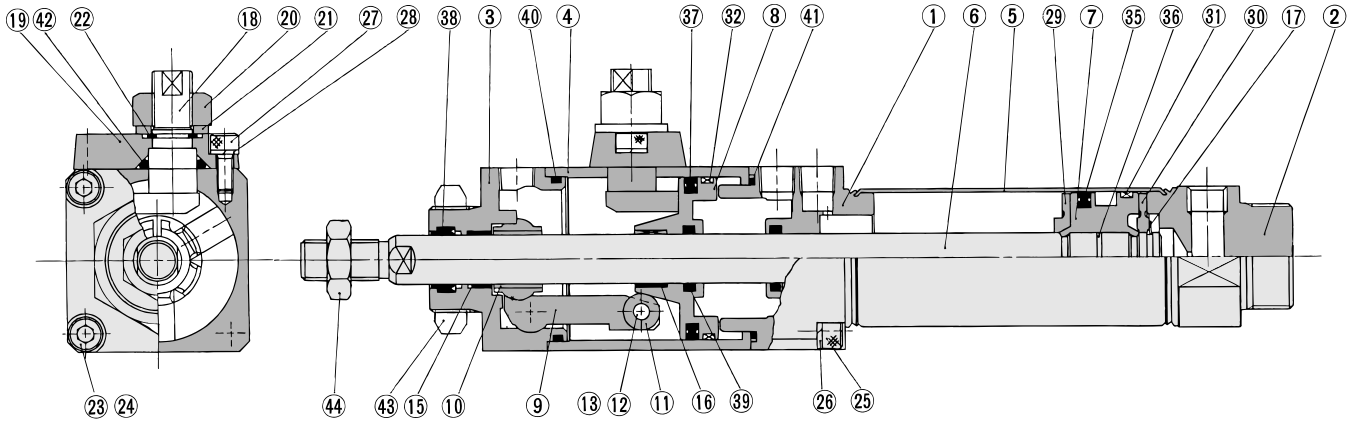
Regarding the installation position and the mounting height of the auto switch, refer to page of Series CDM2 air cylinder (Double acting, Single rod), since the dimensions are the same.

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	Snap ring	Carbon tool steel	Nickel plated
⑭	Brake spring	Spring steel wire	Dacrodized
⑮	Bushing	Oil-impregnated sintered alloy	
⑯	Bushing	Oil-impregnated sintered alloy	
⑰	Snap ring	Carbon tool steel	Nickel plated
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	Snap ring	Carbon tool steel	Nickel plated
㉓	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated

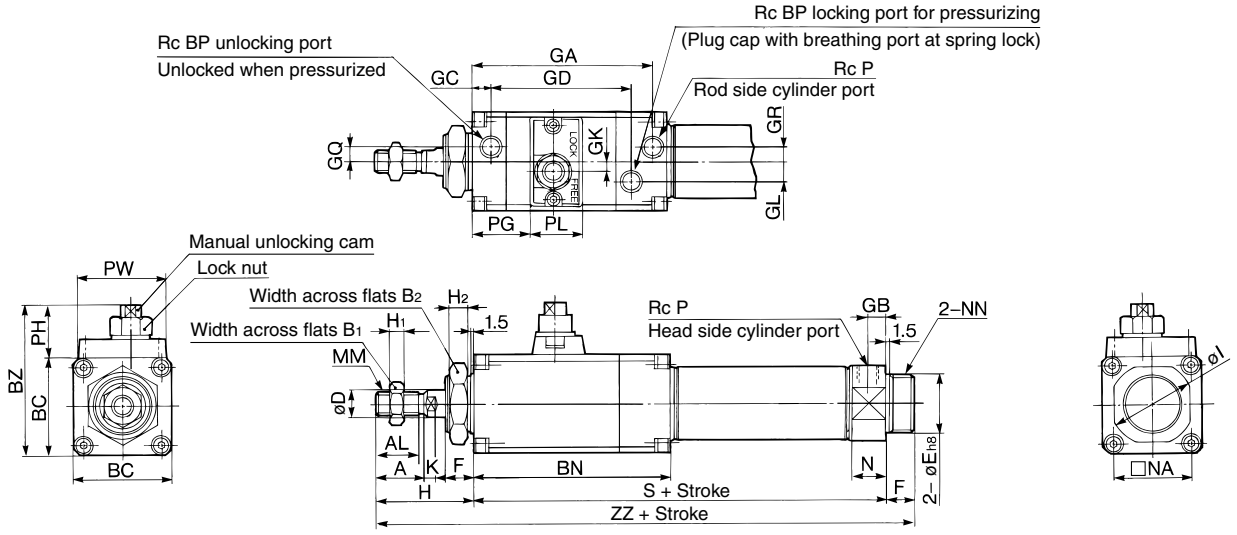
No.	Description	Material	Note
㉔	Spring washer	Steel wire	Nickel plated
㉕	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉖	Spring washer	Steel wire	Nickel plated
㉗	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉘	Spring washer	Steel wire	Nickel plated
㉙	Bumper 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

Series CLM2

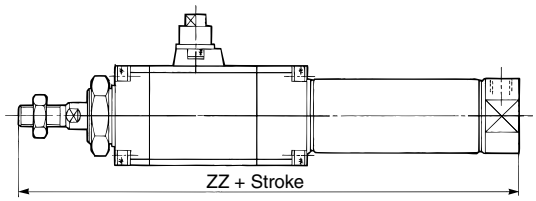
Basic Style (B)

CLM2B Bore size — Stroke

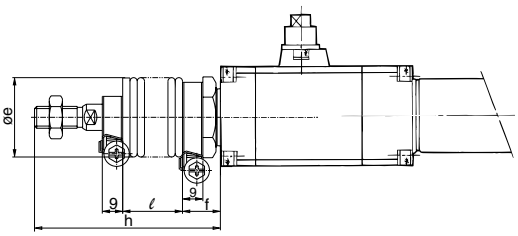
Basic style



Boss-cut



With rod boot



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

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

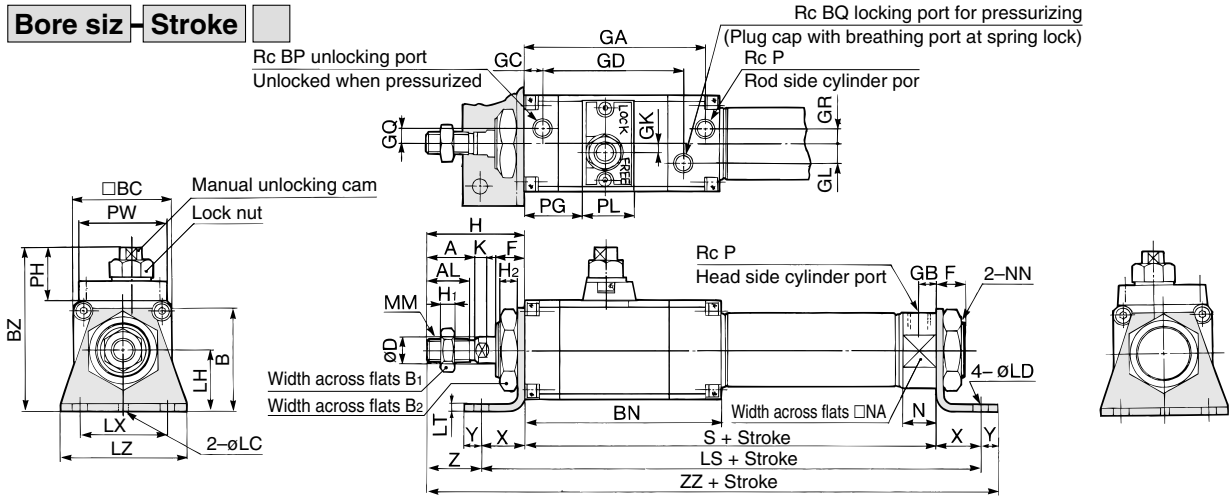
With Rod Boot

Bore size (mm)	e	f	h							ℓ						
			1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500
20	35	17	68	81	93	106	131	156	—	12.5	25	37.5	50	75	100	—
25	35	17	72	85	97	110	135	160	185	12.5	25	37.5	50	75	100	125
32	35	17	72	85	97	110	135	160	185	12.5	25	37.5	50	75	100	125
40	46	17	77	90	102	115	140	165	190	12.5	25	37.5	50	75	100	125

∗ Over 301 stroke: Long stroke.

Axial Foot Style (L)

CLM2L **Bore siz** – **Stroke** ☐

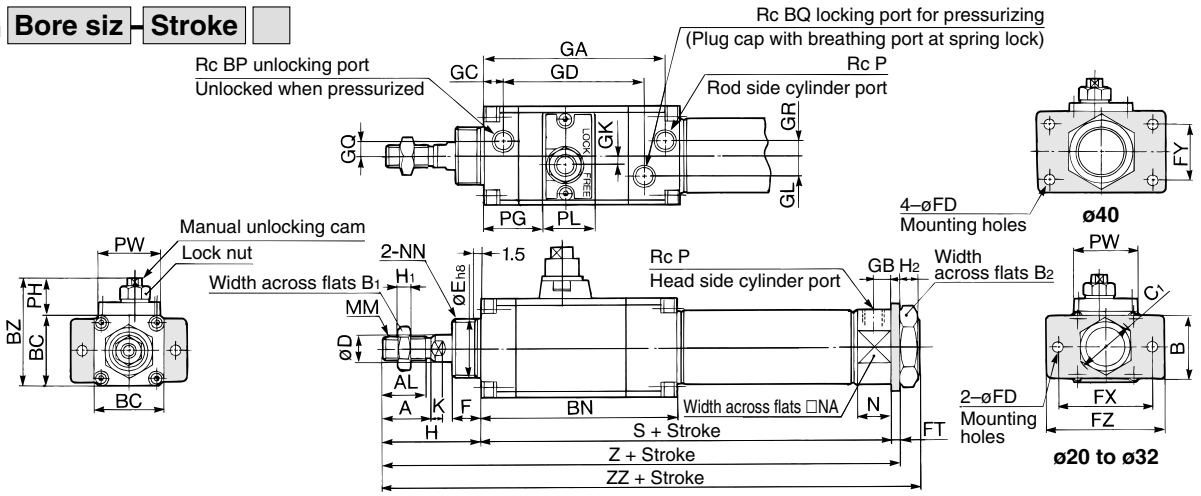


Bore (mm)	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	D	F	GA	GB	GC	GD	GK	GL	GQ	GR	H	H_1	H_2
20	Up to 400	18	15.5	40	13	26	38	80	1/8	1/8	63.5	8	13	73.5	8	8	55	3.5	6	4	4	41	5	8
25	Up to 450	22	19.5	47	17	32	45	90	1/8	1/8	74.5	10	13	83.5	8	9	64.5	4	9	7	7	45	6	8
32	Up to 450	22	19.5	47	17	32	45	90	1/8	1/8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

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 siz** – **Stroke** ☐



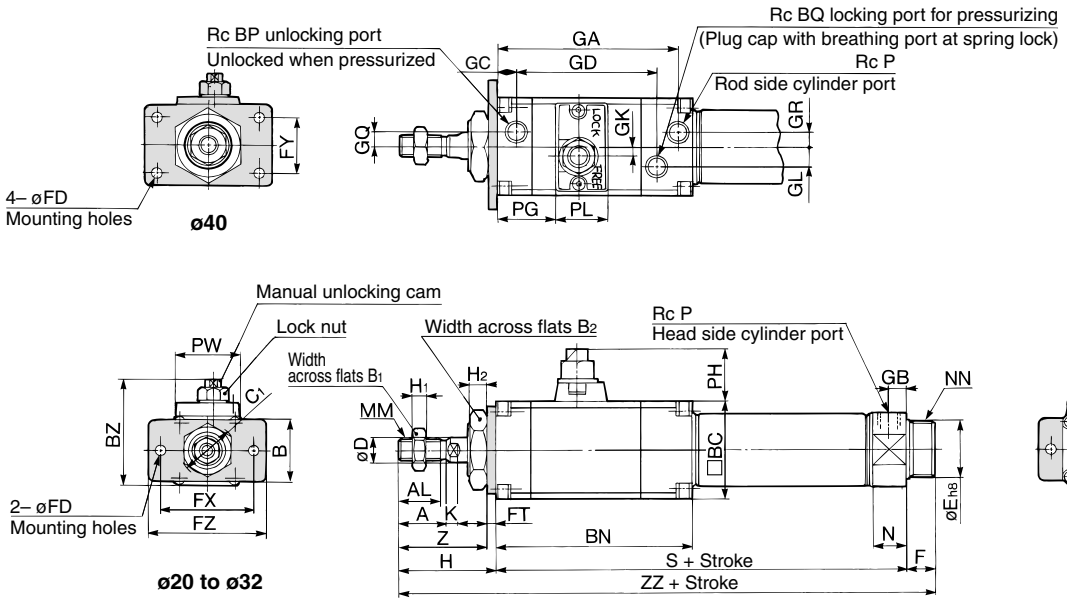
Bore size (mm)	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	C_1	D	E	F	FD	FT	FX	FY	FZ	GA	GB
20	Up to 300	18	15.5	34	13	26	38	80	1/8	1/8	57.5	30	8	$20^{\ 0}_{-0.033}$	13	7	4	60	—	75	73.5	8
25	Up to 300	22	19.5	40	17	32	45	90	1/8	1/8	69	37	10	$26^{\ 0}_{-0.033}$	13	7	4	60	—	75	83.5	8
32	Up to 300	22	19.5	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

Bore size (mm)	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	41	5	8	5	M8x 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	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	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	50	8	10	7	M14 x 1.5	21.5	42.5	M32 x 2	1/4	29	24	24	41	167	222	233

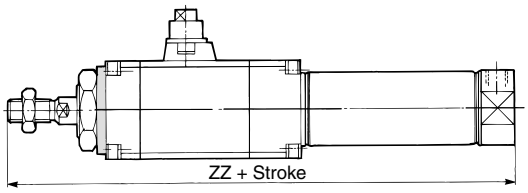
Series CLM2

Rod Side Flange Style (F)

CLM2F Bore size — Stroke



Boss-cut



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

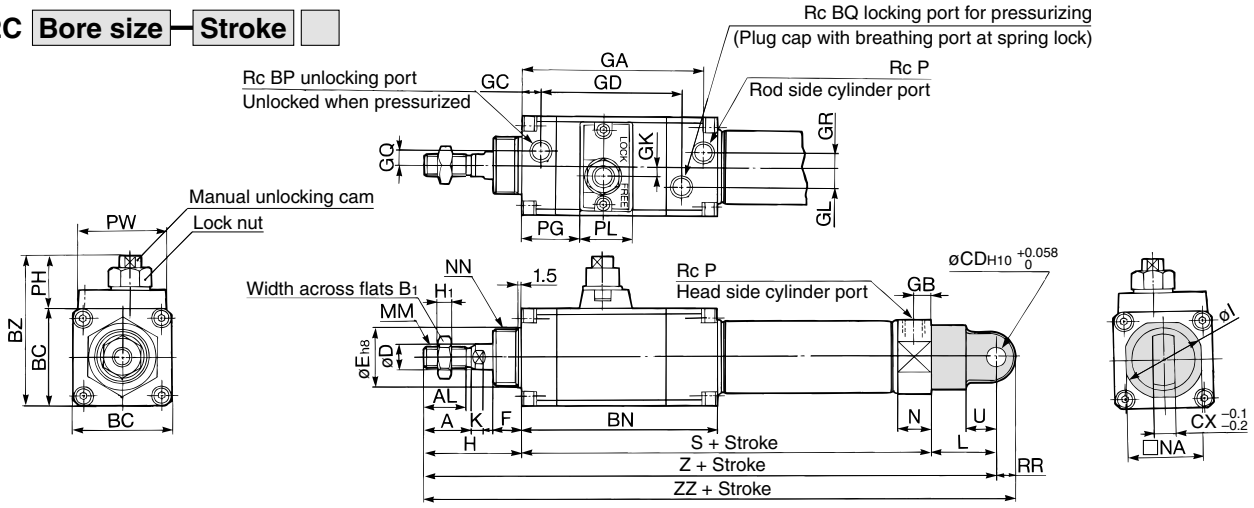
Bore (mm)	GL	GQ	GR	H	H_1	H_2	I	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	Z	ZZ
20	6	4	4	41	5	8	28	5	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	127	37	181
25	9	7	7	45	6	8	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	137	41	195
32	9	7	7	45	6	8	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	139	41	197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

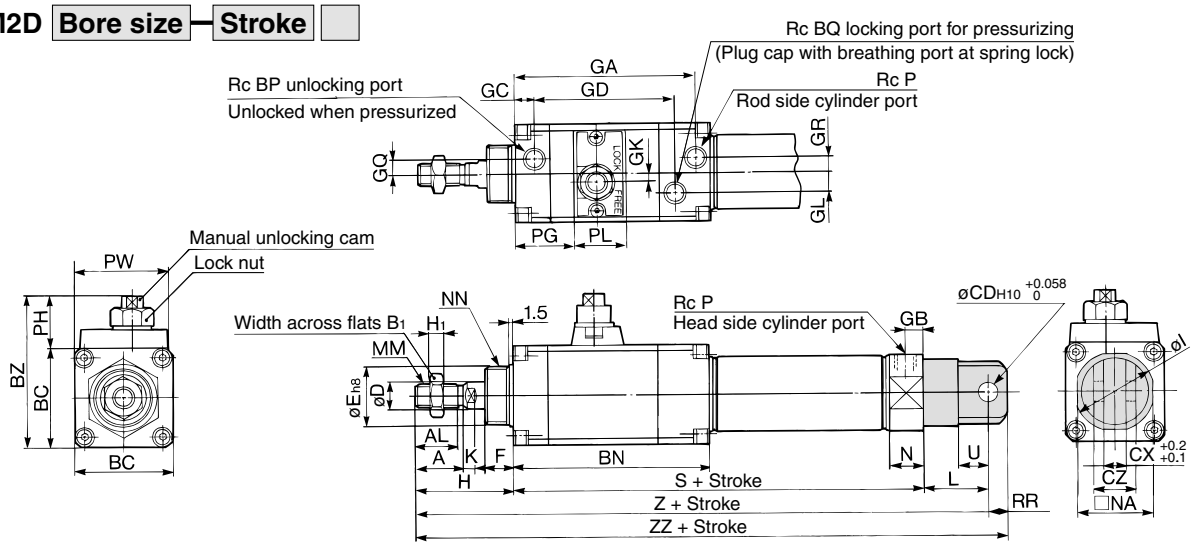


Bore size (mm)	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	Up to 300	18	15.5	13	38	80	1/8	1/8	57.5	9	10	8	20 $^{0}_{-0.033}$	13	73.5	8	8	55	3.5	6	4
25	Up to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	10	26 $^{0}_{-0.033}$	13	83.5	8	9	64.5	4	9	7
32	Up to 300	22	19.5	17	45	90	1/8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



