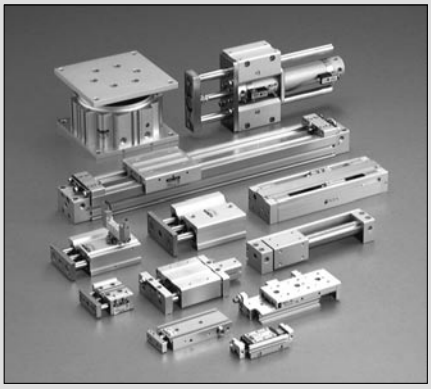
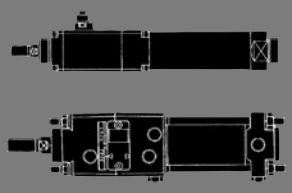
Combination Cylinder

Best Pneumatics 2 Combination Cylinder





Lock Cylinder

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

Variations

Series	Bore (mm)	Standard stroke (mm)	Page
Fine lock cylinder			
Series CLJ2 	16	15 to 200	3.1-8
Series CLM2 	20 25 32 40	25 to 300	3.1-15
Series CLG1 	20	25 to 200	3.1-25
	25 32 40	25 to 300	
Series CLA 	40	25 to 500	3.1-33 3.1-43
	50 63	25 to 600	
	80 100	25 to 700	
Lock-up cylinder			
Series CL1 	40	25 to 500	3.1-49
	50, 63	25 to 600	
	80, 100	25 to 700	
	125, 140 160	Up to 1600	
Clamp cylinder with lock			
Series CLK1 	32 to 63	50 75 100 125 150	3.1-63
Compact cylinder with lock			
Series CLQ 	20,25	5 to 50	3.1-87
	32 to 100	5 to 50, 75, 100	

Made to Order	Refer to p.5.4-90 for Series CL Made to Order specifications.

Series CL
Prior to Use

⚠Precautions

Be sure to read before handling.
The precautions on these pages are for the fine lock cylinder and lock-up cylinder.
Refer to actuator common precautions on p.0-39 to 0-46 for general actuator precautions.

⚠ Warning

Design on Equipment Machine

①Prevent personnel from coming into direct contact with the driven object as well as the moving portion of a cylinder. 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.

②Use 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.3.1-4). 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.

⚠ Warning

Selection

Notes for setting the maximum load in the locked state.

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.

①For constant static loads, such as for drop prevention:
- Fine lock series (CLJ2, CLM2, CLG1, CLA series)

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)

②When 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 CLJ1, CLM2, CLG1, CLA)

Max. load at horizontal mounting: 70% or less of the holding force (max. static load) for spring lock
Max. load at vertical mounting: 35% or less of the holding force (max. static load) for spring lock
- Lock-up series (Series CL1)

Max. load at horizontal mounting: 50% or less of the holding force (max. static load)
Max. load at vertical mounting: 25% or less of the holding force (max. static load)

③In 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.

④The 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%.
CLA··· Holding force at piston rod retracted side decreases approx. 15%.

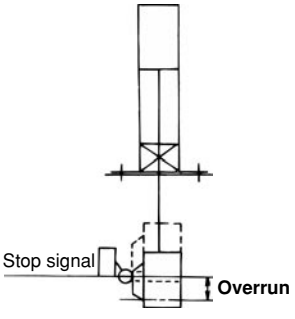
⑤The locking of the lock-up cylinder is unidirectional.
Because the locking direction of the lock-up cylinder is unidirectional, select the locking direction in accordance with the particular operating conditions. It is also possible to manufacture a bidirectional lock-up cylinder. For details, refer to "Made to Order" on p.5.4-90. Due to the nature of its construction, a lock-up cylinder has a play of approximately 0.5mm to 1mm 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.

⑥To 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.**
- **A limit switch requires a detection length (dog length) that is equivalent to the amount of overrun + a**
- **SMC's auto switches have an operation range of 8 to 14mm, depending on the switch. If the overrun exceeds this range, self holding of the contact point must be effected on the switch load side.**

∗The series and their stopping accuracy are as follows: CLJ series (p.3.1-10), CLM2 series (p.3.1-18), CLG1 (p.3.1-27), CLA series (p.3.1-35), and CL1 series (p.3.1-50).

⑦To improve stopping accuracy, use DC-based control circuitry and a solenoid valve with an excellent response, and locate the solenoid valve as close as possible to the cylinder.

⑧Be 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.



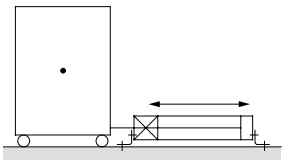
⚠ Warning

Mounting

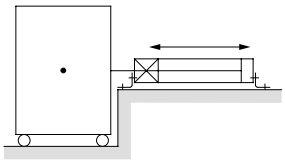
①To attach a load to the end of the rod, make sure that the lock is in the disengaged state.
- If this is performed with the lock engaged, a load that exceeds the allowable rotational force or holding force would be applied to the piston rod, which could damage the locking mechanism. The fine lock and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

⚠ Caution

①Do not apply an unbalanced load to the piston rod.
- Pay particular attention to aligning the centre of gravity of the load with the axial centre 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 centre of gravity and cylinder axis centre are not matched.)



○ (Load centre of gravity and cylinder axis centre are matched.)

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

⚠ Caution

Adjustment

①Place it in the locked position. (Excluding the CL1 series 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 p.3.1-5 for the fine lock series, and p.3.1-52 for the lock-up cylinders. 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.

②Adjust 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.

Prior to Use

Pneumatic Circuit

⚠ Warning

① **To stop the piston by engaging the lock, make sure to use a pneumatic circuit that applies a balanced pressure to both ends of the piston.**
To prevent the piston from lurching after it has been stopped with the lock, during restarting or when disengaging manually, provide a circuit that applies a balanced pressure to both ends of the piston to cancel out the force that is generated by the load in the direction of the operation of the piston.

② **Using 50% or more of the effective area of the cylinder actuating solenoid valve as a guide, use a solenoid valve with a large effective area for the unlocking solenoid.**
The greater the effective area, the shorter will be the length of time the lock takes to engage (shortening the overrun amount), thus improving the stopping precision.

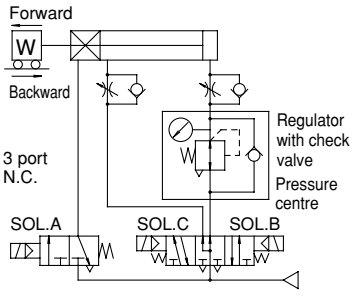
③ **Place the unlocking solenoid close to the cylinder so that it will not be located farther than the cylinder actuating solenoid valve.**
The closer the valve is located to the cylinder (the shorter the pipe length), the shorter will be the overrun amount, thus improving the stopping precision.

④ **Provide 0.5 seconds or more between the time the lock is engaged (to effect an intermediate stop of the cylinder) until the lock is disengaged.**
If the length of time the piston is stopped by engaging the lock is short, the piston rod (and the load) could lurch at a speed that is higher than the speed controlled by the speed controller.

⑤ **During restarting, control the signal for switching the unlocking solenoid to be output before or at the same time as the signal for the cylinder actuating solenoid valve is output.**
If the signal is delayed, the piston rod (and the load) could lurch at a speed that is higher than the speed controlled by the speed controller.

⑥ **Basic circuit**

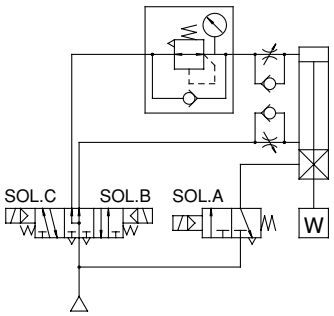
1. [Horizontal]



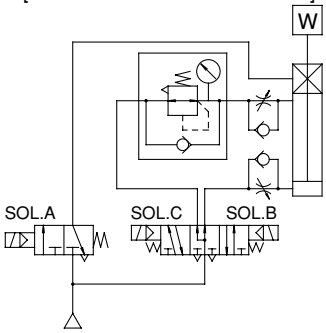
SOL.A	SOL.B	SOL.C	Action	
ON	ON	OFF	Forward	
OFF	OFF	OFF	Locked stop	0.5s or more
ON	OFF	OFF	Unlocked	0 to 0.5s
ON	ON	OFF	Forward	
ON	OFF	ON	Backward	
OFF	OFF	OFF	Locked stop	0.5s or more
ON	OFF	OFF	Unlocked	0 to 0.5s
ON	OFF	ON	Backward	

2. [Vertical]

[Load in direction of rod extension]

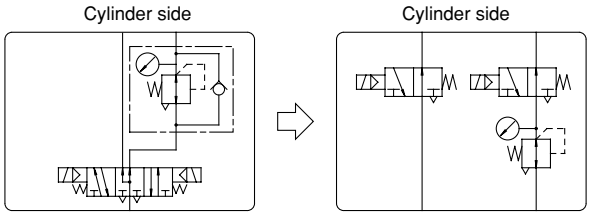


[Load in direction of rod retraction]



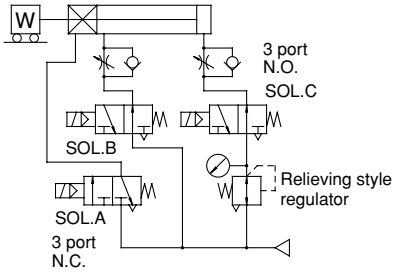
⚠ Caution

① The 3 position pressure centre solenoid valve and regulator with check valve can be interchanged with two 3-port, N.O. valves and a relieving style regulator.



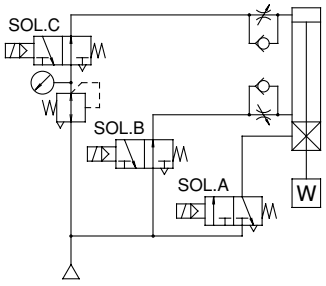
[Example]

1. [Horizontal]

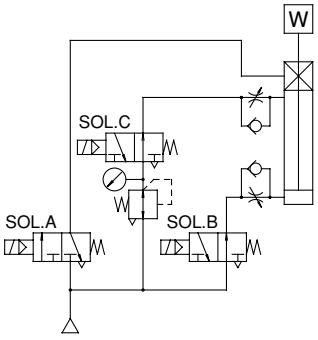


2. [Vertical]

[Load in direction of rod extension]



[Load in direction of rod retraction]



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

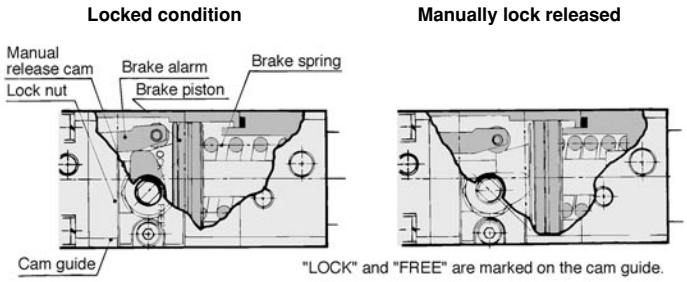
The lock is manually disengaged at the time the cylinder is shipped from the factory. Because the lock will not operate in this state, make sure to change it to the locked state before operation, after having adjusted the axial centre for installation.

How to Change from the Unlocked State to the Locked State

(a) 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.

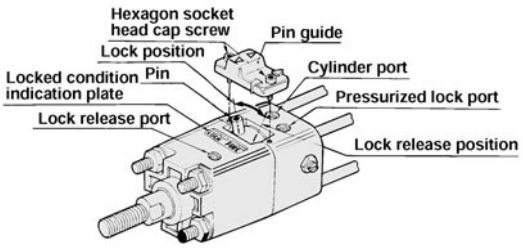


(b) CLA

① Loosen the two hexagon socket bolts and remove the pin guide.
② As viewed from the end of the rod, the pin is tilted 15° to the right of the centre.
③ Supply air pressure of 0.3MPa or more to the lock release port.
④ Using a wooden or plastic rod, such as the handle of a wooden mallet, push the pin and rotate it 30°.

Note) Never rotate the pin by striking it because this could bend or damage the pin. Be very careful when pushing the pin, as the surface is slippery.

⑤ Inside the pin guide, there is a slotted hole that is slightly larger than the pin. Align the pin with the slotted hole and secure them to the cover, using the hexagon socket bolts that were removed in step ①. The protruding portion of the pin guide will then align with the LOCK mark on the nameplate that is attached to the cover surface.



Manually Disengaging the Lock

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.

(a) CLJ2, CLM2, CLG1

① Loose locking nut.
② Supply air pressure of 0.3MPa 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.

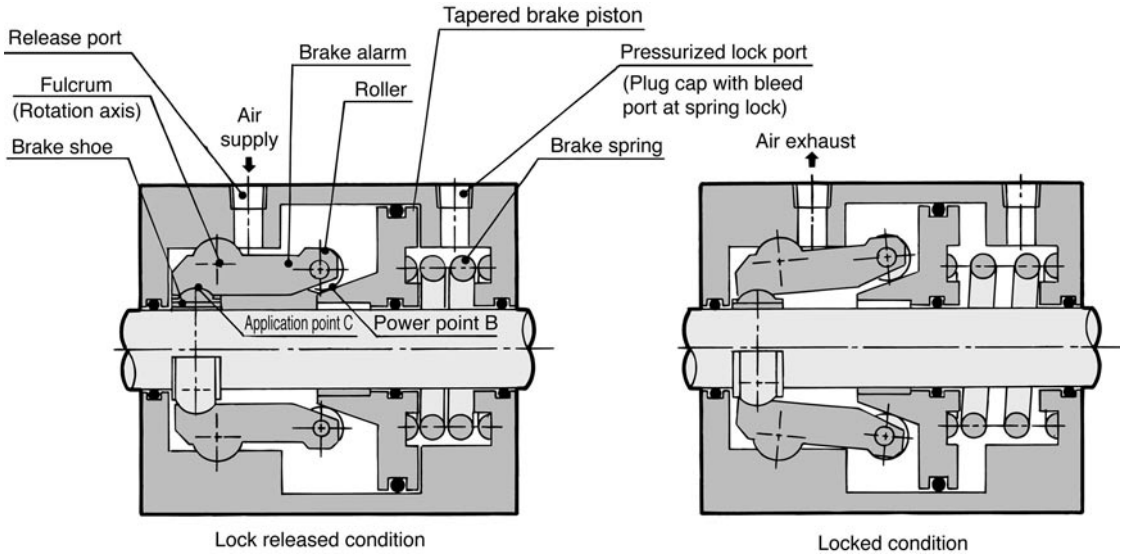
(b) CLA

① Loosen the two hexagon socket bolts and remove the pin guide.
② As viewed from the end of the rod, the pin is tilted 15° to the left of the centre.
③ Supply air pressure of 0.3MPa or more to the lock release port.
④ Using a wooden or plastic rod, such as the handle of a wooden mallet, rotate the pin 30° without scratching it.

Prior to Use

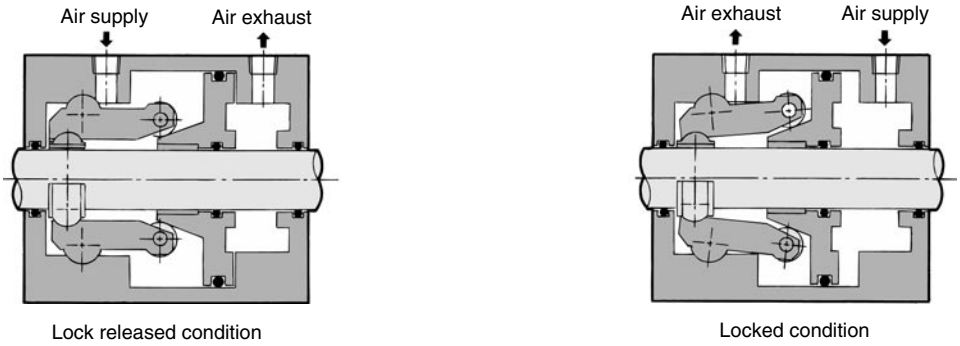
Construction/Applicable Series: CLJ2, CLM2, CLG1

Spring lock style



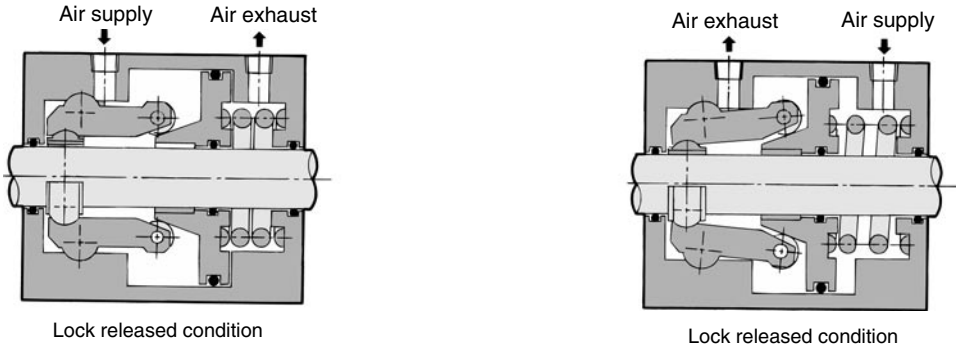
Spring lock (exhaust lock)
The spring force that is applied to the tapered brake piston becomes amplified through the wedge effect. This force becomes further amplified to the power of AB/AC through the mechanical advantage of a lever and acts on the brake shoe, which in turn, applies a large force to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

Pneumatic lock style



Brake piston is operated by air pressure.

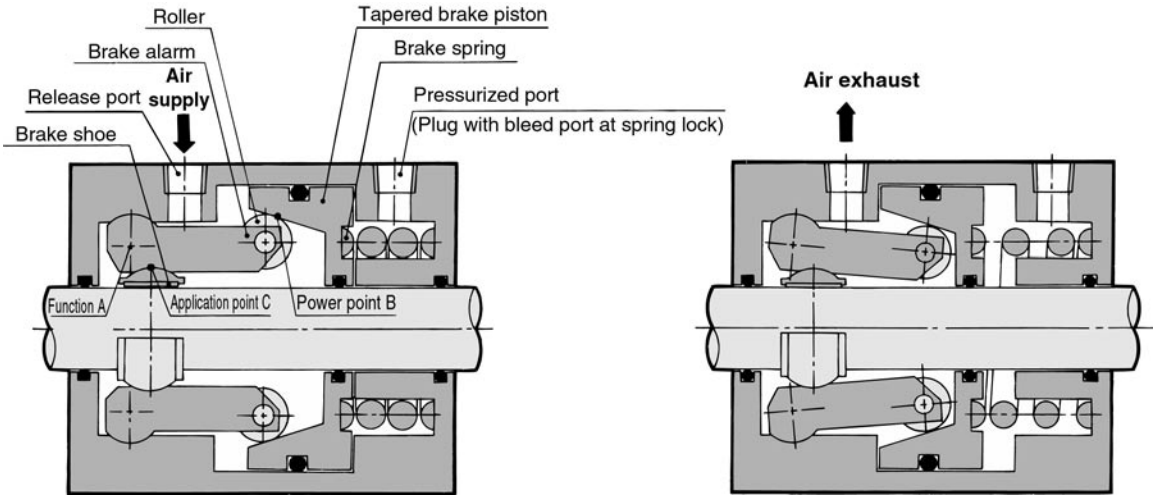
Lock system concurrently using spring and air pressure



Brake piston is operated by air pressure and spring force

Construction/Applicable Series: CLA

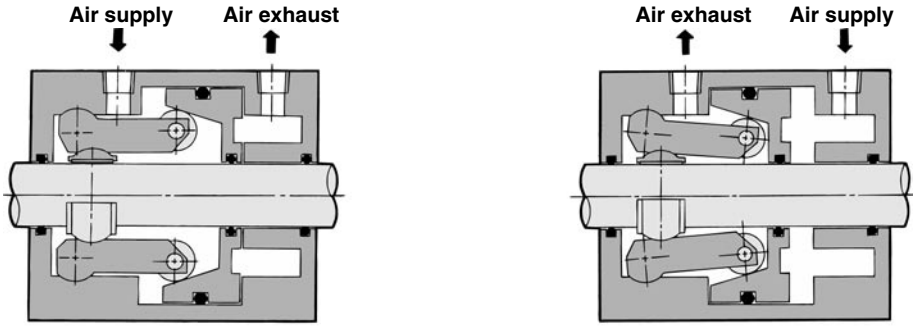
Spring lock style



Lock released condition　　Locked condition

Spring lock (exhaust lock)
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 lock release port, thus disengaging the brake spring force.

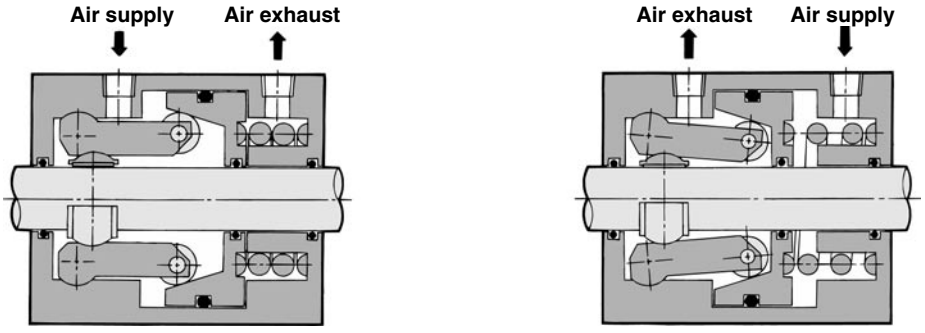
Pneumatic lock style



Lock released condition　　Locked condition

Brake piston is operated by air pressure.

Lock system concurrently using spring and air pressure



Lock released condition　　Locked condition

Brake piston is operated by air pressure and spring force.

Fine Lock Cylinder/Double Acting Single Rod

Series CLJ2

ø16

How to Order

Standard CLJ2 L 16 60 R E

With auto switch CDLJ2 L 16 60 R E C73 L

Air cylinder with auto switch

Mounting

B	Basic style
L	Axial foot style
F	Front flange style
D	Double clevis style

∗ Mounting accessories are not mounted, should be order separate.Please refer order keys in next pages.

Bore size

16	16mm

Cylinder standard stroke (mm)

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

Head cover port position

—	90° to axis
R	Axial direction

Lock operation

E	Spring lock (Exhaust lock)
P	Pneumatic lock (Pressurized lock)
D	Spring and pneumatic lock

Auto switch type

	Select an applicable auto switch model from the table below

Lead wire length

Nil	0.5m
L	3m
Z	5m

Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m)∗ 0.5 (—)	3 (L)	5 (Z)	None (N)	Applicable load	
Reed switch	—	Grommet	Yes	3 wire (NPN equiv.)	5V	—	C76	●	●	—	—	IC	—
				2 wire	12V	100V	C73	●	●	●	—	—	Relay, PLC
			No		5V, 12V	100V or less	C80	●	●	—	—	IC	
		Connector	Yes		12V	—	C73C	●	●	●	●	—	
			No		5V, 12V	24V or less	C80C	●	●	●	●	IC	
Solid state switch	—	Grommet	Yes	3 wire (NPN)	5V, 12V	—	H7A1	●	●	○	—	IC	Relay, PLC
				3 wire (PNP)			H7A2	●	●	○	—		
				2 wire	12V		H7B	●	●	○	—	—	
		Connector					H7C	●	●	●	●		
	Diagnostic indication (2 colour, With timer)	Grommet		3 wire (NPN)	5V, 12V		H7NW	●	●	○	—	IC	
				3 wire (PNP)			H7PW	●	●	○	—		
				2 wire	12V		H7BW	●	●	○	—	—	
	Water resistant (2 colour)						H7BA	—	●	○	—		
	With diagnostic output (2 colour)			3 wire (NPN)	5V, 12V		H7NF	●	●	○	—	IC	
	Latching with diagnostic output (2 colour)			4 wire (NPN)	—		H7LF	●	●	○	—	—	

∗Lead wire length symbol 0.5m····· – (Example) C73C 5m····· Z (Example) C73CZ
3m····· L C73CL None····· N C73CN

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

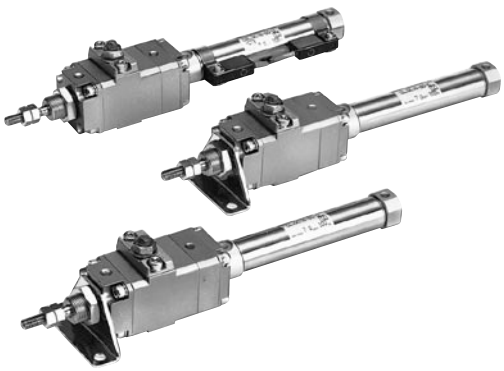
Provided with a compact locking mechanism, it is suitable for intermediate stops, for emergency stops, and for drop prevention.

Locks in both directions

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

Maximum piston speed: 500mm/s

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



Specifications

Bore size (mm)	16
Action	Double acting single rod
Style	Both of non-lube style and lube style
Lock operation	Spring lock (Exhaust lock) Pneumatic (Pressurized lock) Spring and pneumatic lock
Fluid	Air
Proof pressure	1.05MPa
Max. operating pressure	0.7MPa
Min. operating pressure	0.08MPa
Ambient and fluid temperature	Without auto switch: –10°C to + 70°C With auto switch: –10°C to + 60°C (No freezing)
Piston speed	50 to 500mm/s*
Cushion	Rubber bumper
Thread tolerance	JIS class 2
Stroke tolerance	$^{+1.0}_{0}$
Mounting	Basic, Axial foot, Front flange, Double clevis

*Constraints associated with the allowable kinetic energy are imposed on the speeds at which the piston can be locked. To lock the piston in the stationary state for the purpose of drop prevention, the piston can be locked up to a maximum speed of 750mm/s.

Fine Lock Specifications

Lock operation	Spring lock (Exhaust lock)	Spring/ pneumatic lock	Pneumatic lock (Pressurized lock)
Fluid	Air		
Max. operating pressure	0.5MPa		
Lock release pressure	0.3MPa or more		0.1MPa or more
Lock start pressure	0.25MPa or less		0.05MPa or more
Lock direction	Both directions		

Standard Stroke

(mm)

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

Mounting Bracket and Accessories/Refer to p.3.1-14 for details.

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

Bracket Part No.

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

*T bracket is applicable to double clevis style (D).

Auto Switch Mounting Bracket Part No. (Band mounting)

Auto switch mounting bracket	Note
BJ2-016	For D-C7, C8, H7

*Stainless steel mounting bolt set
The set of stainless steel mounting screws described below is available and can be used depending on the operating environment. (The band for auto switches must be ordered separately, as they are not included.)
BBA4: For D-C7/C8/H7
The stainless steel bolts described above are used when the D-H7BAL type switch is shipped mounted on a cylinder. When the switches are shipped as individual parts, the BBA4 set is included.

Minimum Strokes for Auto Switch Mounting

Auto switch mounting	Auto switch model	Number of auto switches	Minimum cylinder stroke (mm)
Band mounting	D-C7 D-C8	2 (Same side)	50
		2 (Different side)	15
		1	10
	D-H7 D-H7□W D-H7NF D-H7BAL	2 (Same side)	60
		2 (Different side)	15
		1	10
	D-C73C D-C80C D-H7C	2 (Same side)	65
		2 (Different side)	15
		1	10
	D-H7LF	2 (Same side)	65
		2 (Different side)	25
		1	15

Weight

(g)

Bore size (mm)		16
Basic weight*		320
Additional weight per 15mm stroke		6.5
Mounting bracket	Axial direction foot	27
	Front flange	21
	Double clevis (with pin)*	10

*Basic weight includes mounting nut and rod end nut.
*Double clevis does not include mounting nut.
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=373g

Stopping Accuracy (Not including tolerance of control system) Unit: mm

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

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

Head Cover Port Position

In the case of the basic style, there are two port positions on the head cover: one that is at 90° to the axis, and the other that is in the axial direction.

Axial direction

90° direction

⚠Caution

Recommended Pneumatic Circuit/Precautions

●Refer to p.3.1-2 to 3.1-5 for further specifications of fine lock cylinder CLJ2 series mentioned above.

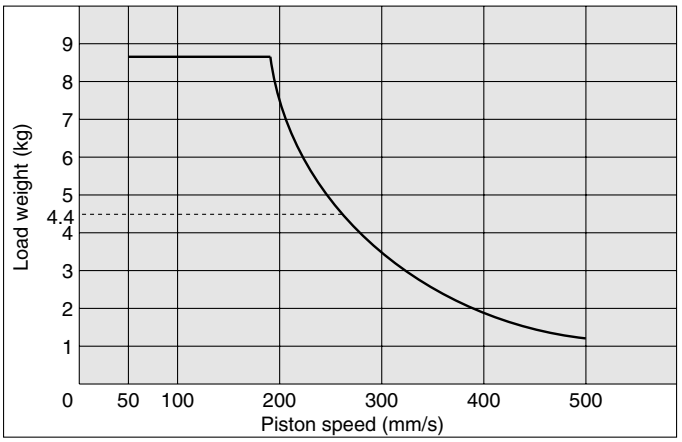
⚠Caution/Allowable Kinetic Energy when Locking

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 3.7kg in weight, and a piston speed of 300mm/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: Load kinetic energy (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 the load, use 1.2 times the average speed as a guide.
④ The relationship between the speed and the load is indicated in the diagram 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 itself, in addition to absorbing the energy of the load. Therefore, even within an 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.

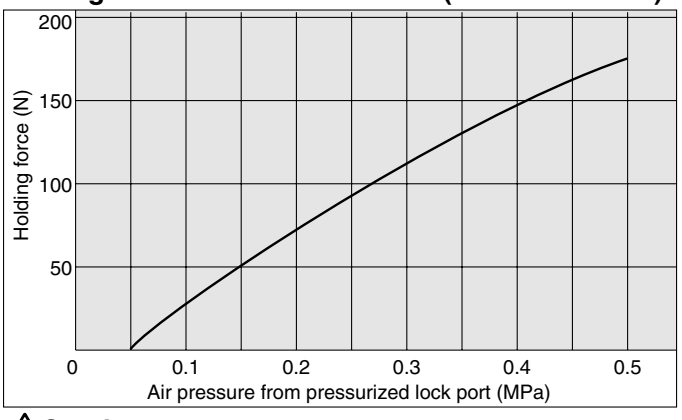


Holding Force of Spring Lock (Maximum static load)

Bore size (mm)	16
Holding force N	122

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

Holding Force of Pneumatic Lock (Max. static load)



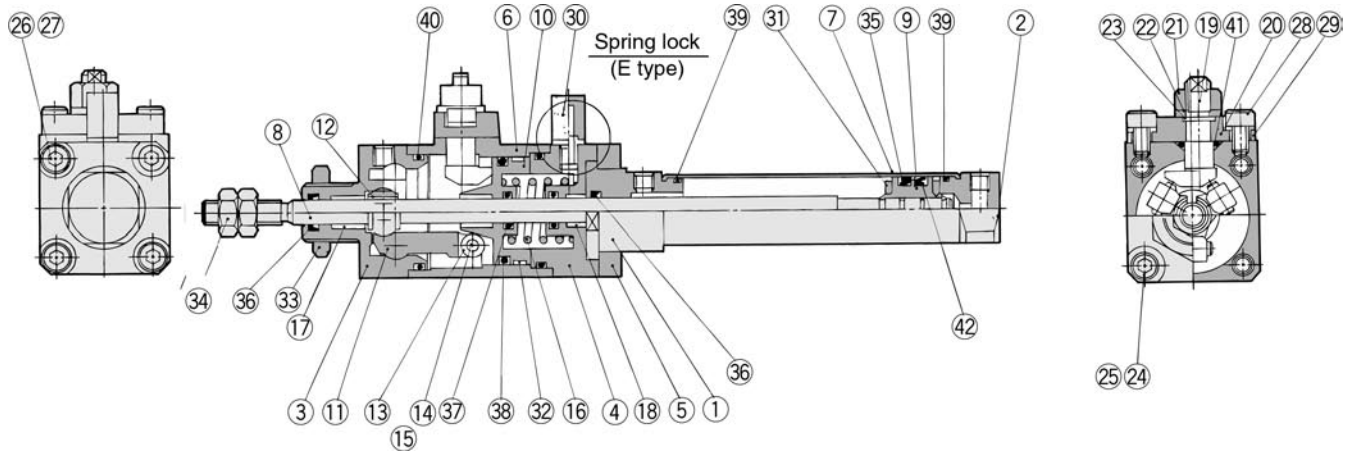
⚠Caution

Cautions when Locking

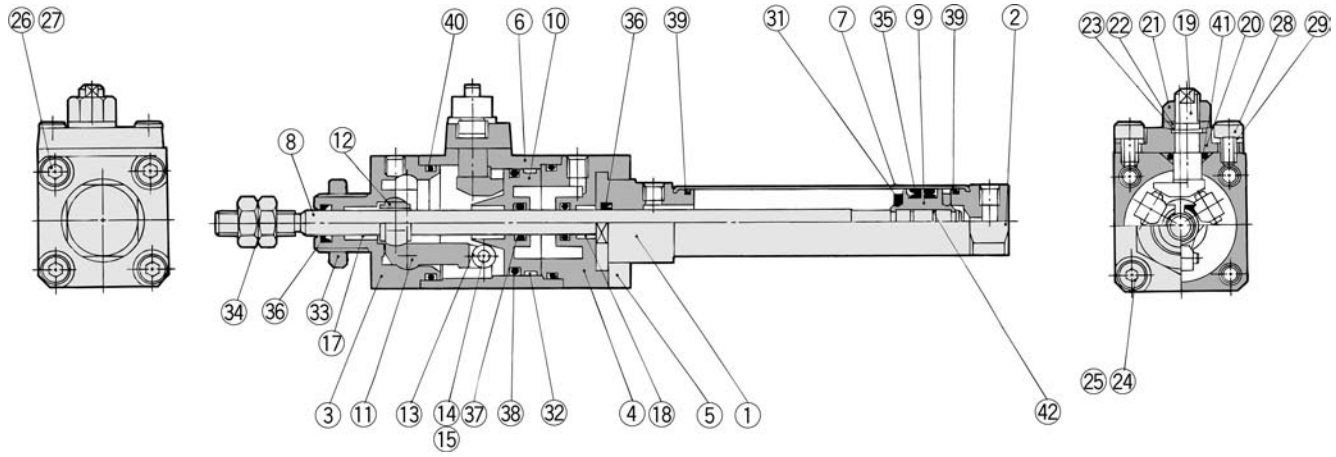
The holding force is the lock's ability to hold a static load that does not involve vibrations or impacts, when it is locked without a load.
Therefore, when normally using the cylinder near the upper limit of the holding force, be aware of the points described below.
- If the piston rod slips because 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/(The cylinder cannot be disassembled.)