Bore size (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

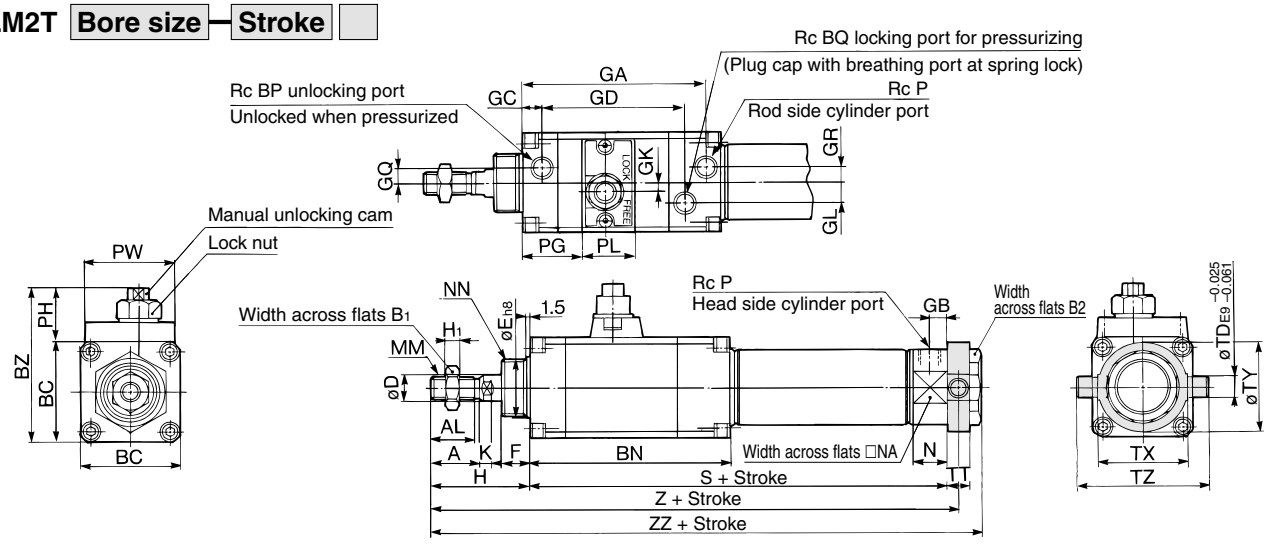
Bore size (mm)	GQ	GR	H	H1	I	K	L	MM	N	NA	NN	P	PG	PH	PL	PW	RR	S	U	Z	ZZ
20	4	4	41	5	28	5	30	M8 x 1.25	15	24	M20 x 1.5	1/8	22	19.5	20	38	9	127	14	198	207
25	7	7	45	6	33.5	5.5	30	M10 x 1.25	15	30	M26 x 1.5	1/8	27	24	24	41	9	137	14	212	221
32	7	7	45	6	37.5	5.5	30	M10 x 1.25	15	34.5	M26 x 1.5	1/8	27	24	24	41	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.

Series CLM2

Head Side Trunnion Style (T)

CLM2T Bore size — Stroke

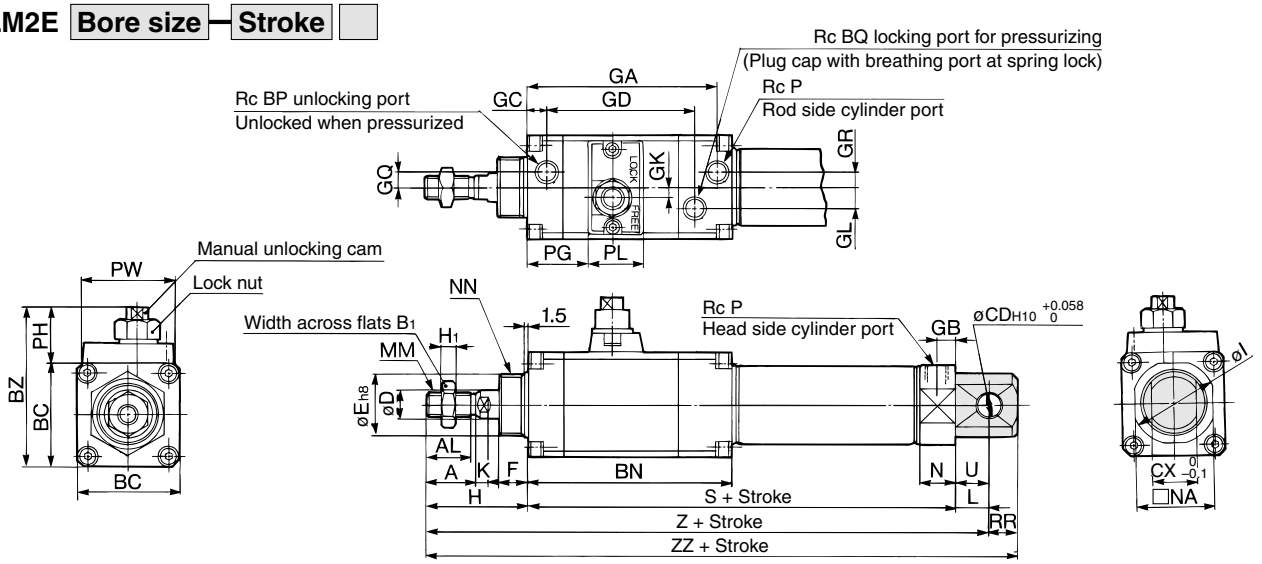


Bore size (mm)	Stroke range	A	AL	B1	B2	BC	BN	BP	BQ	BZ	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	Up to 300	18	15.5	13	26	38	80	1/8	1/8	57.5	8	20 0 −0.033	13	73.5	8	8	55	3.5	6	4
25	Up to 300	22	19.5	17	32	45	90	1/8	1/8	69	10	26 0 −0.033	13	83.5	8	9	64.5	4	9	7
32	Up to 300	22	19.5	17	32	45	90	1/8	1/8	69	12	26 0 −0.033	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 size (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



Bore size (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 size (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

Fine Lock Cylinder
Double Acting, Single Rod
Series CLG1
ø20, ø25, ø32, ø40

How to Order

Without auto switch CLG1 **L N 25 — 100 — E**

With auto switch CDLG1 **L N 25 — 100 — E — H7BW**

Built-in magnet

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
U	Rod side trunnion style
T	Head side trunnion style
D	Clevis style

Type

N	Non-lube/Rubber bumper
A	Non-lube/Air cushion

Bore size

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

Cylinder stroke (mm)

Bore size (mm)	Standard stroke (mm)	Long stroke (mm)
20	25, 50, 75, 100, 125, 150, 200	201 to 350
25	25, 50, 75, 100, 125, 150, 200, 250, 300	301 to 400
32		301 to 450
40		301 to 800

∗ Intermediate stroke is available, too.

With rod boot

Nil	Without rod boot
J	Nylon tarpaulin
K	Heat resistant tarpaulin

Lock operation

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

Auto switch

Nil	Without auto switch (Built-in magnet)

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

Number of auto switches

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

Applicable Auto Switch/Refer to page 9-15-1 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 (m) ∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**C76**	●	●	—	—	—	IC circuit	—
				2-wire	24 V	12 V	100 V, 200 V	**B54**	●	●	●	—	—	—	Relay, PLC
							100 V	**C73**	●	●	●	—	—		
		Connector					—	**C73C**	●	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet				—		**B59W**	●	●	—	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**H7A1**	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)				**H7A2**	●	●	○	—	○		
				2-wire		12 V		**H7B**	●	●	○	—	○	—	
		Connector						**H7C**	●	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**H7NW**	●	●	○	—	○	IC circuit	
				3-wire (PNP)				**H7PW**	●	●	○	—	○		
				2-wire		12 V		**H7BW**	●	●	○	—	○	—	
	Water resistant (2-color indication)							**H7BA**	—	●	○	—	○		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**H7NF**	●	●	○	—	○	IC circuit	

∗ Lead wire length symbols: 0.5 m·····Nil (Example) C73C
3 m····· L (Example) H73CL
5 m····· Z (Example) C73CZ
None····· N (Example) C73CN

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

• Since there are other applicable auto switches than listed, refer to page 9-2-29 for details.
• For details about auto switches with pre-wire connector, refer to page 9-15-66.

Series CLG1

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.

Made to Order Specifications (For details, refer to page 9-16-1.)

Symbol	Specifications
-XA□	Change of rod end shape

Model

Series	Type	Action	Cushion	Piston seal	Bore size (mm)	Lock operation
CLG1□N	Non-lube	Double acting	Rubber bumper	Special seal	20, 25	Spring locking (Exhaust locking) Pneumatic locking (Pressure locking)
CLG1□A			Air cushion		32, 40	Spring and pneumatic locking

Specifications

Fluid	Air
Proof pressure	1.5 MPa
Maximum operating pressure	1 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)
Piston speed	50 to 500 mm/sec *
Thread tolerance	JIS Class 2
Stroke length tolerance	Up to 800 st $^{+1.4}_{0}$ mm
Mounting **	Basic style, Axial foot style, Rod side flange style, Head side flange style, Rod side trunnion style, Head side trunnion style, Clevis style (Used when port position is changed to 90°.)

* Constraints associated with the allowable kinetic energy are imposed on the speeds at which the piston can be locked.
The maximum speed of 1000 mm/s can be accommodated if the piston is to be locked in the stationary state for the purpose of drop prevention.

** The long stroke style is applicable to the basic style, the axial foot style, and the rod side flange style.

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		

Accessory

Mounting		Basic style	Axial foot style	Rod side flange style	Head side flange style	Rod side trunnion style	Head side trunnion style	Clevis style
Standard equipment	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	—	●
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●	●
	Pivot bracket	—	—	—	—	●	●	●
	Rod boot	●	●	●	●	●	●	●

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Long stroke (mm)	Maximum manufacturable stroke (mm)
20	25, 50, 75, 100, 125, 150, 200	201 to 350	1500
25	25, 50, 75, 100, 125, 150, 200, 250, 300	301 to 400	
32		301 to 450	
40		301 to 800	

* Intermediate stroke is available, too.

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.

Weight

(kg)

Bore size (mm)		20	25	32	40
Basic weight	Basic style	0.61	0.97	1.06	1.35
	Axial foot style	0.72	1.10	1.22	1.57
	Flange style	0.73	1.15	1.23	1.58
	Trunnion style	0.62	0.99	1.09	1.40
	Clevis style	0.66	1.05	1.21	1.58
Rod side pivot bracket		0.11	0.13	0.20	0.27
Head side pivot bracket		0.08	0.09	0.17	0.25
Single knuckle joint		0.05	0.09	0.09	0.10
Double knuckle joint (with pin)		0.05	0.09	0.09	0.13
Additional weight per each 50 mm of stroke		0.05	0.07	0.09	0.15
Additional weight with air cushion		0.01	0.01	0.02	0.02
Additional weight for long stroke		0.01	0.01	0.02	0.03

Calculation: (Example)
CLG1LA20-100 (Foot, ø20, 100 st)
- Basic weight····· 0.72
- Additional weight····· 0.05/50 st
- Air cylinder stroke····· 100 st
- Additional weight of air cushion····· 0.01 kg

0.72 + 0.05 x 100/50 + 0.01 = 0.83 kg

Minimum Stroke for Auto Switch Mounting

Due to the space requirements for installing auto switches, the minimum cylinder strokes are as shown in the table below.

Auto switch model	No. of auto switches mounted	
	1	2
D-B5□/B64 D-C7□/C80 D-H7□ D-G5□/K5□	10 mm	15 mm
D-B59W	15 mm	20 mm

⚠ 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.

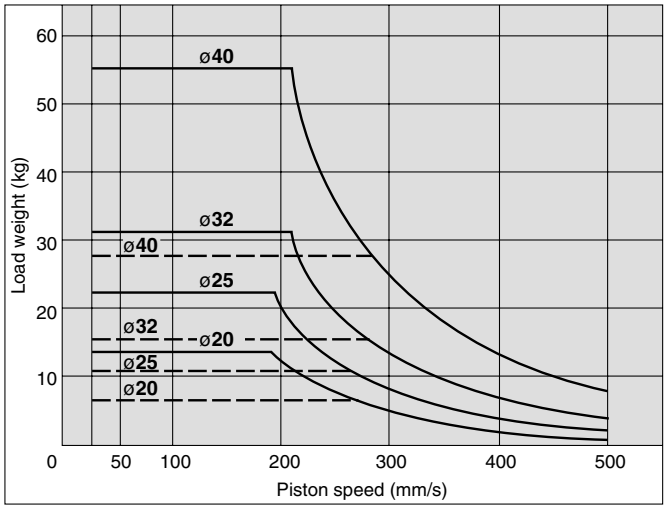
$Ek = \frac{1}{2} m\upsilon^2$

Ek: Kinetic energy of load (J)
m: Load weight (kg)
υ: Piston speed (m/s) (Average speed x 1.2 times)

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.

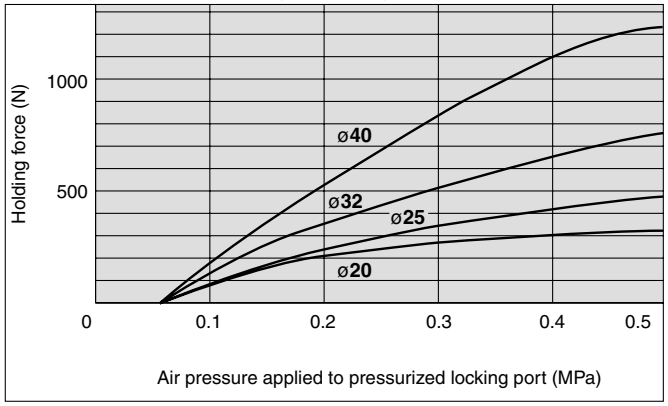


Holding Force of Spring Locking (Maximum static load)

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)



⚠ Caution

Caution when Locking

The holding force is the lock's ability to hold a static load that does not involve vibrations or impacts, when it is locked without a load. Therefore, when normally using the cylinder near the upper limit of the holding force, be aware of the points described below.

- 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.
- 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.
- Do not use the cylinder in the locked state to sustain a load that involves impact.

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

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

Condition/load: 25% of thrust force at 0.5 MPa Solenoid valve: Mounted to the lock port

⚠ Caution

Recommended Pneumatic Circuit/Caution on Handling

For detailed speceifications of the fine lock cylinder, Series CLG1 mentioned above, refer to pages 9-2-4 to 9-2-7.

Regarding the installation position and the mounting height of the auto switch, refer to page of Series CDG1 air cylinder (Double acting, Single rod), since the dimensions are the same.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm) 20	25	32	40
D-B5□/B64 D-G5□/K5□	BA-01	BA-02	BA-32	BA-04
D-C7□/C80 D-H7□	BMA2-020	BMA2-025	BMA2-032	BMA2-040

∗ Mounting screws set made of stainless steel
The following set of mounting screws made of stainless steel is also available. Use it in accordance with the operating environment.
(A switch mounting band is not included, so please order it separately.)
BBA3: For D-B5/B6/G5
BBA4: For D-C7/C8/H7
"D-H7BAL" switch is set on the cylinder with the stainless steel screws above when shipped.
When only a switch is shipped independently, "BBA4" screws are attached.

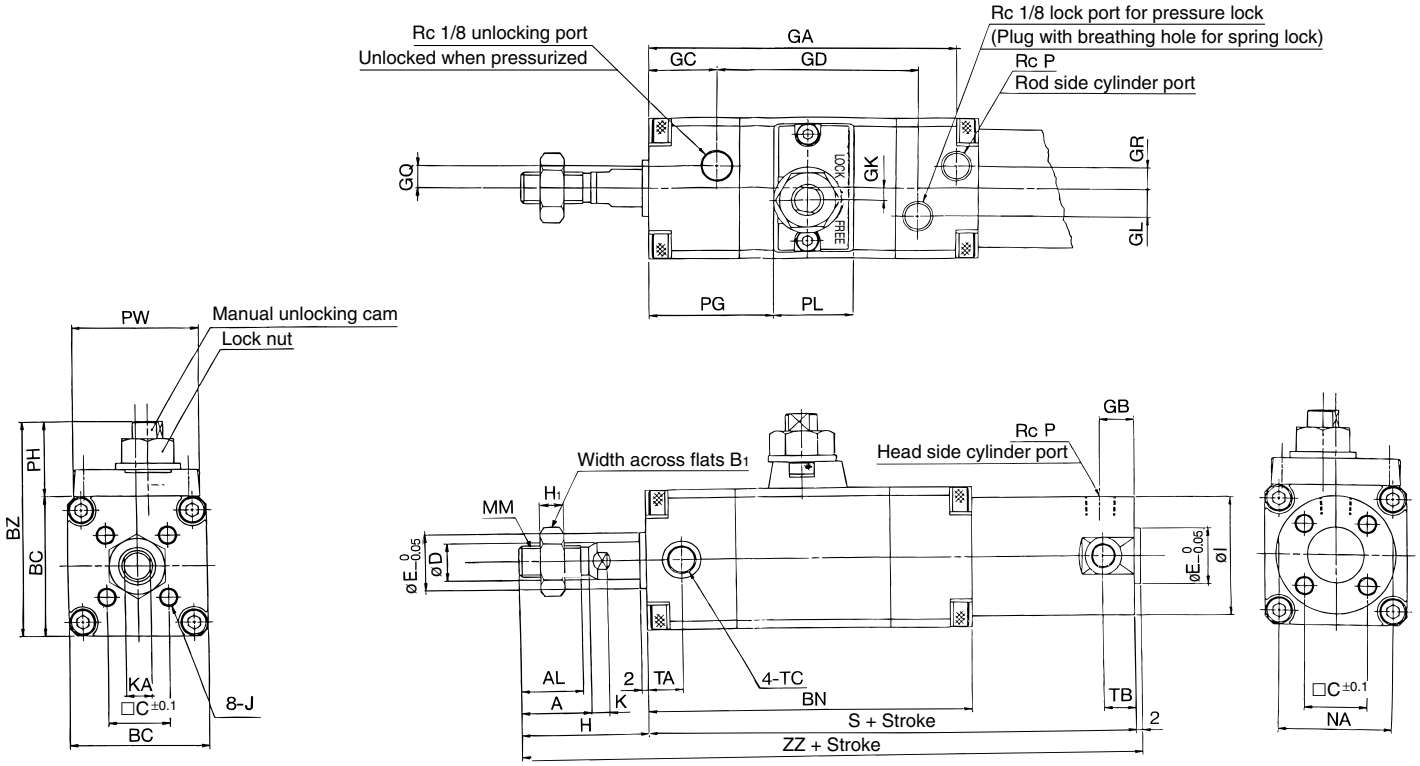
Mounting Bracket Part No.

Auto switch model	Bore size (mm) 20	25	32	40
Axial foot ∗	CLG-L020	CLG-L025	CLG-L032	CLG-L040
Flange	CLG-F020	CLG-F025	CLG-F032	CLG-F040
Trunnion pin	CG-T020	CG-T025	CG-T032	CG-T040
Clevis ∗∗	CG-D020	CG-D025	CG-D032	CG-D040
Rod side pivot bracket	CLG-020-24	CLG-025-24	CLG-032-24	CLG-040-24
Head side pivot bracket	CG-020-24A	CG-025-24A	CG-032-24A	CG-040-24A

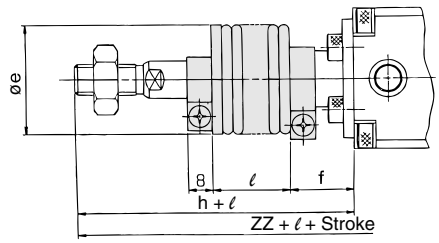
∗ When ordering foot bracket, order 2 pieces per cylinder.
∗∗ Clevis pin and snap ring are shipped together with clevis style.

Series CLG1

Basic Style: CLG1BN



With rod boot



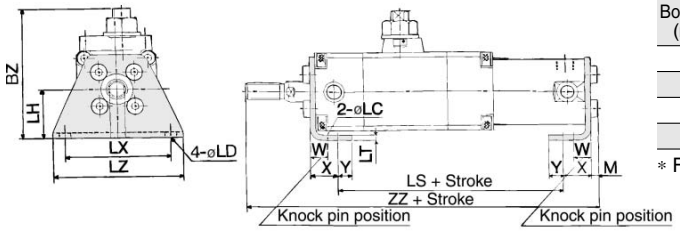
Bore size (mm)	Stroke range	AL	A	B1	BC	BN	BZ	C	D	E	GA	GB	GC	GD	GK	GL	GQ	GR	I	J	K	KA	MM
20	Up to 200	15.5	18	13	38	91	57.5	14	8	12	84	12	19	54	3.5	5.5	4	4	26	M4 x 0.7 depth 7	4	6	M8 x 1.25
25	Up to 300	19.5	22	17	45	101	69	16.5	10	14	94	12	20	62	4	9	7	7	31	M5 x 0.8 depth 7.5	5	8	M10 x 1.25
32	Up to 300	19.5	22	17	45	102	69	20	12	18	95	11	21	62	4	9	7	7	38	M5 x 0.8 depth 8	5.5	10	M10 x 1.25
40	Up to 300	27	30	19	52	111	76	26	16	25	103	12	23	67	4	11	8	8	47	M6 x 1 depth 12	6	14	M14 x 1.5

Bore size (mm)	Stroke range	H1	NA	P	PG	PH	PL	PW	S	TA	TB	TC	Without rod boot		With rod boot				
													H	ZZ	e	f	h	ℓ	ZZ
20	Up to 200	5	24	Rc 1/8	33	19.5	20	38	141	11	11	M5 x 0.8	35	178	30	16	55		198
25	Up to 300	6	29	Rc 1/8	38	24	24	41	151	11	11	M6 x 0.75	40	193	30	17	62	0.25	215
32	Up to 300	6	36	Rc 1/8	39	24	24	41	154	11	10	M8 x 1	40	196	35	17	62	stroke	218
40	Up to 300	8	44	Rc 1/8	44	24	24	41	169	12	10	M10 x 1.25	50	221	35	17	70		241

∗ For long stroke refer to page 9-2-32.

With Mounting Bracket

Foot style: CLG1LN

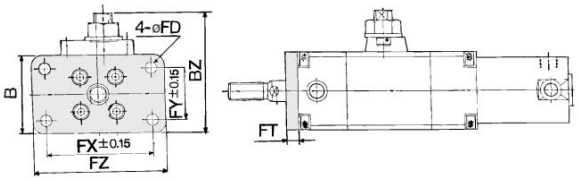


Foot Style

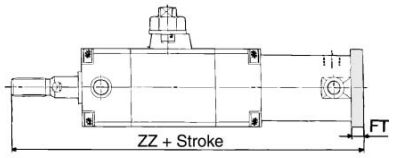
Bore size (mm)	BZ	M	W	X	Y	LC	LD	LH	LS	LT	LX	LZ	Without rod boot ZZ	With rod boot ZZ
20	63.5	3	10	15	7	4	6	25	117	3	50	62	182	202
25	74.5	3.5	10	15	7	4	6	28	127	3	57	70	197.5	219.5
32	74.5	3.5	10	16	8	4	6.6	28	128	3	60	74	200.5	222.5
40	83	4	10	16.5	8.5	4	6.6	33	142	3	68	84	226	246

∗ For long stroke, refer to page 9-2-32.

Rod side flange style: CLG1FN



Head side flange style: CLG1GN



Rod Side Flange Style

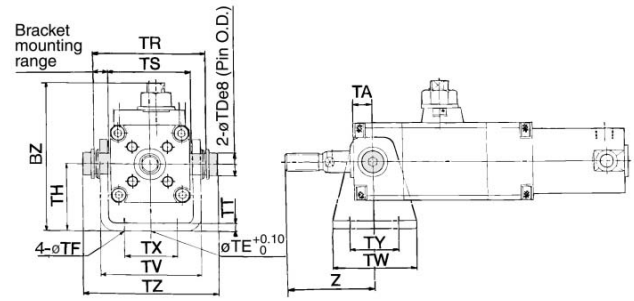
Bore size (mm)	B	BZ	FD	FT	FX	FY	FZ
20	38	57.5	5.5	6	52	25	65
25	45	69	5.5	7	60	30	75
32	45	69	6.6	7	60	30	75
40	52	76	6.6	8	66	36	82

∗ For long stroke, refer to page 9-2-32.

Head Side Flange Style

Bore size (mm)	Without rod boot ZZ	With rod boot ZZ
20	182	202
25	198	220
32	201	223
40	227	247

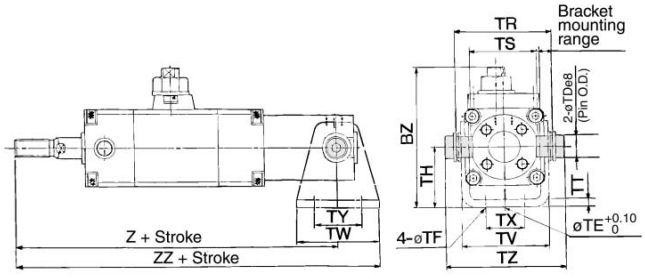
Rod side trunnion style: CLG1UN



Rod Side Trunnion Style

Bore size (mm)	BZ	TDe8	TE	TF	TH	TR	TS	TT	TV	TW	TX	TY	TZ	Without rod boot Z	With rod boot Z
20	69.5	8 −0.025 −0.047	10	5.5	31	51	40	3.2	47.8	42	26	28	59.6	46	66
25	83.5	10 −0.025 −0.047	10	5.5	37	58	47	3.2	54.8	42	28	28	68	51	73
32	85	12 −0.032 −0.059	10	6.6	38.5	62.5	47	4.5	57.4	48	28	28	75.7	51	73
40	92.5	14 −0.032 −0.059	10	6.6	42.5	72.5	54	4.5	65.4	56	36	30	85.7	62	82

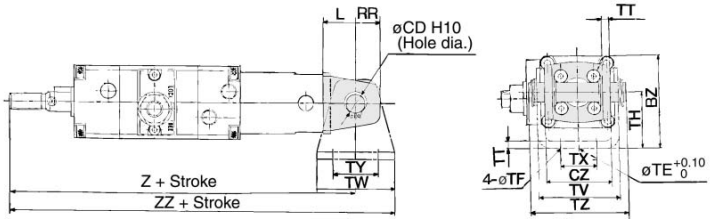
Head side trunnion style: CLG1TN



Head Side Trunnion Style

Bore size (mm)	BZ	TDe8	TE	TF	TH	TR	TS	TT	TV	TW	TX	TY	TZ	Without rod boot Z	Without rod boot ZZ	With rod boot Z	With rod boot ZZ
20	63.5	8 −0.025 −0.047	10	5.5	25	39	28	3.2	35.8	42	16	28	47.6	165	186	185	206
25	76.5	10 −0.025 −0.047	10	5.5	30	43	33	3.2	39.8	42	20	28	53	180	201	202	223
32	81.5	12 −0.032 −0.059	10	6.6	35	54.5	40	4.5	49.4	48	22	28	67.7	184	208	206	230
40	90	14 −0.032 −0.059	10	6.6	40	65.5	49	4.5	58.4	56	30	30	78.7	209	237	229	257

Clevis style: CLG1DN



Clevis Style

Bore size (mm)	BZ	CDH10	CZ	L	RR	TE	TF	TH	TT	TV	TW	TX	TY	TZ
20	44	8 −0.058 0	29	14	11	10	5.5	25	3.2	35.8	42	16	28	43.4
25	52.5	10 −0.058 0	33	16	13	10	5.5	30	3.2	39.8	42	20	28	48
32	57.5	12 −0.070 0	40	20	15	10	6.6	35	4.5	49.4	48	22	28	59.4
40	66	14 −0.070 0	49	22	18	10	6.6	40	4.5	58.4	56	30	30	71.4

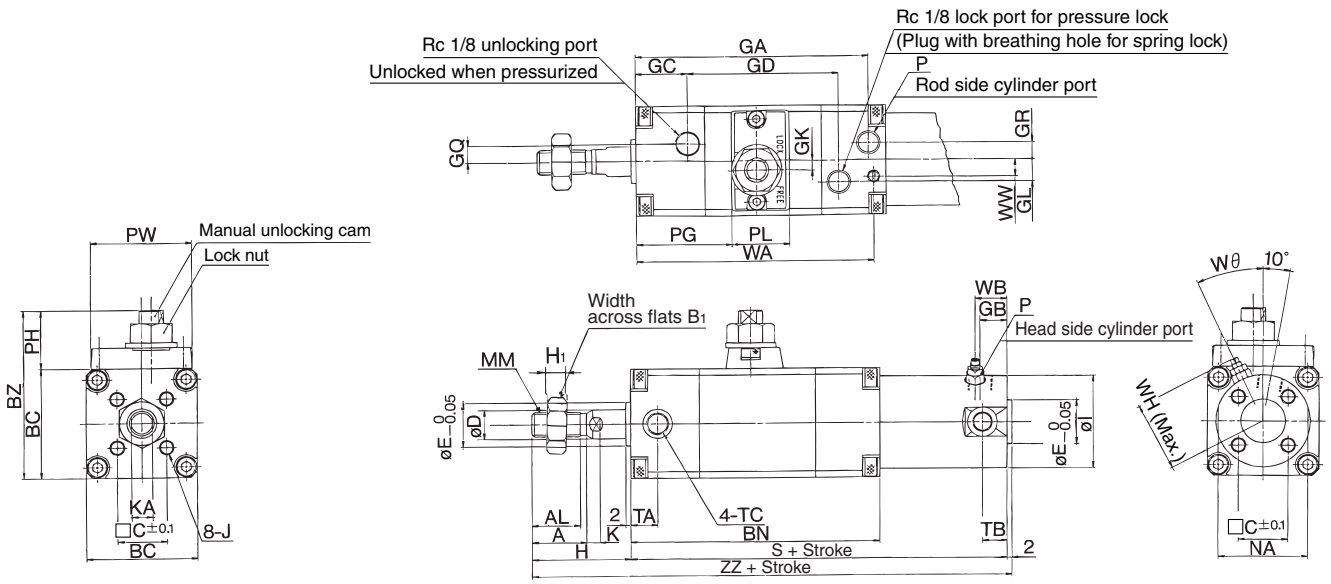
Bore size (mm)	Without rod boot Z	Without rod boot ZZ	With rod boot Z	With rod boot ZZ
20	190	211	210	231
25	207	228	229	250
32	214	238	236	260
40	241	269	261	289

∗ Clevis pin and snap ring are attached.

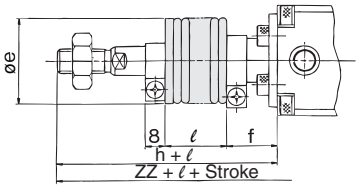
Series CLG1

Basic Style with Air Cushion: CLG1BA

∗ Refer to page 9-2-31 for mounting bracket, since the dimensions except GA, P, WA, WB, WH, WW, Wθ are the same.



With rod boot

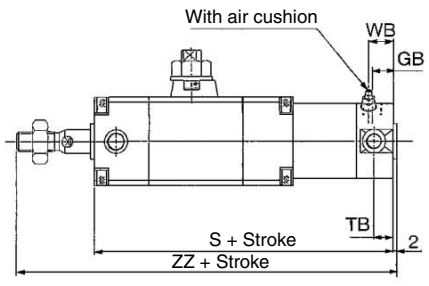


Bore size (mm)	Stroke range	AL	A	B1	BC	BN	BZ	C	D	E	GA	GB	GC	GD	GK	GL	GQ	GR	I	J	K	KA	MM	NA
20	Up to 200	15.5	18	13	38	91	57.5	14	8	12	85	12	19	54	3.5	5.5	4	4	26	M4 x 0.7 depth 7	4	6	M8 x 1.25	24
25	Up to 300	19.5	22	17	45	101	69	16.5	10	14	95	12	20	62	4	9	7	7	31	M5 x 0.8 depth 7.5	5	8	M10 x 1.25	29
32	Up to 300	19.5	22	17	45	102	69	20	12	18	95	11	21	62	4	9	7	7	38	M5 x 0.8 depth 8	5.5	10	M10 x 1.25	36
40	Up to 300	27	30	19	52	111	76	26	16	25	103	12	23	67	4	11	8	8	47	M6 x 1 depth 12	6	14	M14 x 1.5	44

Bore size (mm)	Stroke range	H1	P	PG	PH	PL	PW	S	TA	TB	TC	WA	WW	WB	WH	Wθ	Without rod boot		With rod boot				
																	H	ZZ	e	f	h	ℓ	ZZ
20	Up to 200	5	M5 x 0.8	33	19.5	20	38	141	11	11	M5 x 0.8	86	5.5	14	23	30°	35	178	30	16	55		198
25	Up to 300	6	M5 x 0.8	38	24	24	41	151	11	11	M6 x 0.75	96	7	14	25	30°	40	193	30	17	62	0.25 stroke	215
32	Up to 300	6	Rc 1/8	39	24	24	41	154	11	10	M8 x 1	97	7	13	28.5	25°	40	196	35	17	62		218
40	Up to 300	8	Rc 1/8	44	24	24	41	169	12	10	M10 x 1.25	105.5	9	14	33	20°	50	221	35	17	70		241

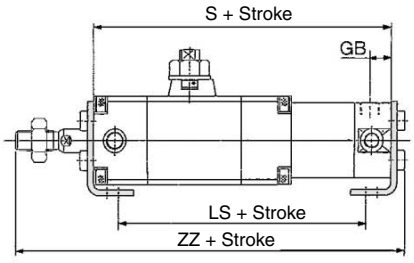
Long Stroke/Refer to pages 9-2-30 to 9-2-32 for mounting dimensions except the table below.

Basic style



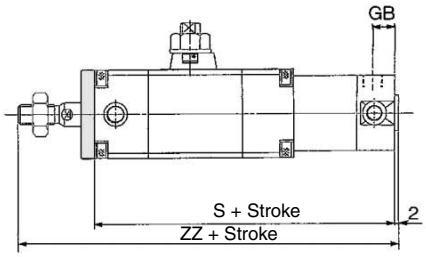
Bore size (mm)	Stroke range	GB	S	Without rod boot ZZ	With rod boot ZZ	TB	WB
20	201 to 350	12	149	186	206	11	14
25	301 to 400	12	159	201	223	11	14
32	301 to 450	12	162	204	226	11	14
40	301 to 800	13	178	230	250	12	15

Foot style



Bore size (mm)	Stroke range	GB	S	LS	Without rod boot ZZ	With rod boot ZZ
20	201 to 350	12	149	125	190	210
25	301 to 400	12	159	135	205.5	227.5
32	301 to 450	12	162	136	208.5	230.5
40	301 to 800	13	178	151	235	255

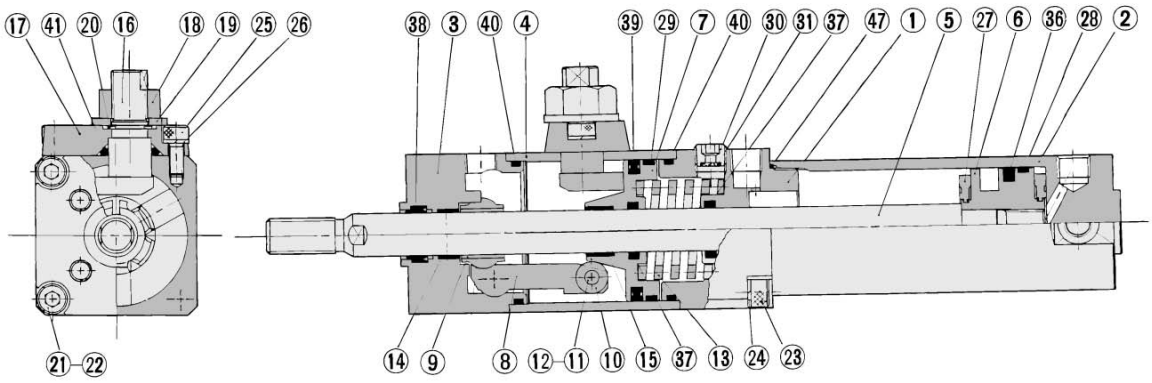
Rod side flange style



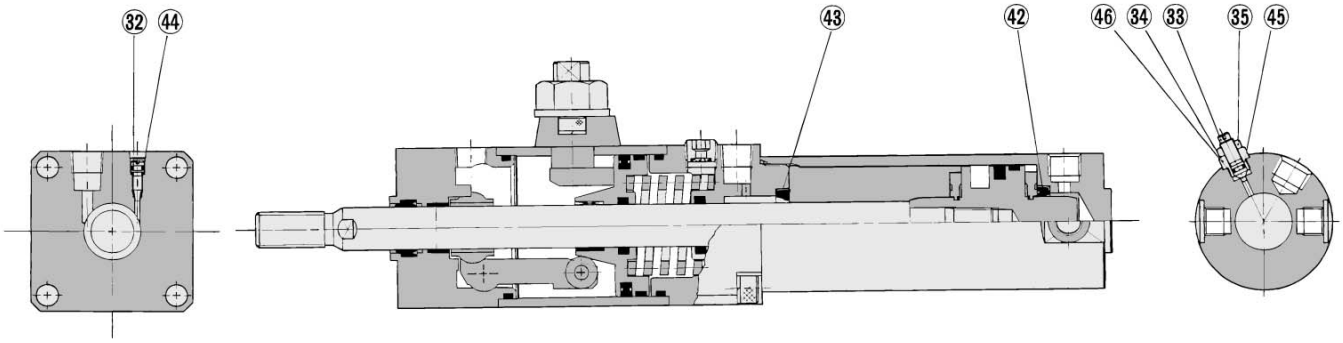
Bore size (mm)	Stroke range	GB	S	Without rod boot ZZ	With rod boot ZZ
20	201 to 350	12	149	186	206
25	301 to 400	12	159	201	223
32	301 to 450	12	162	204	226
40	301 to 800	13	178	230	250

Construction

With rubber bumper: CLG1BN



With air cushion: CLG1BA



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Black hard anodized
②	Tube cover	Aluminum alloy	Hard anodized
③	Cover	Carbon steel	Nitrided
④	Intermediate cover	Aluminum alloy	Black hard anodized
⑤	Piston rod	Carbon steel *	Hard chrome plated
⑥	Piston	Aluminum alloy	Chromated, Hard anodized (With air cushion)
⑦	Brake piston	Carbon steel	Nitrided
⑧	Brake arm	Carbon steel	Nitrided
⑨	Brake shoe	Special friction material	
⑩	Roller	Carbon steel	Nitrided
⑪	Pin	Carbon steel	Heat treated
⑫	Snap ring	Carbon tool steel	Nickel plated
⑬	Brake spring	Spring steel wire	Dacrodized
⑭	Bushing	Oil-impregnated sintered alloy	
⑮	Bushing	Oil-impregnated sintered alloy	
⑯	Manual lock release cam	Chromium molybdenum steel	Nickel plated
⑰	Cam guide	Carbon steel	Nitrided, painted

∗ In the ø20 and ø25 cylinders with auto switches, the piston rod is made of stainless steel.