Spring lock (Exhaust lock)
Spring and pneumatic lock



Pneumatic lock (Pressurized lock)



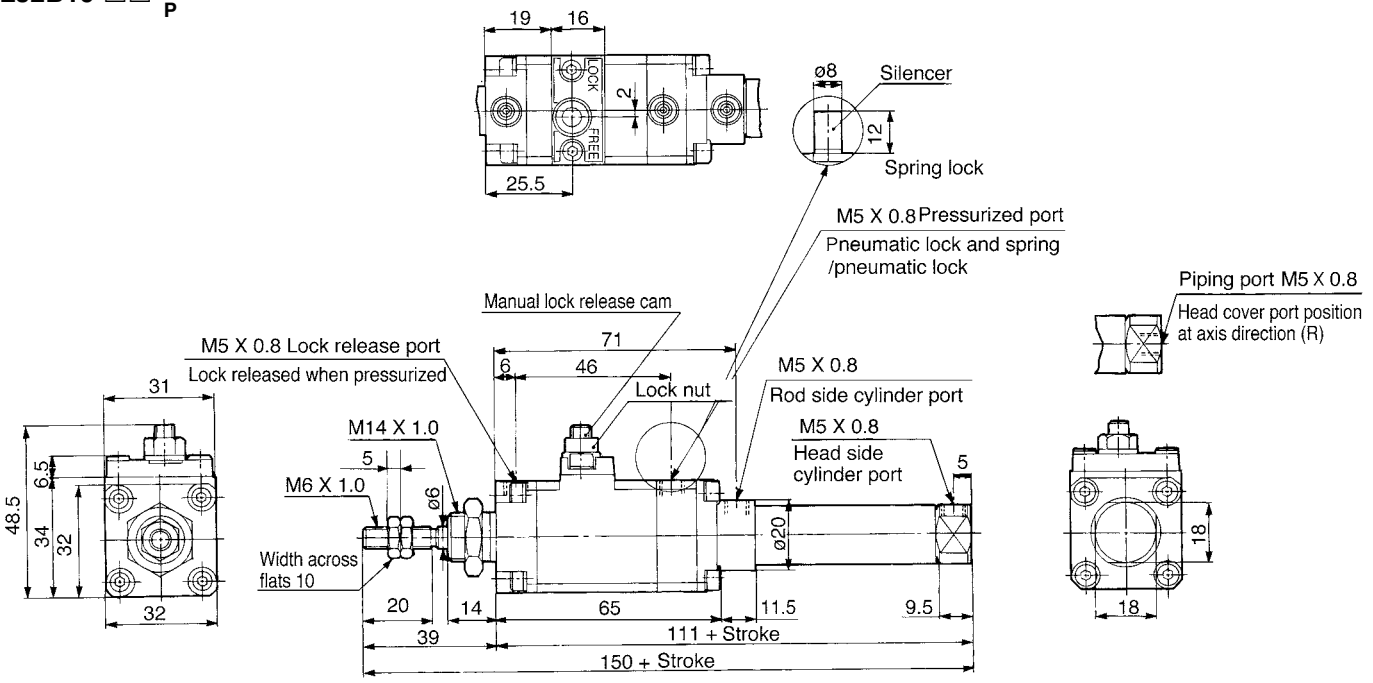
Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	White anodized
②	Head cover	Aluminum alloy	White 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	Middle 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 relase cam	Chrome molybdenum steel	Nitrided
⑳	Cam guide	Carbon steel	Nitrided, platinum silver coated
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	Hex. socket head cap screw	Chrome molybdenum steel	Nickel plated
㉕	Retaining plate	Steel wire	Nickel plated
㉖	Hex. socket head cap screw	Chrome molybdenum steel	Nickel plated
㉗	Retaining plate	Steel wire	Nickel plated
㉘	Hex. socket head cap screw	Chrome molybdenum steel	Nickel plated
㉙	Retaining plate	Steel wire	Nickel plated
㉚	Silencer	Bronze	E type only
㉛	Damper	Urethane	
㉜	Wearing	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	Middle cover gasket	NBR	
㊶	Cam gasket	NBR	
㊷	Piston gasket	NBR	

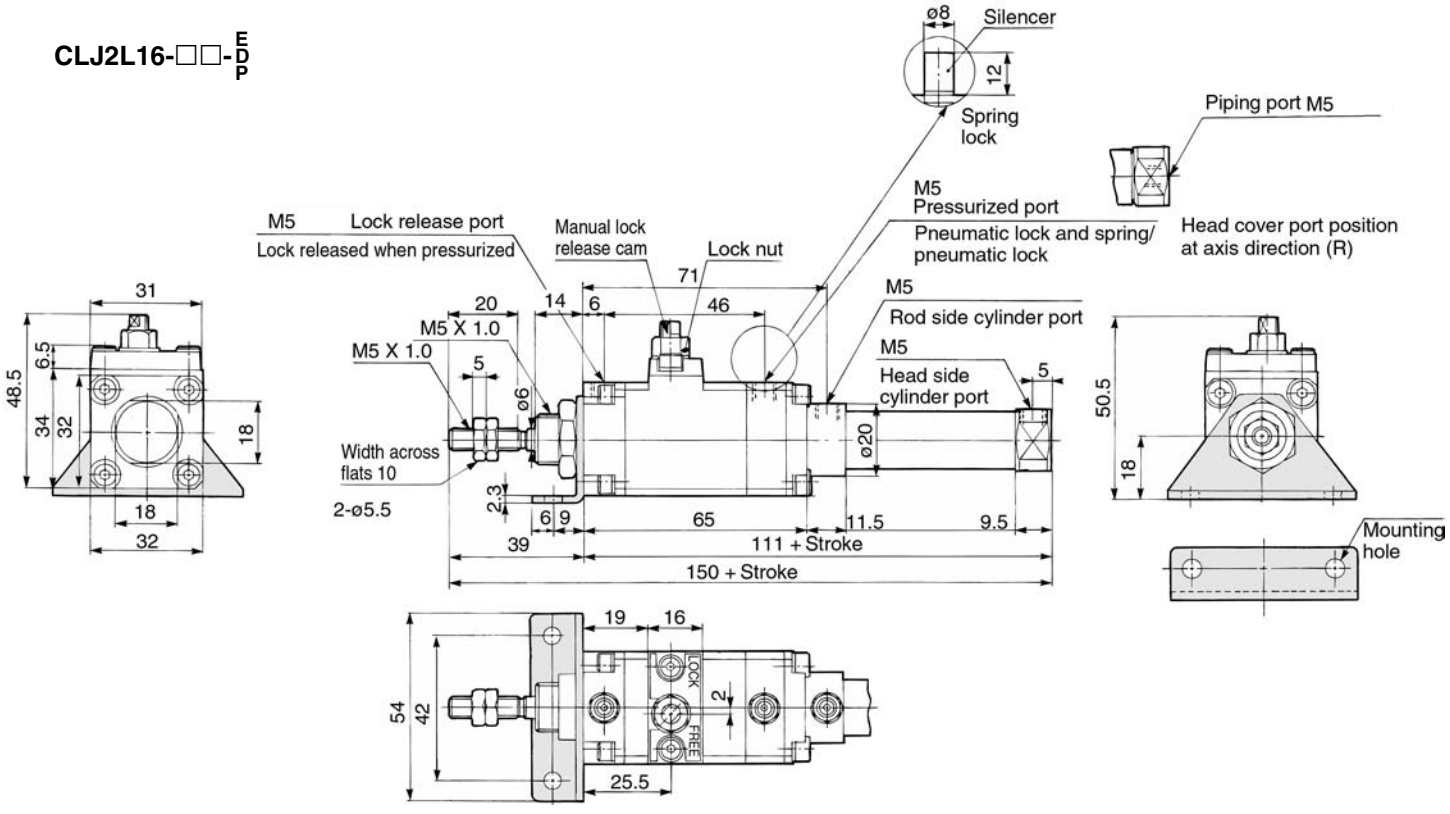
Basic (B)

CLJ2B16-□□-$^{E}_{D}$$^{}_{P}$



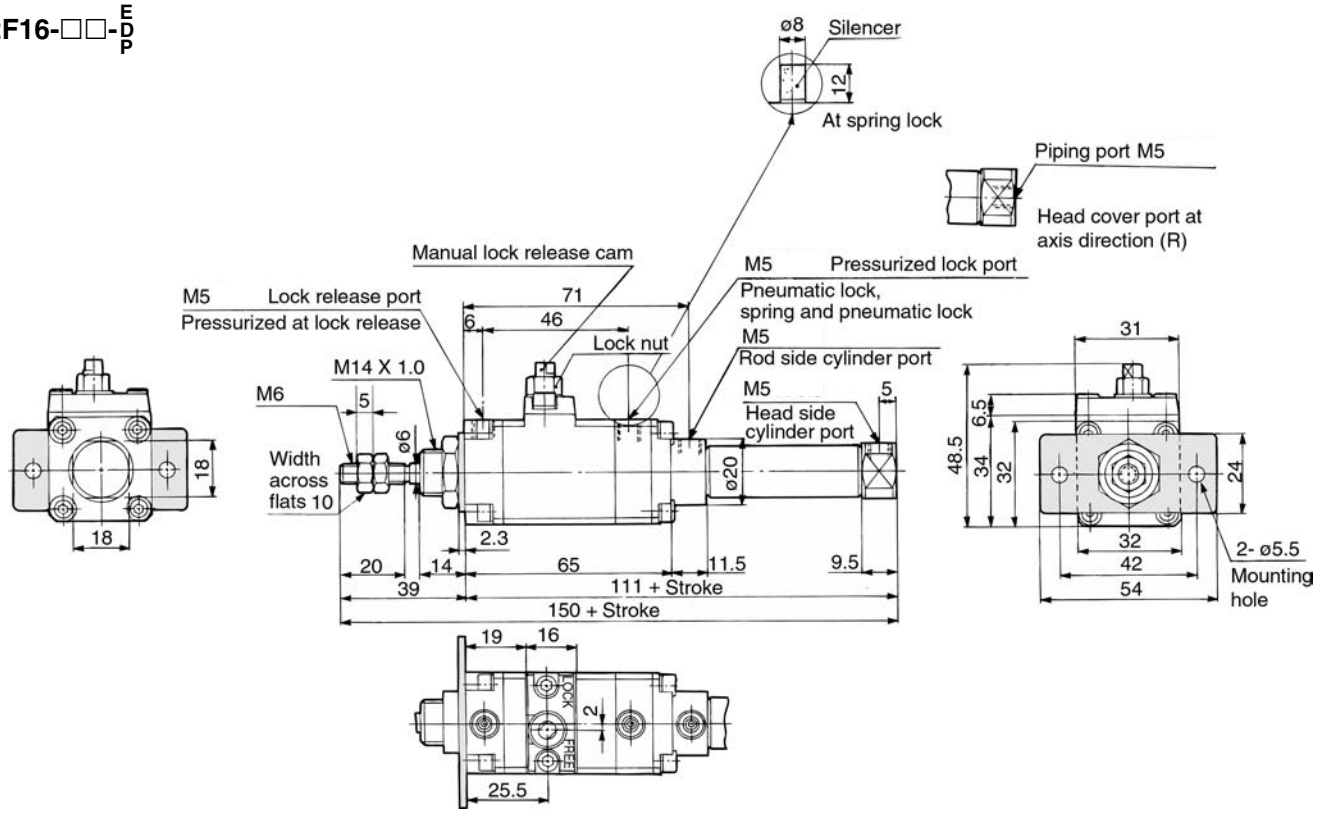
Axial Foot (L)

CLJ2L16-□□-$^{E}_{D}$$^{}_{P}$



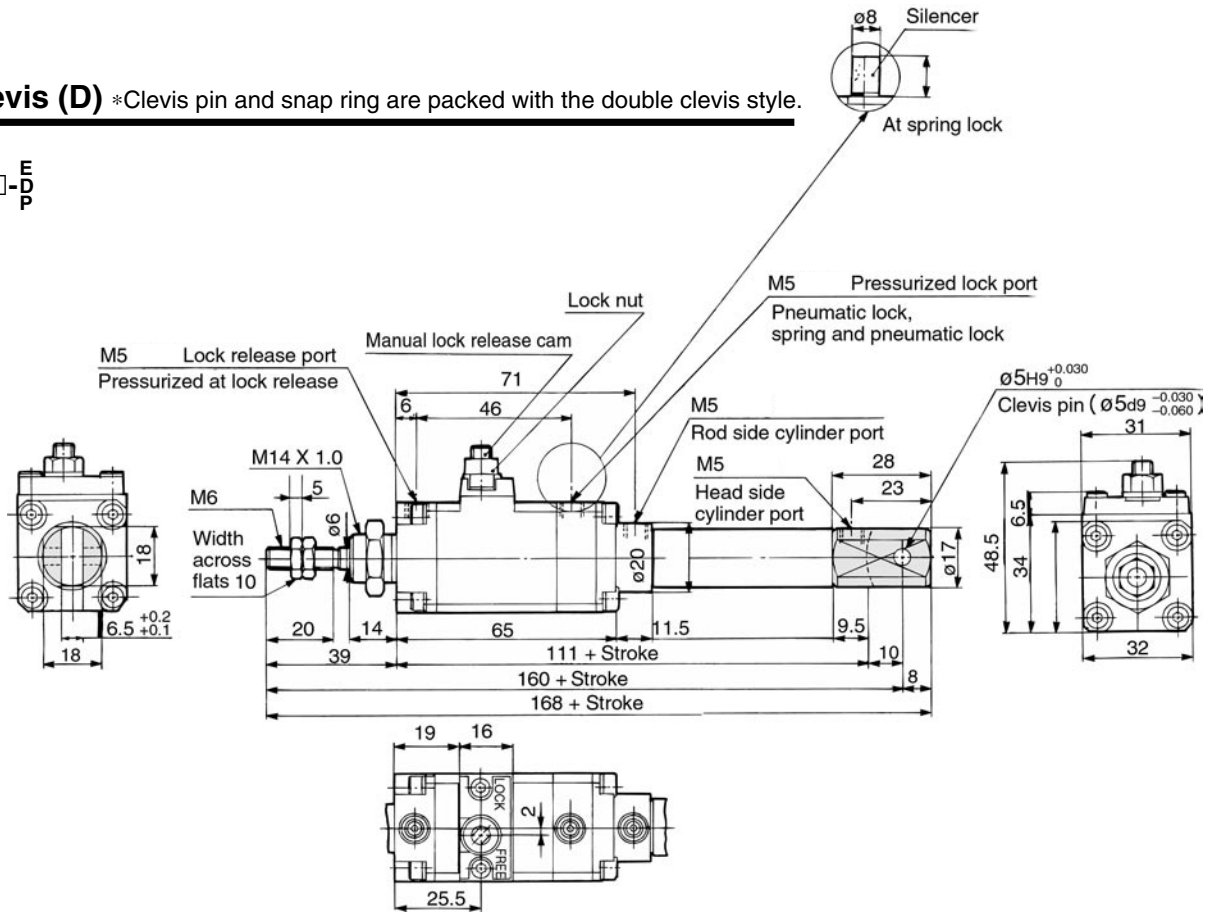
Front Flange (F)

CLJ2F16-□□-$^{E}_{D}$$^{}_{P}$



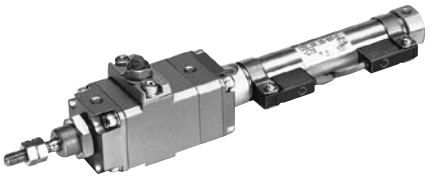
Double Clevis (D) ∗Clevis pin and snap ring are packed with the double clevis style.

CLJ2D16-□□-$^{E}_{D}$$^{}_{P}$



Series CDLJ2
Auto Switch Specifications

Refer to p.5.3-2 for details of auto switch.



Auto switch setting position and mounting height dimensions (Band mounting style)

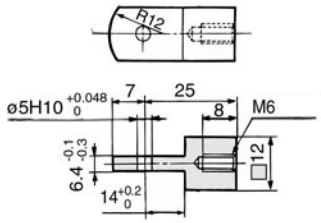
Refer to p.1.3-11 for dimensions because these are same as air cylinder CDJ2 series (Double acting single rod) style.

Applicable Auto Switch

Style	Model	Electrical entry/Function	Page
Reed switch	**D-C7/C8**	Grommet	5.3-9
	D-C73C/C80C	Connector	5.3-11
Solid state switch	**D-H7**	Grommet	5.3-29
	D-H7□W	Grommet(2 colour indication)	5.3-42
	D-H7LF	Grommet(2 colour, with diagnostic output)	5.3-49
	D-H7NF	Grommet(2 colour, with diagnostic output)	5.3-50
	D-H7BAL	Grommet(2 colour, with diagnostic output)	5.3-55
	D-H7C	Connector	5.3-31

Accessories

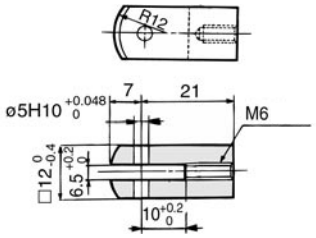
Single knuckle joint/I-LJ016B



Material: Rolled steel

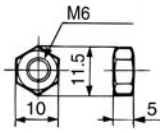
Double knuckle joint/Y-LJ016B

∗ Knuckle pin and snap ring are packed.



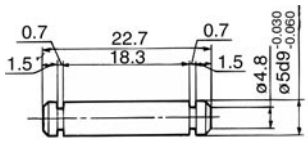
Material: Rolled steel

Rod end nut/NT-015A



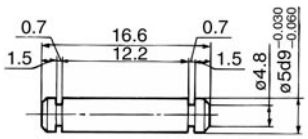
Material: Rolled steel

Clevis pin/CD-Z015



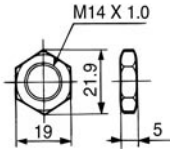
Material: Stainless steel

Knuckle pin/IY-J015A



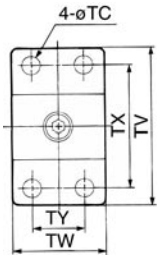
Material: Stainless steel

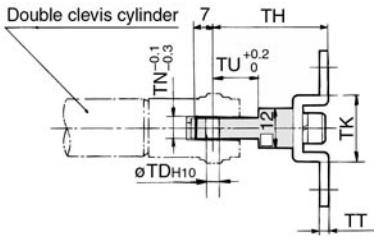
Mounting nut/SNLJ-016B



Material: Brass

T bracket/CJ-T016B





Material: Rolled steel

Part no.	Bore size	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

Fine Lock Cylinder/Double Acting Single Rod

Series CLM2

ø20, ø25, ø32, ø40

How to Order

Standard

CLM2 H L 25 — 100 J — E

With auto switch

CDLM2 H L 25 — 100 J — E — C73 L

Air cylinder with auto switch

Style

—	Pneumatic
H	Air-hydro

Mounting

B	Basic	T	Rear trunnion
L	Axial foot	E	Integrated clevis
F	Front flange	BZ	Boss cut basic
G	Rear flange	FZ	Boss cut flange
C	Single clevis		
D	Double clevis		

∗ Mounting accessories are not mounted, should be order separate.Please refer order keys in next pages.

Bore size

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

Cylinder stroke (mm)

Refer to standard stroke table on p.3.1-16.

Rod boot

—	None
J	Nylon tarpaulin
K	Heat resistant tarpaulin

Lock operation

E	Spring lock (Exhaust lock)
P	Pneumatic lock (Pressurized lock)
D	Spring and pneumatic lock

Lead wire length

Nil	0.5m
L	3m
Z	5m

Auto switch type

Select an applicable auto switch model from the table below

Applicable Auto switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m)∗ 0.5 (—)	3 (L)	5 (Z)	None (N)	Applicable load	
Reed switch	——	Grommet	Yes	3 wire (NPN equiv.)	5V	——	C76	●	●	—	—	IC	—
			No	2 wire	12V	100V	C73	●	●	●	—	—	Relay, PLC
					5V, 12V	100V or less	C80	●	●	—	—	IC	
			Yes		12V	——	B53	●	●	●	—	—	PLC
					12V	100V, 200V	B54	●	●	●	—	—	Relay, PLC
			No		12V	200V	B64	●	●	—	—		
		Connector	Yes		12V	——	C73C	●	●	●	●	—	
			No		5V, 12V	24V or less	C80C	●	●	●	●	IC	
		Terminal conduit	Yes		12V	——	A33A	—	—	—	●	—	PLC
					12V	100V, 200V	A34A	—	—	—	●		Relay, PLC
		DIN terminal					A44A	—	—	—	●		
Solid state switch	Diagnostic indication (2 colour)	Grommet		3 wire (NPN)	——	——	B59W	●	●	—	—	—	
					5V, 12V		H7A1	●	●	○	—	IC	
		Grommet		3 wire (PNP)			H7A2	●	●	○	—		
	——			2 wire	12V		H7B	●	●	○	—	—	
		Connector					H7C	●	●	●	●		
		Termina conduit		3 wire (NPN)	5V, 12V		G39A	—	—	—	●		
				2 wire	12V		K39A	—	—	—	●		
	Diagnostic indication (2 colour)	Grommet	Yes	3 wire (NPN)	24V 5V, 12V	——	H7NW	●	●	○	—	IC	Relay, PLC
				3 wire (PNP)			H7PW	●	●	○	—		
				2 wire	12V		H7BW	●	●	○	—	—	
	Water resistant (2 colour)						H7BA	—	●	○	—		
	With timer			3 wire (NPN)	5V, 12V		G5NT	—	●	○	—	IC	
	With diagnostic output (2 colour)			4 wire (NPN)			H7NF	—	●	○	—		
	Latching with diagnostic output (2 colour)						H7LF	●	●	○	—	—	

∗Lead wire length symbol 0.5m···· —
3m·····L

(Example) C80C 5m·····Z
C80CL None···N

(Example) C80CZ
C80CN

∗∗ Solid state switch marked with a "○" are manufactured upon receipt of order.

∗∗∗ Do not specify "N" (No lead wire) in case of D-A3□A, A44A, G39A and K39A.

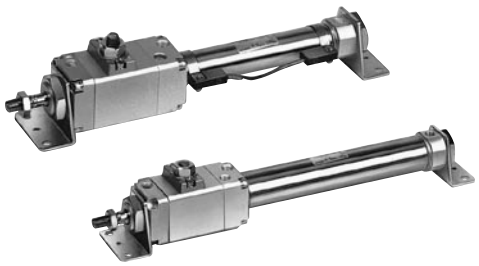
Provided with a compact locking mechanism, it is suitable for intermediate stops, for emergency stops, and for drop prevention.

Locks in both directions

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

Maximum piston speed: 500mm/s

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



Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	60°C
K	Heat resistant tarpaulin	110°C*

* Max. ambient temperature for rod boot

Specifications

Bore size (mm)	20	25	32	40
Action	Double acting single rod			
Style	Pneumatic			
Lock operation	Spring lock (Exhaust lock), Pneumatic lock (Pressurized lock), Spring and pneumatic lock			
Fluid	Air			
Proof pressure	1.5MPa			
Max. operating pressure	1.0MPa			
Min. operating pressure	0.08MPa			
Ambient and fluid temperature	Without auto switch: –10°C to +70°C (No freezing) With auto switch: –10°C to +60°C			
Lubrication	Not required (Non-lube)			
Piston speed	50 to 500mm/s			
Thread tolerance	JIS class 2			
Stroke length tolerance	$^{+1.4}_{0}$			
Piping/Screw-in style	Rc(PT)1/8			Rc(PT)1/4
Mounting	Basic, Axial foot, Front flange, Rear flange, Single clevis, Double clevis, Rear trunnion, Integrated clevis, Boss cut, Boss cut flange			

* Constraints associated with the allowable kinetic energy are imposed on the speeds at which the piston can be locked. To lock the piston in the stationary state for the purpose of drop prevention, the piston can be locked up to a maximum speed of 750mm/s.

Fine Lock Specifications

Lock operation	Spring lock (Exhaust lock)	Spring/ pneumatic lock	Pneumatic lock (Pressurized lock)
Fluid	Air		
Max. operating lock	0.5MPa		
Lock release pressure	0.3MPa or more		0.1MPa or more
Lock starting pressure	0.25MPa or less		0.05MPa or less
Lock direction	Both directions		

Standard Stroke

Bore size (mm)	Standard stroke (mm)(1)	Long stroke(2) (mm)	Allowable max. 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 also available.
Note 2) The long stroke style is applicable to the axial foot style and the front 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 Strokes for Auto Switch Mounting

(mm)

Auto switch model	Number of auto switches				
	2 pcs.		1 pc.		1 pc.
	Different side	Same side	Different side	Same side	
D-C7 **D-C8**	15	50	$15+45(\frac{n-2}{2})$ (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	$15+50(\frac{n-2}{2})$ (n=2, 4, 6···)	65+50(n–2)	10
D-H7LF	20	65	$20+50(\frac{n-2}{2})$ (n=2, 4, 6···)		10
D-B5 **D-B6**	15	75	$15+50(\frac{n-2}{2})$ (n=2, 4, 6···)	75+55(n–2)	10
D-B59W	20	75	$20+50(\frac{n-2}{2})$ (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 and Accessories

Accessory / Mounting	Standard equipment			Accessories			
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double knuckle joint	Clevis bracket	Rod boot
Basic	● (1pc.)	●	—	●	●	—	●
Axial foot	● (2)	●	—	●	●	—	●
Front flange	● (1)	●	—	●	●	—	●
Rear flange	● (1)	●	—	●	●	—	●
Integrated clevis	— (1)	●	—	●	●	●	●
Single clevis	— (1)	●	—	●	●	—	●
Double clevis	— (1)	●	●	●	●	—	●
Rear trunnion	● (1) (2)	●	—	●	●	—	●
Boss cut basic	● (1)	●	—	●	●	—	●
Boss cut flange	● (1)	●	—	●	●	—	●
Note					With pin	With pin	

Note 1) The mounting nuts are not provided with the integrated clevis style, single clevis style, or the double clevis style.
Note 2) The rear trunnion style is provided with a trunnion nut.

Weight

(kg)

Bore size (mm)		20	25	32	40
Basic weight	Basic	0.55	0.87	0.94	1.30
	Axial foot	0.70	1.03	1.10	1.57
	Flange	0.61	0.96	1.03	1.42
	Integrated clevis	0.53	0.85	0.93	1.26
	Single clevis	0.59	0.91	0.98	1.39
	Double clevis	0.60	0.93	0.99	1.43
	Trunnion	0.59	0.94	1.00	1.40
	Boss cut basic	0.54	0.85	0.92	1.27
	Boss cut flange	0.60	0.94	1.01	1.39
Additional weight per 50mm stroke		0.04	0.06	0.08	0.13
Accessory	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=1.26kg

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)			
	20	25	32	40
D-C7/C8 D-H7	BM2-020	BM2-025	BM2-032	BM2-040
D-B5/B6 D-G	BA2-020	BA2-025	BA2-032	BA2-040
D-A3□A/A44A D-G39A/K39A	BM3-020	BM3-025	BM3-032	BM3-040

∗ Stainless steel mounting bolt set
The set of stainless steel mounting screws described below is available and can be used depending on the operating environment. (The band for auto switches must be ordered separately, as they are not included.)
BBA3: For D-B5/B6/G5
BBA4: For D-C7/C8/H7
The stainless steel bolts described above are used when the D-H7BA type switch is shipped mounted on a cylinder. when the switches are shipped as individual parts, the BBA4 set is included.

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 brackets, 2pcs. should be ordered for each cylinder.
∗∗ Clevis pin and snap ring (ø40: cotter pin) are packed with the double clevis style

Boss cut

A cylinder that has been shortened overall by removing the boss for mounting the support bracket for the head cover, it can be used to achieve further space savings.

Total length comparison (vs. standard) (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 1MPa 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 for intermediate stops, just like a hydraulic unit, while using pneumatic equipment such as a valve.

Specifications

Fluid	Turbine oil (Locked area: air)
Action	Double acting single rod
Bore size	ø20, ø25, ø32, ø40
Max. operating pressure	1.0MPa
Min. operating pressure	0.2MPa
Piston speed	15 to 300mm/s
Cushion	Rubber bumper (Standard equipment)
Piping	Screw-in piping
Mounting	Basic, Axial foot, Front flange, Rear flange, Single clevis, Double clevis, Rear trunnion, Integrated clevis, Boss cut

∗ Auto switch can be mounted.
● For an exterior dimension diagram to identify the mounting support types, refer to p.3.1-21 to 3.1-24 as the dimensions are identical to those of standard.

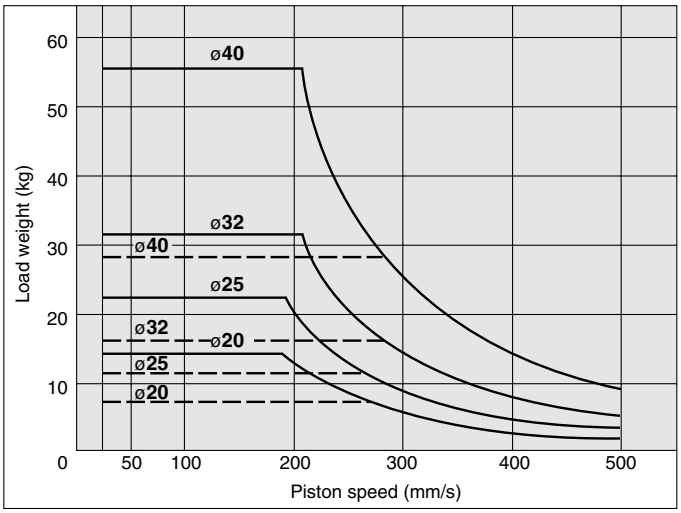
⚠ Caution/Allowable Kinetic Energy when Locking

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 0.5MPa, and a piston speed of 300mm/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: Load kinetic energy (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 the load, use 1.2 times the average speed as a guide.
④ The relationship between the speed and the load 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)

Lock	Piston speed (mm/s)				
	20*	50	100	300	500
Spring lock (Exhaust lock)	±0.3	±0.4	±0.5	±1.0	±2.0
Pneumatic lock (Pressurized lock), Spring and pneumatic lock	±0.15	±0.2	±0.3	±0.5	±1.5

Conditions/load: 25% of thrust force at 0.5MPa
Solenoid valve: mounted to the lock port
The "20mm/s" marked with "*" is applicable to an air-hydro style that is actuated hydraulically.

⚠ Caution

Recommended Pneumatic Circuit/Cautions on Handling

Refer to p.3.1-2 to 3.1-5 for further specifications of fine lock cylinder CLM2 series.

Fine Lock Cylinder with Auto Switch

Regarding the installation position and the mounting height of the auto switch, refer to p.1.4-21, as the dimensions are identical to those of the CDM2 series air cylinder (double acting, single rod style).

Accessories

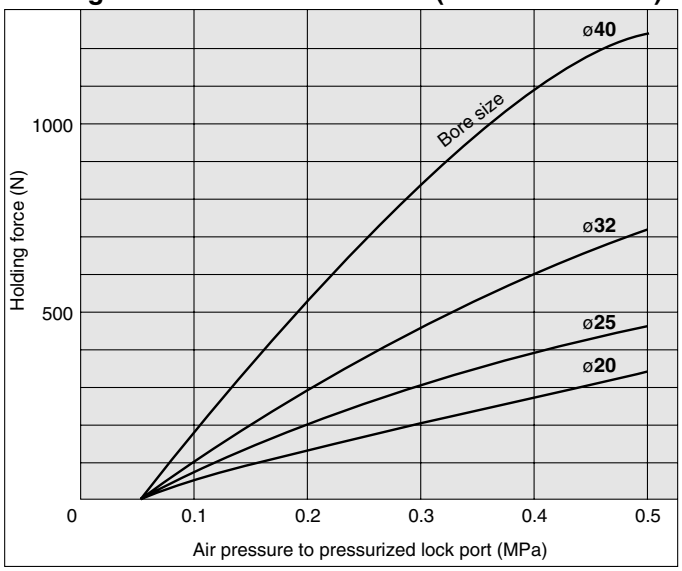
Refer to p.1.4-19 and 1.4-20 for accessory dimensions because it is same as CM2 series.

Holding Force of Spring Lock (Max. 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 approx. 15%.

Holding Force of Pneumatic Lock (Max. Static Load)



⚠ Caution

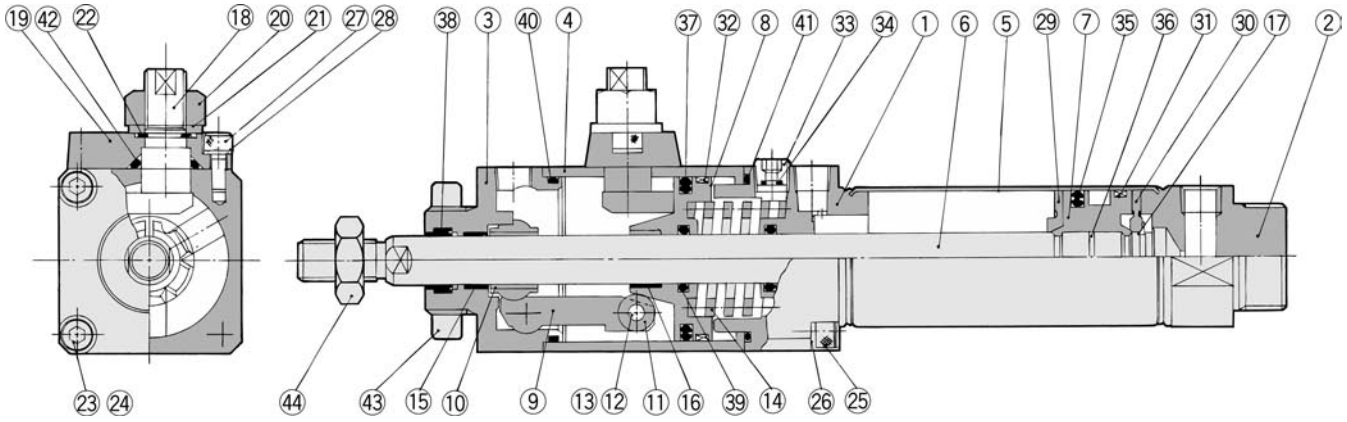
Cautions when Locking

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.

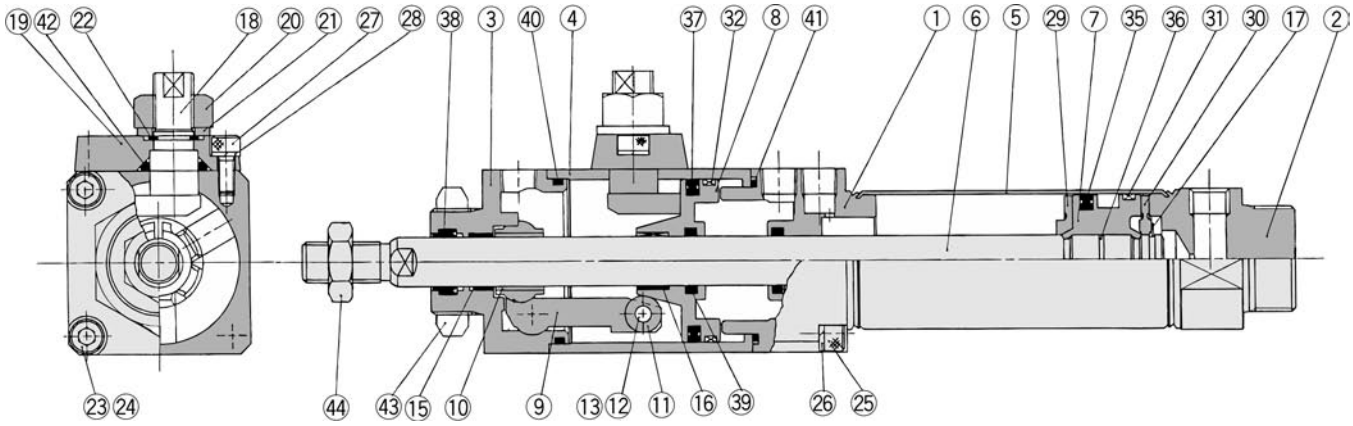
- If the piston rod slips because the lock's holding force has been exceeded, the brake shoe could be damaged, resulting in a reduced holding force or shortened life.
- Do not use the cylinder in the locked state to sustain a load that involves impact.
- To use the lock for drop prevention purposes,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

Construction/(The cylinder cannot be disassembled.)

Spring lock (Exhaust lock)
Spring and pneumatic lock



Pneumatic lock (Pressurized lock)



Component Parts

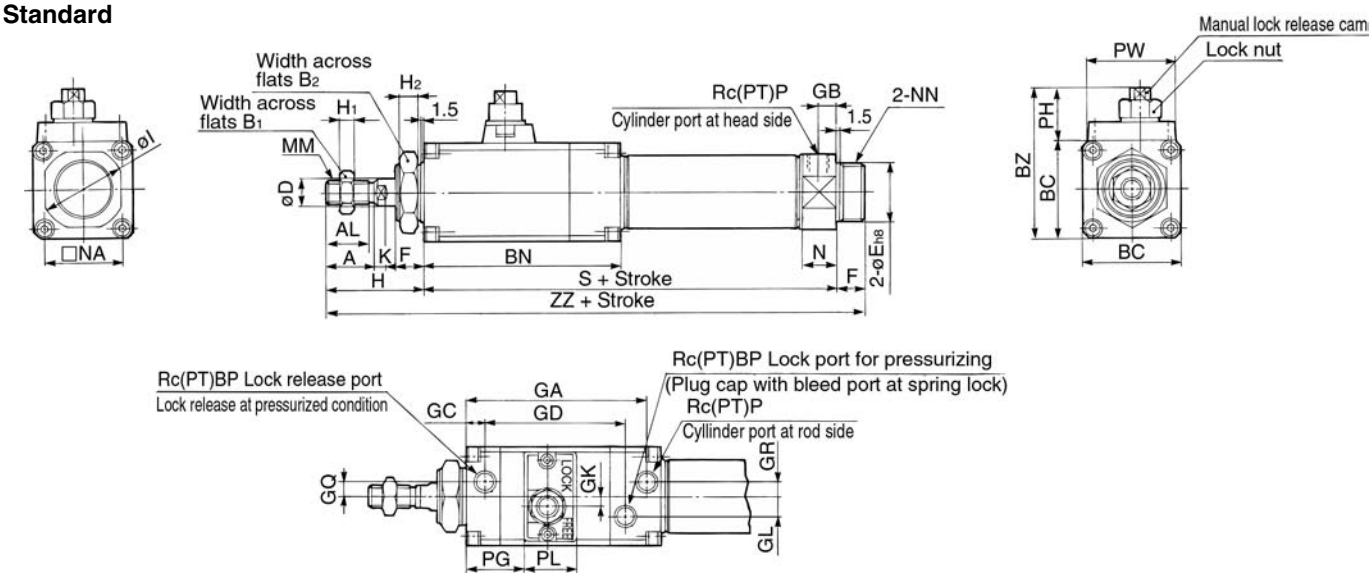
No.	Description	Material	Note
①	Rod cover	Aluminum alloy	White anodized
②	Head cover	Aluminum alloy	White anodized
③	Cover	Carbon steel	Nitrided, chrome plated
④	Middle cover	Aluminum alloy	Hard anodized
⑤	Cylinder tube	Stainless steel	
⑥	Piston rod	Carbon steel	Hard chrome plated
⑦	Piston	Aluminum alloy	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	Chrome molybdenum steel	Nickel plated
⑲	Cam guide	Carbon steel	Nitrided, coated
⑳	Lock nut	Rolled steel	Nickel plated
㉑	Flat washer	Rolled steel	Nickel plated
㉒	Snap ring	Carbon tool steel	Nickel plated
㉓	Hex. socket head cap screw	Chrome molybdenum steel	Nickel plated

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

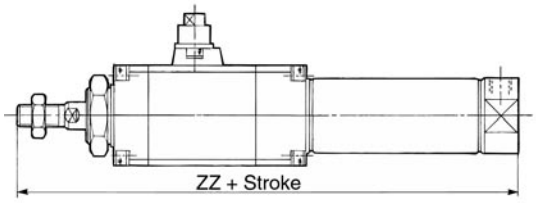
Basic (B)

CLM2B [Bore size] — [Stroke] [ ]

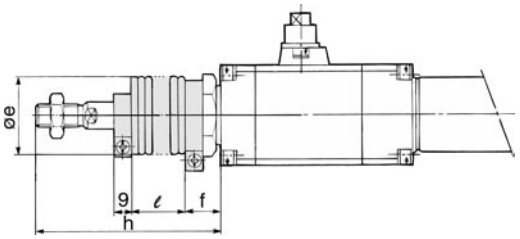
Standard



Boss cut



With rod boot



(mm)

Bore	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	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	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	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	to 300	24	21	22	41	52	100.5	1/8	1/8	76	14	$32^{0}_{-0.039}$	16	90.5	11	8	70	4	11	8	7	50	8	10	46.5

(mm)

Bore	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	ZZ
20	5	M8	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	ZZ
20	168
25	182
32	184
40	217

With rod boot

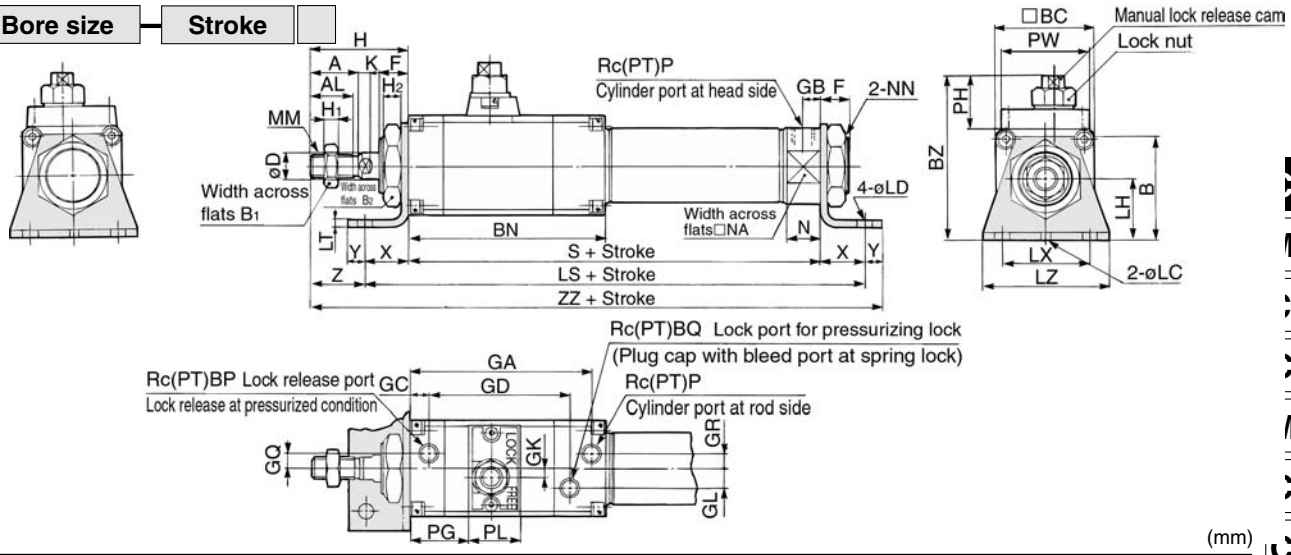
(mm)

Bore	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 301mm stroke: Long stroke.

Axial Foot (L)

CLM2L **Bore size** — **Stroke** ☐



(mm)

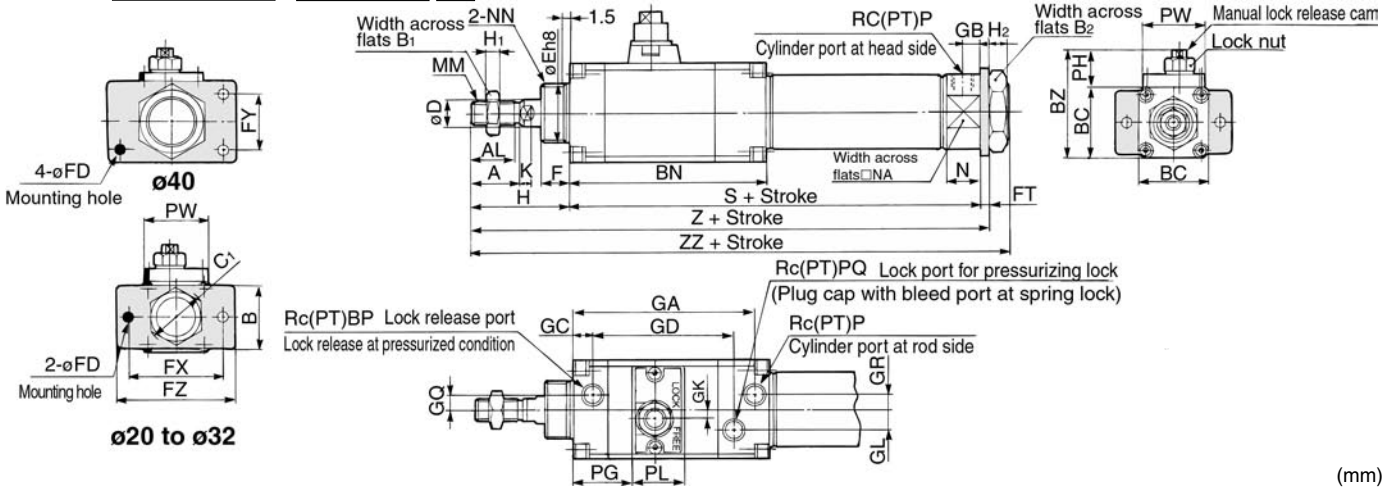
Bore	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	D	F	GA	GB	GC	GD	GK	GL	GQ	GR	H	H_1	H_2
20	to 400	18	15.5	40	13	26	38	80	1/8	1/8	63.5	8	13	73.5	8	8	55	3.5	6	4	4	41	5	8
25	to 450	22	19.5	47	17	32	45	90	1/8	1/8	74.5	10	13	83.5	8	9	64.5	4	9	7	7	45	6	8
32	to 450	22	19.5	47	17	32	45	90	1/8	1/8	74.5	12	13	83.5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

(mm)

Bore	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	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

Rear Flange (G)

CLM2G **Bore size** — **Stroke** ☐



(mm)

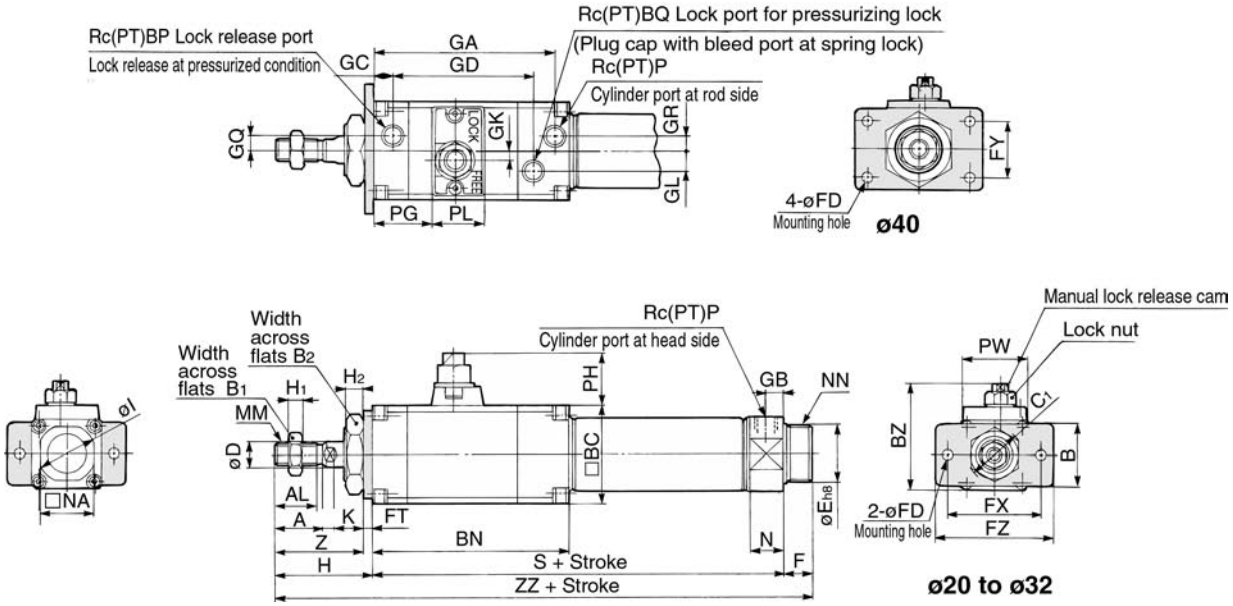
Bore	Stroke range	A	AL	B	B_1	B_2	BC	BN	BP	BQ	BZ	C_1	D	E	F	FD	FT	FX	FY	FZ	GA	GB
20	to 300	18	15.5	34	13	26	38	80	1/8	1/8	57.5	30	8	$20^{0}_{-0.033}$	13	7	4	60	–	75	73.5	8
25	to 300	22	19.5	40	17	32	45	90	1/8	1/8	69	37	10	$26^{0}_{-0.033}$	13	7	4	60	–	75	83.5	8
32	to 300	22	19.5	40	17	32	45	90	1/8	1/8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

(mm)

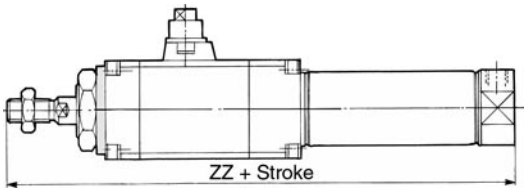
Bore	GC	GD	GK	GL	GQ	b	H	H_1	H_2	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	Z	ZZ
20	8	55	3.5	6	4	4	41	5	8	5	M8	15	24	M20 X 1.5	1/8	22	19.5	20	38	127	172	181
25	9	64.5	4	9	7	7	45	6	8	5.5	M10 X 1.25	15	30	M26 X 1.5	1/8	27	24	24	41	137	186	195
32	9	64.5	4	9	7	7	45	6	8	5.5	M10 X 1.25	15	34.5	M26 X 1.5	1/8	27	24	24	41	139	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

Front Flange (F)

CLM2F | **Bore size** | – | **Stroke** | |



Boss cut



(mm)

Bore	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	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	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	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	to 500	24	21	52	22	41	52	100.5	1/8	1/8	76	47.3	14	$32^{0}_{-0.033}$	16	7	5	66	36	82	90.5	11	8	70	4

(mm)

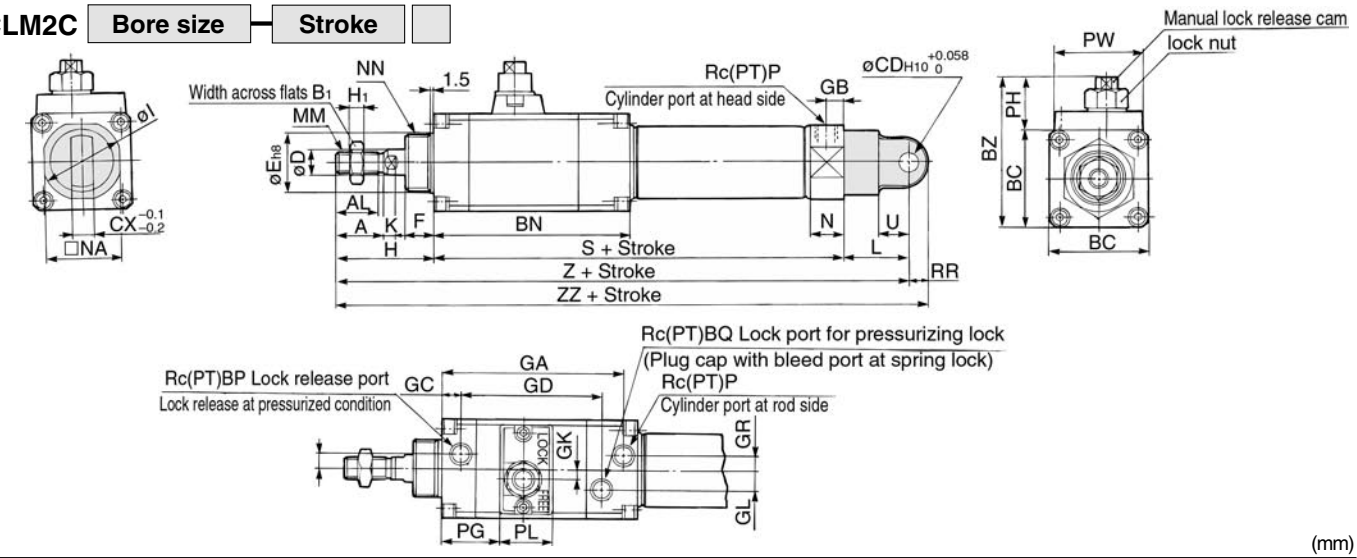
Bore	GL	GQ	GR	H	H_1	H_2	I	K	MM	N	NA	NN	P	PG	PH	PL	PW	S	Z	ZZ
20	6	4	4	41	5	8	28	5	M8	15	24	M20 X 1.5	1/8	22	19.5	20	38	127	37	181
25	9	7	7	45	6	8	33.5	5.5	M10 X 1.25	15	30	M26 X 1.5	1/8	27	24	24	41	137	41	195
32	9	7	7	45	6	8	37.5	5.5	M10 X 1.25	15	34.5	M26 X 1.5	1/8	27	24	24	41	139	41	197
40	11	8	7	50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

Boss cut

Bore	ZZ
20	168
25	182
32	184
40	217

Single Clevis (C)

CLM2C **Bore size** — **Stroke** ☐



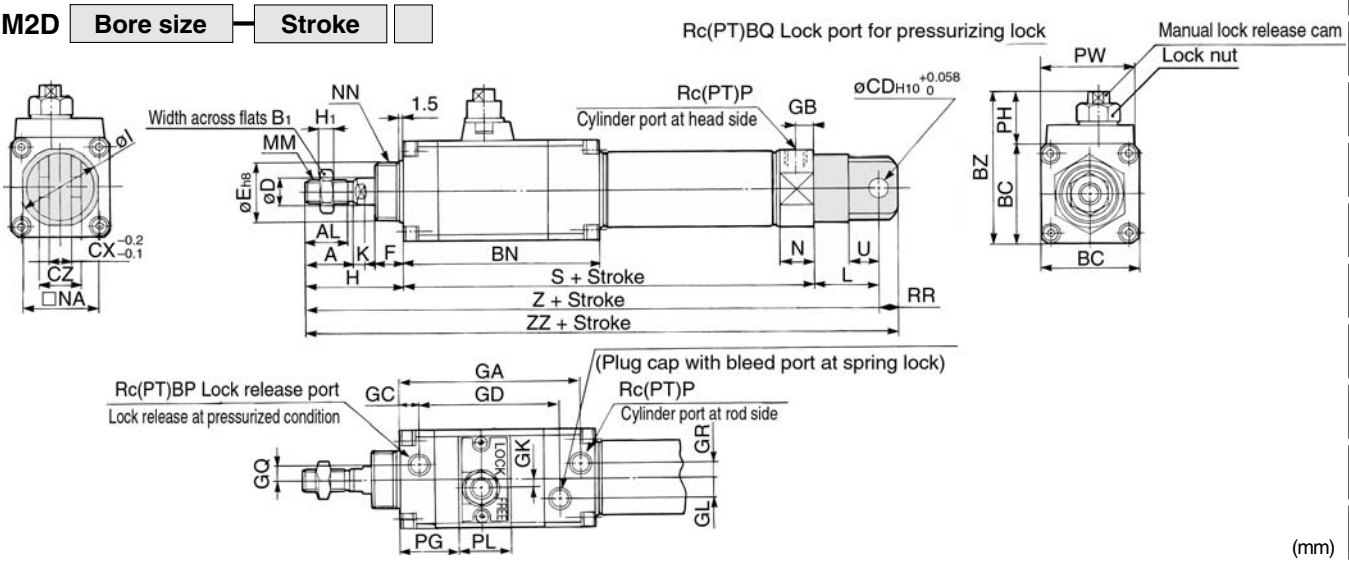
(mm)

Bore	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	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	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	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	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	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	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 (D)

CLM2D **Bore size** — **Stroke** ☐



(mm)

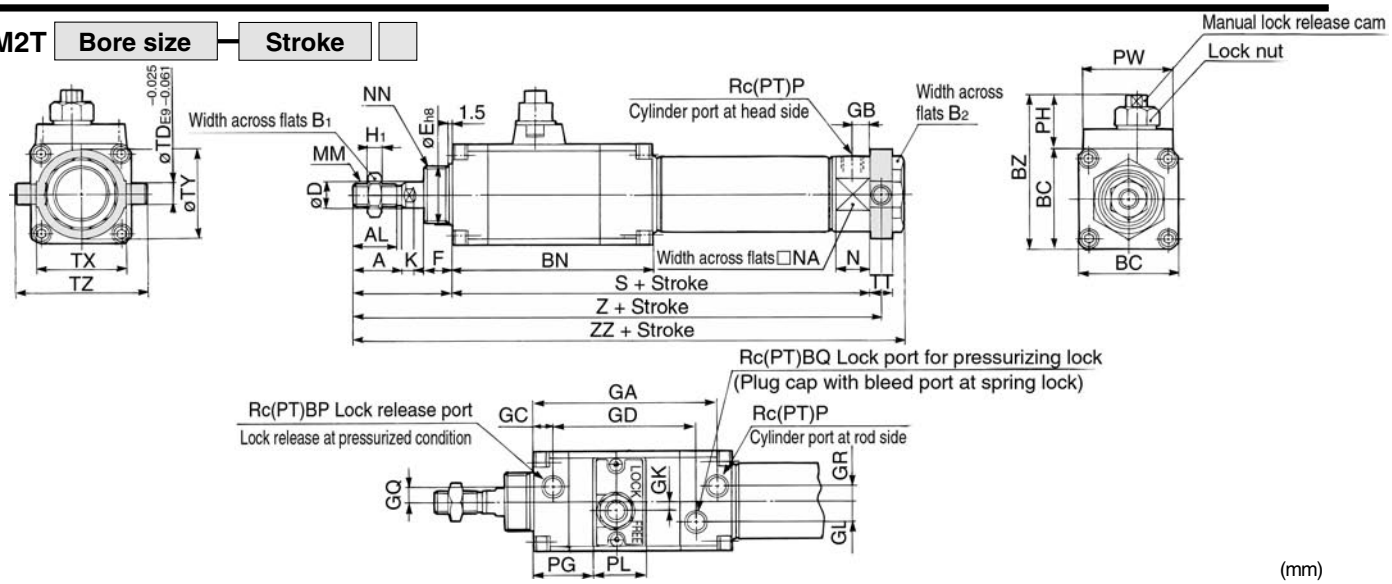
Bore	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	CZ	D	E	F	GA	GB	GC	GD	GK	GL
20	to 300	18	15.5	13	38	80	1/8	1/8	57.5	9	10	19	8	20 0 −0.033	13	73.5	8	8	55	3.5	6
25	to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	19	10	26 0 −0.033	13	83.5	8	9	64.5	4	9
32	to 300	22	19.5	17	45	90	1/8	1/8	69	9	10	19	12	26 0 −0.033	13	83.5	8	9	64.5	4	9
40	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	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	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 packed with the double clevis style.

Rear Trunnion (T)

CLM2T | Bore size | — | Stroke | |



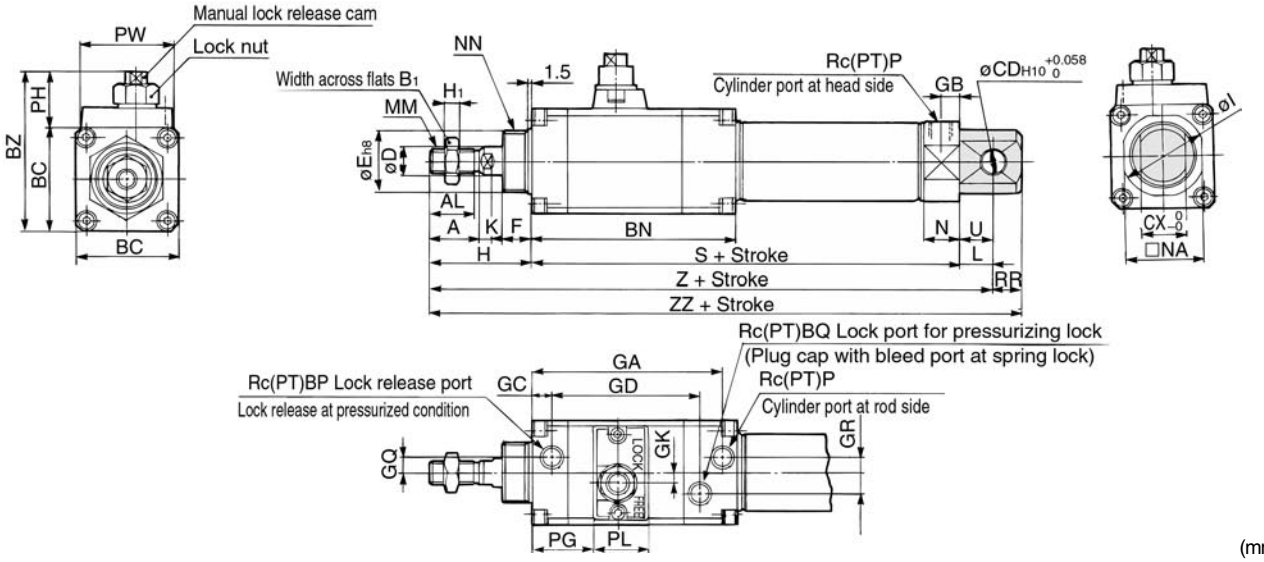
(mm)

Bore	Stroke range	A	AL	B1	B2	BC	BN	BP	BQ	BZ	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	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	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	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	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	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	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

Integrated Clevis (E)

CLM2E | Bore size | — | Stroke | |



(mm)

Bore	Stroke range	A	AL	B1	BC	BN	BP	BQ	BZ	CD	CX	D	E	F	GA	GB	GC	GD	GK	GL	GQ
20	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	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	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	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	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	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

Standard CLG1 L N 25 — 100 [ ] — E

With auto switch CDLG1 L N 25 — 100 [ ] — E — C73 L

Auto switch fine lock cylinder

Mounting

B	Basic
L	Axial foot
F	Front flange
G	Rear flange
U	Front trunnion
T	Rear trunnion
D	Clevis

∗ Mounting accessories are not mounted, should be order separate.Please refer order keys in next pages.

Style

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

Bore size

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

Cylinder stroke (mm)

Bore (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 strokes are also available.

Cylinder rod boot

—	Without rod boot
J	Nylon tarpaulin
K	Heat resistant tarpaulin

Lock operation

E	Spring lock (Exhaust lock)
P	Pneumatic lock (Pressurized lock)
D	Spring and pneumatic lock

Auto switch type

	Select an applicable auto switch model from the table below

Lead wire length

Nil	0.5m
L	3m
Z	5m

Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire (m)∗ 0.5 (—)	3 (L)	5 (Z)	None (N)	Applicable load	
Reed switch	—	Grommet	Yes	3 wire (NPN equiv.)	5V	—	**C76**	●	●	–	–	IC	—
				2 wire	12V	—	**B53**	●	●	●	–	—	PLC
						200V or less	**B54**	●	●	●	–		Relay, PLC
							B64	●	●	–	–		
						100V	**C73**	●	●	●	–		
		Connector			5V, 12V	≤ 100V	**C80**	●	●	–	–	IC	
					12V	—	**C73C**	●	●	●	●	—	
					5V, 12V	≤ 24V	**C80C**	●	●	●	●	IC	
	Diagnostic indication (2 colour)	Grommet	No		—	—	**B59W**	●	●	–	–	—	
Solid state switch	—	Grommet	Yes	3 wire (NPN)	5V, 12V	—	**H7A1**	●	●	○	–	IC	Relay, PLC
				3 wire (PNP)			**H7A2**	●	●	○	–		
				2 wire	12V		**H7B**	●	●	○	–	—	
		Connector					**H7C**	●	●	●	●		
	Diagnostic indication (2 colour)	Grommet		3 wire (NPN)	5V, 12V		**H7NW**	●	●	○	–	IC	
				3 wire (PNP)			**H7PW**	●	●	○	–		
				2 wire	12V		**H7BW**	●	●	○	–	—	
	Water resistant (2 colour)						**H7BA**	–	●	○	–		
	With diagnostic output (2 colour)			4 wire (NPN)	5V, 12V		**H7NF**	●	●	○	–	IC	
	Latching with diagnostic output (2 colour)				—		**H7LF**	●	●	○	–	—	
	With timer			3 wire (NPN)	5V, 12V		**G5NT**	–	●	○	–	IC	

∗Lead wire length symbol: 0.5m ····· – (Example) H7C; 3m ····· L H7CL; 5m ····· Z H7CZ; None ····· N H7CN

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

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

Locks in both directions

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

Model

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

Specifications

Fluid	Air
Proof pressure	1.5MPa
Max. operating pressure	1MPa
Min. operating pressure	0.08MPa
Ambient and fluid temperature	Without auto switch: –10°C to +70°C With auto switch: –10°C to +60°C (No freezing)
Piston speed	50 to 500mm/sec*
Thread tolerance	JIS Class 2
Stroke length tolerance	to 800st $^{+1.4}_{0}$mm
Mounting**	Basic, Axial foot, Front flange, Rear flange, Front trunnion, Rear trunnion, Clevis (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. To lock the piston in the stationary state for the purpose of drop prevention, the piston can be locked up to a maximum speed of 1000mm/s.
** The long stroke style is applicable to the basic style, the axial foot style, and the front flange style.

Fine Lock Specifications

Lock operation	Spring lock (Exhaust lock)	Spring/ pneumatic lock	Pneumatic lock (Pressurized lock)
Fluid	Air		
Max. operating press.	0.5MPa		
Lock release press.	0.3MPa or more		0.1MPa or more
Lock starting press.	0.25MPa or less		0.05MPa or more
Lock direction	Both directions		

Accessories

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

Standard Stroke

Bore (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 strokes are available.

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	60°C
K	Heat resistant tarpaulin	110°C*

* Max. ambient temperature for rod boot

Minimum Strokes for Auto Switch Mounting

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

Model	Number of auto switches	
	1	2
D-B5/B6 **D-C7/C8** **D-H7** **D-G5/K5**	10mm	15mm
D-B59W	15mm	20mm
D-H7LF	10mm	20mm

⚠ Caution/Allowable Kinetic Energy when Locking

Bore (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 0.5MPa, and a piston speed of 300mm/sec. Therefore, if the conditions are below these values, calculations are unnecessary.

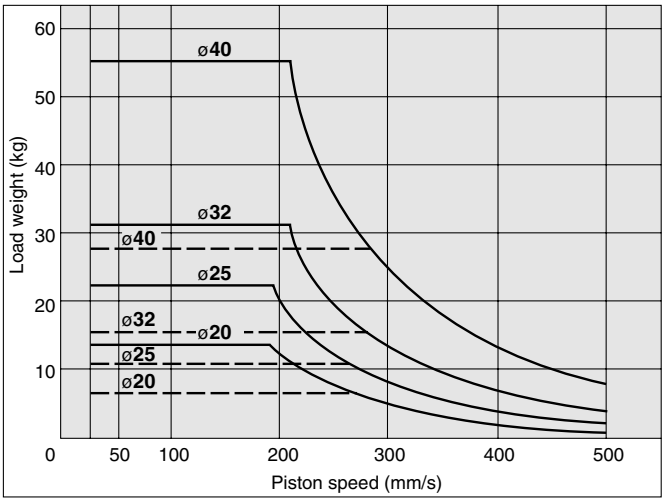
② Apply the following formula to obtain the kinetic energy of the load.

$Ek=\frac{1}{2}m\upsilon^2$ Ek: Load kinetic energy (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 the load, use 1.2 times the average speed as a guide.

④ The relationship 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.

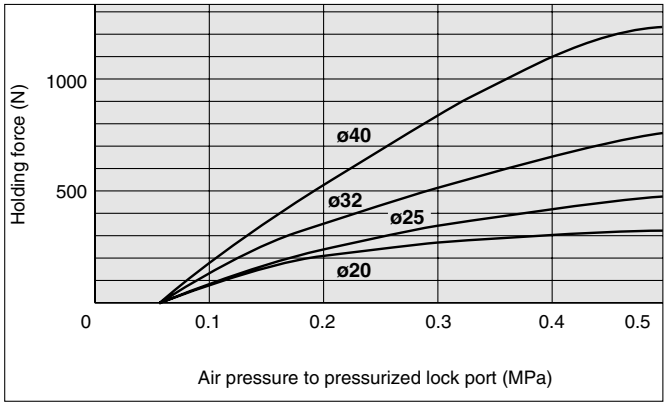


Holding Force of Spring Lock (Max. static load)

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

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

Holding Force of Spring Lock (Max. static load)



⚠ Caution

Cautions 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)

Unit:mm

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

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

Weight

(kg)

Bore size (mm)		20	25	32	40
Basic weight	Basic	0.61	0.97	1.06	1.35
	Axial foot	0.72	1.10	1.22	1.57
	Flange	0.73	1.15	1.23	1.58
	Trunnion	0.62	0.99	1.09	1.40
	Clevis	0.66	1.05	1.21	1.58
Front pivot bracket		0.11	0.13	0.20	0.27
Rear 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 50mm stroke		0.05	0.07	0.09	0.15
Additional weight of air cushion		0.01	0.01	0.02	0.02
Additional weight of long stroke		0.01	0.01	0.02	0.03

Calculation

Example: **CLG1LA20-100**(Foot, ø20, 100st)

- •Basic weight·····0.72
- •Additional weight·····0.05/50 stroke
- •Air cylinder stroke·····100 stroke
- •Additional weight of air cushion····0.01kg

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

⚠ Caution

Recommended Pneumatic Circuit/Cautions on Handling

Refer to p.3.1-2 to 3.1-5 for further specifications of fine lock cylinder CLG1 series.

Fine Lock Cylinder with Auto Switch

Refer to p.1.7-13 for auto switch setting position and mounting height because it is same as those of air cylinder CDG1 series (double acting single rod style).

Auto Switch Mounting Bracket (Band)/Part No.