No.	Description	Material	Note
⑱	Lock nut	Rolled steel	Nickel plated
⑲	Flat washer	Rolled steel	Nickel plated
⑳	Snap ring	Carbon tool steel	Nickel plated
㉑	Hexagon socket head cap screw	Chromium molybdenum steel	Black zinc chromated
㉒	Spring washer	Steel wire	Black zinc chromated
㉓	Hexagon socket head cap screw	Chromium molybdenum steel	Black zinc chromated
㉔	Spring washer	Steel wire	Black zinc chromated
㉕	Hexagon socket head cap screw	Chromium molybdenum steel	Black zinc chromated
㉖	Spring washer	Steel wire	Black zinc chromated
㉗	Bumper	Urethane	
㉘	Wear ring	Resin	
㉙	Wear ring	Resin	
㉚	Hexagon socket head plug	Carbon steel	Type E only
㉛	Element	Bronze	Type E only
㉜	Cushion valve A	Brass	Electroless nickel plated
㉝	Cushion valve B	Rolled steel	Electroless nickel plated
㉞	Cushion valve retainer	Rolled steel	Electroless nickel plated
㉟	Luck nut	Carbon steel	Nickel plated

No.	Description	Material
㊱	Piston seal	NBR
㊲	Rod seal A	NBR
㊳	Rod seal B	NBR
㊴	Brake piston seal	NBR
㊵	Intermediate cover gasket	NBR
㊶	Cam gasket	NBR
㊷	Cushion seal A	NBR
㊸	Cushion seal B	NBR
㊹	Valve seal A	NBR
㊺	Valve seal B	NBR
㊻	Valve retaining gasket	NBR
㊼	Cylinder tube gasket	NBR

Note) Please contact SMC if the fine lock unit must be disassembled.

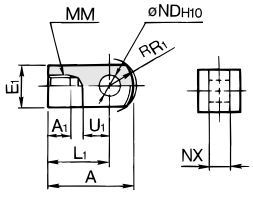
Series CLG1

Accessory Bracket Dimensions

Single Knuckle Joint

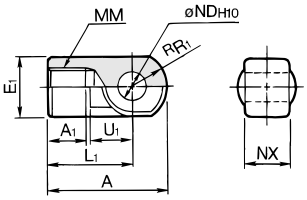
I-G02/G03

Material: Rolled steel



I-G04

Material: Cast iron



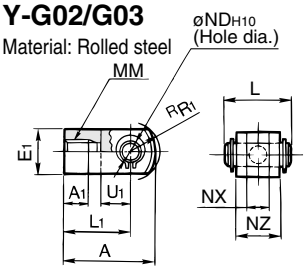
Part no.	Applicable bore size (mm)	A	A_1	E_1	L_1	MM	$^{R}R_1$	U_1	ND_{H10}	NX
I-G02	20	34	8.5	□16	25	M8 x 1.25	10.3	11.5	$8^{+0.058}_{0}$	$8^{-0.2}_{-0.4}$
I-G03	25, 32	41	10.5	□20	30	M10 x 1.25	12.8	14	$10^{+0.058}_{0}$	$10^{-0.2}_{-0.4}$
I-G04	40	42	14	ø22	30	M14 x 1.5	12	14	$10^{+0.058}_{0}$	$18^{-0.3}_{-0.5}$

Double Knuckle Joint

∗ Knuckle pin and snap ring are packaged.

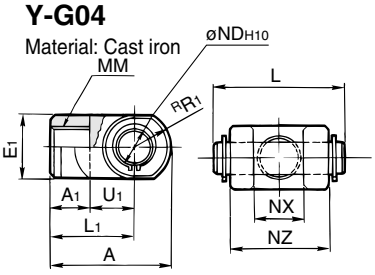
Y-G02/G03

Material: Rolled steel



Y-G04

Material: Cast iron

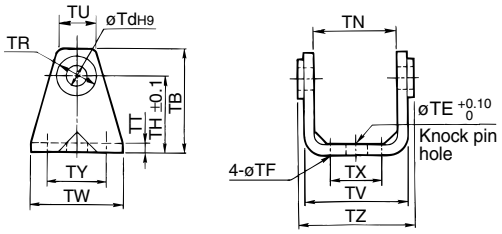


Part no.	Applicable bore size (mm)	A	A_1	E_1	L_1	MM	$^{R}R_1$	U_1	ND_{H10}	NX	NZ	L	Applicable pin part no.
Y-G02	20	34	8.5	□16	25	M8 x 1.25	10.3	11.5	$8^{+0.058}_{0}$	$8^{-0.4}_{-0.2}$	16	21	IY-G02
Y-G03	25, 32	41	10.5	□20	30	M10 x 1.25	12.8	14	$10^{+0.058}_{0}$	$10^{-0.4}_{-0.2}$	20	25.6	IY-G03
Y-G04	40	42	16	ø22	30	M14 x 1.5	12	14	$10^{+0.058}_{0}$	$18^{-0.5}_{-0.3}$	36	41.6	IY-G04

Rod Side Pivot Bracket

ø20 to ø40

Material: Rolled steel



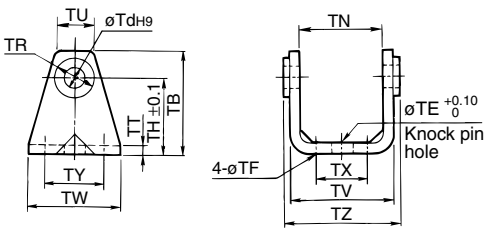
Part no.	Applicable bore size (mm)	TB	Td_{H9}	TE	TF	TH	TN
CLG-020-24	20	42	$8^{+0.036}_{0}$	10	5.5	31	40
CLG-025-24	25	48	$10^{+0.036}_{0}$	10	5.5	37	47
CLG-032-24	32	53	$12^{+0.043}_{0}$	10	6.6	38.5	47
CLG-040-24	40	60	$14^{+0.043}_{0}$	10	6.6	42.5	55

Part no.	Applicable bore size (mm)	TR	TT	TU	TV	TW	TX	TY	TZ
CLG-020-24	20	13	3.2	21.2	47.8	42	26	28	50
CLG-025-24	25	15	3.2	21.3	54.8	42	28	28	57
CLG-032-24	32	17	4.5	25.6	57.4	48	28	28	61.4
CLG-040-24	40	21	4.5	26.3	65.4	56	36	30	71.4

Head Side Pivot Bracket

ø20 to ø40

Material: Rolled steel

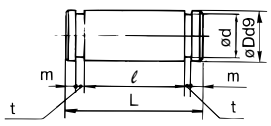


Part no.	Applicable bore size (mm)	TB	Td	TE	TF	TH	TN
CG-020-24A	20	36	8	10	5.5	25	(29.3)
CG-025-24A	25	43	10	10	5.5	30	(33.1)
CG-032-24A	32	50	12	10	6.6	35	(40.4)
CG-040-24A	40	58	14	10	6.6	40	(49.2)

Part no.	Applicable bore size (mm)	TR	TT	TU	TV	TW	TX	TY	TZ
CG-020-24A	20	13	3.2	18.1	35.8	42	16	28	38.3
CG-025-24A	25	15	3.2	20.7	39.8	42	20	28	42.1
CG-032-24A	32	17	4.5	23.6	49.4	48	22	28	53.8
CG-040-24A	40	21	4.5	27.3	58.4	56	30	30	64.6

Knuckle Pin

Material: Carbon steel

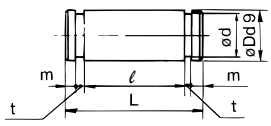


Part no.	Applicable bore size (mm)	Dd9	L	d
IY-G02	20	$8^{-0.040}_{-0.076}$	21	7.6
IY-G03	25, 32	$10^{-0.040}_{-0.076}$	25.6	9.6
IY-G04	40	$10^{-0.040}_{-0.076}$	41.6	9.6

Part no.	ℓ	m	t	Applicable snap ring
IY-G02	16.2	1.5	0.9	Type C 8 for axis
IY-G03	20.2	1.55	1.15	Type C 10 for axis
IY-G04	36.2	1.55	1.15	Type C 10 for axis

Clevis Pin

Material: Carbon steel

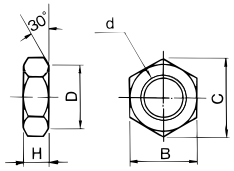


Part no.	Applicable bore size (mm)	Dd9	L	d
CD-G02	20	$8^{-0.040}_{-0.076}$	43.4	7.6
CD-G25	25	$10^{-0.040}_{-0.076}$	48	9.6
CD-G03	32	$12^{-0.050}_{-0.093}$	59.4	11.5
CD-G04	40	$14^{-0.050}_{-0.093}$	71.4	13.4

Part no.	ℓ	m	t	Applicable snap ring
CD-G02	38.6	1.5	0.9	Type C 8 for axis
CD-G25	42.6	1.55	1.15	Type C 10 for axis
CD-G03	54	1.55	1.15	Type C 12 for axis
CD-G04	65	2.05	1.15	Type C 14 for axis

Rod End Nut

Material: Carbon steel



Part no.	Applicable bore size (mm)	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-G04	40	19	21.9	18	M14 x 1.5	8

Lock-up Cylinder
Double Acting, Single Rod
Series CL1
ø40, ø50, ø63, ø80, ø100, ø125, ø140, ø160

The CL1 series lock-up cylinder is a self-locking type that contains a ring that is tilted by a spring force, which is further tilted by the load that is applied to the cylinder, thus locking the piston rod. This cylinder is suitable for intermediate stops, emergency stops, or for drop prevention.

How to Order

Without auto switch CL1 **L** **□** **100** **200** **F** **JN**

With auto switch CDL1 **L** **□** **100** **200** **F** **JN** **Y7BW** **□**

Number of auto switches

Nil	2 pcs.
3	3 pcs.
S	1 pc.
n	"n" pcs.

Built-in magnet

Lock-up cylinder

Mounting style

B	Basic style	C	Single clevis style
L	Foot style	D	Double clevis style
F	Rod side flange style	T	Center trunnion style
G	Head side flange style		

Tubing material

Symbol	Bore size	Tubing material
Nil Note)	40 to 100	Aluminum tube
	125 to 160	Aluminum tube
F *	40 to 160	Steel tube

Note) Auto switches are not available with steel tube.

Bore size (mm)

40	40 mm	100	100 mm
50	50 mm	125	125 mm
63	63 mm	140	140 mm
80	80 mm	160	160 mm

Cylinder stroke (mm)
For details, refer to page 9-3-2.

Locked-up direction

F	Extension locking
B	Retraction locking

* For both sides lock, refer to Made to Order "-X51".

Auto switch

Nil	Without auto switch (Built-in magnet)

* For the applicable auto switch model, refer to the table below.
* D-Z7□/Z80/Y59□/Y69□/Y7□□ types are shipped together, (but not assembled). (But, only the mounting bracket for the above models is assembled when shipping.)

With rod boot/cushion

Rod boot	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	N	Without cushion
	R	With rod bumper
	H	With head cushion
	Nil	With cushion on both ends

* Indicate alphabetically when 2 or more symbols are applicable.

Applicable Auto Switch/Refer to page 9-15-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Tie-rod mounting: Applicable bore size	Auto switch model: Band mounting	Band mounting: Applicable bore size	Lead wire length (m) * 0.5 (Nil)	3 (L)	5 (Z)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	Z76	40 to 160	—	—	●	●	—	—	IC circuit	—
				2-wire	24 V	100 V	Z73	40 to 160	—	—	●	●	●	—		Relay, PLC
						—	—		B53	40 to 100	●	●	●	—		PLC
						100 V, 200 V	A54		B54		●	●	●	—		Relay, PLC
		Terminal conduit				—	A33C	40 to 100	A33	40 to 160	—	—	—	—	—	PLC
						100 V	A34C		A34		—	—	—	—		Relay, PLC
		DIN terminal				200 V	A44C		A44		—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet				—	A59W	40 to 160	B59W	40 to 100	●	●	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	Y59A	40 to 160	G59	40 to 100	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)			Y7P		G5P		●	●	○	○		
				2-wire	—	—	J51		—		●	●	○	—	—	
					24 V	12 V	Y59B		K59		●	●	○	○		
		Terminal conduit		3-wire (NPN)		5 V, 12 V	G39C	40 to 100	G39	40 to 160	—	—	—	—	IC circuit	
				2-wire		12 V	K39C		K39		—	—	—	—	—	
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V	Y7NW	40 to 160	G59W	40 to 100	●	●	○	○	IC circuit	
				3-wire (PNP)		12 V	Y7PW		G5PW		●	●	○	○		
				2-wire		12 V	Y7BW		K59W		●	●	○	○	—	
	Water resistant (2-color indication)						Y7BA		G5BA		—	●	○	○		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V	F59F		G59F		●	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire		—	P5DW	40 to 100	—	—	—	●	●	○		

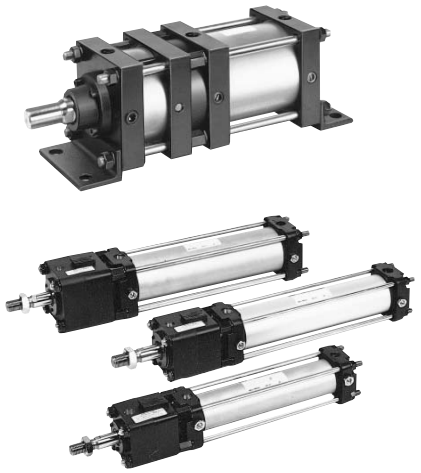
* Lead wire length symbols: 0.5 m ····· Nil (Example) A54
3 m ····· L (Example) A54L
5 m ····· Z (Example) A54Z

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

• Since there are other applicable auto switches than listed, refer to page 9-3-3 for details.
• For details about auto switches with pre-wire connector, refer to page 9-15-66.

Series CL1

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



Made to Order Specifications (For details, refer to page 9-16-1.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC3	Special port location
-XC14	Change of trunnion bracket mounting position
-XC18	NPT finish piping port
-X50	Large bore lock-up cylinder
-X51	Both-directions lock-up cylinder

Model

Series	Applicable air cylinder	Bore size (mm)	Action	Lock operation
CL1	CA1□N*	40, 50, 63, 80, 100	Double acting	Spring lock
	CS1□N	125, 140, 160		

* The Series CA1 has been changed to the Series CA2.

Specifications

Bore size (mm)	**40 to 100**	**125 to 160**
Fluid	Air	
Proof pressure	1.5 MPa	1.57 MPa
Maximum operating pressure	1.0 MPa	0.97 MPa
Minimum operating pressure	0.08 MPa	
Piston speed	50 to 200 mm/s *	
Ambient and fluid temperature	Without auto switch –10 to 70°C With auto switch –10 to 60°C (No freezing)	Without auto switch –0 to 70°C With auto switch –0 to 60°C (No freezing)
Lubrication	Non-lube	
Cushion	Air cushion	
Thread tolerance	JIS class 2	
Stroke length tolerance	Up to 250 $^{+1.0}_{0}$, 251 to 1000 $^{+1.4}_{0}$, 1001 to 1500 $^{+1.8}_{0}$, 1501 to 1600 $^{+2.2}_{0}$	
Mounting	Basic style , Axial foot style, Rod side flange style Head side flange style, Single clevis style Double clevis style, Center trunnion style	

* Make sure to operate the cylinder in such a way that the piston speed does not exceed 200 mm/s during locking.
* The maximum speed of 500 mm/s can be accommodated if the piston is to be locked in the stationary state for the purpose of drop prevention.

Max. Load and Lock Holding Force (Max. static load)

Bore size (mm)		**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**
Max. load (N)	Horizontal Mounting	588	981	1470	2450	3820	6010	7540	9850
	Vertical Mounting	294	490	735	1230	1910	3000	3770	4920
Holding force (N) *		1230	1920	3060	4930	7700	12100	15100	19700

* The cylinder can be used to 1/2 or less of its holding force, if only a static load is applied, such as for drop prevention.

Lock-up Unit Specifications

Lock-up direction release pressure	0.2 MPa (at no load)
Lock-up direction start pressure	0.05 MPa or less
Lock-up direction direction	One direction (Lock direction can be changed.)