Auto switch model	Bore size (Part No.) 20	25	32	40
D-B5, B6 D-G5, K5	BA-01	BA-02	BA-32	BA-04
D-C7, C8 D-H7	BMA2-020	BMA2-025	BMA2-032	BMA2-040

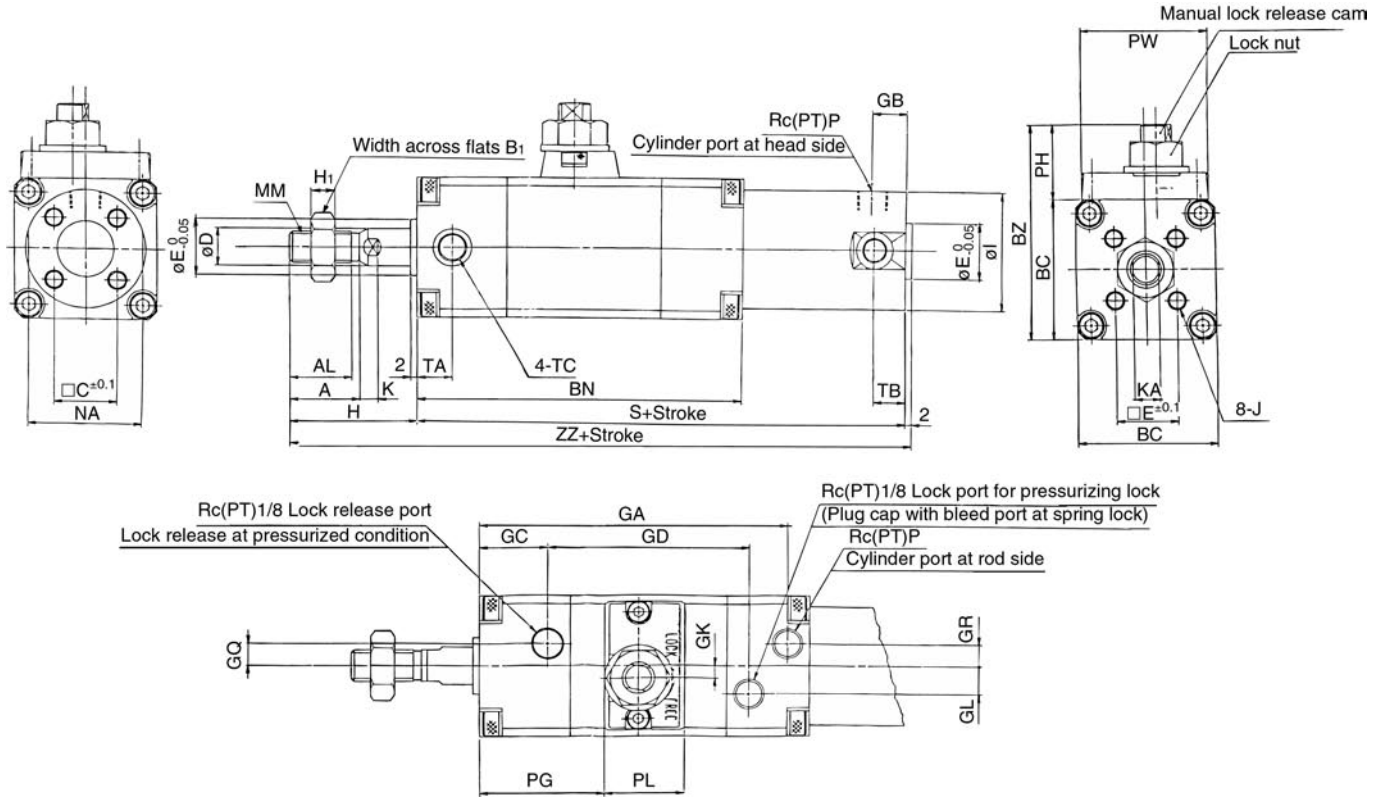
∗Stainless steel mounting bolt set
The set of stainless steel mounting screws described below is available and can be used depending on the operating environment.
(The band for auto switches must be ordered separately, as they are not included.)
BBA3: For D-B5/B6/G5
BBA4: For D-C7/C8/H7
The stainless steel bolts described above are used when the D- H7BA type switch is shipped mounted on a cylinder. When the switches are shipped as individual parts, the BBA4 set are included.

Mounting Bracket Part No.

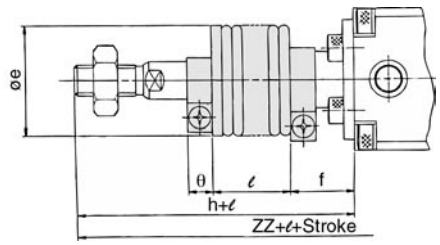
Mounting bracket	Bore size (Part No.) 20	25	32	40
Axial foot∗	CLG-L020	CLG-L025	CLG-L032	CLG-L040
Flange	CLG-F020	CLG-F025	CLG-F032	CLG-F040
Trunnion	CG-T020	CG-T025	CG-T032	CG-T040
Clevis∗∗	CG-D020	CG-D025	CG-D032	CG-D040
Front pivot bracket	CLG-020-24	CLG-025-24	CLG-032-24	CLG-040-24
Rear pivot bracket	CG-020-24A	CG-025-24A	CG-032-24A	CG-040-24A

∗ When ordering foot brackets, 2 pcs. should be ordered for each cylinder.
∗∗ Clevis pin and snap ring are packed with the clevis style.

Basic/CLG1BN



With rod boot



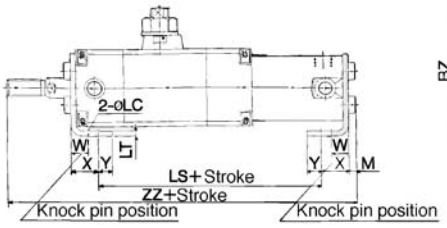
Bore (mm)	Stroke range	AL	A	B1	BC	BN	BZ	C	D	E	GA	GB	GC	GD	GK	GL	GQ	GR	I	J	K	KA	MM
20	to 200	15.5	18	13	38	91	57.5	14	8	12	84	10	19	54	3.5	5.5	4	4	26	M4 depth7	5	6	M8
25	to 300	19.5	22	17	45	101	69	16.5	10	14	94	10	20	62	4	9	7	7	31	M5 depth7.5	5.5	8	M10 X 1.25
32	to 300	19.5	22	17	45	102	69	20	12	18	95	10	21	62	4	9	7	7	38	M5 depth8	5.5	10	M10 X 1.25
40	to 300	27	30	19	52	111	76	26	16	25	103	10	23	67	4	11	8	8	47	M6 depth12	6	14	M14 X 1.5

Bore (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	to 200	5	24	Rc(PT)1/8	33	19.5	20	38	141	11	11	M5	35	178	30	16	55		198
25	to 300	6	29	Rc(PT)1/8	38	24	24	41	151	11	11	M6 X 0.75	40	193	30	17	62	0.25	215
32	to 300	6	35.5	Rc(PT)1/8	39	24	24	41	154	11	10	M8	40	196	35	17	62	Stroke	218
40	to 300	8	44	Rc(PT)1/8	44	24	24	41	169	12	10	M10 X 1.25	50	221	35	17	70		241

∗ Refer to p.3.1-30 for long stroke dimensions.

With Mounting Bracket

Foot/CLG1LN

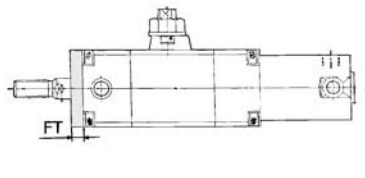


Foot

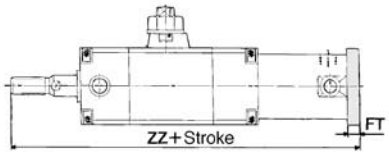
Bore (mm)	BZ	M	W	X	Y	LC	LD	LH	LS	LT	LX	LZ	Without rod boot ZZ	With rod boot ZZ
20	63.5	3	10	15	7	4	6	25	117	3	50	62	182	202
25	74.5	3.5	10	15	7	4	6	28	127	3	57	70	197.5	219.5
32	74.5	3.5	10	16	8	4	6.6	28	128	3	60	74	200.5	222.5
40	83	4	10	16.5	8.5	4	6.6	33	142	3	68	84	226	246

∗Refer to p.3.1-30 for long stroke dimensions.

Rear flange/CLG1GN



Front flange/CLG1FN



Front flange

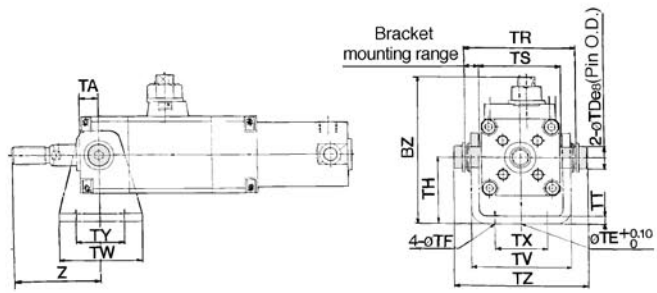
Bore (mm)	B	BZ	FD	FT	FX	FY	FZ
20	38	57.5	5.5	6	52	25	65
25	45	69	5.5	7	60	30	75
32	45	69	6.6	7	60	30	75
40	52	76	6.6	8	66	36	82

∗Refer to p.3.1-30 for long stroke dimensions.

Rear flange

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

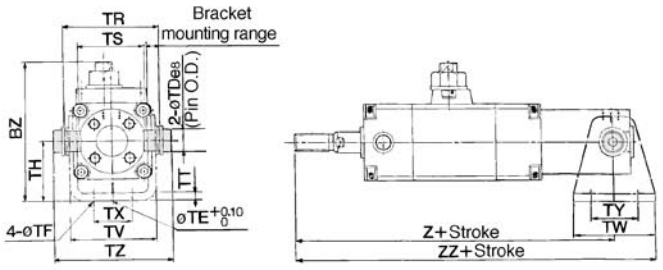
Front trunnion/CLG1UN



Front trunnion

Bore (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

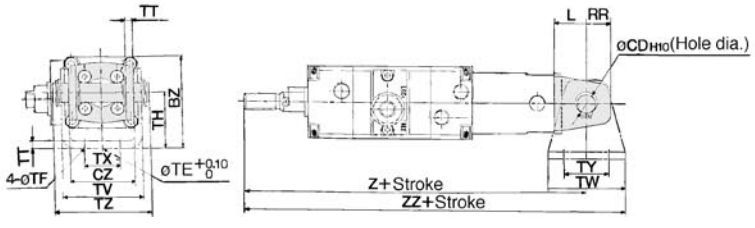
Rear trunnion/CLG1TN



Rear trunnion

Bore (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/CLG1DN



Clevis

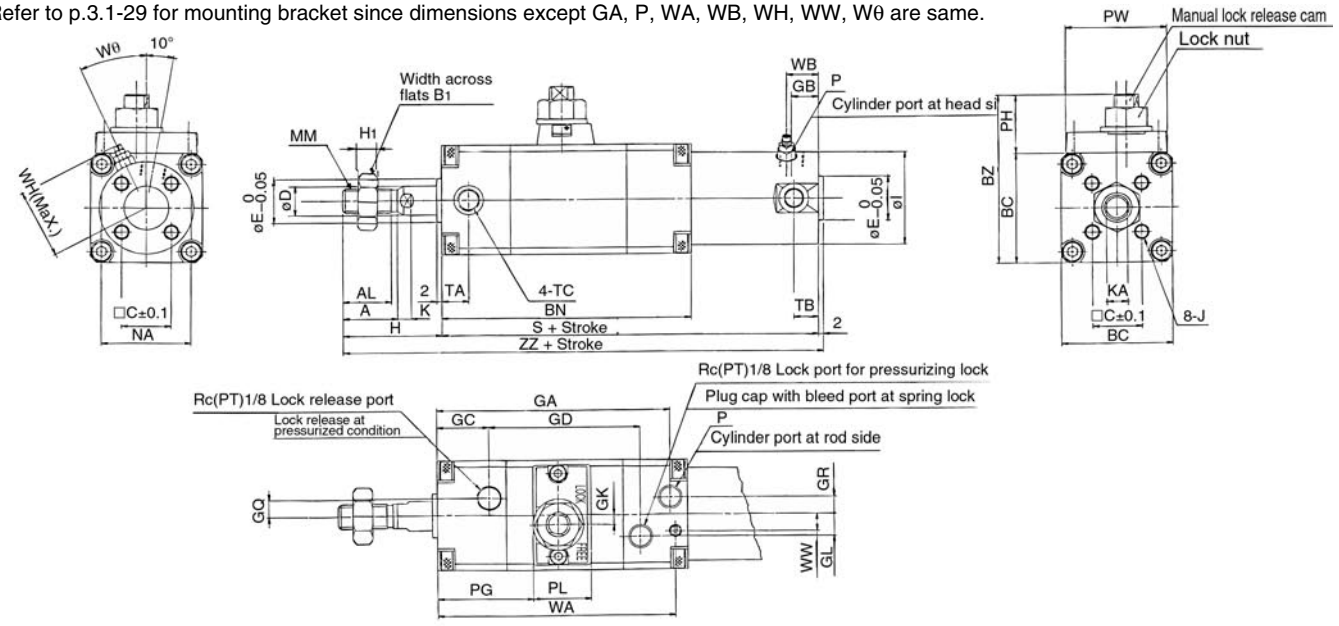
Bore (mm)	BZ	CDH10	CZ	L	RR	TE	TF	TH	TT	TV	TW	TX	TY	TZ
20	44	8 +0.058 0	29	14	11	10	5.5	25	3.2	35.8	42	16	28	43.4
25	52.5	10 +0.058 0	33	16	13	10	5.5	30	3.2	39.8	42	20	28	48
32	57.5	12 +0.070 0	40	20	15	10	6.6	35	4.5	49.4	48	22	28	59.4
40	66	14 +0.070 0	49	22	18	10	6.6	40	4.5	58.4	56	30	30	71.4

∗(Hole dia.)

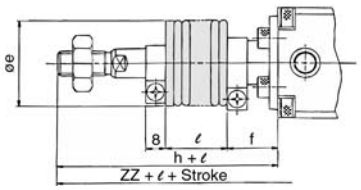
Bore (mm)	Without rod boot Z	Without rod boot ZZ	With rod boot Z	With rod boot ZZ
20	190	211	210	231
25	207	228	229	250
32	214	238	236	260
40	241	269	261	289

With Air Cushion/Basic: CLG1BA

∗Refer to p.3.1-29 for mounting bracket since dimensions except GA, P, WA, WB, WH, WW, Wθ are same.



With rod boot

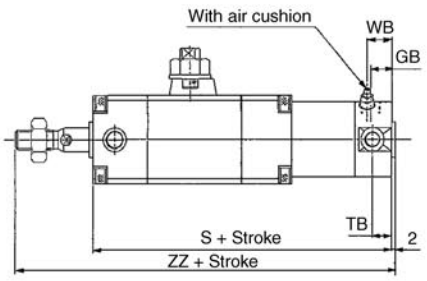


Bore (mm)	Stroke range	AL	A	B1	BC	BN	BZ	C	D	E	GA	GB	GC	GD	GK	GL	GQ	GR	I	J	K	KA	MM	NA
20	to 200	15.5	18	13	38	91	57.5	14	8	12	85	10	19	54	3.5	5.5	4	4	26	M4 depth 7	5	6	M8	24
25	to 300	19.5	22	17	45	101	69	16.5	10	14	95	10	20	62	4	9	7	7	31	M5 depth 5	5.5	8	M10 X 1.25	29
32	to 300	19.5	22	17	45	102	69	20	12	18	95	10	21	62	4	9	7	7	38	M5 depth 8	5.5	10	M10 X 1.25	35.5
40	to 300	27	30	19	52	111	76	26	16	25	103	10	23	67	4	11	8	8	47	M6 depth 12	6	14	M14 X 1.5	44

Bore (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	to 200	5	M5	33	19.5	20	38	141	11	11	M5	86	5.5	15	23	30°	35	178	30	16	55	0.25 Stroke	198
25	to 300	6	M5	38	24	24	41	151	11	11	M6 X 0.75	96	7	15	25	30°	40	193	30	17	62		215
32	to 300	6	Rc(PT)1/8	39	24	24	41	154	11	10	M8	97	7	15	28.5	25°	40	196	35	17	62		218
40	to 300	8	Rc(PT)1/8	44	24	24	41	169	12	10	M10 X 1.25	105.5	9	15	33	20°	50	221	35	17	70		241

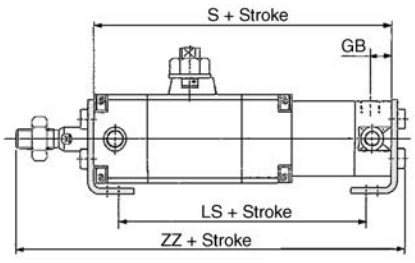
Long stroke/Refer to p.3.1-28 and 3.1-29 for mounting dimensions except table below.

Basic



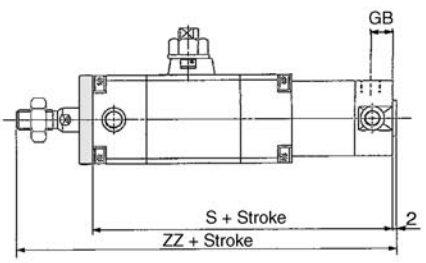
Bore (mm)	Stroke range	GB	S	W/o rod boot ZZ	W/ rod boot ZZ	TB	WB
20	201 to 350	12	149	186	206	11	16
25	301 to 400	12	159	201	223	11	16
32	301 to 450	12	162	204	226	11	16
40	301 to 800	13	178	230	250	12	16

Foot



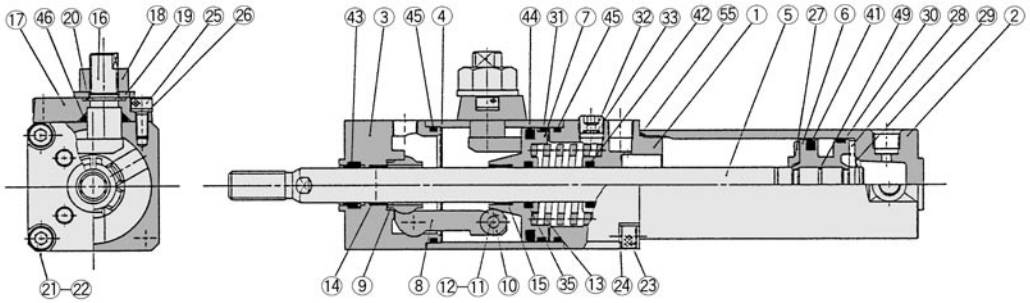
Bore (mm)	Stroke range	GB	S	LS	W/o rod boot ZZ	W/ rod boot ZZ
20	201 to 350	12	149	125	190	210
25	301 to 400	12	159	135	205.5	227.5
32	301 to 450	12	162	136	208.5	230.5
40	301 to 800	13	178	151	235	255

Front flange

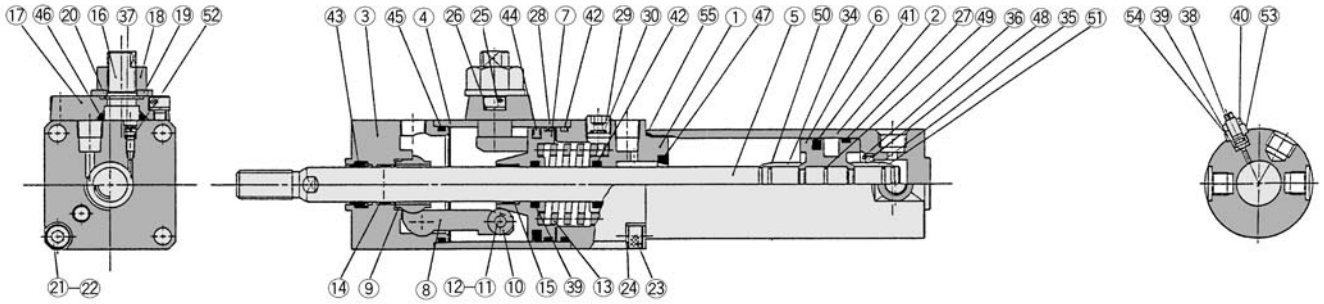


Bore (mm)	Stroke range	GB	S	W/o rod boot ZZ	W/ rod boot ZZ
20	201 to 350	12	149	186	206
25	301 to 400	12	159	201	223
32	301 to 450	12	162	204	226
40	301 to 800	13	178	230	250

Construction



With air cushion



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	White hard anodized
②	Tube cover	Aluminum alloy	White hard anodized
③	Cover	Carbon steel	Nitrided, chrome plated
④	Middle cover	Aluminum alloy	White 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	Chrome molybdrenum steel	Nickel plated
⑰	Cam guide	Carbon steel	Nitrided, coated

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

Component Parts

No.	Description	Material
㊶	Piston seal	NBR
㊷	Rod seal A	NBR
㊸	Rod seal B	NBR
㊹	Brake piston seal	NBR
㊺	Middle cover gasket	NBR
㊻	Cam gasket	NBR
㊼	Cushion seal A	NBR
㊽	Cushion seal B	NBR
㊾	Piston gasket	NBR
㊿	Cushion ring gasket A	NBR
(51)	Cushion ring gasket B	NBR
(52)	Valve seal A	NBR
(53)	Valve seal B	NBR
(54)	Gasket for valve retainer	NBR
(55)	Cylinder tube gasket	NBR

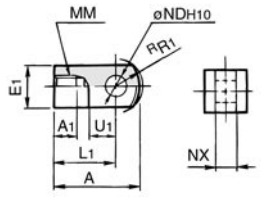
Note) Contact SMC if the fine lock unit must be disassembled.

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	Hex. socket head cap screw	Chrome molybdenum steel	Black zinc chromated
㉒	Spring washer	Steel wire	Black zinc chromated
㉓	Hex. socket head cap screw	Chrome molybdenum steel	Black zinc chromated
㉔	Spring washer	Steel wire	Black zinc chromated
㉕	Hex. socket head cap screw	Chrome molybdenum steel	Black zinc chromated
㉖	Spring washer	Steel wire	Black zinc chromated
㉗	Damper A	Urethane	
㉘	Damper B	Urethane	
㉙	Snap ring	Carbon tool steel	
㉚	Wearing	Resin	
㉛	Wearing	Resin	
㉜	Hex. socket head plug	Carbon steel	E type only
㉝	Element	Bronze	E type only
㉞	Cushion ring A	Brass	
㉟	Cushion ring B	Brass	
㊱	Seal retainer	Rolled steel	Nickel plated
㊲	Cushion valve A	Brass	Electroless nickel plated
㊳	Cushion valve B	Rolled steel	Electroless nickel plated
㊴	Cushion valve retainer	Rolled steel	Electroless nickel plated
㊵	Luck nut	Rolled steel	Nickel plated

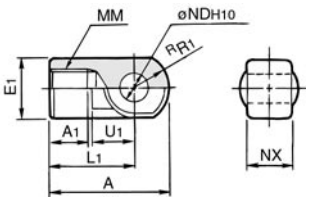
Series CLG1
Accessory Dimensions

Single Knuckle Joint

I-G02, G03
Material: Rolled steel



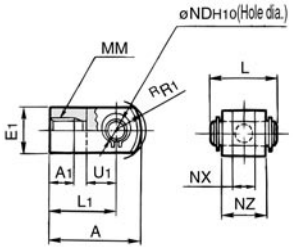
I-G04
Material: Casting steel



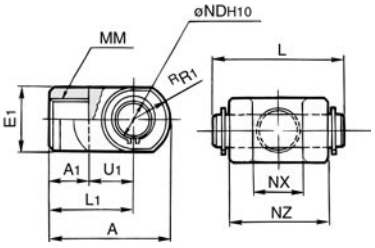
Part No.	Tube dia. (mm)	A	A1	E1	L1	MM	R R1	U1	NDH10	NX
I-G02	20	34	8.5	□16	25	M8	10.3	11.5	$8^{+0.058}_{0}$	$8^{-0.2}_{-0.4}$
I-G03	25, 32	41	10.5	□20	30	M10 X .25	12.8	14	$10^{+0.058}_{0}$	$10^{-0.2}_{-0.4}$
I-G04	40	42	14	ø22	30	M14 X 1.5	12	14	$10^{+0.058}_{0}$	$18^{-0.3}_{-0.5}$

Double Knuckle Joint (∗Knuckle pin and snap ring are packed.)

Y-G02, G03
Material: Rolled steel



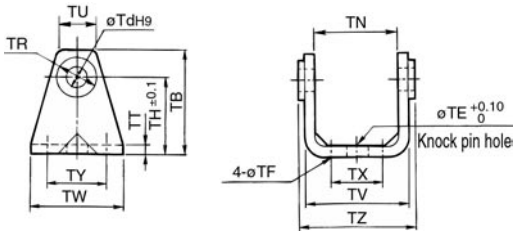
Y-G04
Material: Casting steel



Part No.	Tube dia. (mm)	A	A1	E1	L1	MM	R R1	U1	NDH10	NX	NZ	L	Pin part no.
Y-G02	20	34	8.5	□16	25	M8	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

Front Side Pivot Bracket

ø20 to ø40
Material: Rolled steel

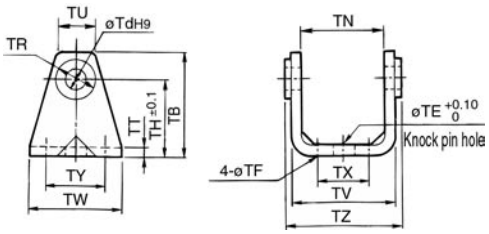


Part No.	Tube dia. (mm)	TB	TdH9	TE	TF	TH	TN
CLG-020-24	20	42	$8^{+0.036}_{0}$	10	5.5	31	$41^{+0.4}_{+0.1}$
CLG-025-24	25	48	$10^{+0.036}_{0}$	10	5.5	37	$48^{+0.4}_{+0.1}$
CLG-032-24	32	53	$12^{+0.036}_{0}$	10	6.6	38.5	$48^{+0.5}_{+0.1}$
CLG-040-24	40	60	$14^{+0.043}_{0}$	10	6.6	42.5	$56^{+0.5}_{+0.1}$

Part No.	Tube dia. (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

Rear Side Pivot Bracket

ø20 to ø40
Material: Rolled steel

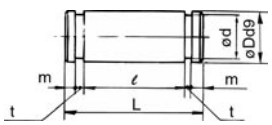


Part No.	Tube dia. (mm)	TB	Td	TE	TF	TH	TN
CG-020-24A	20	36	8	10	5.5	25	(29.3)
CG-025-24A	25	43	10	10	5.5	30	(33.1)
CG-032-24A	32	50	12	10	6.6	35	(40.4)
CG-040-24A	40	58	14	10	6.6	40	(49.2)

Part No.	Tube dia.(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

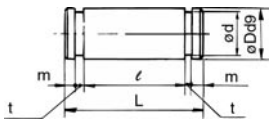
Material: Carbon steel



Part No.	Tube dia. (mm)	Dd9	L	d	ℓ	m	t	Used snap ring
IY-G02	20	$8^{-0.040}_{-0.076}$	21	7.6	16.2	1.5	0.9	C shape 8 for axis
IY-G03	25, 32	$10^{-0.040}_{-0.076}$	25.6	9.6	20.2	1.55	1.15	C shape 10 for axis
IY-G04	40	$10^{-0.040}_{-0.076}$	41.6	9.6	36.2	1.55	1.15	C shape 10 for axis

Clevis Pin

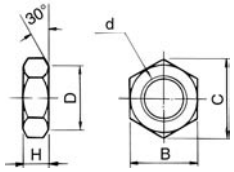
Material: Carbon steel



Part No.	Tube dia. (mm)	Dd9	L	d	ℓ	m	t	Used snap ring
CD-G02	20	$8^{-0.040}_{-0.076}$	43.4	7.6	38.6	1.5	0.9	C shape 8 for axis
CD-G25	25	$10^{-0.040}_{-0.076}$	48	9.6	42.6	1.55	1.15	C shape 10 for axis
CD-G03	32	$12^{-0.050}_{-0.093}$	59.4	11.5	54	1.55	1.15	C shape 12 for axis
CD-G04	40	$14^{-0.050}_{-0.093}$	71.4	13.4	65	2.05	1.15	C shape 14 for axis

Rod End Nut

Material: Carbon steel



Part No.	Tube dia. (mm)	B	C	D	d	H
NT-02	20	13	15.0	12.5	M8	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

Fine Lock Cylinder/Double Acting Single Rod

Series CLA

ø40, ø50, ø63, ø80, ø100

How to order

Standard CLA L N 50 — 100 JR — E

With auto switch CDLA L N 50 — 100 JR — E — A53 L

Air cylinder with auto switch

Mounting

B	Basic	C	Single clevis
L	Foot	D	Double clevis
F	Front flange	T	Centre trunnion
G	Rear flange		

∗ Mounting accessories are not mounted, should be order separate.Please refer order keys in next pages.

Style

N	Non-lube
F	Steel tube
H	Air-hydro

Bore size

40	40mm
50	50mm
63	63mm
80	80mm
100	100mm

Cylinder stoke (mm)
Refer to p.3.1-34 for details

Lead wire length

Nil	0.5m
L	3m
Z	5m

Auto switch type

	Select an applicable auto switch model from the table below

Lock operation

E	Spring lock (Exhaust lock)
P	Pneumatic lock (Pressurized lock)
D	Spring and pneumatic lock

Cylinder

Rod boot	J	Nylon tarpaulin
	K	Heat tarpaulin
Cushion	—	With cushion on both ends
	N	Without cushion
	R	With cushion on rod side
	H	With cushion on head side

∗Air-hydro style: Without cushion.

Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Tie-rod mounting	Auto switch model Band mounting	Lead wire (m)∗ 0.5 (—)	3 (L)	5 (Z)	None	Applicable load	
Reed switch	——	Grommet	Yes	3 wire (NPN equiv.)	—	5V	—	A56	—	●	●	—	—	IC	—
				2 wire	24V	12V	—	A53	B53	●	●	●	—	—	PLC
						12V	100V, 200V	A54	B54	●	●	●	—		Relay, PLC
			No			5V, 12V	—	A67	—	●	●	—	—	IC	PLC
						5V, 12V	200V or less	A64	B64	●	●	—	—	—	Relay, PLC
		Terminal conduit	Yes			—	—	A33C	A33	—	—	—	●		PLC
		DIN terminal					100V, 200V	A34C	A34	—	—	—	●	—	Relay, PLC
								A44C	A44	—	—	—	●		
	Diagnostic indication (2 colour)	Grommet				—	—	A59W	B59W	●	●	—	—		
Solid state switch	——	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	—	F59	G59	●	●	○	—	IC	Relay, PLC
				3 wire (PNP)				F5P	G5P	●	●	○	—		
				2 wire	—	—	100V, 200V	J51	—	●	●	○	—	—	
		Terminal conduit			24V	12V	—	J59	K59	●	●	○	—		
				3 wire (PNP)		5V, 12V		G39C	G39	—	—	—	●	IC	
				2 wire		12V		K39C	K39	—	—	—	●	—	
	Diagnostic indication (2 colour)	Grommet		3 wire (NPN)		5V, 12V		F59W	G59W	●	●	○	—	IC	
				3 wire (PNP)				F5PW	G5PW	●	●	○	—		
				2 wire		12V		J59W	K59W	●	●	○	—	—	
	Water resistant (2 colour)							F5BA	G5BA	—	●	○	—		
	With timer			3 wire (NPN)		5V, 12V		F5NT	G5NT	—	●	○	—	IC	
	With diagnostic output (2 colour)			4 wire (NPN)				F59F	G59F	●	●	○	—		
	Latch with diagnostic output (2 colour)					—		F5LF	—	●	●	○	—	—	

∗ Lead wire length symbol 0.5m·····— (Example) A53
3m·····L (Example) A53L
5m·····Z (Example) A53Z

∗ Solid state switches marked with a "○" are manufactured upon receipt order.

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

Style

Series	Style	Action	Bore size (mm)	Lock style
CLA□N	Non-lube style	Double acting	40, 50, 63, 80, 100	Spring lock, Pneumatic lock, Spring and pneumatic lock
CLA□H	Air-hydro style			

Specifications

Style	Non-lube	Air-hydro
Fluid	Air	Turbine oil (Lock portion is air)
Proof pressure	1.5MPa	
Max. operating pressure	1.0MPa	
Min. operating pressure	0.08MPa	0.2MPa
Piston speed	50 to 500mm/s*	15 to 300mm/s*
Ambient and fluid temperature	Without auto switch: –10°C to 70°C With auto switch: –10°C to 60°C (No freezing)	
Cushion	Air cushion	None
Thread tolerance	JIS class 2	
Stroke length tolerance	to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$	
Mounting	Basic, Axial direction foot, Front flange, Rear flange, Single clevis, Double clevis, Centre trunnion	

*Constraints associated with the allowable kinetic energy are imposed on the speeds at which the piston can be locked.

Lock Specifications

Lock	Spring lock (Exhaust lock)	Spring/ pneumatic lock	Pneumatic lock (Pressurized lock)
Lock release pressure (MPa)	0.3 or more		0.1 or more
Lock starting pressure (MPa)	0.25 or less		0.05 or more
Max. operating pressure (MPa)	0.5		
Lock direction	Both directions		

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Max. stroke
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
50, 63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1200
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700	1400
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700	1500

Note) Intermediate stroke except stroke mentioned above is also available. Contact SMC.

Minimum Strokes for Auto Switch Mounting

Refer to p.1.13-4 because it is same as air cylinder CDA1 series (Standard/Double acting: Single Rod) style.

⚠ Caution

Recommended Pneumatic Circuit/Caution on Handling

Refer to p.3.1-2 to 3.1-5 for details of CLA series specifications mentioned above.

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	60°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Accessories

Rod end nut (Standard equipment), Single knuckle joint, Double knuckle joint, Knuckle pin*, Clevis pin*, Rod boot

* Only the Double knuckle and the double clevis are provided as standard equipment.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size				
	40	**50**	**63**	**80**	**100**
D-A5/A6/A59W D-F5□/J5□/F5W□/J59W D-F5NT, F5BA, F59F	BT-04	BT-04	BT-06	BT-08	BT-08
D-A3/A44/G39/K39	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M
D-B5/B6/B59W D-G5□/K59/G5□W/K59W D-G5BA/G59F/G5NTL	BA-04	BA-05	BA-06	BA-08	BA-10
D-A3□C/A44C/G39C/K39C	BA3-040	BA3-050	BA3-063	BA3-080	BA3-100

* Mounting brackets are provided with D-A3□C, A44C, G39C, and K39C.
When ordering, indicate as described below, in accordance with 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 Bracket Part No.

Bore size (mm)	**40**	**50**	**63**	**80**	**100**
Foot*	CA1-L04	CA1-L05	CA1-L06	CA1-L08	CA1-L10
Flange	CA1-F04	CA1-F05	CA1-F06	CA1-F08	CA1-F10
Single clevis	CA1-C04	CA1-C05	CA1-C06	CA1-C08	CA1-C10
Double clevis**	CA1-D04	CA1-D05	CA1-D06	CA1-D08	CA1-D10

* When ordering foot brackets, 2pcs. should be ordered for each cylinder.
** Clevis pin, plain washer and cotter pin are packed with the double clevis style.

Weight/( ): Value at steel tubing (kg)

Bore size (mm)			40	50	63	80	100
Basic weight	Basic		1.82 (1.87)	2.79 (2.83)	4.41 (4.45)	7.20 (7.36)	10.29 (10.50)
	Foot		2.01 (2.06)	3.01 (3.05)	4.75 (4.79)	7.87 (8.03)	11.28 (11.49)
	Flange		2.19 (2.24)	3.24 (3.28)	5.20 (5.24)	8.65 (8.81)	12.21 (12.42)
	Single clevis		2.05 (2.10)	3.13 (3.17)	5.04 (5.08)	8.31 (8.47)	12.07 (12.28)
	Double clevis		2.09 (2.14)	3.22 (3.26)	5.20 (5.24)	8.60 (8.76)	12.59 (12.80)
	Trunnion		2.27 (2.37)	3.32 (3.42)	5.30 (5.50)	8.90 (9.19)	12.69 (13.08)
Additional weight per 50mm stroke	Aluminum tubing	All brackets	0.22	0.28	0.37	0.52	0.65
	Steel tubing	Mounting bracket except trunnion	0.28	0.35	0.43	0.70	0.87
		Trunnion	0.36	0.46	0.65	0.86	1.07
Accessory	Single knuckle joint		0.23	0.26	0.26	0.60	0.83
	Double knuckle joint		0.32	0.38	0.38	0.73	1.08
	Knuckle pin		0.05	0.05	0.05	0.14	0.19

Calculation Example: **CLAL40-100-E** Basic weight·····2.01(Foot style, ø40)
Additional weight·····0.22/50 stroke
Cylinder stroke·····100 stroke
2.01+0.22 X 100/50=2.45kg

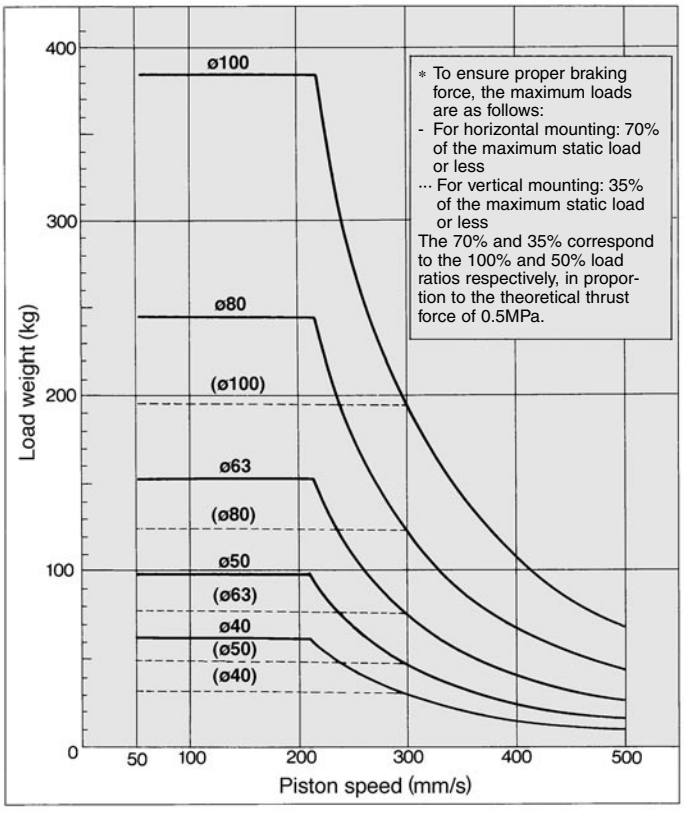
⚠ Caution/Allowable Kinetic Energy when Locking

Bore size (mm)	40	50	63	80	100
Allowable kinetic energy J	1.42	2.21	3.53	5.69	8.83

① In terms of specific load conditions, the allowable kinetic energy indicated in the table above is equivalent to a 50% load ratio at 0.5MPa, and a piston speed of 300mm/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: Load kinetic energy (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 the load, use 1.2 times the average speed as a guide.
④ The relationship 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.



Fine Lock Cylinder with Auto Switch

Refer to p.1.13-14 for auto switch setting position and mounting height since it is same as air cylinder CDA1 series (Double acting single rod) style.

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

Lock style	Piston speed (mm/sec)			
	50	100	300	500
Spring lock	± 0.4	± 0.5	± 1.0	± 2.0
Pneumatic lock Spring and pneumatic lock	± 0.2	± 0.3	± 0.5	± 1.5

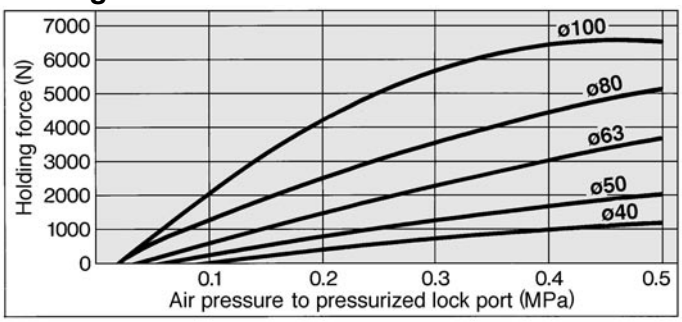
Condition/load: 25% of thrust force at 0.5MPa
Solenoid valve: mounted to the lock port

Holding Force of Spring Lock (Max. static load)

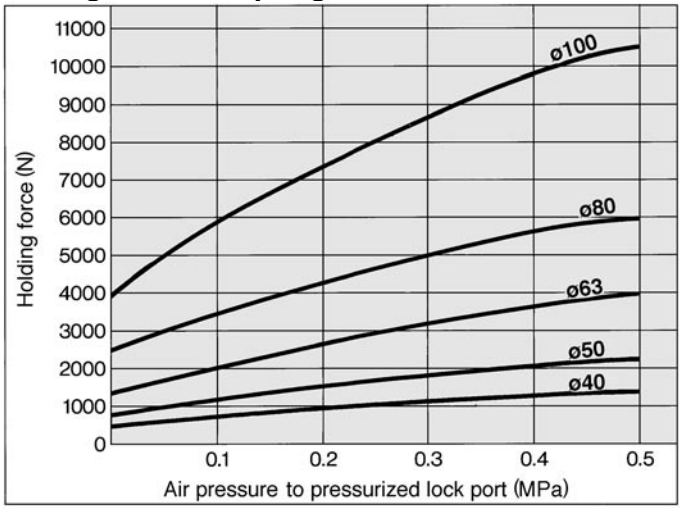
Bore size (mm)	40	50	63	80	100
Holding force N	882	1370	2160	3430	5390

Note) Holding force at piston rod retracted side decreases approx. 15%.

Holding Force of Pneumatic Lock



Holding Force of Spring and Pneumatic Lock



⚠ Caution

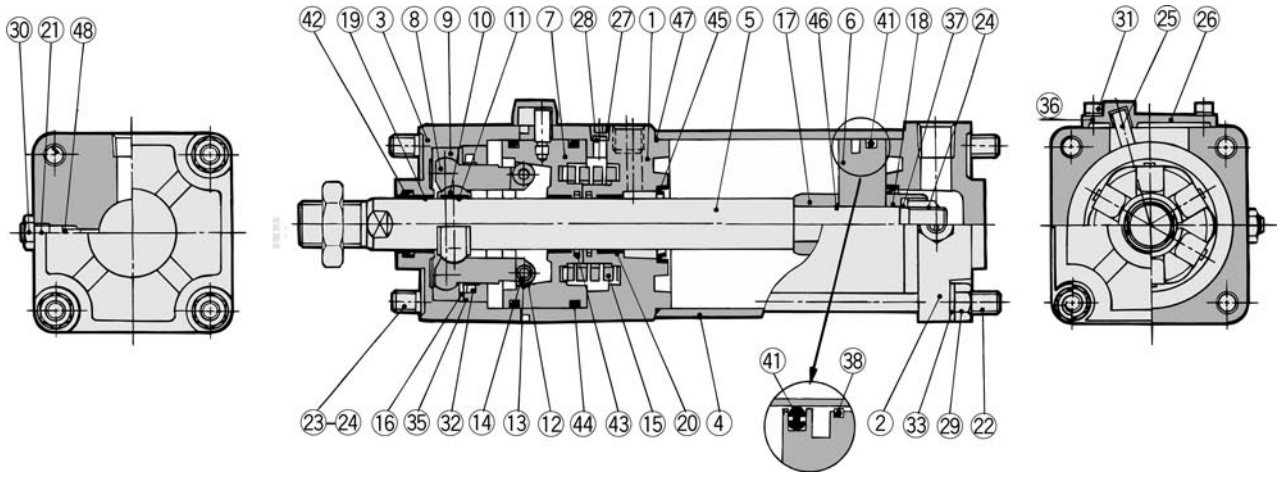
Cautions when Locking

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.

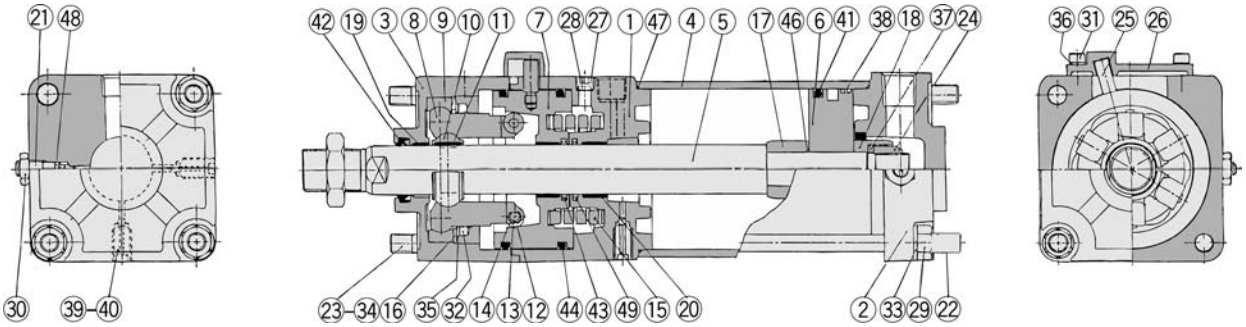
- If the piston rod slips because the lock's holding force has been exceeded, the brake shoe could be damaged, resulting in a reduced holding force or shortened life.
- To use the lock for drop prevention purposes, the load to be attached to the cylinder must be within 35% of the cylinder's holding force.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

Construction

Non-lube style



Air-hydro style



Non-lube style (Long stroke)

Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Black coated after hard anodized
②	Head cover	Aluminum alloy	Black coated
③	Cover	Aluminum alloy	Black coated after hard anodized
④	Cylinder tube	Aluminum alloy	Hard anodized
⑤	Piston rod	Carbon steel	Hard chrome plated
⑥	Piston	Aluminum alloy	Chromated
⑦	Brake piston	Carbon steel	Nitrided
⑧	Brake arm	Carbon steel	Nitrided
⑨	Arm holder	Carbon steel	Nitrided
⑩	Brake shoe holder	Carbon steel	Nitrided
⑪	Brake shoe	Special friction material	
⑫	Roller	Chrome molybdenum steel	Nitrided
⑬	Pin	Chrome bearing steel	Heat treated
⑭	Snap ring	Carbon tool steel	Nickel plated
⑮	Brake spring	Steel wire	Dacrodized
⑯	Retainer	Rolled steel	Zinc chromated
⑰	Cushion ring A	Rolled steel	Zinc chromated
⑱	Cushion ring B	Rolled steel	Zinc chromated
⑲	Bushing	Lead bronze casting	
⑳	Bushing	Lead bronze casting	
㉑	Cushion valve	Rolled steel	Electroless nickel plated
㉒	Tie rod	Carbon steel	Chromated
㉓	Unit fixing tie rod	Carbon steel	Chromated

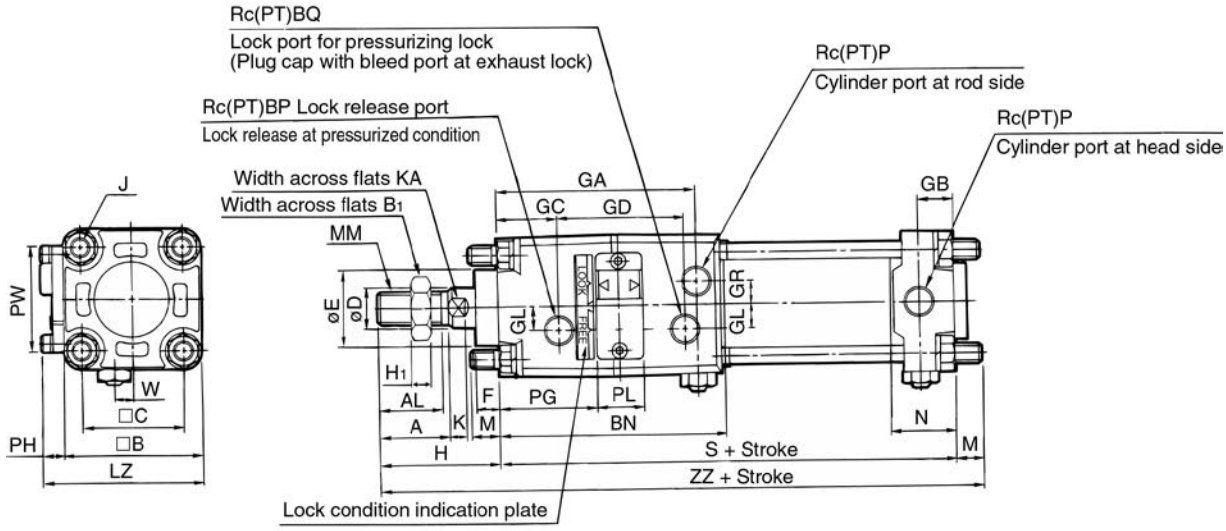
No.	Description	Material	Note
㉔	Piston nut	Rolled steel	Zinc chromated
㉕	Non rotating pin	Carbon steel	Induction hardening
㉖	Pin guide	Carbon steel	Black coated after nitrided
㉗	Hex. socket head pulg	Chrome molybdenum steel	Black zinc chromated
㉘	Elememnt	Bronze	
㉙	Tie rod nut	Rolled steel	Black zinc chromated
㉚	Lock nut	Rolled steel	Nickel plated
㉛	Hex. socket head cap screw	Chrome molybdenum steel	Black zinc chromated
㉜	Hex. socket head cap screw	Chrome molybdenum steel	Nickel plated
㉝	Spring seat	Steel wire	Black zinc chromated
㉞	Spring seat	Steel wire	Black zinc chromated
㉟	Spring seat	Steel wire	Black zinc chromated
㊱	Spring seat	Steel wire	Black zinc chromated
㊲	Spring seat	Steel wire	Zinc chromated
㊳	Wearing	Resin	
㊴	Exhaust valve	Chrome molybdenum steel	
㊵	Check ball	Chrome bearing steel	

Component Parts

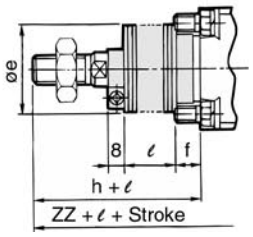
No.	Description	Material
㊶	Piston seal	NBR
㊷	Rod seal A	NBR
㊸	Rod seal B	NBR
㊹	Brake piston seal	NBR
㊺	Cushion seal	NBR
㊻	Piston gasket	NBR
㊼	Tube gasket	NBR
㊽	Cushion valve seal	NBR
㊾	Rod seal C	NBR

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

Basic/CLAB



With rod boot

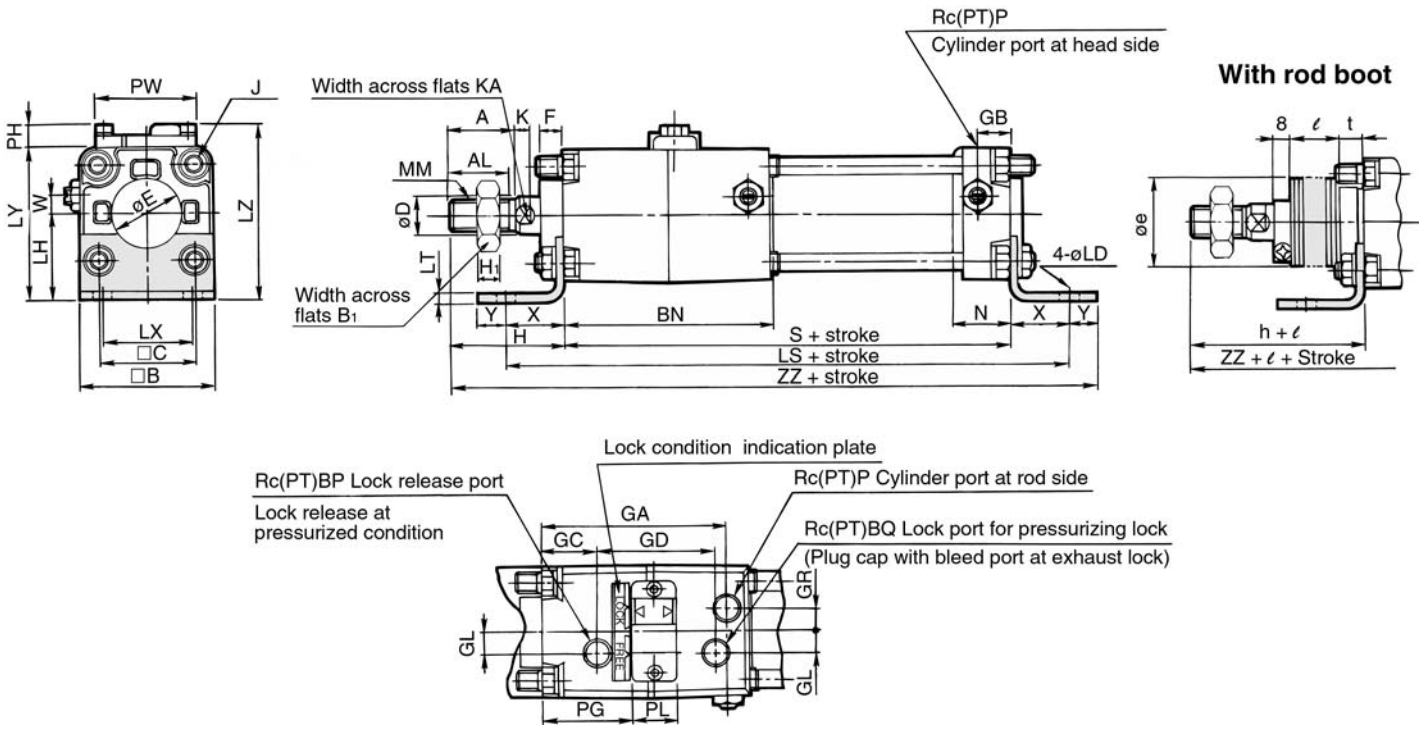


(mm)

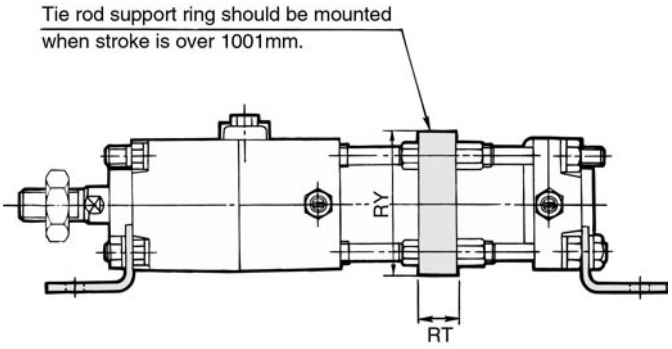
Bore (mm)	Stroke range (mm)		A	AL	B	B1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR	H1	J
	Without rod boot	With rod boot																			
40	to 500	20 to 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10	8	M8
50	to 600	20 to 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12	11	M8
63	to 600	20 to 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15	11	M10 X 1.25
80	to 750	20 to 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17	13	M12
100	to 750	20 to 750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19	16	M12

Bore (mm)	K	KA	LZ	M	MM	N	P	PG	PH	PL	PW	S	W	Without rod boot		With rod boot				
														H	ZZ	e	f	h	ℓ	ZZ
40	6	14	71	11	M14 X 1.5	27	1/4	42	11	20	45	153	8	51	215	43	11.2	59	1/4 Stroke	223
50	7	18	80	11	M18 X 1.5	30	3/8	46	10	21	50	168	0	58	237	52	11.2	66	1/4 Stroke	245
63	7	18	99	14	M18 X 1.5	31	3/8	48.5	13	23	60	182	0	58	254	52	11.2	66	1/4 Stroke	262
80	11	22	117	17	M22 X 1.5	37	1/2	55	15	23	70	208	0	71	296	65	12.5	80	1/4 Stroke	305
100	11	26	131	17	M26 X 1.5	40	1/2	56.5	15	25	80	226	0	72	315	65	14	81	1/4 Stroke	324

Foot/CLAL



Long stroke (ø50 to ø100)



Long stroke

Bore (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

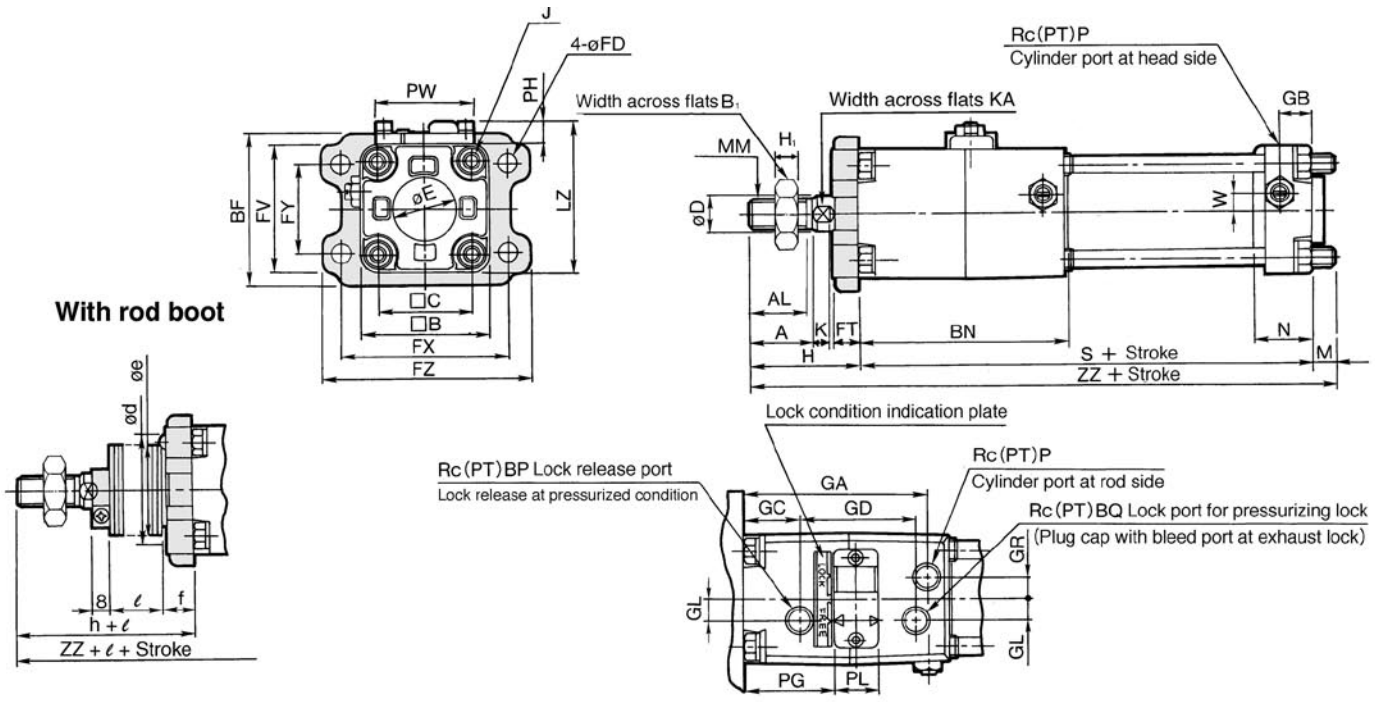
(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B_1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR
	Without rod boot	With rod boot																	
40	to 500	20 to 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10
50	to 600	20 to 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12
63	to 600	20 to 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15
80	to 750	20 to 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17
100	to 750	20 to 750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19

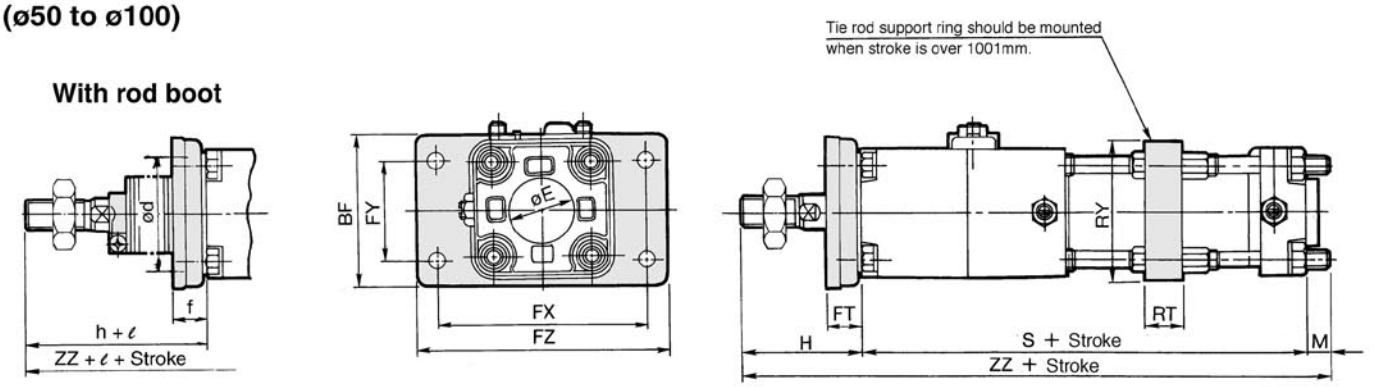
Bore (mm)	H_1	J	K	KA	LD	LH	LS	LT	LX	LY	LZ	MM	N	P	PG	PH	PL	PW	S	W	X
40	8	M8	6	14	9	40	207	3.2	42	70	81	M14 X 1.5	27	1/4	42	11	20	45	153	8	27
50	11	M8	7	18	9	45	222	3.2	50	80	90	M18 X 1.5	30	3/8	46	10	21	50	168	0	27
63	11	M10 X 1.25	7	18	11.5	50	250	3.2	59	93	106	M18 X 1.5	31	3/8	48.5	13	23	60	182	0	34
80	13	M12	11	22	13.5	65	296	4.5	76	116	131	M22 X 1.5	37	1/2	55	15	23	70	208	0	44
100	16	M12	11	26	13.5	75	312	6	92	133	148	M26 X 1.5	40	1/2	56.5	15	25	80	226	0	43

Bore (mm)	Y	Without rod boot		With rod boot				
		H	ZZ	e	f	h	ℓ	ZZ
40	13	51	244	43	11.2	59	1/4 Stroke	252
50	13	58	266	52	11.2	66	1/4 Stroke	274
63	16	58	290	52	11.2	66	1/4 Stroke	298
80	16	71	339	65	12.5	80	1/4 Stroke	348
100	17	72	358	65	14.0	81	1/4 Stroke	367

Front Flange/CLAF



Long stroke
(ø50 to ø100)



(mm)

Bore (mm)	Stroke range (mm)		Long stroke range (mm)	A	AL	B	B1	BF	BN	BP	BQ	C	D	E	GA	GB	GC	GD	GL	GR	H1	J	K
	Without rod boot	With rod boot																					
40	to 500	20 to 500	501 to 800	30	27	60	22	71	96	1/4	1/4	44	16	32	85	15	26	54	10	10	8	M8	6
50	to 600	20 to 600	601 to 1000	35	32	70	27	81	108	1/4	1/4	52	20	40	95	17	27	59	13	12	11	M8	7
63	to 600	20 to 600	601 to 1000	35	32	86	27	101	115	1/4	1/4	64	20	40	102	17	26	67	18	15	11	M10 X 1.25	7
80	to 750	20 to 750	751 to 1000	40	37	102	32	119	129	1/4	1/4	78	25	52	113	21	30	72	23	17	13	M12	11
100	to 750	20 to 750	751 to 1000	40	37	116	41	133	140	1/4	1/4	92	30	52	124	21	31	76	25	19	16	M12	11

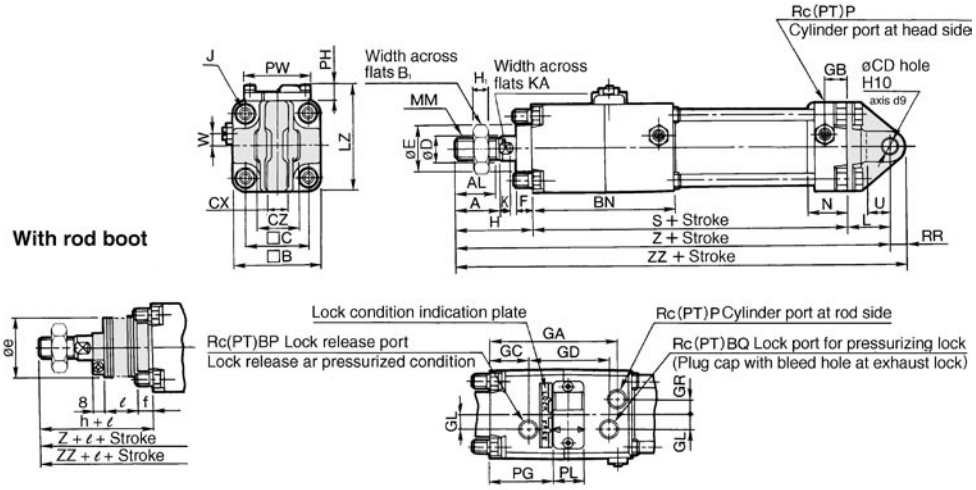
Bore (mm)	KA	LZ	M	MM	N	P	PG	PH	PL	PW	S	W	FV	FD	FT	FX	FY	FZ	W/o rod boot		W/ rod boot					
																			H	ZZ	d	e	f	h	ℓ	ZZ
40	14	71	11	M14 X 1.5	27	1/4	42	11	20	45	153	8	60	9	12	80	42	100	51	215	52	43	15	59	1/4 Stroke	223
50	18	80	11	M18 X 1.5	30	3/8	46	10	21	50	168	0	70	9	12	90	50	110	58	237	58	52	15	66	1/4 Stroke	245
63	18	99	14	M18 X 1.5	31	3/8	48.5	13	23	60	182	0	86	11.5	15	105	59	130	58	254	58	52	17.5	66	1/4 Stroke	262
80	22	117	17	M22 X 1.5	37	1/2	55	15	23	70	208	0	102	13.5	18	130	76	160	71	296	80	65	21.5	80	1/4 Stroke	305
100	26	131	17	M26 X 1.5	40	1/2	56.5	15	25	80	226	0	116	13.5	18	150	92	180	72	315	80	65	21.5	81	1/4 Stroke	324

Long stroke

Dimensions except those below are same as one in table above.