Stopping Accuracy

(Not including tolerance of control system)

Piston speed	Bore size (mm)	
	40 to 100	**125 to 160**
50 mm/s	±0.6 mm	±1 mm
100 mm/s	±1.2 mm	±2 mm
200 mm/s	±2.3 mm	±3 mm

Lock-up Unit Model

Applicable bore size (mm)	**40**	**50**	**63**	**80**	**100**
Lock-up unit part no.	CL-40	CL-50	CL-63	CL-80	CL-100

Standard Stroke

Bore size (mm)	Standard stroke (mm)
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50, 63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80, 100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700

Maximum Stroke

For the maximum stroke of the CA1 series ø40 to ø100, and CS1 series ø120 to ø160, refer to Best Pneumatics Vol. 6.
Note) The Series CA1 has been changed to the Series CA2.

Minimum Stroke for Auto Switch Mounting

Regarding the minimum stroke for auto switch mounting, refer to the following pages by bore size.
• Bore size/ø40 to ø100····Refer to page of the CA2 series.
• Bore size/ø125 to ø160····Refer to page of the CS1 series.

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Head side flange style	Single clevis style	Double clevis style	Center trunnion style
Standard products	Rod end nut *	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

* ø125 to ø160: Option

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Weight

(kg)

Tubing Material		Aluminum tube							
Bore size (mm)		40	50	63	80	100	125	140	160
Locked-up unit weight		0.76	1.23	2.05	3.04	4.40	16.93	21.46	32.31
Basic weight	Basic style	1.66	2.55	4.12	6.56	9.49	30.88	38.25	55.72
	Foot style	1.83	2.75	4.42	7.36	10.43	32.21	40.83	59.09
	Rod side flange style	2.06	3.15	5.08	8.40	11.81	33.65	43.28	60.95
	Head side flange style	2.09	3.29	5.16	8.51	12.06	34.35	44.32	62.98
	Single clevis style	1.93	3.00	4.88	7.94	11.80	36.02	45.46	65.45
	Double clevis style	1.92	2.98	4.90	7.94	11.82	35.83	45.17	64.28
	Trunnion style	2.26	3.30	5.47	8.90	13.02	35.77	46.09	63.86
Additional weight per each 100 mm of stroke		0.44	0.56	0.74	1.04	1.30	1.77	1.90	2.39
Accessory bracket	Single knuckle	0.23	0.26	0.26	0.66	0.83	0.91	1.16	1.56
	Double knuckle (with pin)	0.37	0.43	0.43	0.87	1.27	1.37	1.81	2.48

Calculation: (Example) CL1L125-500F
- Basic weight·····32.21 (ø125, Foot style)
- Additional weight····1.77/100 st
  32.21 + 1.77/100 x 500 = 41.06 kg

* When steel tubes measuring ø40 to ø100, and ø125 to ø160 are used, the lock-up unit weight must be added to the respective cylinder weight as in the individual cylinder weight tables on page in Best Pneumatics Vol. 6.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)							
	40	50	63	80	100	125	140	160
D-A5/A6/A59W D-F5□/J5□/F5NTL D-F5□W/J59W D-F5BAL/F59F	BT-04	BT-04	BT-06	BT-08	BT-08	BT-12	BT-12	BT-16
D-A3/A44 D-G39/K39	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M	BS1-125	BS1-140	BS1-160
D-B5/B6/B59W D-G5□/K59/G5BAL D-G5□W/K59W D-G59F/G5NTL	BA-04	BA-05	BA-06	BA-08	BA-10	—	—	—
D-A3□C/A44C D-G39C/K39C	BA3-040	BA3-050	BA3-063	BA3-080	BA3-100	—	—	—
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W D-Y7□WV D-Y7BAL	BA4-040	BA4-040	BA4-063	BA4-080	BA4-080	BS4-125	BS4-125	BS4-160
D-P5DWL	BAP2-040	BAP2-040	BAP2-063	BAP2-080	BAP2-080	—	—	—

* Mounting brackets are provided with D-A3□C, A44C, G39C, and K39C.
  To order, indicate as shown below, according to the cylinder size.
  Example) ø40–D-A3□C-4, ø50–D-A3□C-5, ø63–D-A3□C-6, ø80–D-A3□C-8, ø100–D-A3□C-10
  To order the mounting brackets separately, use the part number shown above.

[Mounting screws set made of stainless steel]
The following set of mounting screws made of stainless steel is also available. Use it in accordance with the operating environment.
(Please order the mounting band separately, since it is not included.)
BBA1: For D-A5/A6/F5/J5
BBA3: For D-B5/B6/G5/K5
"D-F5BAL/G5BAL" switch is set on the cylinder with the stainless steel screws above when shipped.
When only a switch is shipped independently, "BBA1" or "BBA3" screws are attached.

Mounting Bracket Part No.

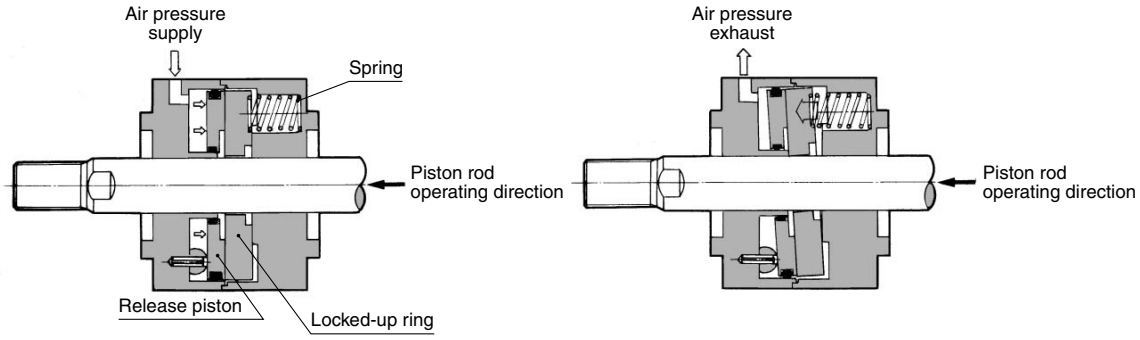
Bore size (mm)		40	50	63	80	100	125	140	160
Foot * style	Rod side	CA-L04	CA-L05	CA-L06	CA-L08	CA-L10	CS1-L12	CS1-L14	CS1-L16
	Head side	CA1-L04	CA1-L05	CA1-L06	CA1-L08	CA1-L10			
Rod side flange style **		CA-F04	CA-F05	CA-F06	CA-F08	CA-F10	CS1-F12	CS1-F14	CS1-F16
Head side flange style		CA1-F04	CA1-F05	CA1-F06	CA1-F08	CA1-F10	CS1-F12	CS1-F14	CS1-F16
Single clevis		CA1-C04	CA1-C05	CA1-C06	CA1-C08	CA1-C10	CS1-C12	CS1-C14	CS1-C16
Double clevis ***		CA1-D04	CA1-D05	CA1-D06	CA1-D08	CA1-D10	CS1-D12	CS1-D14	CS1-D16

* When ordering foot bracket for 1 cylinder, order 1 foot bracket each for the rod side and the head side for ø40 to ø100 (with different part no.) and 2 foot brackets for ø125 to ø160.
** The ø125 to ø160 rod side flange styles use the long stroke flanges of the CS1 series.
*** Clevis pin, plain washer and cotter pin are shipped together with double clevis style.

Regarding the installation position and the mounting height of the auto switch,
- Bore sizes ø40 to ø100 are the same as Series CDA1. Bore sizes ø125 to ø160 are the same as Series CDS1.

Note) The Series CA1 has been changed to the Series CA2.

Construction Principle



Unlocked state **Locked-up state**

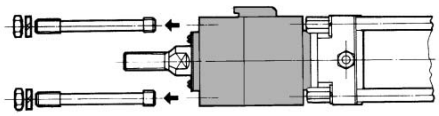
⚠Caution

Caution on Changing the Lock-up Direction

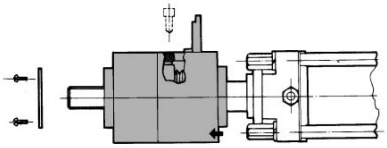
ø40 to ø100

The lock-up is unidirectional. However, the lock-up direction can be changed easily. To change the direction, pay particular attention to the following steps:
Loosening the tie-rods for the purpose of changing the direction could also loosen the nuts on the cylinder side. Therefore, before assembling the unit, make sure to verify that the nuts on the cylinder are not loose. Retighten the nuts if they are loose, and while turning the piston rod, apply a low pressure of 0.08 MPa to make sure that it operates smoothly in both the extending and retracting directions.

1. Loosen the tie-rod nuts and pull out the four tie-rods.



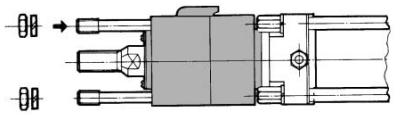
2. Open the rubber cap and screw in the unlocking bolt, which is provided as an accessory part. At this time, apply air pressure of 0.2 MPa to 0.3 MPa to disengage the lock and insert the bolt. (The operation to follow can be performed properly and easily with the application of air pressure.) After verifying that the bolt has been inserted properly, pull out the unit from the rod. Then, loosen the three screws in the scraper presser plate to remove the presser plate and the scraper. Install the scraper and the presser plate, in that order, on the opposite side.



⚠Caution

When the lock-up unit is not secured by the tie-rods, the air pressure applied to the lock-up port should be between 0.2 MPa and 0.3 MPa. Never supply a higher air pressure as it could lead to equipment damage.

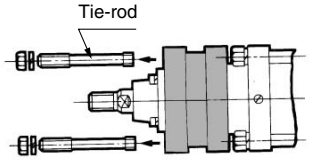
3. Turn the unit to the opposite end so that the end without the scraper is facing the cylinder rod cover. Then, securely insert the unit into the end boss portion of the rod cover.
4. Install four tie-rods, with their shorter threaded portion oriented towards the rod cover, and tighten them with uniform torque. Until the installation and adjustment have been completed, never pull out the unlocking bolt (or release the air pressure).



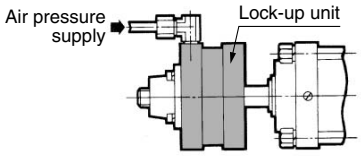
The processes described above complete the changing of the locked-up direction. Before using the cylinder, make sure that the lock-up operates properly.

ø125 to ø160

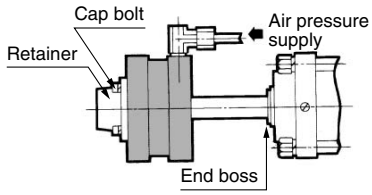
1. Loosen the tie-rod nuts and pull out the four tie-rods.



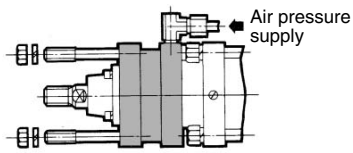
2. Apply air pressure of 0.2 MPa to 0.3 MPa to disengage the lock and pull out the lock-up unit from the piston rod.



3. Remove the retainer plate from the lock-up unit and install the retainer plate on the opposite end. Reapply the air pressure, and with the end on which the retainer plate had, until now, been facing towards the cylinder, insert the locked-up unit into the piston rod and fit it into the end boss portion of the rod cover.



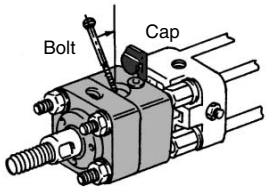
4. Install the four tie-rods, with their shorter threaded portion oriented towards the rod cover, and tighten them with uniform torque.
Maintain the application of air pressure until the installation and adjustment have been completed, and never actuate the lock in the meantime.



Manual Lock Release (ø40 to ø100)

To manually disengage the lock, perform the following steps:

1. Open the rubber cap.
2. Apply 0.2 MPa to 0.3 MPa of air pressure to the locking port, and bring the tilted ring upright.
3. Screw a bolt of an appropriate length into the ring tap.
   The bolt size is M5 for ø40 and ø50, and M6 for ø63, ø80, and ø100.



ø40 to ø100
(On cylinders ø125 to ø160, the lock cannot be disengaged manually.)

⚠Caution

During installation adjustment, perform the operation by applying air pressure only to the lock-up port.

⚠ Caution Recommended Pneumatic Circuit/Caution on Handling

For recommended pneumatic circuit, stopping accuracy and caution on handling, refer to pages 9-2-6 to 9-2-7.

⚠Caution

Stopping Accuracy

1. Load fluctuations during the reciprocal movement of the piston could cause the piston speed to change. A change in the piston speed could greatly increase the variance in the piston's stopping position. Therefore, perform the installation and adjustment operations so as not to create any load fluctuations during the piston's reciprocal movement, particularly just before stopping.
2. During a cushioning stroke, or when the piston is in the acceleration region following the start of its travel, there is a large change in speed. Thus, the variance in the stopping position will also be large. Therefore, to effect a step movement in which the stroke from the start of the operation to the next position is short (approximately 30 mm, although it could vary according to conditions) be aware of the possibility of being unable to attain the level of accuracy shown in the specifications column.
3. Precautions regarding lock-up after the piston has been stopped with an external stopper:
   To apply the lock-up after the piston has been stopped by an external stopper other than the locked-up mechanism, including stoppage by the stroke end of the cylinder, be aware of the matters described below.
   Due to the nature of the lock-up mechanism, there is an axial play of about 0.5 to 1.0 mm. Furthermore, due to pipe routing conditions, if it takes longer for the air to discharge through the lock-up port than for the balance pressure to stabilize, causing a delay in locking, the piston rod will move for an amount that is equivalent to the "play + delay".

Piston speed over 200 mm/s (When locking)

4. Immediately before a lock stop, drop the piston speed to 200 mm/s or lower by switching the speed controller (to the bypass circuit). Then, operate the lock-up.

⚠Caution

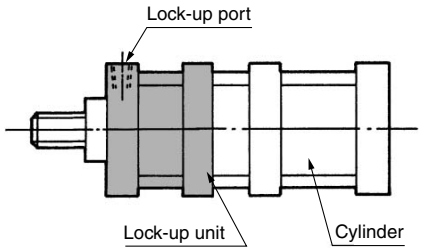
Caution on Handling

1. Flushing
   Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove cutting chip, cutting oil and other debris from inside the pipe.
2. The load on the piston rod
   Use the cylinder in the state in which the load to the piston rod is always applied in the axial direction. This must be more strictly adhered to than with ordinary air cylinders. Furthermore, use a guide to control the movement of the load so as not to cause chatter or twist.
3. A rotational force against the piston rod
   Avoid applying a rotational force against the piston rod. In particular, the application of a rotational force must be prevented when in a lock-up state.
4. Protecting the sliding portion of the rod
   Use caution that no scratch or dent will be given to the slide part of the guide rod, as this could damage the seals and lead to leaks or faulty lock-up.
5. Lubrication
   It is not necessary to lubricate the CL series because it is the non-lube style. Never lubricate it because doing so will cause faulty lock-up.

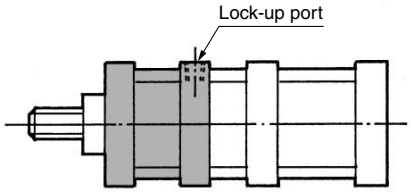
Recommended Pneumatic Circuit

For recommended pneumatic circuits, refer to page 9-2-6.

1. Operating the pneumatic circuit
   Instead of the conventional reciprocal air cylinder circuit, use an pneumatic circuit, such as the recommended circuit, in which measures are taken to prevent the piston from lurching after the lock-up has been disengaged.
2. Lock-up direction
   The lock-up is unidirectional. The locking direction is in accordance with the position of the lock-up port, as shown in the figure below.



Extension locking



Retraction locking

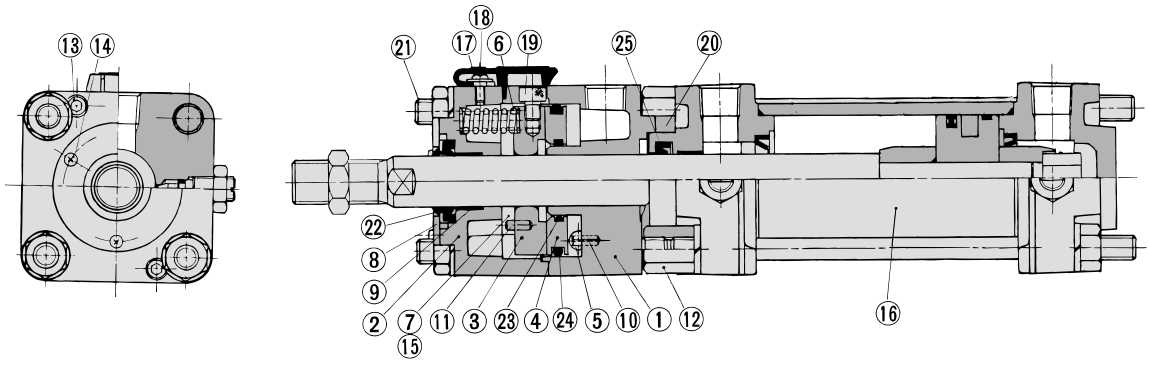
ø125 to ø160
For cylinders ø40 to ø100, verify the ← portion that is stamped on the cap of the lock.

3. Maximum speed and maximum load
   Never lock up a cylinder that involves a kinetic energy that exceeds the maximum speed or the maximum load indicated in the specifications.
4. After completing the installation adjustment, do not forget to remove the bolt that was used for disengaging the lock. (ø40 to ø100 only)

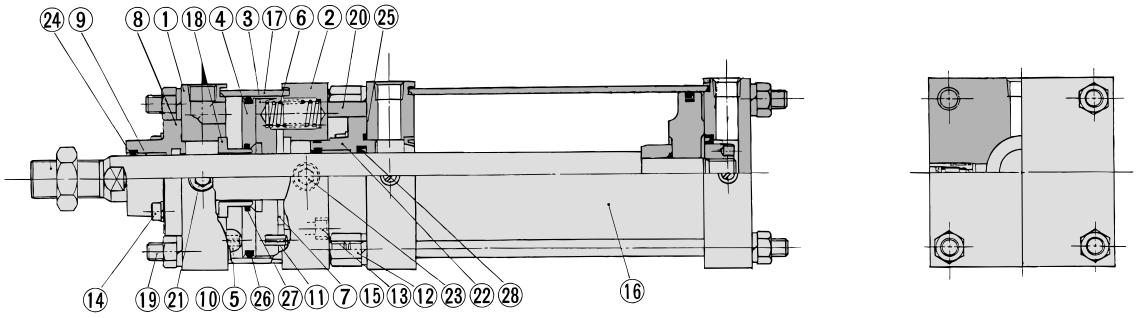
Series CL1

Construction

CL1ø40 to ø100



CL1ø125 to ø160



Component Parts: CL1ø40 to ø100

No.	Description	Material	Note
①	Body	Aluminum alloy	Black painted
②	Cover	Aluminum alloy	Black painted
③	Locked-up ring	Carbon steel	Heat treated
④	Release piston	Rolled steel	Zinc chromated
⑤	Pivot	Carbon steel	Heat treated, zinc chromated
⑥	Spring	Steel wire	Zinc chromated
⑦	Stopper	Urethane	
⑧	Retaining plate	Rolled steel	Black zinc chromated
⑨	Bushing	Lead-bronze casted	
⑩	Spring pin	Carbon steel	JIS B 2808
⑪	Spring pin for non-rotating	Carbon steel	JIS B 2808
⑫	Wing nut	Rolled steel	Black zinc chromated
⑬	Unit fixing hex. socket head cap screw	Chromium molybdenum steel	
⑭	Retainer machine screw	Rolled steel	
⑮	Hexagon socket countersunk head screw	Chromium molybdenum steel	
⑯	Non lube air cylinder		Series CA1□N
⑰	cap	Nylon	
⑱	Cap screw	Rolled steel	
⑲	release bolt	Chromium molybdenum steel	
⑳	Spacer	Aluminum alloy	Black painted
㉑	Unit holding tie-rod	Carbon steel	Chromated
㉒	Scraper	NBR	
㉓	O-ring	NBR	
㉔	O-ring	NBR	
㉕	Rod seal	NBR	

Note) Please consult with SMC when disassembling fine locked-up unit.