Bore (mm)	Stroke range (mm)	BF	M	RT	RY	FT	FX	FY	FZ	Without rod boot		With rod boot		
										H	ZZ	f	h	ZZ
50	1001 to 1200	88	6	30	76	20	120	58	144	67	241	19	66	240
63	1001 to 1200	105	10	40	92	23	140	64	170	71	263	19	66	258
80	1001 to 1400	124	12	45	112	28	164	84	198	87	307	21	80	300
100	1001 to 1500	140	12	50	136	29	180	100	220	89	327	21	81	319

Double Clevis/CLAD



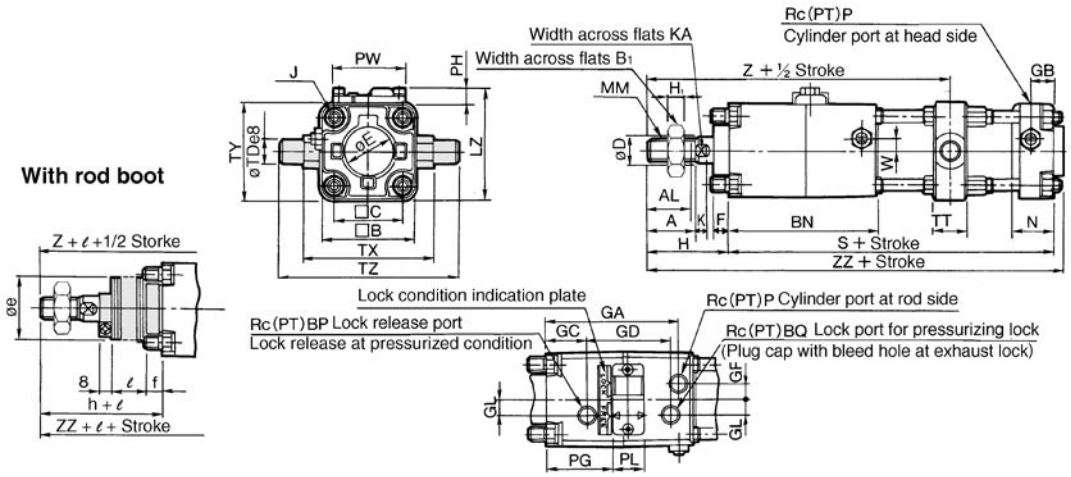
(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B1	BN	BP	BQ	C	CD	CX	CZ	D	E	F	GA	GB	GC	GD	GL	GR	H1
	W/o rod boot	W/ rod boot																					
40	to 500	20 to 500	30	27	60	22	96	1/4	1/4	44	10	$15^{+0.3}_{+0.1}$	29.5	16	32	10	85	15	26	54	10	10	8
50	to 600	20 to 600	35	32	70	27	108	1/4	1/4	52	12	$18^{+0.3}_{+0.1}$	38	20	40	10	95	17	27	59	13	12	11
63	to 600	20 to 600	35	32	86	27	115	1/4	1/4	64	16	$25^{+0.3}_{+0.1}$	49	20	40	10	102	17	26	67	18	15	11
80	to 750	20 to 750	40	37	102	32	129	1/4	1/4	78	20	$31.5^{+0.3}_{+0.1}$	61	25	52	14	113	21	30	72	23	17	13
100	to 750	20 to 750	40	37	116	41	140	1/4	1/4	92	25	$35.5^{+0.3}_{+0.1}$	64	30	52	14	124	21	31	76	25	19	16

Bore (mm)	J	K	KA	L	LZ	MM	N	P	PG	PH	PL	PW	RR	S	U	W	W/o rod boot			W/ rod boot					
																	H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	M8	6	14	30	71	M14 X 1.5	27	1/4	42	11	20	45	10	153	16	8	51	234	244	43	11.2	59	1/4 Stroke	242	252
50	M8	7	18	35	80	M18 X 1.5	30	3/8	46	10	21	50	12	168	19	0	58	261	273	52	11.2	66	1/4 Stroke	269	281
63	M10 X 1.25	7	18	40	99	M18 X 1.5	31	3/8	48.5	13	23	60	16	182	23	0	58	280	296	52	11.2	66	1/4 Stroke	288	304
80	M12	11	22	48	117	M22 X 1.5	37	1/2	55	15	23	70	20	208	28	0	71	327	347	65	12.5	80	1/4 Stroke	336	356
100	M12	11	26	58	131	M26 X 1.5	40	1/2	56.5	15	25	80	25	226	36	0	72	356	381	65	14.0	81	1/4 Stroke	365	390

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

Trunnion/CLAT



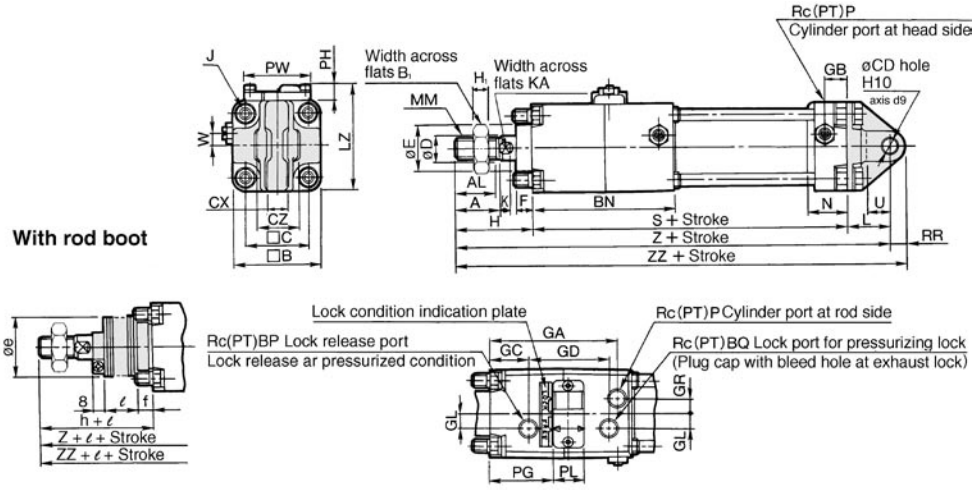
(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR	H1	J	K	KA	LZ	MM
	W/o rod boot	W/ rod boot																							
40	25 to 500	25 to 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10	8	M8	6	14	71	M14 X 1.5
50	25 to 600	25 to 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12	11	M8	7	18	80	M18 X 1.5
63	32 to 600	32 to 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15	11	M10 X 1.25	7	18	99	M18 X 1.5
80	41 to 750	41 to 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17	13	M12	11	22	117	M22 X 1.5
100	45 to 750	45 to 750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19	16	M12	11	26	131	M26 X 1.5

Bore (mm)	N	P	PG	PH	PL	PW	S	W	TDe8	TT	TX	TY	TZ	W/o rod boot			W/ rod boot					
														H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	27	1/4	42	11	20	45	153	8	$15^{-0.032}_{-0.059}$	22	85	62	117	51	162	209	43	11.2	59	1/4 Stroke	170	217
50	30	3/8	46	10	21	50	168	0	$15^{-0.032}_{-0.059}$	22	95	74	127	58	181	232	52	11.2	66	1/4 Stroke	189	240
63	31	3/8	48.5	13	23	60	182	0	$18^{-0.032}_{-0.059}$	28	110	90	148	58	191	248	52	11.2	66	1/4 Stroke	199	256
80	37	1/2	55	15	23	70	208	0	$25^{-0.040}_{-0.073}$	34	140	110	192	71	221	286	65	12.5	80	1/4 Stroke	230	295
100	40	1/2	56.5	15	25	80	226	0	$25^{-0.040}_{-0.073}$	40	162	130	214	72	235	306	65	14.0	81	1/4 Stroke	244	315

Double Clevis/CLAD

With rod boot



(mm)

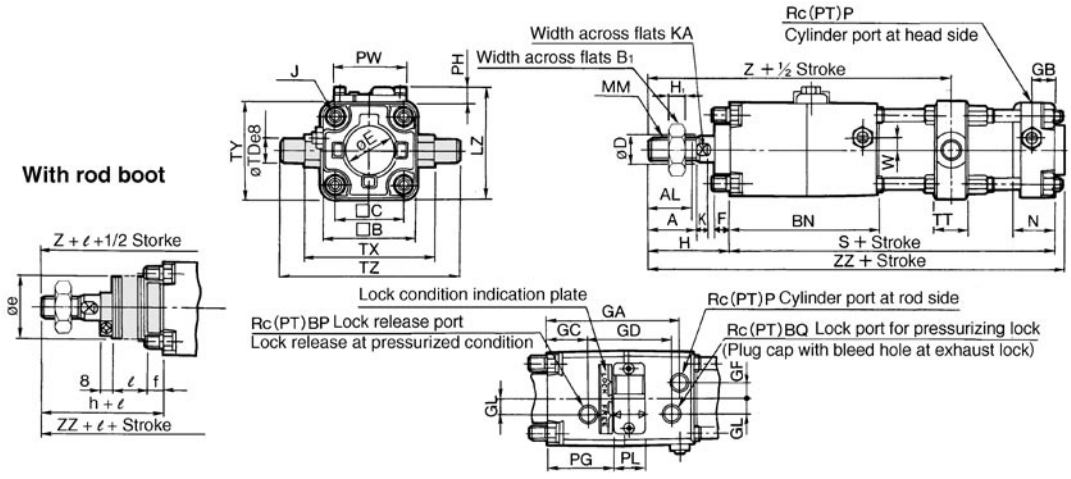
Bore (mm)	Stroke range (mm) W/o rod boot	Stroke range (mm) W/ rod boot	A	AL	B	B1	BN	BP	BQ	C	CD	CX	CZ	D	E	F	GA	GB	GC	GD	GL	GR	H1
40	to 500	20 to 500	30	27	60	22	96	1/4	1/4	44	10	$15^{+0.3}_{+0.1}$	29.5	16	32	10	85	15	26	54	10	10	8
50	to 600	20 to 600	35	32	70	27	108	1/4	1/4	52	12	$18^{+0.3}_{+0.1}$	38	20	40	10	95	17	27	59	13	12	11
63	to 600	20 to 600	35	32	86	27	115	1/4	1/4	64	16	$25^{+0.3}_{+0.1}$	49	20	40	10	102	17	26	67	18	15	11
80	to 750	20 to 750	40	37	102	32	129	1/4	1/4	78	20	$31.5^{+0.3}_{+0.1}$	61	25	52	14	113	21	30	72	23	17	13
100	to 750	20 to 750	40	37	116	41	140	1/4	1/4	92	25	$35.5^{+0.3}_{+0.1}$	64	30	52	14	124	21	31	76	25	19	16

Bore (mm)	J	K	KA	L	LZ	MM	N	P	PG	PH	PL	PW	RR	S	U	W	W/o rod boot H	W/o rod boot Z	W/o rod boot ZZ	W/ rod boot e	W/ rod boot f	W/ rod boot h	W/ rod boot ℓ	W/ rod boot Z	W/ rod boot ZZ
40	M8	6	14	30	71	M14 X 1.5	27	1/4	42	11	20	45	10	153	16	8	51	234	244	43	11.2	59	1/4 Stroke	242	252
50	M8	7	18	35	80	M18 X 1.5	30	3/8	46	10	21	50	12	168	19	0	58	261	273	52	11.2	66	1/4 Stroke	269	281
63	M10 X 1.25	7	18	40	99	M18 X 1.5	31	3/8	48.5	13	23	60	16	182	23	0	58	280	296	52	11.2	66	1/4 Stroke	288	304
80	M12	11	22	48	117	M22 X 1.5	37	1/2	55	15	23	70	20	208	28	0	71	327	347	65	12.5	80	1/4 Stroke	336	356
100	M12	11	26	58	131	M26 X 1.5	40	1/2	56.5	15	25	80	25	226	36	0	72	356	381	65	14.0	81	1/4 Stroke	365	390

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

Trunnion/CLAT

With rod boot



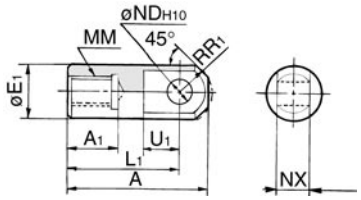
(mm)

Bore (mm)	Stroke range (mm) W/o rod boot	Stroke range (mm) W/ rod boot	A	AL	B	B1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR	H1	J	K	KA	LZ	MM
40	25 to 500	25 to 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10	8	M8	6	14	71	M14 X 1.5
50	25 to 600	25 to 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12	11	M8	7	18	80	M18 X 1.5
63	32 to 600	32 to 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15	11	M10 X 1.25	7	18	99	M18 X 1.5
80	41 to 750	41 to 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17	13	M12	11	22	117	M22 X 1.5
100	45 to 750	45 to 750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19	16	M12	11	26	131	M26 X 1.5

Bore (mm)	N	P	PG	PH	PL	PW	S	W	TDe8	TT	TX	TY	TZ	W/o rod boot H	W/o rod boot Z	W/o rod boot ZZ	W/ rod boot e	W/ rod boot f	W/ rod boot h	W/ rod boot ℓ	W/ rod boot Z	W/ rod boot ZZ
40	27	1/4	42	11	20	45	153	8	$15^{-0.032}_{-0.059}$	22	85	62	117	51	162	209	43	11.2	59	1/4 Stroke	170	217
50	30	3/8	46	10	21	50	168	0	$15^{-0.032}_{-0.059}$	22	95	74	127	58	181	232	52	11.2	66	1/4 Stroke	189	240
63	31	3/8	48.5	13	23	60	182	0	$18^{-0.032}_{-0.059}$	28	110	90	148	58	191	248	52	11.2	66	1/4 Stroke	199	256
80	37	1/2	55	15	23	70	208	0	$25^{-0.040}_{-0.073}$	34	140	110	192	71	221	286	65	12.5	80	1/4 Stroke	230	295
100	40	1/2	56.5	15	25	80	226	0	$25^{-0.040}_{-0.073}$	40	162	130	214	72	235	306	65	14.0	81	1/4 Stroke	244	315

Accessory Dimensions

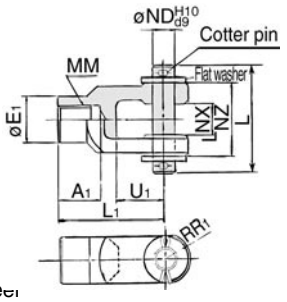
I type single knuckle joint



Material: Sulphur free-cutting steel

Part No.	Tube I.D. (mm)	A	A1	øE1	L1	MM	R1	U1	øND H10	NX
I-04	40	69	22	24	55	M14 X 1.5	15.5	20	12 +0.070 0	16 −0.1 −0.3
I-05	50/63	74	27	28	60	M18 X 1.5	15.5	20	12 +0.070 0	16 −0.1 −0.3
I-08	80	91	37	36	71	M22 X 1.5	22.5	26	18 +0.070 0	28 −0.1 −0.3
I-10	100	105	37	40	83	M26 X 1.5	24.5	28	20 +0.084 0	30 −0.1 −0.3

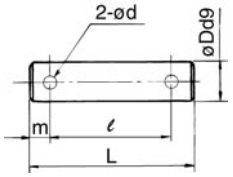
Y type double knuckle joint * Knuckle pin, cotter pin and flat washer are packed.



Material: Casting steel (mm)

Part No.	Tube I.D. (mm)	A1	E1	L1	MM	RR1	U1	ND	NX	NZ	L	Cotter pin size	Flat washer
Y-04C	40	22	24	55	M14 X 1.5	13	25	12	16 +0.3 +0.1	38	55.5	ø3 X 18ℓ	"MIGAKIMARU" 12
Y-05C	50/63	27	28	60	M18 X 1.5	15	27	12	16 +0.3 +0.1	38	55.5	ø3 X 18ℓ	"MIGAKIMARU" 12
Y-08C	80	37	36	71	M22 X 1.5	19	28	18	28 +0.3 +0.1	55	76.5	ø4 X 25ℓ	"MIGAKIMARU" 18
Y-10C	100	37	40	83	M26 X 1.5	21	38	20	30 +0.3 +0.1	61	83	ø4 X 30ℓ	"MIGAKIMARU" 20

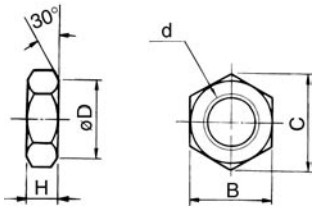
Clevis pin/Knuckle pin



Material: Carbon steel (mm)

Part No.	Tube I.D.		Dd9	L	ℓ	m	d Cut through	Used cotter pin	Used flat washer
	Clevis	Knuckle							
CDP-2A	40	–	10 −0.040 −0.076	46	38	4	3	ø3 X 18ℓ	"MIGAKIMARU"10
CDP-3A	50	40/50/63	12 −0.050 −0.093	55.5	47.5	4	3	ø3 X 18ℓ	"MIGAKIMARU"12
CDP-4A	63	–	16 −0.050 −0.093	71	61	5	4	ø4 X 25ℓ	"MIGAKIMARU"16
CDP-5A	–	80	18 −0.050 −0.093	76.5	66.5	5	4	ø4 X 25ℓ	"MIGAKIMARU"18
CDP-6A	80	100	20 −0.065 −0.117	83	73	5	4	ø4 X 30ℓ	"MIGAKIMARU"20
CDP-7A	100	–	25 −0.065 −0.117	88	78	5	4	ø4 X 36ℓ	"MIGAKIMARU"24

Rod end nut



Material: Rolled steel

Part No.	Tube I.D. (mm)	d	H	B	C	D
NT-04	40	M14 X 1.5	8	22	25.4	21
NT-05	50/63	M18 X 1.5	11	27	31.2	26
NT-08	80	M22 X 1.5	13	32	37.0	31
NT-10	100	M26 X 1.5	16	41	47.3	39

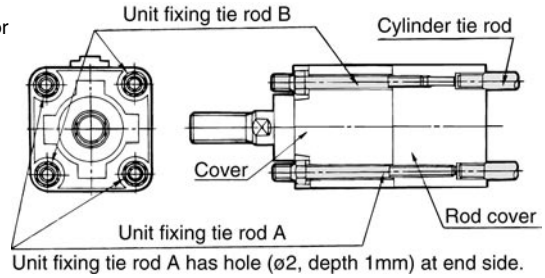
⚠ Caution

Caution on Handling

① After mounting and adjusting, follow the procedures for changing the lock to the locked state shown on p.3.1-5. Rotate the pin, and put the cylinder into the locked state before using.

② **Precautions for using the basic body or replacing the support bracket:**
The lock unit and the cylinder rod cover are assembled as shown in the diagram below. Therefore, unlike the ordinary air cylinder that uses the basic type, it is not possible to mount it directly by screwing the cylinder tie rods into a machine. Furthermore, the tie rods for securing the unit could become loosened when the support bracket is replaced. If this occurs, make sure to retighten the tie rods.
Use a socket wrench when replacing the support bracket or to retighten the tie rods for securing the unit.

Bore (mm)	Mounting bracket nut			Unit fixing tie rod	
	Used nut	Width across flats	Used socket	Width across flats	Used socket
40	JIS B1181 Class 3 M8	13	JIS B4636 Socket13	10	JIS B4636 Socket10
50				13	JIS B4636 Socket13
63	JIS B1181 Class 3 M10 X 1.25	17	JIS B4636 Socket17	13	JIS B4636 Socket13
80/100	JIS B1181 Class 3 M12	19	JIS B4636 Socket19	17	JIS B4636 Socket17



Unit fixing tie rod A has hole (ø2, depth 1mm) at end side.

Fine Lock Cylinder/Double Acting Double Rod

Series CLAW

Non-lube Style/ø40, ø50, ø63, ø80, ø100

How to Order

Standard CLAW L N 40 — 200 JJ — E

With auto switch CDLAW L N 40 — 200 JJ — E — B53 L

Air cylinder with auto switch

Double rod

Mounting

B	Basic
L	Axial foot
F	Front flange
T	Centre trunnion

∗ Mounting accessories are not mounted, should be order separate.Please refer order keys in next pages.

Style

N	Non-lube

Bore size

40	40mm
50	50mm
63	63mm
80	80mm
100	100mm

Cylinder stroke (mm)
Refer to p.3.1-44 for details.

Lock operation

E	Spring lock (Exhaust lock)
P	Pneumatic lock (Pressurized lock)
D	Spring and pneumatic lock

Auto switch type

	Select an applicable auto switch model from the table below

Lead wire length

Nil	0.5m
L	3m
Z	5m

Rod boot

One side	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Both sides	JJ	Nylon tarpaulin
	KK	Heat resistant tarpaulin

Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Tie rod mounting	Auto switch model: Band mounting	Lead wire (m)∗ 0.5 (—)	3 (L)	5 (Z)	None	Applicable load	
Reed switch	——	Grommet	Yes	3 wire (NPN equiv.)	—	5V	—	A56	—	●	●	—	—	IC	—
				2 wire	24V	12V	—	A53	B53	●	●	●	—	—	PLC
						12V	100V, 200V	A54	B54	●	●	●	—		Relay, PLC
			No			5V, 12V	—	A67	—	●	●	—	—	IC	PLC
						5V, 12V	200V	A64	B64	●	●	—	—		Relay, PLC
		Terminal conduit	Yes			—	—	A33C	A33	—	—	—	●		PLC
							100V, 200V	A34C	A34	—	—	—	●	—	
		DIN Terminal						A44C	A44	—	—	—	●		Relay, PLC
	Diagnostic indication (2 colour)	Grommet				—	—	A59W	B59W	●	●	—	—		
Solid state switch	——	Grommet	Yes	3 Wire (NPN)	24V	5, 12V	—	F59	G59	●	●	○	—	IC	Relay, PLC
				3 Wire (PNP)				F5P	G5P	●	●	○	—		
				2 wire	—	—	100V, 200V	J51	—	●	●	○	—	—	
					24V	12V	—	J59	K59	●	●	○	—		
		Terminal conduit		3 wire (NPN)		5, 12V		G39C	G39	—	—	—	●	IC	
				2 wire		12V		K39C	K39	—	—	—	●	—	
	Diagnostic indication (2 colour)	Grommet		3 Wire (NPN)		5, 12V		F59W	G59W	●	●	○	—	IC	
				3 Wire (PNP)				F5PW	G5PW	●	●	○	—		
				2 wire		12V		J59W	K59W	●	●	○	—	—	
	Water resistant (2 colour)							F5BA	G5BA	—	●	○	—		
	With timer			3 wire (NPN)		5, 12V		F5NT	G5NT	—	●	○	—	IC	
	With diagnostic output (2 colour)			4 wire (NPN)				F59F	G59F	●	●	○	—		
	Latch with diagnostic output (2 colour)					—		F5LF	—	●	●	○	—	—	

∗ Lead wire length symbol 0.5m·····— (Example) A53
3m·····L (Example) A53L
5m·····Z (Example) A53Z

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

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

Specifications

Bore size (mm)	40	50	63	80	100
Action	Double acting double rod				
Lock action	Spring lock, Pneumatic lock, Spring and pneumatic lock				
Style	Non-lube				
Proof pressure	1.5MPa				
Max. operating pressure	1.0MPa				
Min. operating pressure	0.1MPa				
Piston speed	50 to 500mm/sec*				
Ambient and fluid temperature	Without auto switch: –10°C to +70°C With auto switch: –10°C to +60°C (No freezing)				
Cushion	Air cushion				
Thread tolerance	JIS class 2				
Stroke length tolerance	to 250: $^{+1.0}_{0}$, 251 to 750: $^{+1.4}_{0}$				
Mounting	Basic, Foot, Flange, Centre trunnion				

*Constraints associated with the allowable kinetic energy are imposed on the speeds at which the piston can be locked.

Lock Specifications

Lock style	Spring lock (Exhaust lock)	Spring/ pneumatic lock	Pneumatic lock (Pressurized lock)
Lock release pressure (MPa)	0.3 or more		0.1 or more
Lock starting pressure (MPa)	0.25 or less		0.05 or more
Max. operating pressure (MPa)	0.5		
Lock direction	Both directions		

Accessories/Refer to p.3.1-42 for details.

Mounting		Basic	Foot	Flange	Centre trunnion
Standard	Rod end nut	●	●	●	●
Option	Single knuckle joint	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●
	Rod boot	●	●	●	●

* Dimensions are same as CLA series (standard). Refer to p.3.1-42.

Standard Stroke

(mm)

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

Note) Intermediate strokes are also available. Contact SMC.

Minimum Strokes for Auto Switch Mounting

Refer to p.1.13-4 for minimum strokes for auto switch mounting because it is same as air cylinder CA1 series (Standard/Double acting: Single rod style).

Fine Lock Cylinder with Auto Switch

Refer to p.1.13-14 for auto switch setting position and mounting height because it is same as air cylinder CDA1 series (Double acting single rod style).

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	60°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temp. for the rod boot itself.

Auto Switch Mounting Bracket

Refer to p.3.1-46 for auto switch mounting bracket (Band) when auto switch is mounted.

Mounting Bracket

Refer to p.3.1-46 for part no. of mounting bracket except basic style.

⚠ Caution

Recommended Pneumatic Circuit/Caution on Handling

Refer to p.3.1-2 to 3.1-5 for CLA series specifications.

Weight/ ( ): Value at steel tubing

(kg)

Bore size (mm)			40	50	63	80	100
Basic weight	Basic		1.96 (2.01)	3.02 (3.07)	4.67 (4.71)	7.66 (7.82)	10.99 (11.21)
	Foot		2.15 (2.20)	3.24 (3.29)	5.01 (5.05)	8.33 (8.49)	11.98 (12.20)
	Flange		2.33 (2.38)	3.49 (3.52)	5.46 (5.50)	9.11 (9.28)	12.91 (13.13)
	Trunnion		2.41 (2.51)	3.55 (3.66)	5.56 (5.76)	9.36 (9.65)	13.39 (13.78)
Additional weight per 50mm stroke	Al tubing	All brackets	0.30	0.40	0.50	0.71	0.92
	Steel tubing	Mounting bracket except trunnion	0.35	0.47	0.55	0.89	1.15
		Trunnion	0.44	0.58	0.77	1.06	1.35
Accessory	Single knuckle joint		0.23	0.26	0.26	0.60	0.83
	Double knuckle joint (with pin)		0.37	0.43	0.43	0.87	1.27

Calculation Example: Weight**CLAWL40-100-E**

- Basic weight·····2.15(Foot, 100stroke)
- Additional weight·····0.30/50 stroke
- Cylinder stroke·····100 stroke

2.15+0.30 X 100/50=2.75kg

⚠Caution/Allowable Kinetic Energy when Locking

Bore size (mm)	40	50	63	80	100
Allowable kinetic energy J	1.42	2.21	3.53	5.69	8.83

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

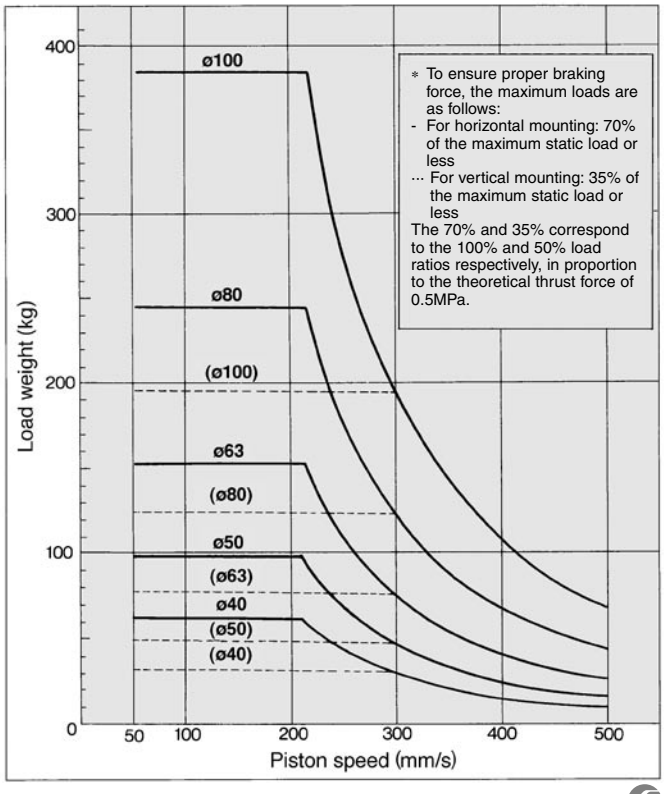
② Apply the following formula to obtain the kinetic energy of the load.

$Ek=\frac{1}{2}m\upsilon^2$ Ek: Load kinetic energy (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, use 1.2 times the average speed as a guide.

④ The relationship between the speed and the load 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, 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.



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

Lock style	Piston speed mm/sec			
	50	100	300	500
Spring lock	±0.4	±0.5	±1.0	±2.0
Pneumatic lock, Spring and pneumatic lock	±0.2	±0.3	±0.5	±1.5

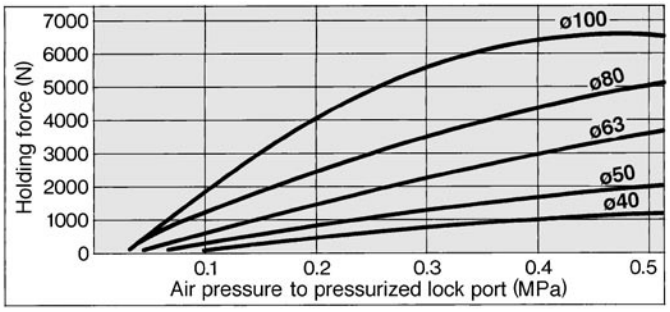
Condition/load: 25% of output force at 0.5MPa
Solenoid valve: mounted to the lock port

Holding Force of Spring Lock (Max. Static Load)

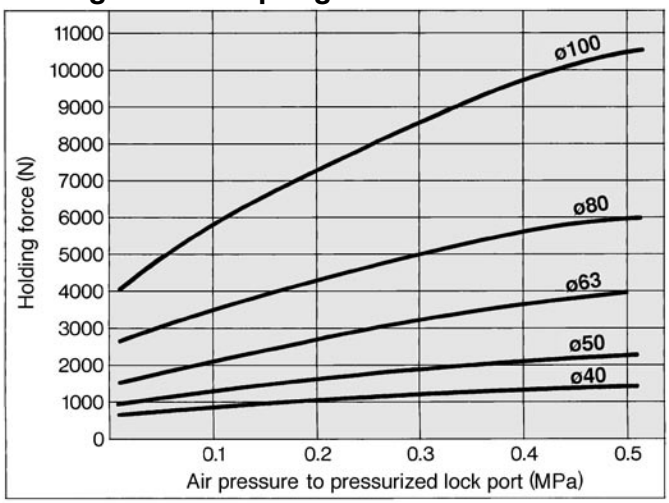
Bore size (mm)	40	50	63	80	100
Holding force N	882	1370	2160	3430	5390

Note) Holding force at piston rod retracted side decreases approx. 15%.

Holding Force of Pneumatic Lock



Holding Force of Spring and Pneumatic Lock



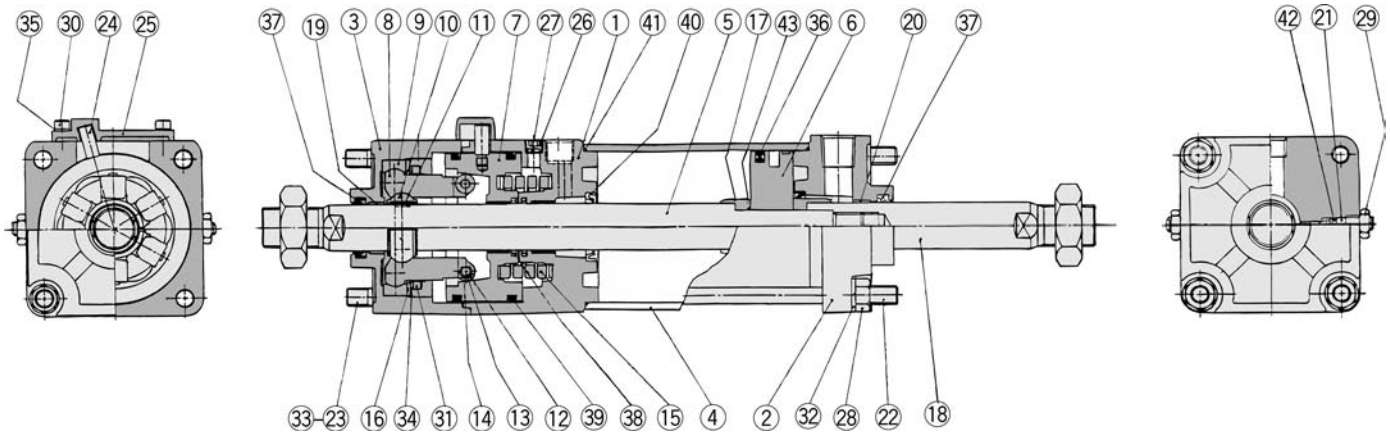
⚠Caution

Cautions 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



Component Parts

No.	Description	Material	Note
①	Rod cover A	Aluminum alloy	Black coated after hard anodized
②	Rod cover B	Aluminum alloy	Black coated
③	Cover	Aluminum alloy	Black coated after hard anodized
④	Cylinder tube	Aluminum alloy	Hard anodized
⑤	Piston rod A	Carbon steel	Hard chrome plated
⑥	Piston	Aluminum alloy	Chromated
⑦	Brake piston	Carbon steel	Nitrided
⑧	Brake arm	Carbon steel	Nitrided
⑨	Arm holder	Carbon steel	Nitrided
⑩	Brake shoe holder	Carbon steel	Nitrided
⑪	Brake shoe	Special friction material	
⑫	Roller	Chrome molybdenum steel	Nitrided
⑬	Pin	Chrome bearing steel	Heat treated
⑭	Snap ring	Carbon tool steel	Nickel plated
⑮	Brake spring	Steel wire	Dacrodized
⑯	Retainer	Rolled steel	Zinc chromated
⑰	Cushion ring B	Rolled steel	Zinc chromated
⑱	Piston rod B	Carbon steel	Hard chrome plated

No.	Description	Material	Note
⑲	Bushing	Lead bronze casting	
⑳	Bushing	Lead bronze casting	
㉑	Cushion valve	Rolled steel	Electroless nickel plated
㉒	Tie rod	Carbon steel	Chromated
㉓	Unit fixing tie rod	Carbon steel	Chromated
㉔	Non rotating pin	Carbon steel	Induction hardening
㉕	Pin guide	Carbon steel	Black coated after nitrided
㉖	Hex. socket head plug	Chrome molybdenum steel	Black zinc chromated
㉗	Element	Bronze	
㉘	Tie rod nut	Carbon steel	Black zinc chromated
㉙	Lock nut	Carbon steel	Nickel plated
㉚	Hex. socket head cap screw	Chrome molybdenum steel	Black zinc chromated
㉛	Hex. socket head cap screw	Chrome molybdenum steel	Nickel plated
㉜	Spring seat	Steel wire	Black zinc chromated
㉝	Spring seat	Steel wire	Black zinc chromated
㉞	Spring seat	Steel wire	Black zinc chromated
㉟	Spring seat	Steel wire	Black zinc chromated

Component Parts

No.	Description	Material
㊱	Piston seal	NBR
㊲	Rod seal A	NBR
㊳	Rod seal B	NBR
㊴	Brake piston seal	NBR
㊵	Cushion seal	NBR
㊶	Tube gasket	NBR
㊷	Cushion valve seal	NBR
㊸	Piston gasket	NBR

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

Mounting Bracket Part No.

Bore (mm)	40	50	63	80	100
Foot*	CA1-L04	CA1-L05	CA1-L06	CA1-L08	CA1-L10
Flange	CA1-F04	CA1-F05	CA1-F06	CA1-F08	CA1-F10

* When ordering foot brackets, 2pcs. should be ordered for each cylinder.

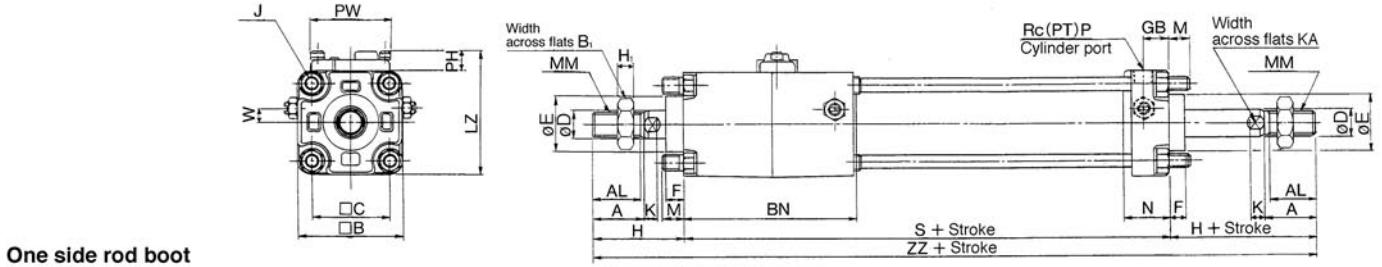
Auto Switch Mounting Bracket Part No. (Band Mounting)

Auto switch model	Bore size				
	40	50	63	80	100
D-A5/A6/A59W D-F5□/J5□/F5□W/J59W D-F5NTL, F5BAL, F59F	BT-04	BT-04	BT-06	BT-08	BT-08
D-A3/A44/G39/K39	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M
D-B5/B6/B59W D-G5□/K59/G5□W/K59W D-G5BAL/G59F/G5NTL	BA-04	BA-05	BA-06	BA-08	BA-10
D-A3□C/A44C/G39C/K39C*	BA3-040	BA3-050	BA3-063	BA3-080	BA3-100

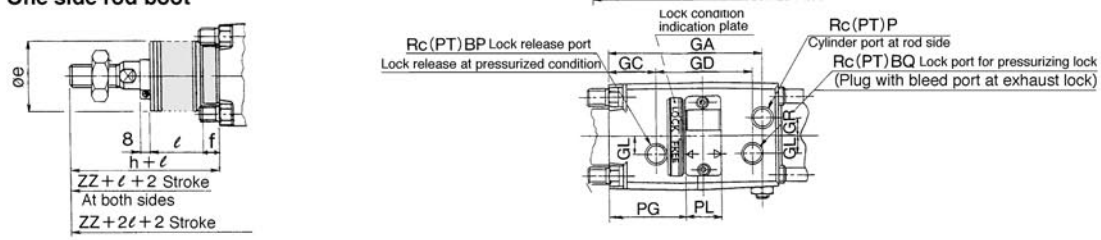
* Mounting brackets are provided with D-A3□C, A44C, G39C, and K39C. When ordering, indicate as described below, in accordance with the cylinder size. To order the mounting brackets separately, use the part number shown above.
(Example) ø40/D-A3□C-4, 50/D-A3□C-5
ø63/D-A3□C-6, ø80/D-A3□C-8, ø100/D-A3□C-10

[Stainless steel mounting bolt set]
The set of stainless steel mounting screws (with set screw) described below is available and can be used depending on the operating environment. (The mounting bracket and band for auto switches must be ordered separately, as they are not included.)
BBA1: For D-A5/A6/F5/J5
BBA3: For D-B5/B6/G5/K5
The stainless steel bolts described above are used when the D-F5BAL/G5BAL type switch is shipped mounted on a cylinder. When the switches are shipped as individual parts, the BBA1 and BBA3 set are included.

Basic/CLAWB



One side rod boot

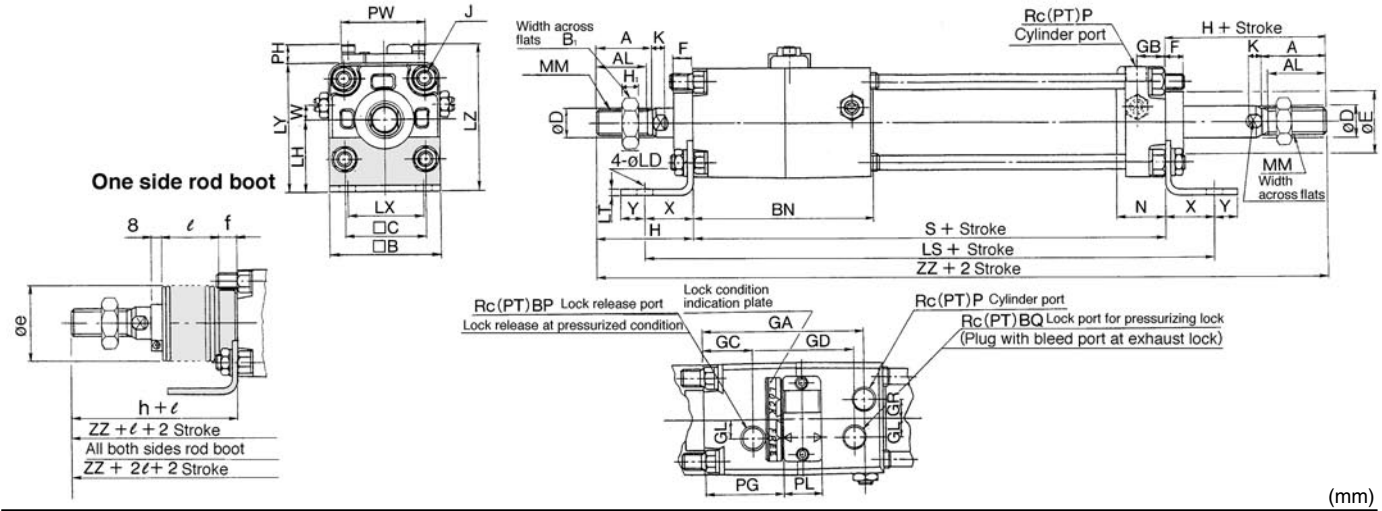


(mm)

Bore (mm)	Stroke range (mm) W/o rod boot	Stroke range (mm) W/ rod boot	A	AL	B	B1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR	H1	J
40	to 500	20 to 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10	8	M8
50	to 600	20 to 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12	11	M8
63	to 600	20 to 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15	11	M10 X 1.25
80	to 750	20 to 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17	13	M12
100	to 750	20 to750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19	16	M12

Bore (mm)	K	KA	LZ	M	MM	N	P	PG	PH	PL	PW	S	W	W/o rod boot H	W/o rod boot ZZ	W/ rod boot (One side) e	f	h	ℓ	ZZ	(Both sides) ZZ
40	6	14	71	11	M14 X 1.5	27	1/4	42	11	20	45	153	8	51	255	43	11.2	59	1/4 Stroke	263	271
50	7	18	80	11	M18 X1.5	30	3/8	46	10	21	50	168	0	58	284	52	11.2	66	1/4 Stroke	292	300
63	7	18	99	14	M18 X 1.5	31	3/8	48.5	13	23	60	182	0	58	298	52	11.2	66	1/4 Stroke	306	314
80	11	22	117	17	M22 X 1.5	37	1/2	55	15	23	70	208	0	71	350	65	12.5	80	1/4 Stroke	359	368
100	11	26	131	17	M26 X1.5	40	1/2	56.5	15	25	80	226	0	72	370	65	14	81	1/4 Stroke	379	388

Foot/CLAWL



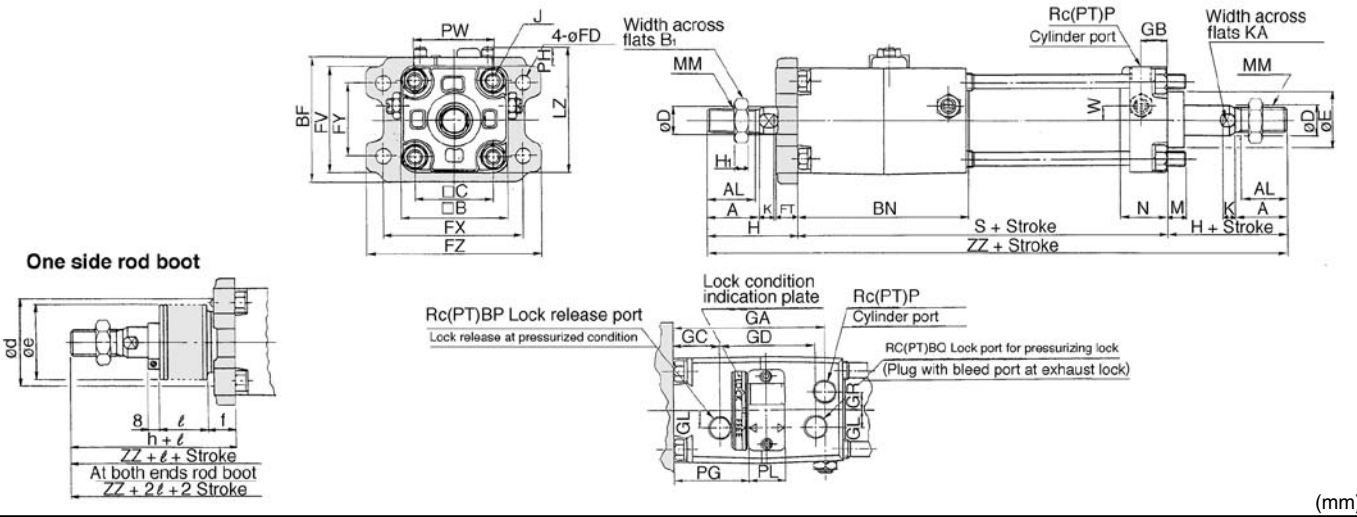
One side rod boot

(mm)

Bore (mm)	Stroke range (mm) W/o rod boot	Stroke range (mm) W/ rod boot	A	AL	B	B1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR	H1	J	K	KA	LD
40	to 500	20 X 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10	8	M8	6	14	9
50	to 600	20 X 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12	11	M8	7	18	9
63	to 600	20 X 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15	11	M10 X 1.25	7	18	11.5
80	to 750	20 X 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17	13	M12	11	22	13.5
100	to 750	20 X 750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19	16	M12	11	26	13.5

Bore (mm)	LH	LS	LT	LX	LY	LZ	MM	N	P	PG	PH	PL	PW	S	W	X	Y	W/o rod boot H	W/o rod boot ZZ	W/ rod boot (One side) e	f	h	ℓ	ZZ	(Both sides) ZZ
40	40	207	3.2	42	70	81	M14 X 1.5	27	1/4	42	11	20	45	153	8	27	13	51	255	43	11.2	59	1/4 Stroke	263	271
50	45	222	3.2	50	80	90	M18 X 1.5	30	3/8	46	10	21	50	168	0	27	13	58	284	52	11.2	66	1/4 Stroke	292	300
63	50	250	3.2	59	93	106	M18 X 1.5	31	3/8	48.5	13	23	60	182	0	34	16	58	298	52	11.2	66	1/4 Stroke	306	314
80	65	296	4.5	76	116	131	M22 X 1.5	37	1/2	55	15	23	70	208	0	44	16	71	350	65	12.5	80	1/4 Stroke	359	368
100	75	312	6	92	133	148	M26 X 1.5	40	1/2	56.5	15	25	80	226	0	43	17	72	370	65	14.0	81	1/4 Stroke	379	388

Flange/CLAWF

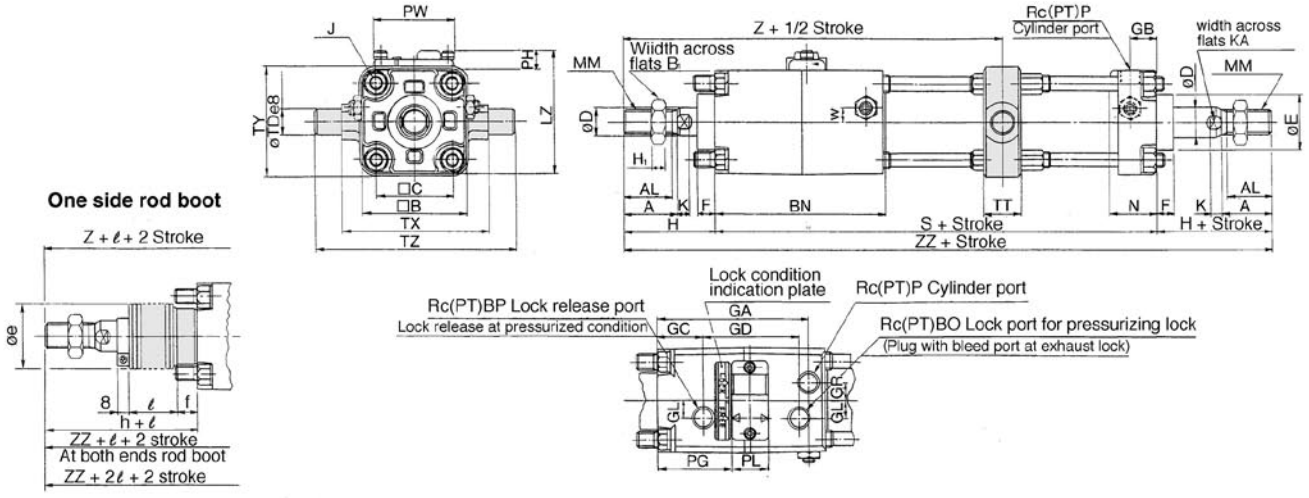


(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B1	BF	BN	BP	BQ	C	D	E	FV	FD	FT	FX	FY	FZ	GA	GB	GC	GD	GL	GR	H1
	W/o rod boot	W/ rod boot																								
40	to 500	20 to 500	30	27	60	22	71	96	1/4	1/4	44	16	32	60	9	12	80	42	100	85	15	26	54	10	10	8
50	to 600	20 to 600	35	32	70	27	81	108	1/4	1/4	52	20	40	70	9	12	90	50	110	95	17	27	59	13	12	11
63	to 600	20 to 600	35	32	86	27	101	115	1/4	1/4	64	20	40	86	11.5	15	105	59	130	102	17	26	67	18	15	11
80	to 750	20 to 750	40	37	102	32	119	129	1/4	1/4	78	25	52	102	13.5	18	130	76	160	113	21	30	72	23	17	13
100	to 750	20 to 750	40	37	116	41	133	140	1/4	1/4	92	30	52	116	13.5	18	150	92	180	124	21	31	76	25	19	16

Bore (mm)	J	K	KA	LZ	M	MM	N	P	PG	PH	PL	PW	S	W	W/o rod boot		W/ rod boot (One side)						(Both sides)	
															H	ZZ	d	e	f	h	ℓ	ZZ	ZZ	
40	M8	6	14	71	11	M14 X 1.5	27	1/4	42	11	20	45	153	8	51	255	52	43	15	59	1/4 Stroke	263	271	
50	M8	7	18	80	11	M18 X 1.5	30	3/8	46	10	21	50	168	0	58	284	58	52	15	66	1/4 Stroke	292	300	
63	M10 X 1.25	7	18	99	14	M18 X 1.5	31	3/8	48.5	13	23	60	182	0	58	298	58	52	17.5	66	1/4 Stroke	306	314	
80	M12	11	22	117	17	M22 X 1.5	37	1/2	55	15	23	70	208	0	71	350	80	65	21.5	80	1/4 Stroke	359	368	
100	M12	11	26	131	17	M26 X 1.5	40	1/2	56.5	15	25	80	226	0	72	370	80	65	21.5	81	1/4 Stroke	379	388	

Trunnion/CLAWT



(mm)

Bore (mm)	Stroke range		A	AL	B	B1	BN	BP	BQ	C	D	E	F	GA	GB	GC	GD	GL	GR	H1	J	K	KA	LZ
	W/o rod boot	W/ rod boot																						
40	25 X 500	25 X 500	30	27	60	22	96	1/4	1/4	44	16	32	10	85	15	26	54	10	10	8	M8	6	14	71
50	25 X 600	25 X 600	35	32	70	27	108	1/4	1/4	52	20	40	10	95	17	27	59	13	12	11	M8	7	18	80
63	32 X 600	32 X 600	35	32	86	27	115	1/4	1/4	64	20	40	10	102	17	26	67	18	15	11	M10 X 1.25	7	18	99
80	41 X 750	41 X 750	40	37	102	32	129	1/4	1/4	78	25	52	14	113	21	30	72	23	17	13	M12	11	22	117
100	45 X 750	45 X 750	40	37	116	41	140	1/4	1/4	92	30	52	14	124	21	31	76	25	19	16	M12	11	26	131

Bore (mm)	MM	N	P	PG	PH	PL	PW	S	TDe8	TT	TX	TY	TZ	W	W/o out rod boot			W/ rod boot (One side)						(Both sides)	
															H	Z	ZZ	e	f	h	ℓ	Z	ZZ	Z	ZZ
40	M14 X 1.5	27	1/4	42	11	20	45	153	$15^{-0.032}_{-0.059}$	22	85	62	117	8	51	162	255	43	11.2	59	1/4 Stroke	170	263	178	271
50	M18 X 1.5	30	3/8	46	10	21	50	168	$15^{-0.032}_{-0.059}$	22	95	74	127	0	58	181	284	52	11.2	66	1/4 Stroke	189	292	197	300
63	M18 X 1.5	31	3/8	48.5	13	23	60	182	$18^{-0.032}_{-0.059}$	28	110	90	148	0	58	191	298	52	11.2	66	1/4 Stroke	199	306	207	314
80	M22 X 1.5	37	1/2	55	15	23	70	208	$25^{-0.040}_{-0.073}$	34	140	110	192	0	71	221	350	65	12.5	80	1/4 Stroke	230	359	239	368
100	M26 X 1.5	40	1/2	56.5	15	25	80	226	$25^{-0.040}_{-0.073}$	40	162	130	214	0	72	235	370	65	14.0	81	1/4 Stroke	244	379	253	388

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 style 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

Standard CL1 L ☐ 100 — 200 F — JN

With auto switch CDL1 L ☐ 100 — 200 F — JN — A33 — L

Air cylinder with auto switch

Lock-up Cylinder

Mounting

B	Basic	C	Single clevis
L	Foot	D	Double clevis
F	Front flange	T	Centre trunnion
G	Rear flange		

∗ Mounting accessories are not mounted, should be order separate.Please refer order keys in next pages.

Tube material

Symbol	Bore size	Tube material
— Note)	ø40 to ø100	Aluminum tube
	ø125 to ø160	Aluminum tube
F∗	ø40 to ø160	Steel tube

Note) Auto switch can not be mounted on steel tube.

Bore size

Symbol	Bore size	Symbol	Bore size
40	40mm	100	100mm
50	50mm	125	125mm
63	63mm	140	140mm
80	80mm	160	160mm

Cylinder stroke(mm)

Refer to p.3.1-50 for details.

Lock-up directions

F	Lock at piston forward
B	Lock at piston backward

∗ Refer to Made to Order "-X51" for both sides lock.

Lead wire length

Nil	0.5m
L	3m
Z	5m

Auto switch type

Select an applicable auto switch model from the table below

Cylinder

Rod boot	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	N	Without cushion
	R	Rod side cushion
	H	Head side cushion
	—	Both ends cushion

∗ Indicate in alphabetical order when 2 or more symbols are applicable.

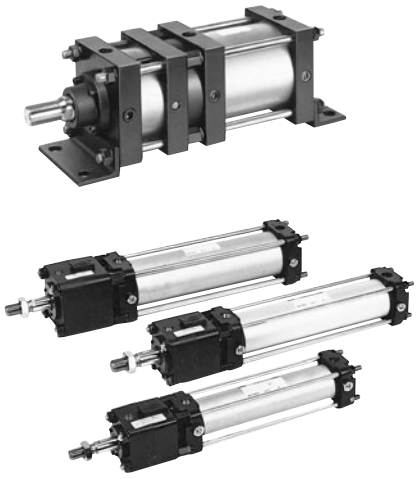
Applicable Auto Switches/Refer to p.5.3-2 for further information on auto switch.

Style	Special function	Electrical entry	Indicator	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Tie rod mounting	Tie rod mounting Bore	Auto switch model: Band mounting	Band mounting Bore	Lead wire(m)∗ 0.5 (–)	3 (L)	5 (Z)	None	Applicable load	
Reed switch	——	Grommet	Yes	3 wire (NPN equiv.)	— 5V	—	A56	ø40 to ø160	—	ø40 to ø100	●	●	—	—	IC	—
				2 wire	24V 12V	—	A53		B53		●	●	●	—	—	PLC
					12V	100V, 200V	A54		B54		●	●	●	—	—	Relay, PLC
			No		5V, 12V	—	A67		—		●	●	—	—	IC	PLC
					12V	200V or less	A64		B64		●	●	—	—	—	Relay, PLC
		Terminal conduit	Yes		12V	—	A33C	ø40 to ø100	A33	ø40 to ø160	—	—	—	●	—	PLC
						100V, 200V	A34C		A34		—	—	—	●		Relay, PLC
		DIN terminal					A44C		A44		—	—	—	●		
	Diagnostic indication (2 colour)	Grommet				—	A59W	ø40 to ø160	B59W	ø40 to ø100	●	●	—	—		
Solid state switch	——	Grommet	Yes	3 wire (NPN)	24V 5V, 12V	—	F59	ø40 to ø160	G59	ø40 to ø100	●	●	○	—	IC	Relay, PLC
				3 wire (PNP)			F5P		G5P		●	●	○	—		
				2 wire	— —	100V, 200V	J51		—		●	●	○	—	—	
					24V 12V	—	J59		K59		●	●	○	—		
		Terminal conduit		3 wire(NPN)	5V, 12V		G39C		G39	ø40 to ø160	—	—	—	●	IC	
				2 wire	12V		K39C		K39		—	—	—	●	—	
	Diagnostic indication (2 colour)	Grommet		3 wire(NPN)	5V, 12V		F59W		G59W	ø40 to ø100	●	●	○	—	IC	
				3 wire(PNP)			F5PW		G5PW		●	●	○	—		
				2 wire	12V		J59W		K59W		●	●	○	—	—	
	Water resistant (2 colour)						F5BA		G5BA		—	●	○	—		
	With timer			3 wire(NPN)	5V, 12V		F5NT		G5NT		—	●	○	—	IC	
	With diagnostic output (2 colour)						F59F		G59F		●	●	○	—		
	Latch with diagnostic output (2 colour)			4 wire (NPN)	—		F5LF		—		●	●	○	—	—	

∗ Lead wire length symbol 0.5m·····— (Example) A53
3m·····L (Example) A53L
5m·····Z (Example) A53Z

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

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



Model

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

Specifications

Bore size (mm)	ø40 to ø100	ø125 to ø160
Fluid	Air	
Proof pressure	1.5MPa	1.57MPa
Max. operating pressure	1.0MPa	0.97MPa
Min. operating pressure	0.08MPa	
Piston speed	50 to 200mm/s*	
Ambient and fluid temperature	Without auto switch –10 to +70°C With auto switch –10 to +60°C (No condensation)	Without auto switch 0 to +70°C With auto switch 0 to +60°C (No condensation)
Lubrication	Non-lube	
Cushion	Air cushion	
Thread tolerance	JIS Class 2	
Stroke length tolerance	to 250 $^{+1.0}_{0}$, 251 to 1000 $^{+1.0}_{0}$, 1001 to 1500 $^{+1.0}_{0}$, 1501 to 1600 $^{+1.0}_{0}$	
Mounting	Basic, Axial foot, Front flange, Rear flange, Single clevis, Double clevis, Centre trunnion	

* Make sure to operate the cylinder in such a way that the piston speed does not exceed 200mm/s during locking.
* The maximum speed of 500mm/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 release pressure	0.2MPa (at no load)
Lock-up start pressure	0.05MPa or less
Lock-up 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
50mm/s	±0.6mm	±1mm
100mm/s	±1.2mm	±2mm
200mm/s	±2.3mm	±3mm

Lock-up Unit Style

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

Max. Stroke

Refer to p.1.13-3 for maximum stroke of CA1 series ø40 to ø100 and p.1.14-3 for maximum stroke of CS1 series ø120 to ø160.

Minimum Strokes for Auto Switch Mounting

Refer to following pages for minimum strokes for auto switch mounting.

- Bore size ø40 to ø100: p.1.13-4
- Bore size ø125 to ø160: p.1.14-8

Accessories

Mounting bracket		Basic	Foot	Front flange	Rear flange	Single clevis	Double clevis	Centre trunnion
Standard	Rod end nut*	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

* ø125 to ø160: Option

Weight

(kg)

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

Rod Boot Material

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	60°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the itself

Lock-up Cylinder with Auto Switch

Refer to following pages for auto switch setting position and mounting height.

• Bore size/ø40 to ø100: p.1.13-14
• Bore size/ø125 to ø160: p.1.14-20

Calculation Example: **CL1L125-500F**

• Basic weight····32.21(ø125, Foot style)
• Additional weight····1.77/100 stroke
32.21+1.77/100 X 100/50=41.06kg

*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 p.1.13-4 and 1.14-4.

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□/F5NT** **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/G5BA** **D-G5□W/K59W** **D-G59F/G5NT**	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	–	–	–

* Mounting brackets are provided with D-A3□C, A44C, G39C, and K39C. When ordering, indicate as described below, in accordance with 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.

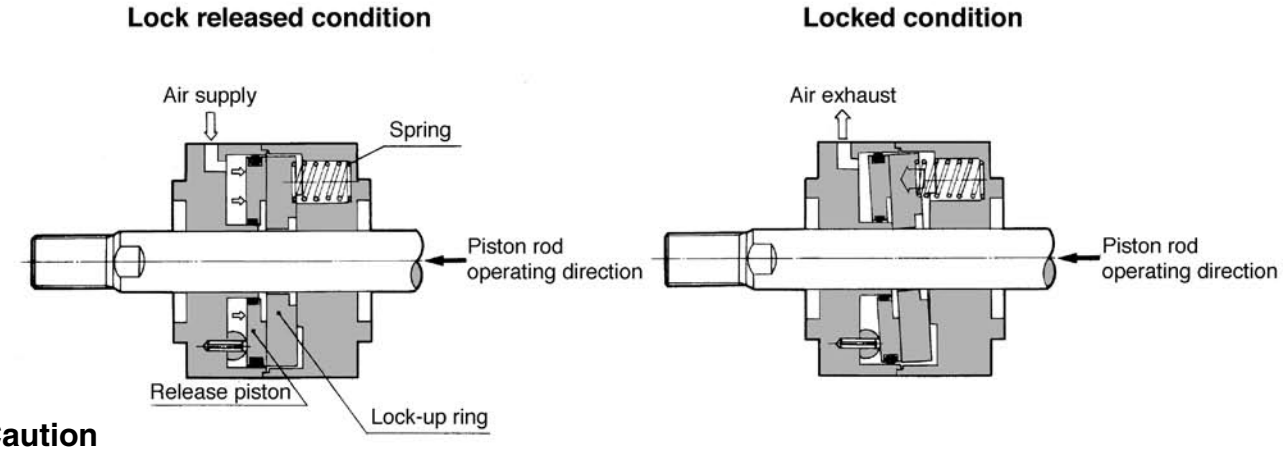
[Stainless steel mounting bolt set]
The set of stainless steel mounting screws (with set screw) described below is available and can be used depending on the operating environment. (The mounting bracket and band for auto switches must be ordered separately, as they are not included.)
BBA1: For D-A5/A6/F5/J5
BBA3: For D-B5/B6/G5/K5
The stainless steel bolts described above are used when the D-F5BAL/G5BAL type switch is shipped mounted on a cylinder. When the switches are shipped as individual parts, the BBA1 and BBA3 set are included.

Mounting Bracket Part No.

Bore size (mm)		**40**	**50**	**63**	**80**	**100**	**125**	**140**	**160**
Foot*	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			
Front flange**		CA-F04	CA-F05	CA-F06	CA-F08	CA-F10	CS1-F12	CS1-F14	CS1-F16
Rear flange		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

* To order foot brackets for 1 cylinder, order 1 foot bracket each for the rod side and the head side for cylinders ø40 to ø100, and 2 foot brackets for cylinders ø125 to ø160.
** The ø125 to ø160 front flange styles use the long stroke flanges of the CS1 series.
*** Clevis pin, flat washer and cotter pin are packed with the double clevis style.

Construction

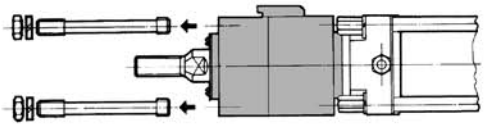


⚠ Caution
Precautions for Changing The Lock-up Direction

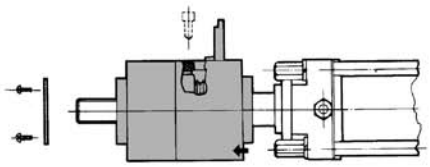
ø40 to ø100

The lock-up is unidirectional. However, the lock-up direction can be changed easily. To change the direction, pay particular attention to the following precautions:
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 0.08MPa 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 0.2MPa to 0.3MPa 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.

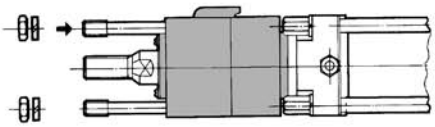


⚠ Caution

When the lock-up unit is not secured by the tie-rods, the air pressure applied to the lock-up port should be between 0.2MPa and 0.3MPa. 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.

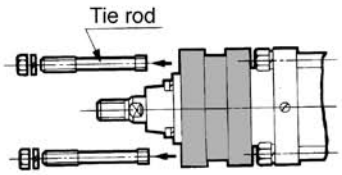
④ Install the four tie-rods, with their shorter threaded portion oriented towards the rod cover, and tighten them with uniform torque. Until the installation and adjustment have been completed, never pull out the unlocking bolt (or release the air pressure).



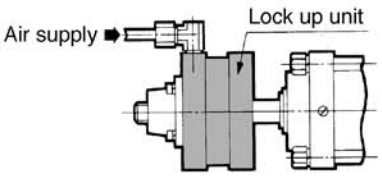
The processes described above complete the changing of the lock-up direction. Before using the cylinder, make sure that the lock-up operates properly.

ø125 to ø160

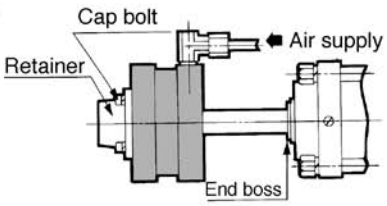
① Loosen the tie-rod nuts and pull out the four tie-rods.



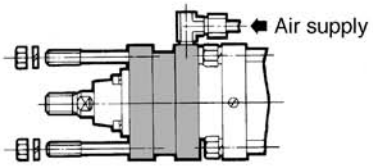
② Apply air pressure of 0.2MPa to 0.3MPa to disengage the lock and pull out the lock-up unit from the piston rod.



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 lock-up unit into the piston rod and fit it into the end boss portion of the rod cover.

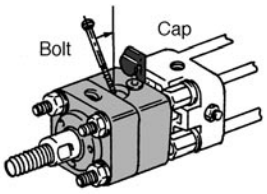


④ Install the four tie-rods, with their shorter threaded portion oriented towards the rod cover, and tighten them with uniform torque. Maintain the application of air pressure until the installation and adjustment have been completed, and never actuate the lock in the meantime.



Manual Lock Release (ø40 to ø100)

To manually disengage the lock, perform the following steps:
① Open the rubber cap.
② Apply 0.2MPa to 0.3MPa 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

Refer to p.3.1-4 to 3.1-5 for recommended pneumatic circuits, stopping accuracy and cautions on handling.

⚠ 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 30mm, 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 lock-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 1.0mm. 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 200mm/s (When locking)

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

⚠ Caution

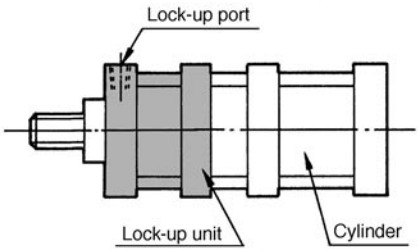
Cautions on Handling

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
Make sure not to scratch or gouge the sliding portion of the piston 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.

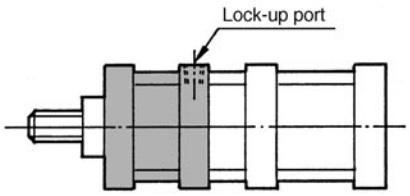
Recommended Pneumatic Circuit

Refer to p.3.1-4 for the recommended air pressure circuit.
① Operating the air pressure circuit
Instead of the conventional reciprocal air cylinder circuit, use an air pressure 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 diagram below.



Forward direction lock

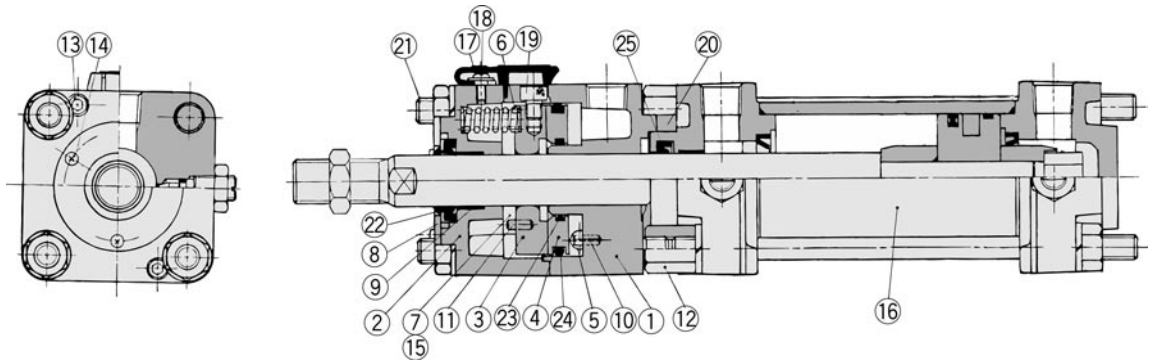


Backward direction lock

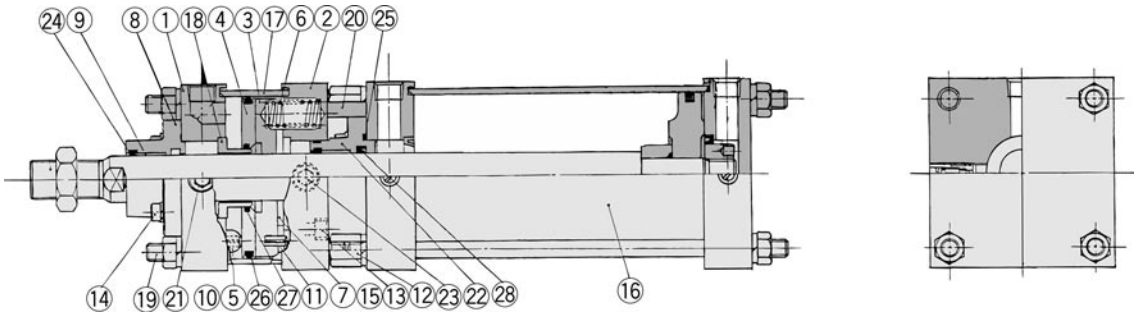
ø125 to ø160
For cylinders ø40 to ø100, verify the portion that is stamped on the cap of the lock.
③ Maximum speed and maximum load
Never lock up a cylinder that involves a kinetic energy that exceeds the maximum speed or the maximum load indicated in the specifications.
④ After completing the installation adjustment, do not forget to remove the bolt that was used for disengaging the lock. (ø40 to ø100 only)

Construction

CL1ø40 to ø100



CL1ø125 to ø160



Component Parts/CL1ø40 to ø100

No.	Description	Material	Note
①	Body	Aluminum alloy	Black coated
②	Cover	Aluminum alloy	Black coated
③	Lock 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	Stainless steel	Heat treated
⑧	Retainer	Rolled steel	Black zinc chromated
⑨	Bushing	Lead bronze casting	
⑩	Spring pin	Carbon steel	JIS B2808
⑪	Spring pin for non-rotating	Carbon steel	JIS B2808
⑫	Long nut	Rolled steel	Black zinc chromated
⑬	Unit fixing hex. socket head cap screw	Chrome molybdenum steel	
⑭	Retainer machine screw	Rolled steel	
⑮	Hex. socket counter sunk head screw	Chrome molybdenum steel	
⑯	Non lube air cylinder		CA1□N series
⑰	Cap	Nylon	
⑱	Cap screw	Rolled steel	
⑲	Release bolt	Chrome molybdenum steel	
⑳	Spacer	Aluminum alloy	Black coated
㉑	Unit fixing tie rod	Carbon steel	Chromated
㉒	Scraper	NBR	
㉓	O ring	NBR	
㉔	O ring	NBR	
㉕	Rod seal	NBR	

Note) Contact SMC if the fine lock-up unit must be disassembled.

Component Parts/CL1ø125 to ø160

No.	Description	Material	Note
①	Body	Rolled steel	Black coated
②	Cover	Rolled steel	Black coated
③	Lock up ring	Carbon steel	Heat treated
④	Release piston	Rolled steel	Zinc chromated
⑤	Pivot	Carbon steel	Heat treated
⑥	Spring	Steel wire	Zinc chromated
⑦	Stopper	Stainless steel	Heat treated
⑧	Retainer	Casting steel	Black coated
⑨	Bushing	Lead bronze casting	——
⑩	Spring pin	Carbon steel	JIS B2808
⑪	Spring pin	Carbon steel	JIS B2808
⑫	Long nut	Rolled steel	Black zinc chromated
⑬	Unit fixing hex. socket head cap screw	Chrome molybdenum steel	Zinc chromated
⑭	Hex. socket head cap screw	Chrome molybdenum steel	Black zinc chromated
⑮	Hex. socket counter sunk head screw	Chrome molybdenum steel	Zinc chromated
⑯	Non lube air cylinder	———	CA1□N series
⑰	Brake tube	Carbon steel piping	Inside: Hard chrome plated
⑱	Sleeve	Rolled steel	Zinc chromated
⑲	Unit fixing tie rod	Carbon steel	Chromated
⑳	Spacer	Rolled steel	Black coated
㉑	Hexagon socket head plug	Rolled steel	Black zinc chromated
㉒	Retainer	Casting steel	Black coated
㉓	Element	Sintered metal BC	——
㉔	Wiper ring	NBR	
㉕	Retainer gasket	NBR	
㉖	O ring	NBR	
㉗	O ring	NBR	
㉘	Rod seal	NBR	

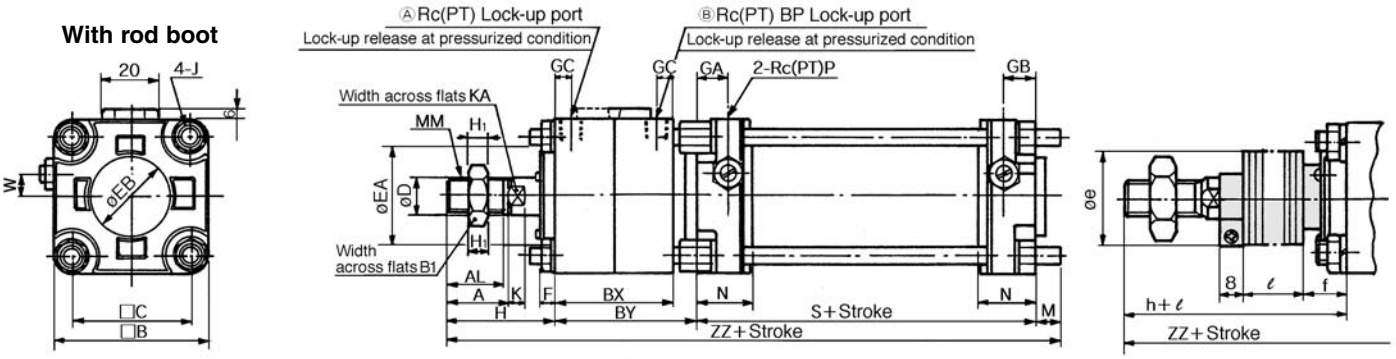
Note) Contact SMC if the fine lock-up unit must be disassembled.