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Bore size (mm)	Kit no.
40	CL40-PS	100	CL100-PS
50	CL50-PS	125	CL125-PS
63	CL63-PS	140	CL140-PS
80	CL80-PS	160	CL160-PS

∗ Since the lock section for Series CL1 is normally replaced as a unit, kits are for the cylinder section only. These can be ordered using the order number for each bore size.

Component Parts: CL1ø125 to ø160

No.	Description	Material	Note
①	Body	Rolled steel plate	Black painted
②	Cover	Rolled steel plate	Black painted
③	Locked-up ring	Carbon steel	Heat treated
④	Release piston	Rolled steel plate	Zinc chromated
⑤	Pivot	Carbon steel	Heat treated
⑥	Spring	Steel wire	Zinc chromated
⑦	Stopper	Urethane	
⑧	Retaining plate	Cast iron	Black painted
⑨	Bushing	Lead-bronze casted	—
⑩	Spring pin	Carbon steel	JIS B 2808
⑪	Spring pin	Carbon steel	JIS B 2808
⑫	Wing nut	Rolled steel	Black zinc chromated
⑬	Unit fixing hex. socket head cap screw	Chromium molybdenum steel	Zinc chromated
⑭	Hex. socket head cap screw	Chromium molybdenum steel	Black zinc chromated
⑮	Hexagon socket countersunk head screw	Chromium molybdenum steel	Zinc chromated
⑯	Non lube air cylinder	—	Serie CS1□N
⑰	Brake tube	Carbon steel tube	Inside: Hard chrome plated
⑱	Sleeve	Rolled steel	Zinc chromated
⑲	Unit holding tie-rod	Carbon steel	Chromated
⑳	Spacer	Rolled steel	Black painted
㉑	Hexagon socket head plug	Rolled steel	Black zinc chromated
㉒	Retaining plate	Cast iron	Black painted
㉓	Element	Sintered metallic BC	—
㉔	Wiper ring	NBR	
㉕	Retaining plate gasket	NBR	
㉖	O-ring	NBR	
㉗	O-ring	NBR	
㉘	Rod seal	NBR	

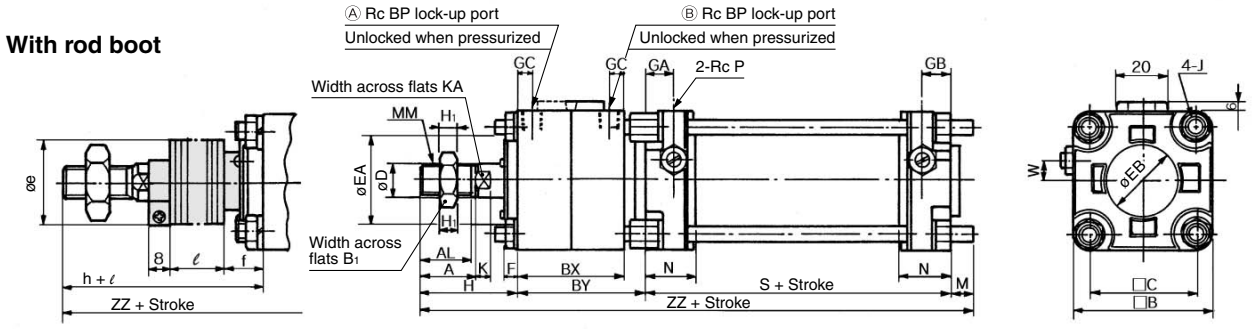
Note) Please consult with SMC when disassembling fine lock-up unit.

Basic Style (B)

ø40 to ø100

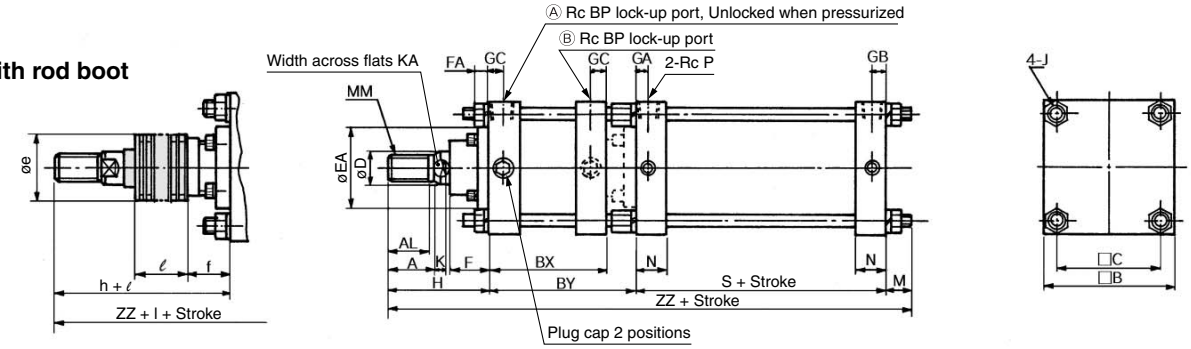
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



Bore size (mm)	Stroke range (mm)		A	AL	B	B1	BX	BY	BP	C	D	EA	EB	F	FA	GA	GB	GC	H1	J	K	KA
	Without rod boot	With rod boot																				
40	Up to 500	20 to 500	30	27	60	22	59	69	1/4	44	16	40	32	6.5	—	15	15	11	8	M8 x 1.25	6	14
50	Up to 600	20 to 600	35	32	70	27	67	78	1/4	52	20	50	40	6.0	—	17	17	11	11	M8 x 1.25	7	18
63	Up to 600	20 to 600	35	32	86	27	73	84	1/4	64	20	55	40	6.0	—	17	17	11	11	M10 x 1.25	7	18
80	Up to 750	20 to 750	40	37	102	32	77	92	1/4	78	25	65	52	8.0	—	21	21	11	13	M12 x 1.75	11	22
100	Up to 750	20 to 750	40	37	116	41	85	100	1/4	92	30	80	52	8.0	—	21	21	11	16	M12 x 1.75	11	26
125	Up to 1000	30 to 1000	50	47	145	—	112.5	141.5	1/2	115	36	90	—	43	14	16	16	16	—	M14 x 1.5	15	31
140	Up to 1000	30 to 1000	50	47	161	—	121	150	1/2	128	36	90	—	43	14	16	16	16	—	M14 x 1.5	15	31
160	Up to 1200	30 to 1200	56	53	182	—	133	167	3/4	144	40	90	—	43	14	18.5	18.5	18.5	—	M16 x 1.5	17	36

Bore size (mm)	M	MM	N	P	S	W	Without rod boot		With rod boot				
							H	ZZ	e	f	h	ℓ	ZZ
40	11	M14 x 1.5	27	1/4	84	8	51	215	36	16.5	59	1/4 stroke	223
50	11	M18 x 1.5	30	3/8	90	0	58	237	45	16.0	66	1/4 stroke	245
63	14	M18 x 1.5	31	3/8	98	0	58	254	45	16.0	66	1/4 stroke	262
80	17	M22 x 1.5	37	1/2	116	0	71	296	60	18.0	80	1/4 stroke	305
100	17	M26 x 1.5	40	1/2	126	0	72	315	60	18.0	81	1/4 stroke	324
125	27	M30 x 1.5	35	1/2	98	—	110	376.5	75	40	133	1/5 stroke	399.5
140	27	M30 x 1.5	35	1/2	98	—	110	385	75	40	133	1/5 stroke	408
160	30.5	M36 x 1.5	39	3/4	106	—	120	423.5	75	40	141	1/5 stroke	444.5

Note) In installing an air cylinder, if a hole must be made to accommodate the rod portion, make sure to machine a hole that is larger than the boot outer diameter "øe".

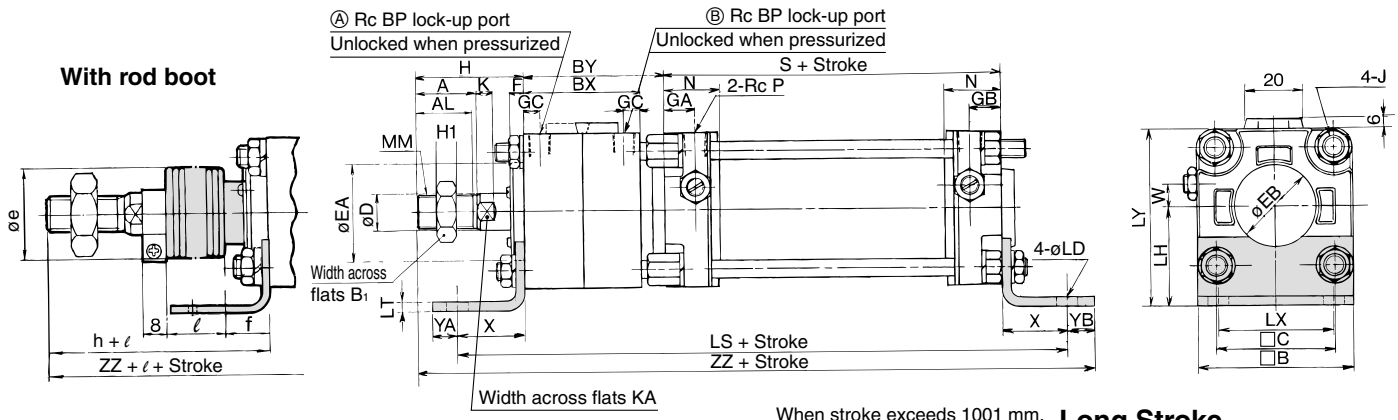
Series CL1

Axial Foot Style (L)

ø40 to ø100

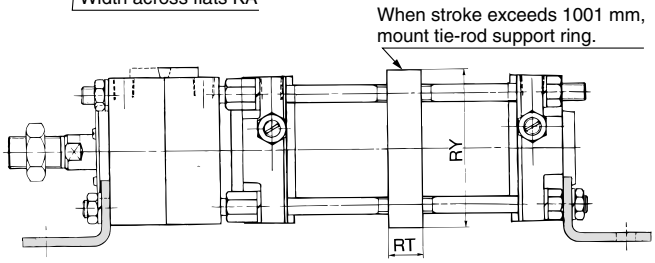
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



Long stroke

ø50 to ø100



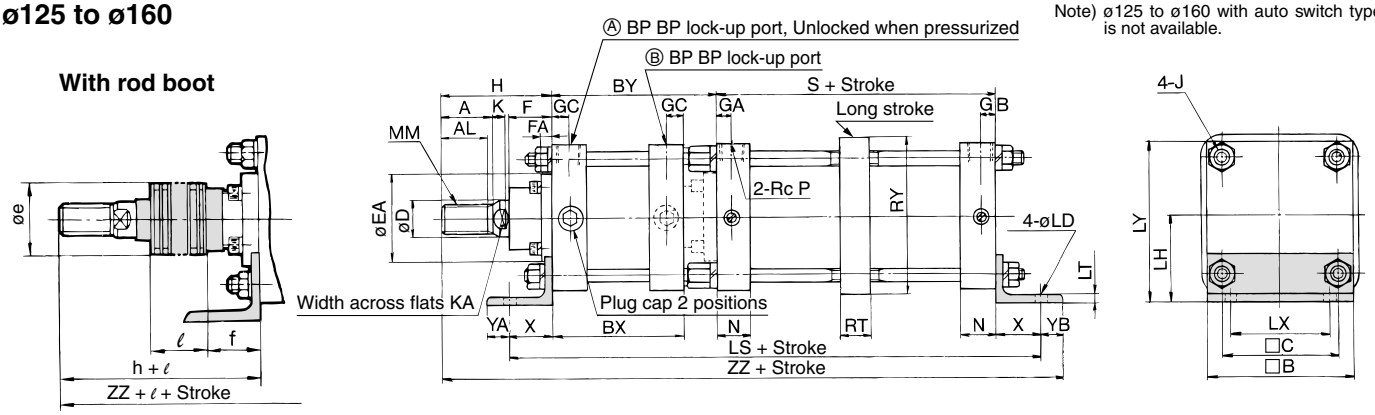
Long Stroke

Bore size (mm)	Stroke range (mm)	RT	RY
40	501 to 800	—	—
50	601 to 1000	—	—
	1001 to 1200	30	76
63	601 to 1000	—	—
	1001 to 1200	40	92
80	751 to 1000	—	—
	1001 to 1400	45	112
100	751 to 1000	—	—
	1001 to 1500	50	136
125	1401 to 1600	36	164
140	1401 to 1600	36	184
160	1401 to 1600	40	204

Note) ø125 to ø160 with auto switch type is not available.

ø125 to ø160

With rod boot



Bore size (mm)	Stroke range (mm)		A	AL	B	B1	BX	BY	BP	C	D	EA	EB	F	FA	GA	GB	GC	H1	J	K	KA	LD	LH
	Without rod boot	With rod boot																						
40	Up to 500	20 to 500	30	27	60	22	59	69	1/4	44	16	40	32	6.5	—	15	15	11	8	M8 x 1.25	6	14	9	40
50	Up to 600	20 to 600	35	32	70	27	67	78	1/4	52	20	50	40	6.0	—	17	17	11	11	M8 x 1.25	7	18	9	45
63	Up to 600	20 to 600	35	32	86	27	73	84	1/4	64	20	55	40	6.0	—	17	17	11	11	M10 x 1.25	7	18	11.5	50
80	Up to 750	20 to 750	40	37	102	32	77	92	1/4	78	25	65	52	8.0	—	21	21	11	13	M12 x 1.75	11	22	13.5	65
100	Up to 750	20 to 750	40	37	116	41	85	100	1/4	92	30	80	52	8.0	—	21	21	11	16	M12 x 1.75	11	26	13.5	75
125	Up to 1400	30 to 1400	50	47	145	—	112.5	141.5	1/2	115	36	90	—	43	14	16	16	16	—	M14 x 1.5	15	31	19	85
140	Up to 1400	30 to 1400	50	47	161	—	121	150	1/2	128	36	90	—	43	14	16	16	16	—	M14 x 1.5	15	31	19	100
160	Up to 1400	30 to 1400	56	53	182	—	133	167	3/4	144	40	90	—	43	14	18.5	18.5	18.5	—	M16 x 1.5	17	36	19	106

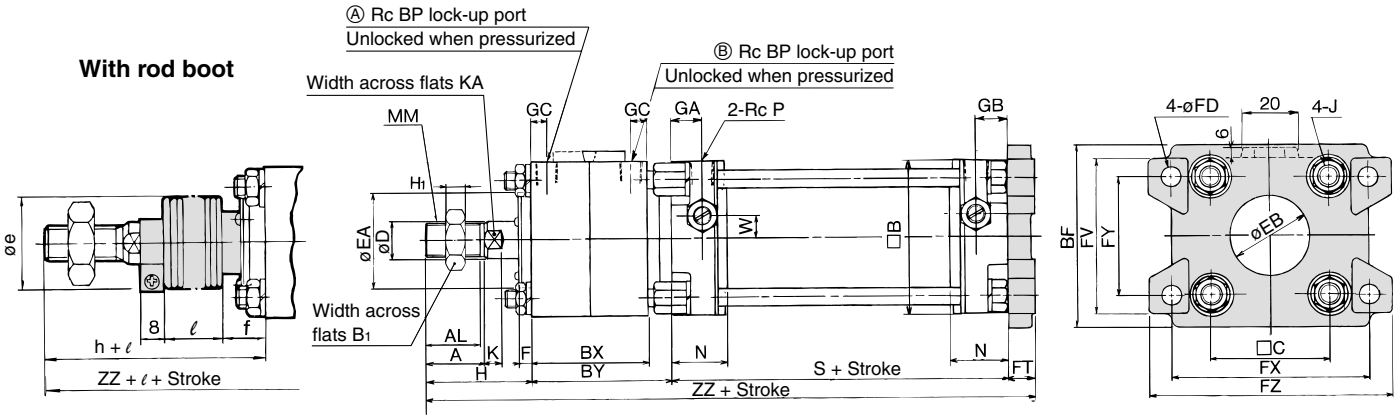
Bore size (mm)	LS	LT	LX	LY	MM	N	P	S	W	X	YA	YB	Without rod boot		With rod boot				
													H	ZZ	e	f	h	ℓ	ZZ
40	207	3.2	42	70	M14 x 1.5	27	1/4	84	8	27	13	13	51	244	36	16.5	59	1/4 stroke	252
50	222	3.2	50	80	M18 x 1.5	30	3/8	90	0	27	13	13	58	266	45	16.0	66	1/4 stroke	274
63	250	3.2	59	93	M18 x 1.5	31	3/8	98	0	34	16	16	58	290	45	16.0	66	1/4 stroke	298
80	296	4.5	76	116	M22 x 1.5	37	1/2	116	0	44	21	16	71	339	60	18.0	80	1/4 stroke	348
100	312	6.0	92	133	M26 x 1.5	40	1/2	126	0	43	22	17	72	358	60	18.0	81	1/4 stroke	367
125	329.5	8	100	157.5	M30 x 1.5	35	1/2	98	—	45	20	20	110	414.5	75	40	133	1/5 stroke	437.5
140	338	9	112	180.5	M30 x 1.5	35	1/2	98	—	45	30	30	110	433	75	40	133	1/5 stroke	456
160	373	9	118	197	M36 x 1.5	39	3/4	106	—	50	25	25	120	468	75	40	141	1/5 stroke	489