Basic/(B)

ø40 to ø100

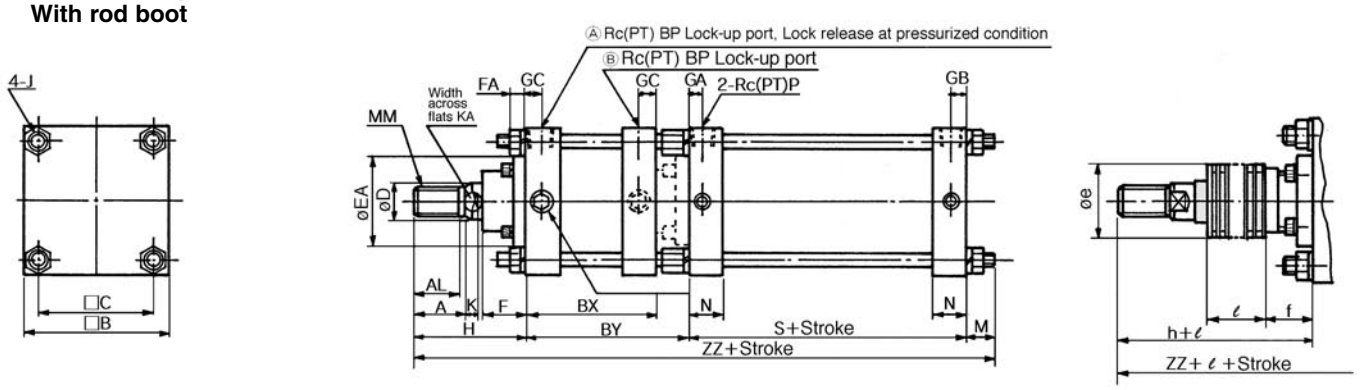
A Lock-up at piston forward B Lock-up at piston backward

With rod boot



ø125 to ø160

With rod boot



(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B1	BX	BY	BP	C	D	EA	EB	F	FA	GA	GB	GC	H1	J	K	KA
	W/o rod boot	W/ rod boot																				
40	to 500	20 to 500	30	27	60	22	59	69	1/4	44	16	40	32	6.5	–	15	15	11	8	M8	6	14
50	to 600	20 to 600	35	32	70	27	67	78	1/4	52	20	50	40	6.0	–	17	17	11	11	M8	7	18
63	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	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	to 750	20 to 750	40	37	116	41	85	100	1/4	92	30	80	52	8.0	–	21	21	11	16	M12	11	26
125	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	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	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

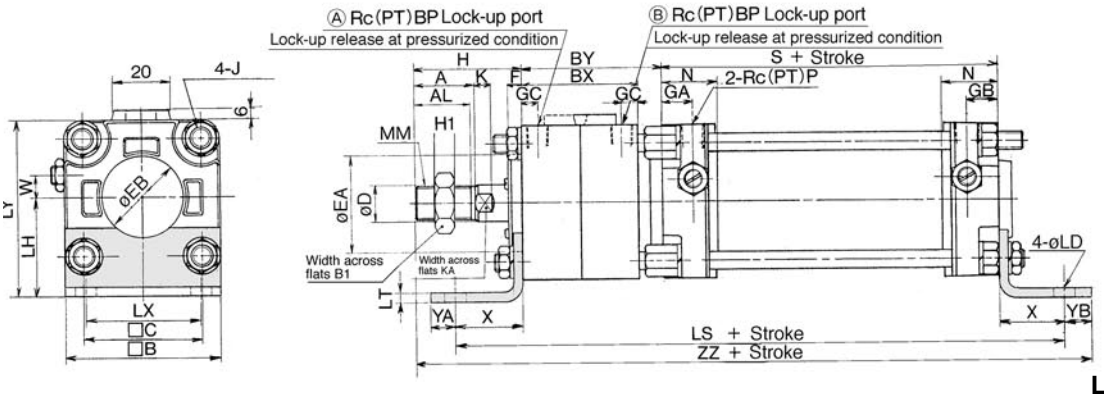
Bore (mm)	M	MM	N	P	S	W	W/o rod boot		W/ rod boot				
							H	ZZ	e	f	h	ℓ	ZZ
40	11	M14 X 1.5	27	1/4	84	8	51	215	36	16.5	59	1/4 Stroke	223
50	11	M18 X 1.5	30	3/8	90	0	58	237	45	16.0	66	1/4 Stroke	245
63	14	M18 X 1.5	31	3/8	98	0	58	254	45	16.0	66	1/4 Stroke	262
80	17	M22 X 1.5	37	1/2	116	0	71	296	60	18.0	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

∗ 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"

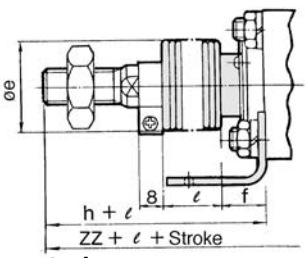
Axial Foot/(L)

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

ø40 to ø100



With rod boot



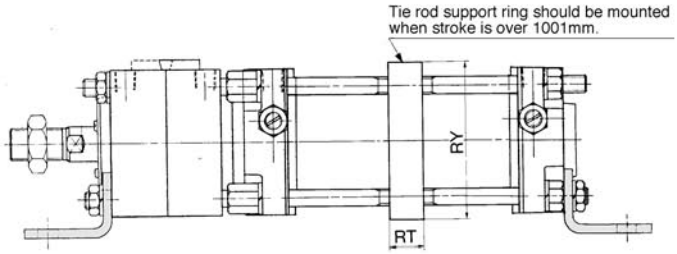
Long stroke

Bore (mm)	Stroke range (mm)	PT	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

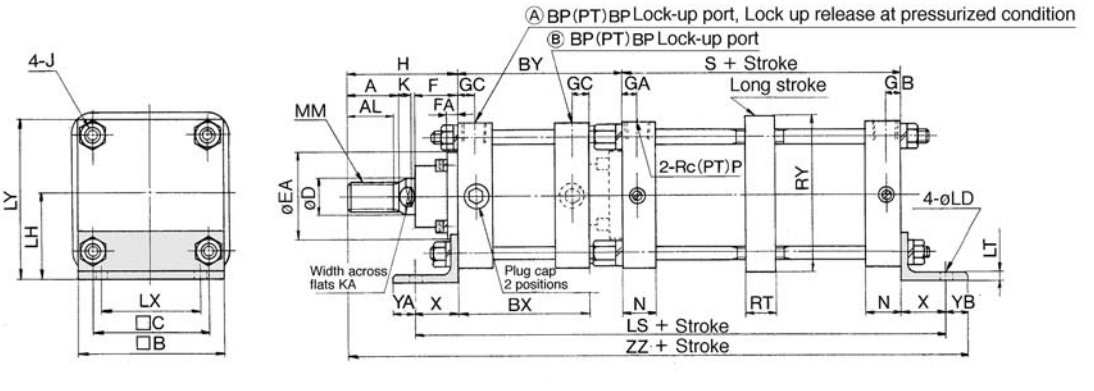
Note) ø125 to ø160 with auto switch type is not available.

Long stroke

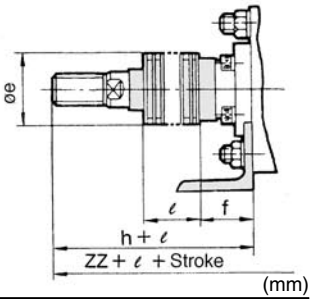
ø50 to ø100



ø125 to ø160



With rod boot



(mm)

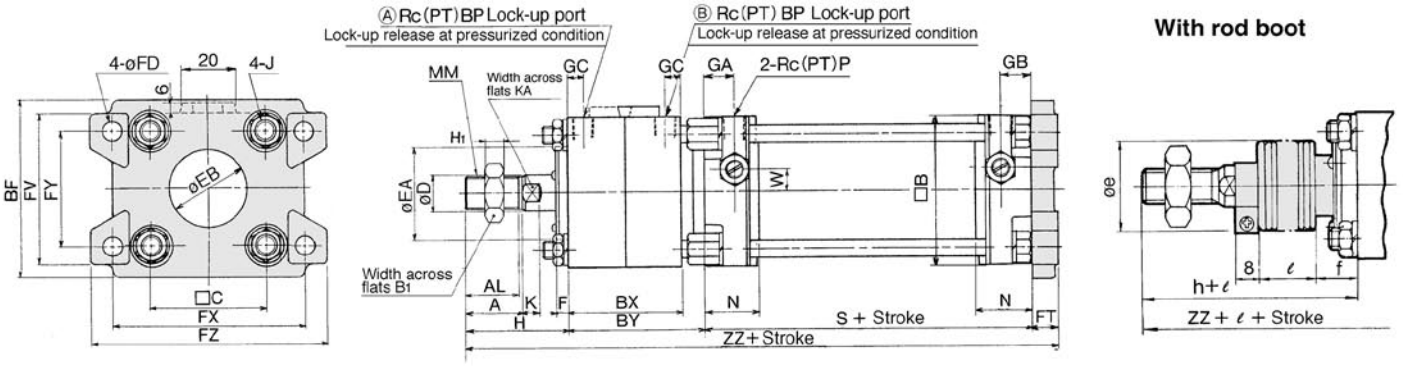
Bore (mm)	Stroke range (mm) Without rod boot	Stroke range (mm) With rod boot	A	AL	B	B1	BX	BY	BP	C	D	EA	EB	F	FA	GA	GB	GC	H1	J	K	KA	LD	LH
40	to 500	20 to 500	30	27	60	22	59	69	1/4	44	16	40	32	6.5	—	15	15	11	8	M8	6	14	9	40
50	to 600	20 to 600	35	32	70	27	67	78	1/4	52	20	50	40	6.0	—	17	17	11	11	M8	7	18	9	45
63	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	to 750	20 to 750	40	37	102	32	77	92	1/4	78	25	65	52	8.0	—	21	21	11	13	M12	11	22	13.5	65
100	to 750	20 to 750	40	37	116	41	85	100	1/4	92	30	80	52	8.0	—	21	21	11	16	M12	11	26	13.5	75
125	to 1400	30 to1400	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	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	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 (mm)	LS	LT	LX	LY	MM	N	P	S	W	X	YA	YB	Without rod boot H	Without rod boot ZZ	With rod boot e	With rod boot f	With rod boot h	With rod boot ℓ	With rod boot 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	1/4 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	1/4 Stroke	456
160	373	9	118	197	M36 X 1.5	39	3/4	106	—	50	25	25	120	468	75	40	141	1/4 Stroke	489

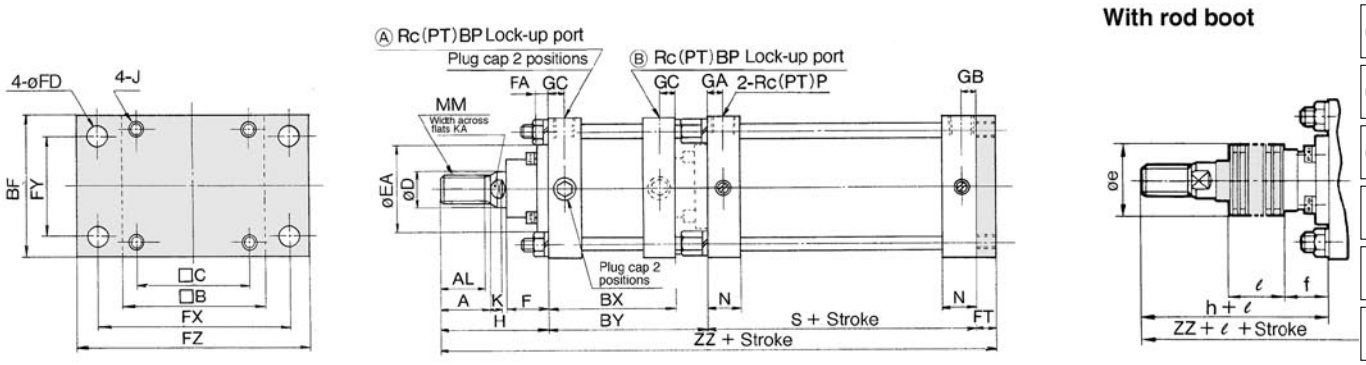
Rear Flange/(G)

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

ø40 to 100



ø125 to ø160



(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B1	BF	BF	BX	BY	C	D	EA	EB	F	FA	FD	FT	FX	FY	FZ	FV	GA	GB	GC	H1
	W/o rod boot	W/ rod boot																								
40	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	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	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	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	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	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	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	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	—

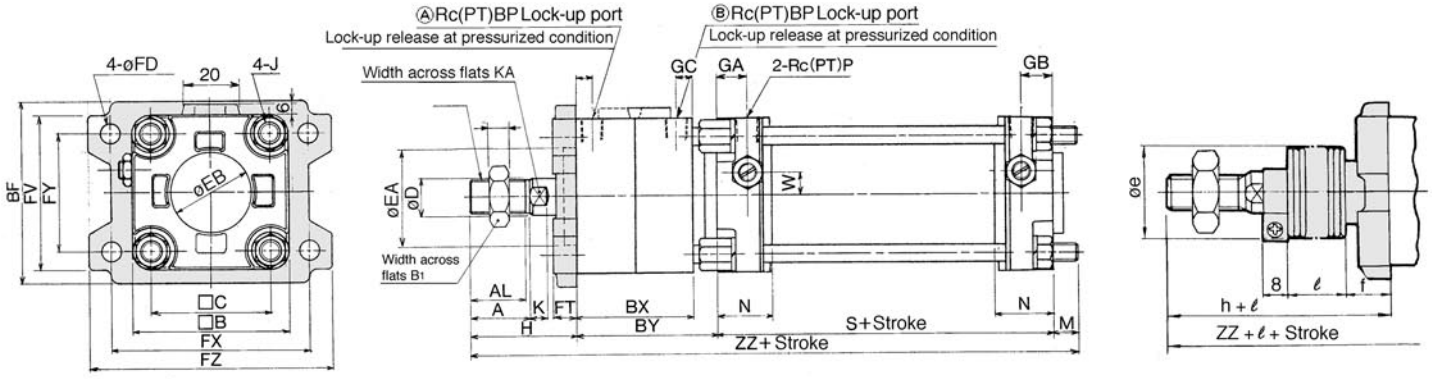
Bore (mm)	J	K	KA	MM	N	P	S	W	W/o rod boot		W/ rod boot				
									H	ZZ	e	f	h	ℓ	ZZ
40	M8	6	14	M14 X 1.5	27	1/4	84	8	51	216	36	16.5	59	1/4 Stroke	224
50	M8	7	18	M18 X 1.5	30	3/8	90	0	58	238	45	16.0	66	1/4 Stroke	246
63	M10 X 1.25	7	18	M18 X 1.5	31	3/8	98	0	58	255	45	16.0	66	1/4 Stroke	263
80	M12	11	22	M22 X 1.5	37	1/2	116	0	71	297	60	18.0	80	1/4 Stroke	306
100	M12	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

Front Flange/(F)

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

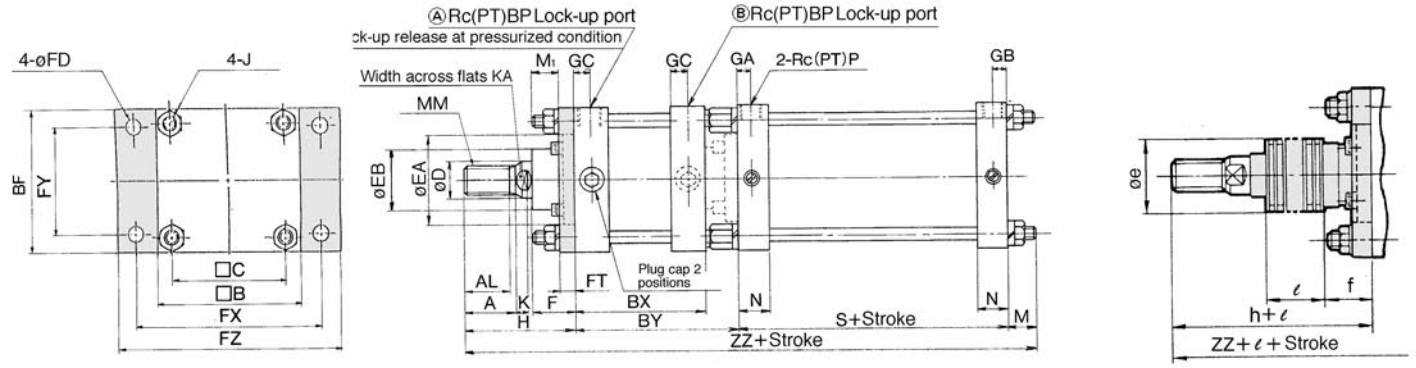
ø40 to ø100

With rod boot



ø120 to ø160

With rod boot



(mm)

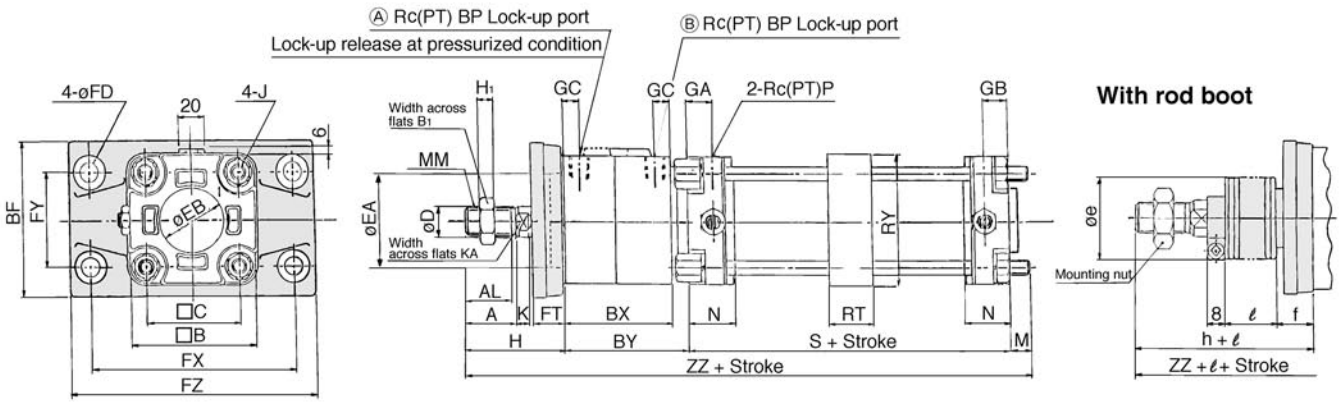
Bore (mm)	Stroke range (mm)		Long stroke range (mm)	A	AL	B	B1	BF	BP	BX	BY	C	D	EA	EB	F	FD	FT	FX	FY	FZ
	W/o rod boot	W/ rod boot																			
40	to 500	20 to 500	501 to 800	30	27	60	22	71	1/4	59	69	44	16	40	32	—	9.0	12	80	42	100
50	to 600	20 to 600	601 to 1000	35	32	70	27	81	1/4	67	78	52	20	50	40	—	9.0	12	90	50	110
63	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	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	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	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	to 1400	30 to 1400	———	50	47	161	—	160	1/2	121	150	128	36	90	59	43	19	20	212	112	255
160	to 1400	30 to 1400	———	56	53	182	—	180	3/4	133	167	144	40	90	59	43	19	20	236	118	275

Bore (mm)	FV	GA	GB	GC	H1	J	K	KA	M	M1	MM	N	P	S	W	W/o rod boot		W/ rod boot				
																H	ZZ	e	f	h	ℓ	ZZ
40	60	15	15	11	8	M8	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	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	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	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	1/4 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	1/4 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	1/4 Stroke	440

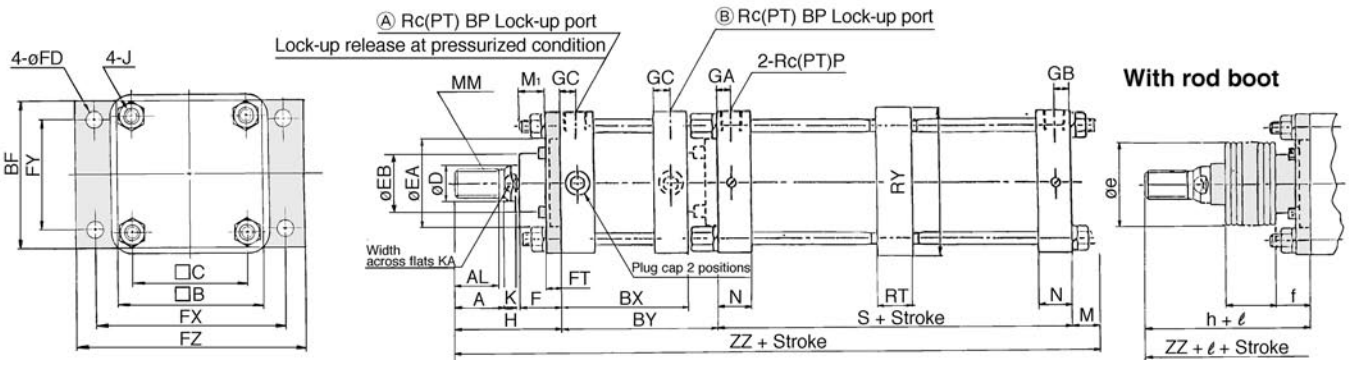
Front Flange (F)/Long Stroke

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

ø50 to ø100



ø125 to ø160



(mm)

Bore (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	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	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	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

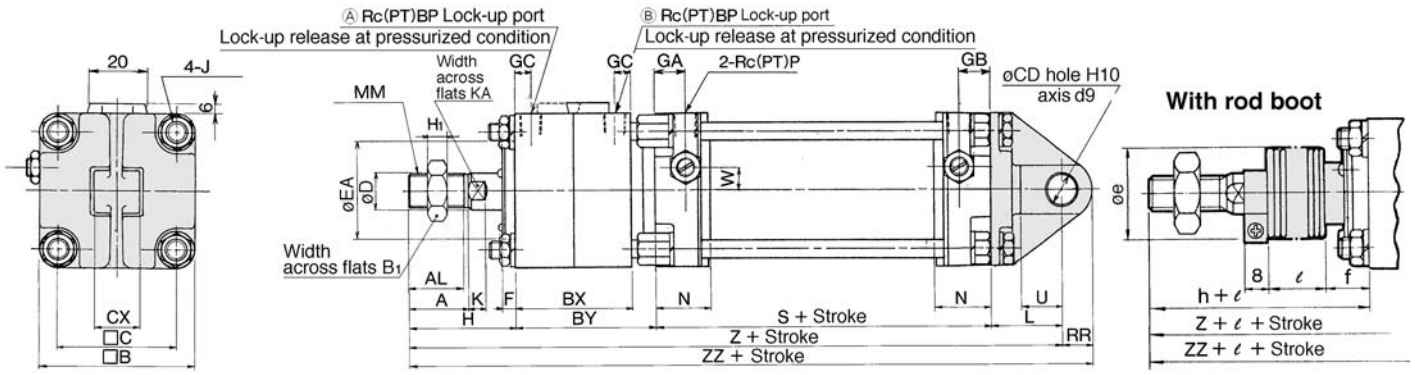
Bore (mm)	Stroke range	M	M1	MM	N	P	RT	RY	S	W	W/o rod boot		W/ rod boot				
											H	ZZ	e	f	h	ℓ	ZZ
50	1001 to 1200	6	—	M18 X 1.5	30	3/8	30	76	90	0	67	241	45	16.0	66	1/4 Stroke	240
63	1001 to 1200	10	—	M18 X 1.5	31	3/8	40	92	98	0	71	263	45	16.0	66	1/4 Stroke	258
80	1001 to 1400	12	—	M22 X 1.5	37	1/2	45	112	116	0	87	307	60	18.0	80	1/4 Stroke	300
100	1001 to1500	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) ø125 to ø160 with auto switch and ø40 are not available.

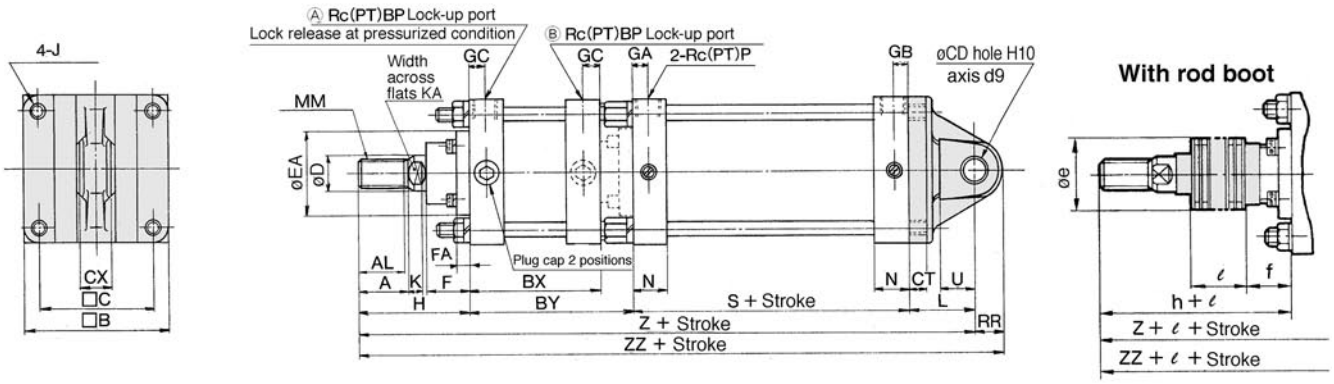
Single Clevis/(C)

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

ø40 to ø100



ø125 to ø160



(mm)

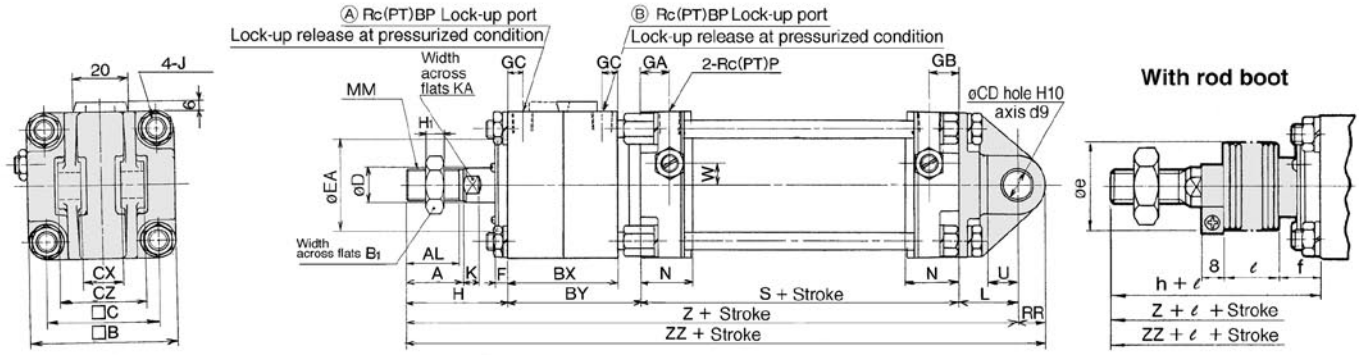
Bore (mm)	Stroke range (mm)		A	AL	B	B1	BP	BX	BY	C	CD	CT	CX	D	EA	F	FA	GA	GB	GC	H1
	W/o rod boot	W/ rod boot																			
40	to 500	20 to 500	30	27	60	22	1/4	59	69	44	10	—	$15.0^{-0.1}_{-0.3}$	16	40	6.5	—	15	15	11	8
50	to 600	20 to 600	35	32	70	27	1/4	67	78	52	12	—	$18.0^{-0.1}_{-0.3}$	20	50	6.0	—	17	17	11	11
63	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	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	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	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	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	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 (mm)	J	K	KA	L	MM	N	P	RR	S	U	W	W/o rod boot			W/ rod boot					
												H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	M8	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	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	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	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	1/4 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	1/4 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	1/4 Stroke	494	530

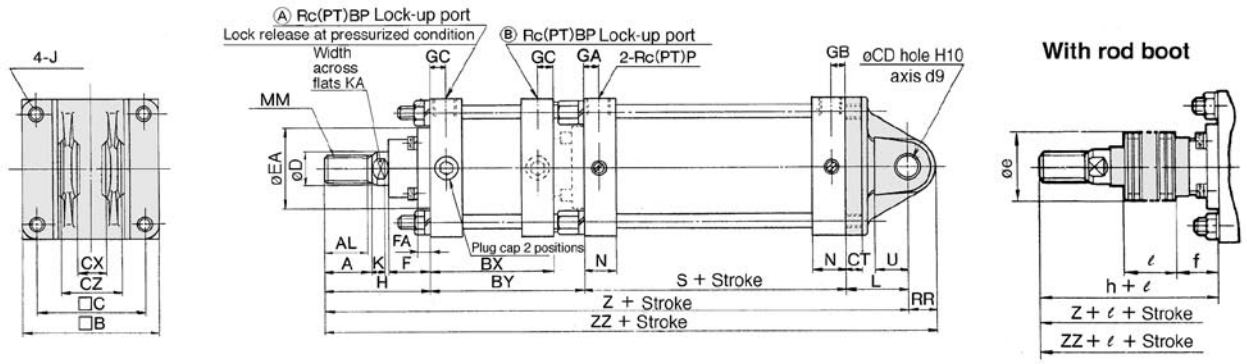
Double Clevis/(D)

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

ø40 to ø100



ø125 to ø160



(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B_1	BP	BX	BY	C	CD	CT	CX	CZ	D	EA	F	FA	GA	GB
	W/o rod boot	W/ rod boot																		
40	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	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	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	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	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	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	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	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

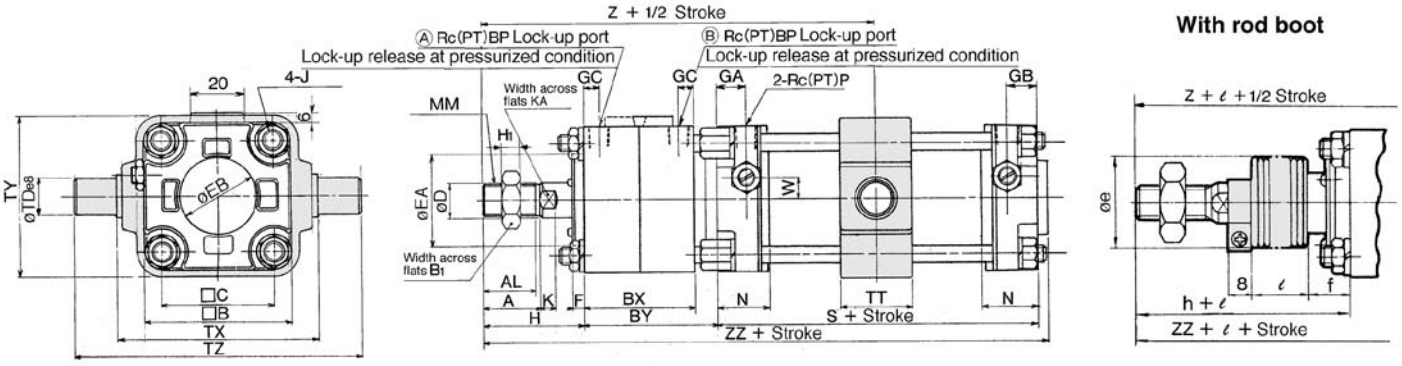
Bore (mm)	GC	H_1	J	K	KA	L	MM	N	P	RR	S	U	W	W/o rod boot			W/ rod boot					
														H	Z	ZZ	e	f	h	ℓ	Z	ZZ
40	11	8	M8	6	14	30	M14 X 1.5	27	1/4	10	84	16	8	51	234	244	36	16.5	59	1/4 Stroke	242	252
50	11	11	M8	7	18	35	M18 X 1.5	30	3/8	12	90	19	0	58	261	273	45	16.0	66	1/4 Stroke	269	281
63	11	11	M10 X 1.25	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	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	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 packed with the double clevis style.

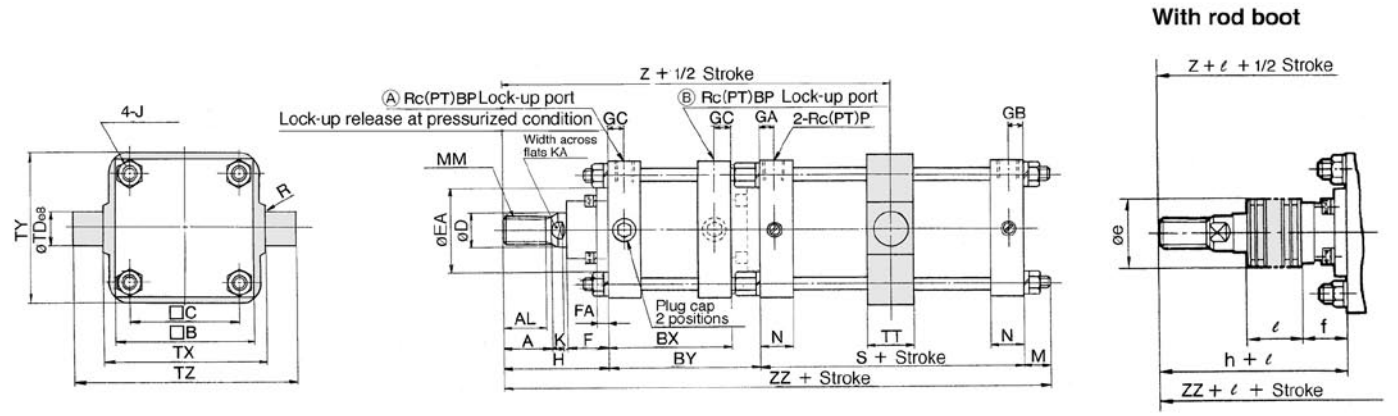
Centre Trunnion/(T)

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

ø40 to ø100



ø125 to ø160



(mm)

Bore (mm)	Stroke range (mm)		A	AL	B	B1	BP	BX	BY	C	D	EA	EB	F	FA	GA	GB	GC	H1	J	K	KA
	W/o rod boot	W/ rod boot																				
40	to 500	20 to 500	30	27	60	22	1/4	59	69	44	16	40	32	6.5	—	15	15	11	8	M8	6	14
50	to 600	20 to 600	35	32	70	27	1/4	67	78	52	20	50	40	6.0	—	17	17	11	11	M8	7	18
63	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	to 750	20 to 750	40	37	102	32	1/4	77	92	78	25	65	52	8.0	—	21	21	11	13	M12	11	22
100	to 750	20 to 750	40	37	116	41	1/4	85	100	92	30	80	52	8.0	—	21	21	11	16	M12	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 (mm)	M	MM	N	P	R	S	TDe8	TT	TX	TY	TZ	W	W/o rod boot			W/ rod root					
													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