Head Side Flange Style (G)

ø40 to ø100

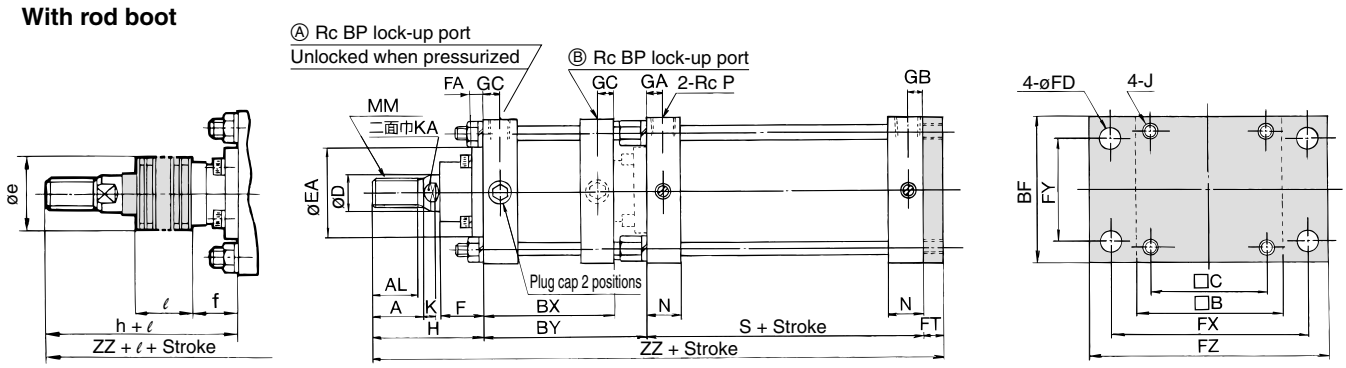
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



Bore size (mm)	Stroke range (mm)		A	AL	B	B1	BF	BP	BX	BY	C	D	EA	EB	F	FA	FD	FT	FX	FY	FZ	FV	GA	GB	GC	H1
	Without rod boot	With rod boot																								
40	Up to 500	20 to 500	30	27	60	22	71	1/4	59	69	44	16	40	32	6.5	—	9.0	12	80	42	100	60	15	15	11	8
50	Up to 600	20 to 600	35	32	70	27	81	1/4	67	78	52	20	50	40	6.0	—	9.0	12	90	50	110	70	17	17	11	11
63	Up to 600	20 to 600	35	32	86	27	101	1/4	73	84	64	20	55	40	6.0	—	11.5	15	105	59	130	86	17	17	11	11
80	Up to 750	20 to 750	40	37	102	32	119	1/4	77	92	78	25	65	52	8.0	—	13.5	18	130	76	160	102	21	21	11	13
100	Up to 750	20 to 750	40	37	116	41	133	1/4	85	100	92	30	80	52	8.0	—	13.5	18	150	92	180	116	21	21	11	16
125	Up to 1000	30 to 1000	50	47	145	—	145	1/2	112.5	141.5	115	36	90	—	43	14	19	14	190	100	230	—	16	16	16	—
140	Up to 1000	30 to 1000	50	47	161	—	160	1/2	121	150	128	36	90	—	43	14	19	20	212	112	255	—	16	16	16	—
160	Up to 1200	30 to 1200	56	53	182	—	180	3/4	133	167	144	40	90	—	43	14	19	20	236	118	275	—	18.5	18.5	18.5	—

Bore size (mm)	J	K	KA	MM	N	P	S	W	Without rod boot	With rod boot					
									H	ZZ	e	f	h	ℓ	ZZ
40	M8 x 1.25	6	14	M14 x 1.5	27	1/4	84	8	51	216	36	16.5	59	1/4 stroke	224
50	M8 x 1.25	7	18	M18 x 1.5	30	3/8	90	0	58	238	45	16.0	66	1/4 stroke	246
63	M10 x 1.25	7	18	M18 x 1.5	31	3/8	98	0	58	255	45	16.0	66	1/4 stroke	263
80	M12 x 1.75	11	22	M22 x 1.5	37	1/2	116	0	71	297	60	18.0	80	1/4 stroke	306
100	M12 x 1.75	11	26	M26 x 1.5	40	1/2	126	0	72	316	60	18.0	81	1/4 stroke	325
125	M14 x 1.5	15	31	M30 x 1.5	35	1/2	98	—	110	363.5	75	40	133	1/5 stroke	386.5
140	M14 x 1.5	15	31	M30 x 1.5	35	1/2	98	—	110	378	75	40	133	1/5 stroke	401
160	M16 x 1.5	17	36	M36 x 1.5	39	3/4	106	—	120	413	75	40	141	1/5 stroke	434

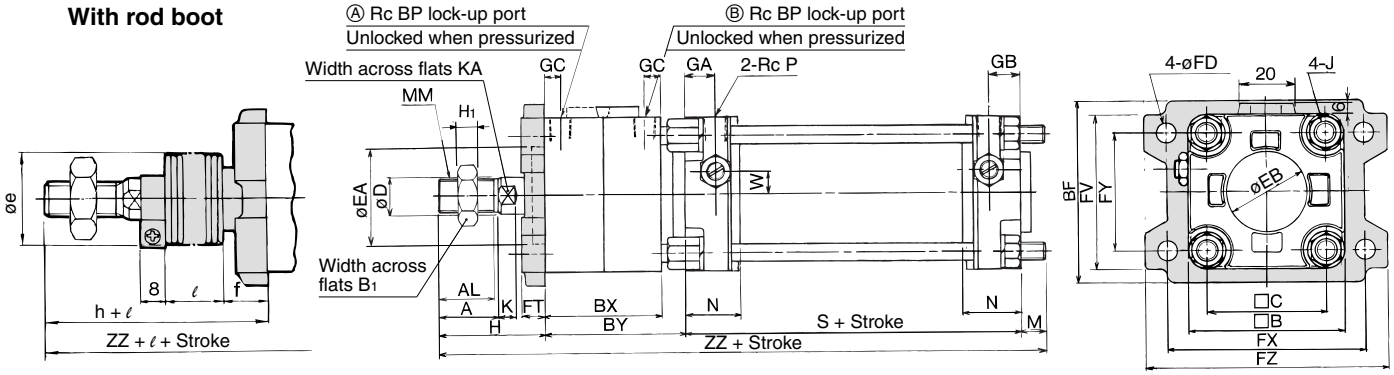
Series CL1

Rod Side Flange Style (F)

ø40 to ø100

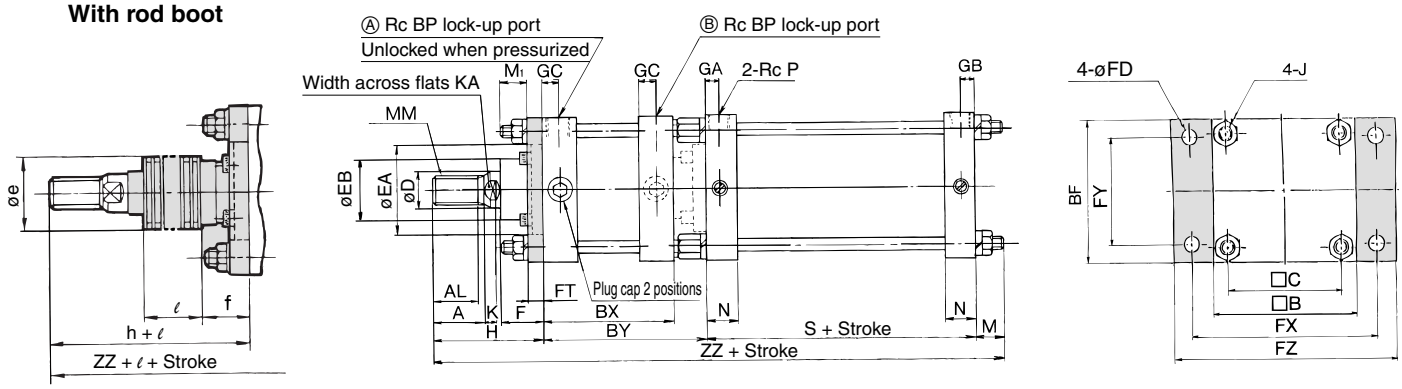
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



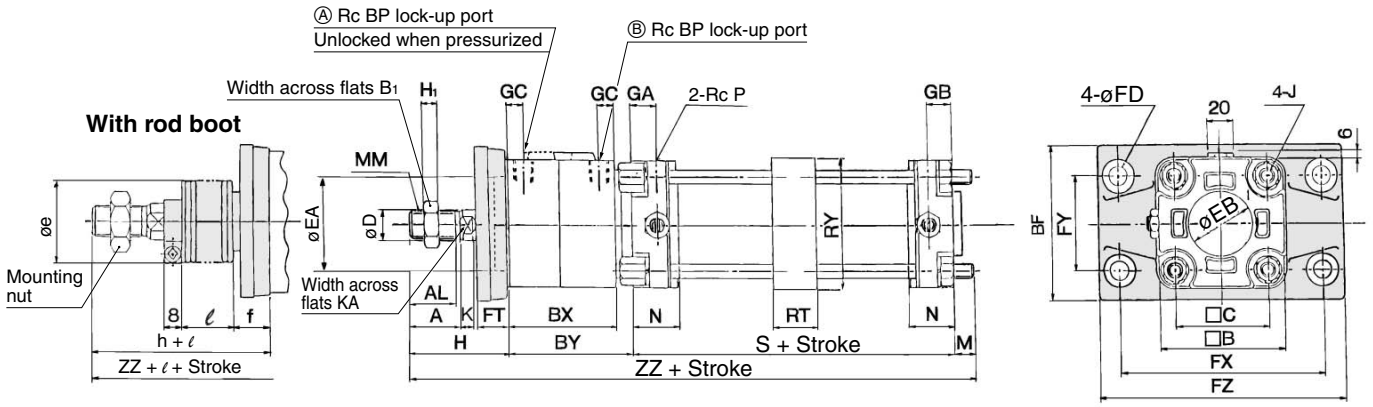
Bore size (mm)	Stroke range (mm)		Long stroke range (mm)	A	AL	B	B1	BF	BP	BX	BY	C	D	EA	EB	F	FD	FT	FX	FY	FZ
	Without rod boot	With rod boot																			
40	Up to 500	20 to 500	501 to 800	30	27	60	22	71	1/4	59	69	44	16	40	32	—	9.0	12	80	42	100
50	Up to 600	20 to 600	601 to 1000	35	32	70	27	81	1/4	67	78	52	20	50	40	—	9.0	12	90	50	110
63	Up to 600	20 to 600	601 to 1000	35	32	86	27	101	1/4	73	84	64	20	55	40	—	11.5	15	105	59	130
80	Up to 750	20 to 750	751 to 1000	40	37	102	32	119	1/4	77	92	78	25	65	52	—	13.5	18	130	76	160
100	Up to 750	20 to 750	751 to 1000	40	37	116	41	133	1/4	85	100	92	30	80	52	—	13.5	18	150	92	180
125	Up to 1400	30 to 1400	—	50	47	145	—	145	1/2	112.5	141.5	115	36	90	59	43	19	14	190	100	230
140	Up to 1400	30 to 1400	—	50	47	161	—	160	1/2	121	150	128	36	90	59	43	19	20	212	112	255
160	Up to 1400	30 to 1400	—	56	53	182	—	180	3/4	133	167	144	40	90	59	43	19	20	236	118	275

Bore size (mm)	FV	GA	GB	GC	H1	J	K	KA	M	M1	MM	N	P	S	W	Without rod boot		With rod boot				
																H	ZZ	e	f	h	ℓ	ZZ
40	60	15	15	11	8	M8 x 1.25	6	14	11	—	M14 x 1.5	27	1/4	84	8	51	215	36	16.5	59	1/4 stroke	223
50	70	17	17	11	11	M8 x 1.25	7	18	11	—	M18 x 1.5	30	3/8	90	0	58	237	45	16.0	66	1/4 stroke	245
63	86	17	17	11	11	M10 x 1.25	7	18	14	—	M18 x 1.5	31	3/8	98	0	58	254	45	16.0	66	1/4 stroke	262
80	102	21	21	11	13	M12 x 1.75	11	22	17	—	M22 x 1.5	37	1/2	116	0	71	296	60	18.0	80	1/4 stroke	305
100	116	21	21	11	16	M12 x 1.75	11	26	17	—	M26 x 1.5	40	1/2	126	0	72	315	60	18.0	81	1/4 stroke	324
125	—	16	16	16	—	M14 x 1.5	15	31	30	22	M30 x 1.5	35	1/2	98	—	110	379.5	75	40	133	1/5 stroke	402.5
140	—	16	16	16	—	M14 x 1.5	15	31	24	19	M30 x 1.5	35	1/2	98	—	110	382	75	40	133	1/5 stroke	405
160	—	18.5	18.5	18.5	—	M16 x 1.5	17	36	26	22	M36 x 1.5	39	3/4	106	—	120	419	75	40	141	1/5 stroke	440

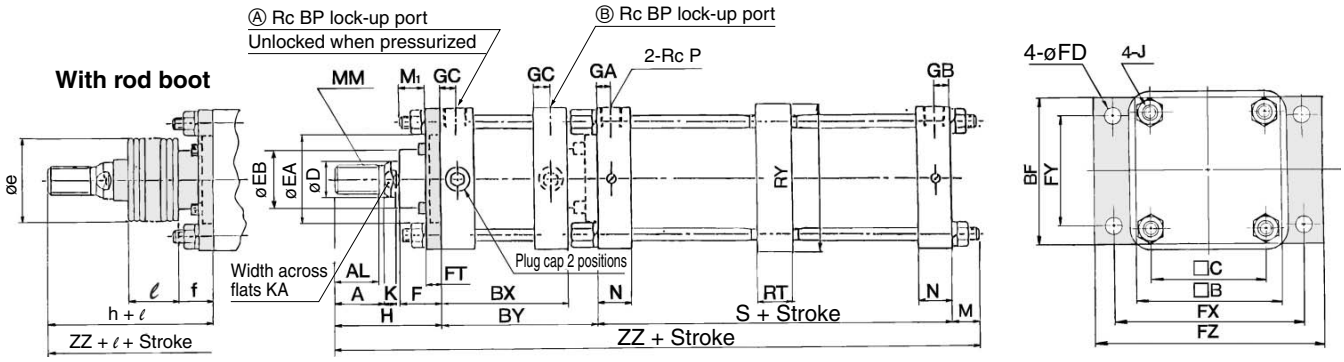
Rod Side Flange Style (F)/Long Stroke

ø50 to ø100

Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward



ø125 to ø160



Bore size (mm)	Stroke range	A	AL	B	B1	BF	BP	BX	BY	C	D	EA	EB	F	FD	FT	FX	FY	FZ	GA	GB	GC	H1	J	K	KA
50	1001 to 1200	35	32	70	27	88	1/4	67	78	52	20	50	40	—	9.0	20	120	58	144	17	17	11	11	M8 x 1.25	7	18
63	1001 to 1200	35	32	86	27	105	1/4	73	84	64	20	55	40	—	11.5	23	140	64	170	17	17	11	11	M10 x 1.25	7	18
80	1001 to 1400	40	37	102	32	124	1/4	77	92	78	25	65	52	—	13.5	28	164	84	198	21	21	11	13	M12 x 1.75	11	22
100	1001 to 1500	40	37	116	41	140	1/4	85	100	92	30	80	52	—	13.5	29	180	100	220	21	21	11	16	M12 x 1.75	11	26
125	1401 to 1600	50	47	145	—	145	1/2	112.5	141.5	115	36	90	59	43	19	14	190	100	230	16	16	16	—	M14 x 1.5	15	31
140	1401 to 1600	50	47	161	—	160	1/2	121	150	128	36	90	59	43	19	20	212	112	255	16	16	16	—	M14 x 1.5	15	31
160	1401 to 1600	56	53	182	—	180	3/4	133	167	144	40	90	59	43	19	20	236	118	275	18.5	18.5	18.5	—	M16 x 1.5	17	36

Bore size (mm)	Stroke range	M	M1	MM	N	P	RT	RY	S	W	Without rod boot		With rod boot				
											H	ZZ	e	f	h	ℓ	ZZ
50	1001 to 1200	6	—	M18 x 1.5	30	3/8	30	76	90	0	67	241	45	16.0	66	1/4 stroke	240
63	1001 to 1200	10	—	M18 x 1.5	31	3/8	40	92	98	0	71	263	45	16.0	66	1/4 stroke	258
80	1001 to 1400	12	—	M22 x 1.5	37	1/2	45	112	116	0	87	307	60	18.0	80	1/4 stroke	300
100	1001 to 1500	12	—	M26 x 1.5	40	1/2	50	136	126	0	89	327	60	18.0	81	1/4 stroke	319
125	1401 to 1600	30	22	M30 x 1.5	35	1/2	36	164	98	—	110	379.5	75	40	133	1/5 stroke	402.5
140	1401 to 1600	24	19	M30 x 1.5	35	1/2	36	184	98	—	110	382	75	40	133	1/5 stroke	405
160	1401 to 1600	26	22	M36 x 1.5	39	3/4	45	204	106	—	120	419	75	40	141	1/5 stroke	440

Note) Bore size ø40 and bore sizes ø125 through ø160 with auto switch are not available.

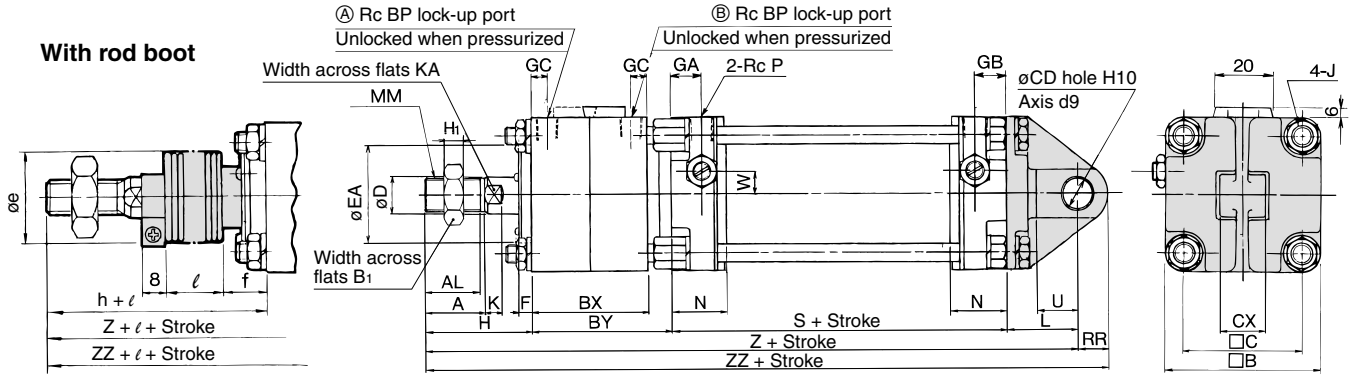
Series CL1

Single Clevis Style (C)

ø40 to ø100

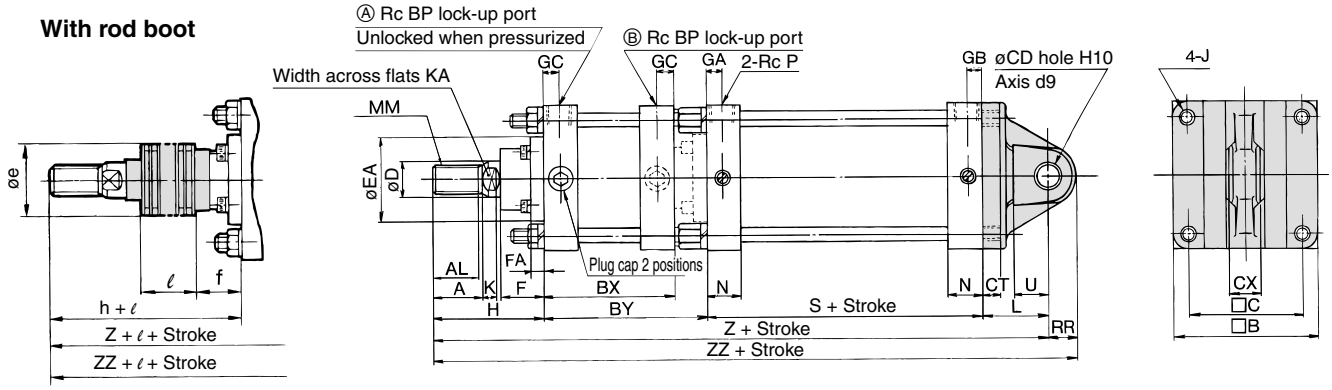
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



Bore size (mm)	Stroke range (mm)		A	AL	B	B1	BP	BX	BY	C	CD	CT	CX	D	EA	F	FA	GA	GB	GC	H1
	Without rod boot	With rod boot																			
40	Up to 500	20 to 500	30	27	60	22	1/4	59	69	44	10	—	15.0 $^{-0.1}_{-0.3}$	16	40	6.5	—	15	15	11	8
50	Up to 600	20 to 600	35	32	70	27	1/4	67	78	52	12	—	18.0 $^{-0.1}_{-0.3}$	20	50	6.0	—	17	17	11	11
63	Up to 600	20 to 600	35	32	86	27	1/4	73	84	64	16	—	25.0 $^{-0.1}_{-0.3}$	20	55	6.0	—	17	17	11	11
80	Up to 750	20 to 750	40	37	102	32	1/4	77	92	78	20	—	31.5 $^{-0.1}_{-0.3}$	25	65	8.0	—	21	21	11	13
100	Up to 750	20 to 750	40	37	116	41	1/4	85	100	92	25	—	35.5 $^{-0.1}_{-0.3}$	30	80	8.0	—	21	21	11	16
125	Up to 1000	30 to 1000	50	47	145	—	1/2	112.5	141.5	115	25	17	32.0 $^{-0.1}_{-0.3}$	36	90	43	14	16	16	16	—
140	Up to 1000	30 to 1000	50	47	161	—	1/2	121	150	128	28	17	36.0 $^{-0.1}_{-0.3}$	36	90	43	14	16	16	16	—
160	Up to 1200	30 to 1200	56	53	182	—	3/4	133	167	144	32	20	40.0 $^{-0.1}_{-0.3}$	40	90	43	14	18.5	18.5	18.5	—

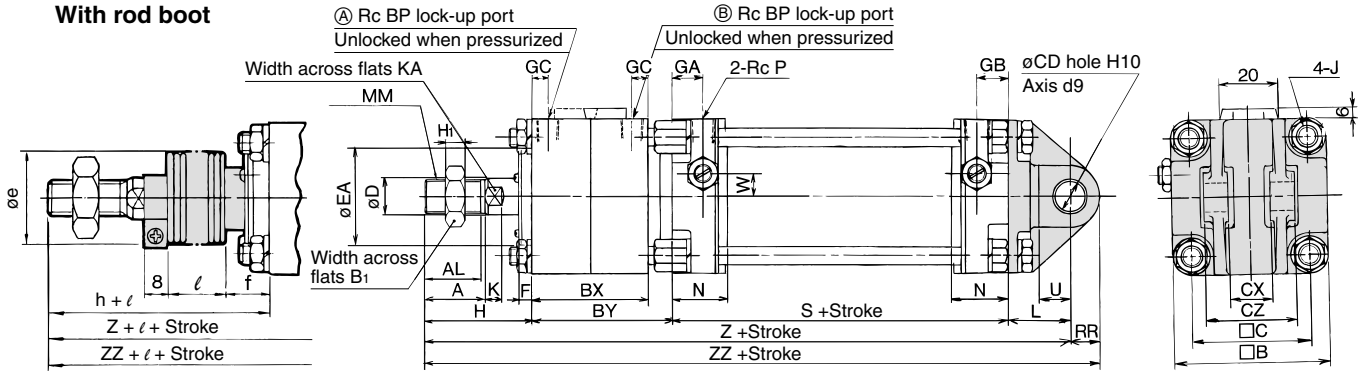
Bore size (mm)	J	K	KA	L	MM	N	P	RR	S	U	W	Without rod boot			With rod boot					
												H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	M8 x 1.25	6	14	30	M14 x 1.5	27	1/4	10	84	16	8	51	234	244	36	16.5	59	1/4 stroke	242	252
50	M8 x 1.25	7	18	35	M18 x 1.5	30	3/8	12	90	19	0	58	261	273	45	16.0	66	1/4 stroke	269	281
63	M10 x 1.25	7	18	40	M18 x 1.5	31	3/8	16	98	23	0	58	280	296	45	16.0	66	1/4 stroke	288	304
80	M12 x 1.75	11	22	48	M22 x 1.5	37	1/2	20	116	28	0	71	327	347	60	18.0	80	1/4 stroke	336	356
100	M12 x 1.75	11	26	58	M26 x 1.5	40	1/2	25	126	36	—	72	356	381	60	18.0	81	1/4 stroke	365	390
125	M14 x 1.5	15	31	65	M30 x 1.5	35	1/2	29	98	35	—	110	414.5	443.5	75	40	133	1/5 stroke	437.5	466.5
140	M14 x 1.5	15	31	75	M30 x 1.5	35	1/2	32	98	40	—	110	433	465	75	40	133	1/5 stroke	456	488
160	M16 x 1.5	17	36	80	M36 x 1.5	39	3/4	36	106	45	—	120	473	509	75	40	141	1/5 stroke	494	530

Double Clevis Style (D)

ø40 to ø100

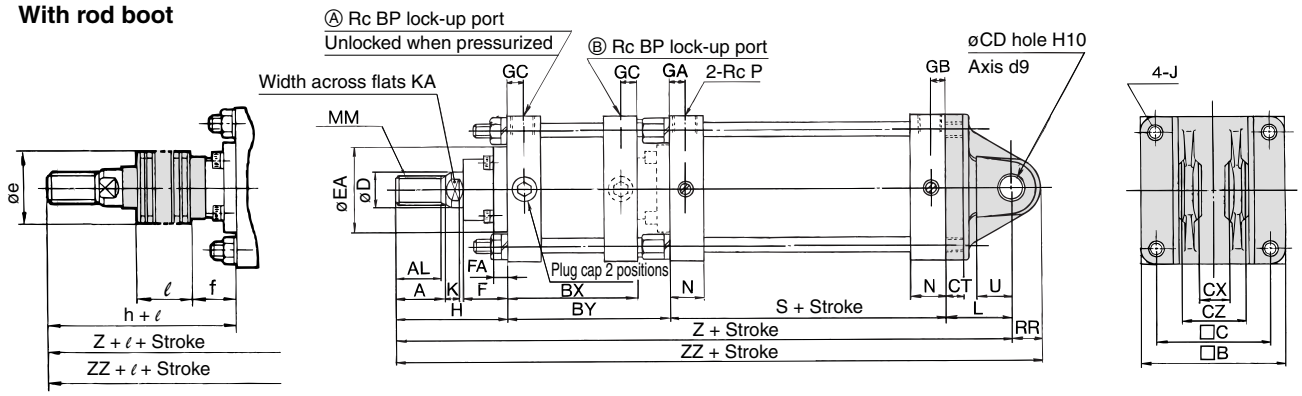
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



Bore size (mm)	Stroke range (mm)		A	AL	B	B_1	BP	BX	BY	C	CD	CT	CX	CZ	D	EA	F	FA	GA	GB
	Without rod boot	With rod boot																		
40	Up to 500	20 to 500	30	27	60	22	1/4	59	69	44	10	—	15.0 $^{+0.3}_{+0.1}$	29.5	16	40	6.5	—	15	15
50	Up to 600	20 to 600	35	32	70	27	1/4	67	78	52	12	—	18.0 $^{+0.3}_{+0.1}$	38	20	50	6.0	—	17	17
63	Up to 600	20 to 600	35	32	86	27	1/4	73	84	64	16	—	25.0 $^{+0.3}_{+0.1}$	49	20	55	6.0	—	17	17
80	Up to 750	20 to 750	40	37	102	32	1/4	77	92	78	20	—	31.5 $^{+0.3}_{+0.1}$	61	25	65	8.0	—	21	21
100	Up to 750	20 to 750	40	37	116	41	1/4	85	100	92	25	—	35.5 $^{+0.3}_{+0.1}$	64	30	80	8.0	—	21	21
125	Up to 1000	30 to 1000	50	47	145	—	1/2	112.5	141.5	115	25	17	32.0 $^{+0.3}_{+0.1}$	64 $^{0}_{-0.2}$	36	90	43	14	16	16
140	Up to 1000	30 to 1000	50	47	161	—	1/2	121	150	128	28	17	36.0 $^{+0.3}_{+0.1}$	72 $^{0}_{-0.2}$	36	90	43	14	16	16
160	Up to 1200	30 to 1200	56	53	182	—	3/4	133	167	144	32	20	40.0 $^{+0.3}_{+0.1}$	80 $^{0}_{-0.2}$	40	90	43	14	18.5	18.5

Bore size (mm)	GC	H_1	J	K	KA	L	MM	N	P	RR	S	U	W	Without rod boot			With rod boot					
														H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	11	8	M8 x 1.25	6	14	30	M14 x 1.5	27	1/4	10	84	16	8	51	234	244	36	16.5	59	1/4 stroke	242	252
50	11	11	M8 x 1.25	7	18	35	M18 x 1.5	30	3/8	12	90	19	0	58	261	273	45	16.0	66	1/4 stroke	269	281
63	11	11	M10 x 1.25	7	18	40	M18 x 1.5	31	3/8	16	98	23	0	58	280	296	45	16.0	66	1/4 stroke	288	304
80	11	13	M12 x 1.75	11	22	48	M22 x 1.5	37	1/2	20	116	28	0	71	327	347	60	18.0	80	1/4 stroke	336	356
100	11	16	M12 x 1.75	11	26	58	M26 x 1.5	40	1/2	25	126	36	0	72	356	381	60	18.0	81	1/4 stroke	365	390
125	16	—	M14 x 1.5	15	31	65	M30 x 1.5	35	1/2	29	98	35	—	110	414.5	443.5	75	40	133	1/5 stroke	437.5	466.5
140	16	—	M14 x 1.5	15	31	75	M30 x 1.5	35	1/2	32	98	40	—	110	433	465	75	40	133	1/5 stroke	456	488
160	18.5	—	M16 x 1.5	17	36	80	M36 x 1.5	39	3/4	36	106	45	—	120	473	509	75	40	141	1/5 stroke	494	530

∗ Clevis pin, flat washer and cotter pin are attached.

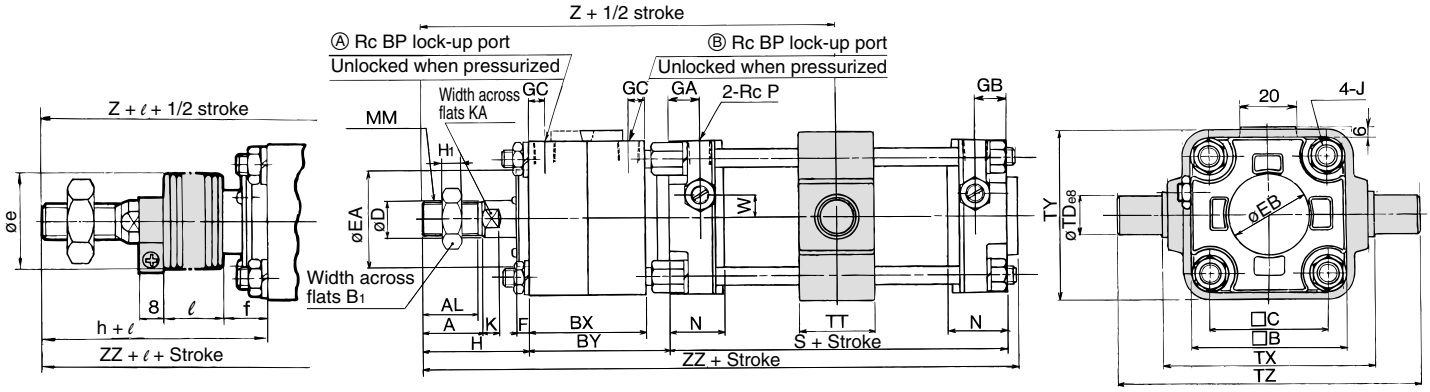
Series CL1

Center Trunnion Style (T)

ø40 to ø100

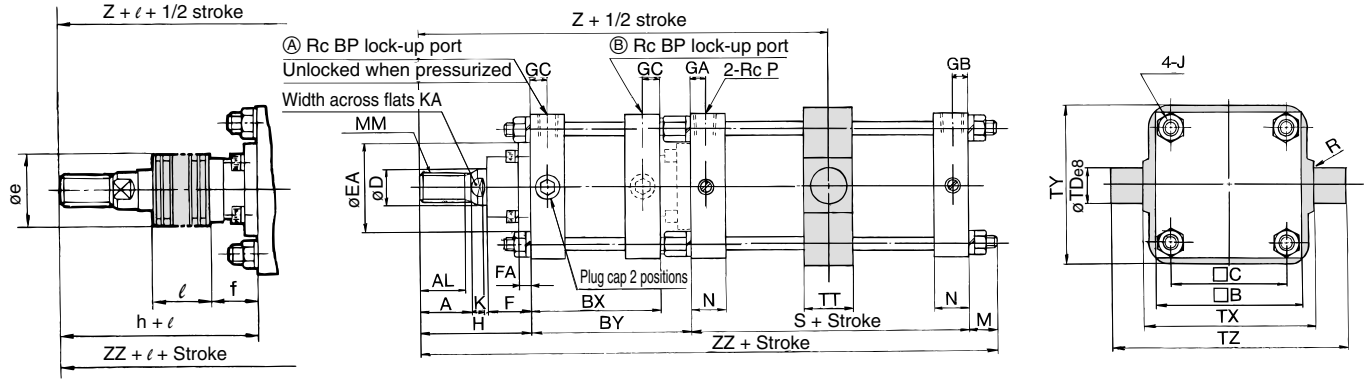
Ⓐ Lock-up at piston forward Ⓑ Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



Bore size (mm)	Stroke range (mm)		A	AL	B	B1	BP	BX	BY	C	D	EA	EB	F	FA	GA	GB	GC	H1	J	K	KA
	Without rod boot	With rod boot																				
40	Up to 500	20 to 500	30	27	60	22	1/4	59	69	44	16	40	32	6.5	—	15	15	11	8	M8 x 1.25	6	14
50	Up to 600	20 to 600	35	32	70	27	1/4	67	78	52	20	50	40	6.0	—	17	17	11	11	M8 x 1.25	7	18
63	Up to 600	20 to 600	35	32	86	27	1/4	73	84	64	20	55	40	6.0	—	17	17	11	11	M10 x 1.25	7	18
80	Up to 750	20 to 750	40	37	102	32	1/4	77	92	78	25	65	52	8.0	—	21	21	11	13	M12 x 1.75	11	22
100	Up to 750	20 to 750	40	37	116	41	1/4	85	100	92	30	80	52	8.0	—	21	21	11	16	M12 x 1.75	11	26
125	25 to 1000	30 to 1000	50	47	145	—	1/2	112.5	141.5	115	36	90	—	43	14	16	16	16	—	M14 x 1.5	15	31
140	30 to 1000	30 to 1000	50	47	161	—	1/2	121	150	128	36	90	—	43	14	16	16	16	—	M14 x 1.5	15	31
160	35 to 1200	35 to 1200	56	53	182	—	3/4	133	167	144	40	90	—	43	14	18.5	18.5	18.5	—	M16 x 1.5	17	36

Bore size (mm)	M	MM	N	P	R	S	TDe8	TT	TX	TY	TZ	W	Without rod boot			With rod boot					
													H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	—	M14 x 1.5	27	1/4	—	84	15 −0.032 −0.059	22	85	62	117	8	51	162	209	36	16.5	59	1/4 stroke	170	217
50	—	M18 x 1.5	30	3/8	—	90	15 −0.032 −0.059	22	95	74	127	0	58	181	232	45	16.0	66	1/4 stroke	189	240
63	—	M18 x 1.5	31	3/8	—	98	18 −0.032 −0.059	28	110	90	148	0	58	191	246	45	16.0	66	1/4 stroke	199	254
80	—	M22 x 1.5	37	1/2	—	116	25 −0.040 −0.073	34	140	110	192	0	71	221	286	60	18.0	80	1/4 stroke	230	295
100	—	M26 x 1.5	40	1/2	—	126	25 −0.040 −0.073	40	162	130	214	0	72	235	306	60	18.0	81	1/4 stroke	244	315
125	19	M30 x 1.5	35	1/2	1.0	98	32 −0.050 −0.089	50	170	164	234	—	110	300.5	368.5	75	40	133	1/5 stroke	323.5	391.5
140	19	M30 x 1.5	35	1/2	1.5	98	36 −0.050 −0.089	55	190	184	262	—	110	309	377	75	40	133	1/5 stroke	332	400
160	22	M36 x 1.5	39	3/4	1.5	106	40 −0.050 −0.089	60	212	204	292	—	120	340	415	75	40	141	1/5 stroke	361	436