



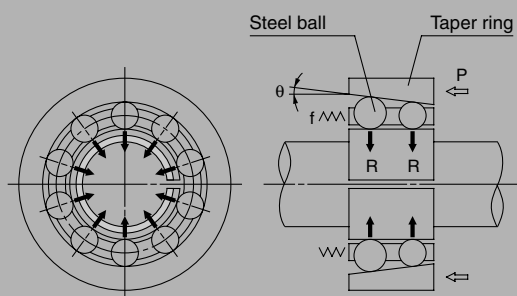
Cylinder with Lock Series CNG

ø20, ø25, ø32, ø40

A locking cylinder ideal for intermediate stops, emergency stops and drop prevention.

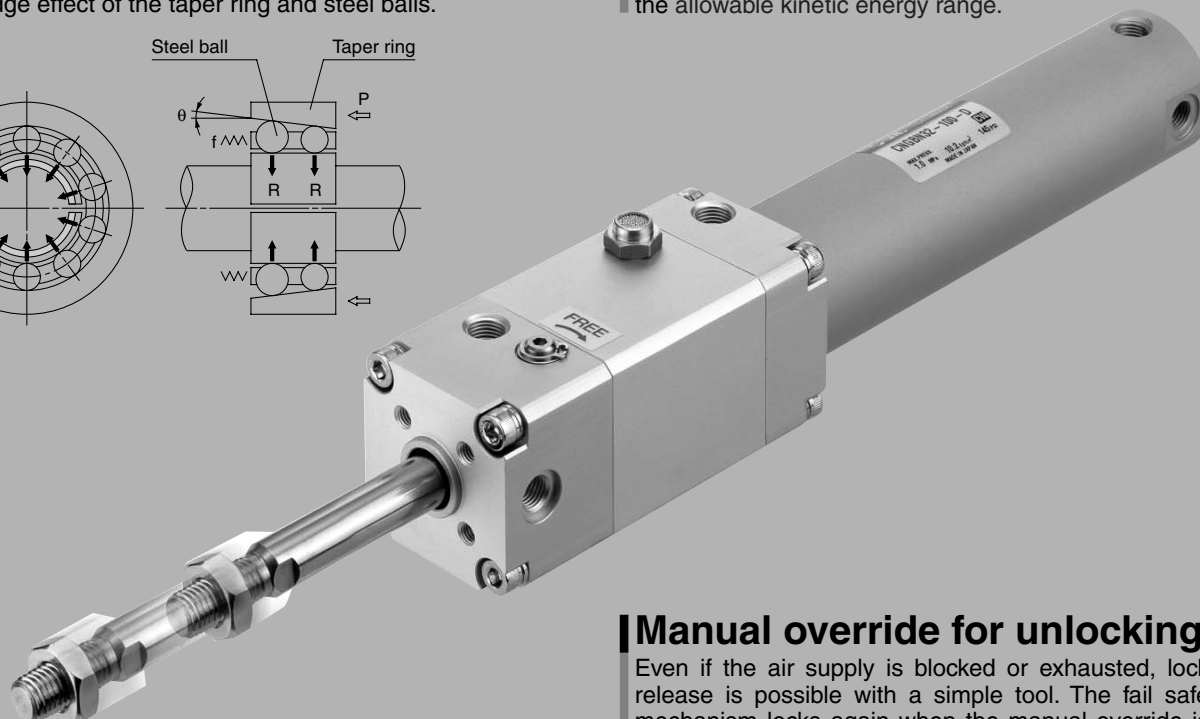
Simple construction

A force magnifying mechanism is employed based on the wedge effect of the taper ring and steel balls.



Maximum piston speed: 1000 mm/s

It can be used at 50 to 1000 mm/s provided that it is within the allowable kinetic energy range.



High locking efficiency

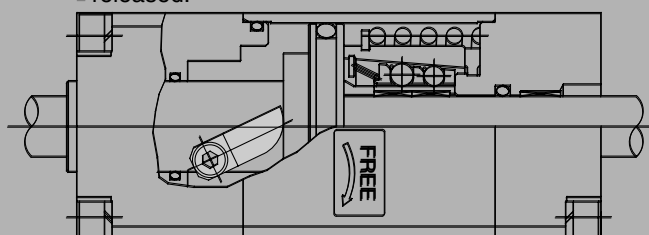
Greater locking efficiency as well as stable locking and unlocking operation has been achieved by arranging a large number of steel ball bearings in circular rows. (Unlocking pressure of 0.25 MPa 0.05 MPa lower than conventional SMC products) In addition, both alignability and stable locking force with respect to piston rod eccentricity are obtained by allowing the taper ring to float.

High reliability and stable holding force

Outstanding durability and stable holding force are maintained by the use of a brake shoe having superior wear resistance, which has also been substantially lengthened (double the conventional SMC product).

Manual override for unlocking

Even if the air supply is blocked or exhausted, lock release is possible with a simple tool. The fail safe mechanism locks again when the manual override is released.



Design minimizes the influences of unlocking air quality

A construction which is strong against moisture and drainage in the compressed air has been realized by separating the locking mechanism and the unlocking chamber.

Series Variations

Series	Action	Cushion type		Standard variations		Bore size (mm)	Stroke (mm)
		Rubber bumper	Air cushion	Auto switch built-in magnet	With rod boot		
Cylinder with lock Series CNG	Double acting, Single rod	●	●	●	●	20	Maximum up to 800
		●	●	●	●	25	
		●	●	●	●	32	
		●	●	●	●	40	

Can be locked in both directions

Holding force is equal on either extend or retract.

Compact lock unit saves space

The lock unit is extremely compact, without a large overhang.

CL
CL1
MLGC
CNG
MNB
CNA
CNS
CLS
CLQ
MLGP
RLQ
MLU
ML1C
D-
-X
20-
Data



Design of Equipment and Machinery

⚠ Warning

1. Construct so that the human body will not come into direct contact with driven objects or the moving parts of locking cylinders.

Devise a safe structure by attaching protective covers that prevent direct contact with the human body, or in cases where there is a danger of contact, provide sensors or other devices to perform an emergency stop, etc., before contact occurs.

2. Use a balance circuit, taking cylinder lurching into consideration.

In cases such as an intermediate stop, where a lock is operated at a desired position within the stroke and air pressure is applied from only one side of the cylinder, the piston will lurch at high speed when the lock is released. In such situations, there is a danger of causing human injury by having hands or feet, etc. caught, and also a danger for causing damage to the equipment. In order to prevent this lurching, a balance circuit such as the recommended pneumatic circuits (page 9-5-4) should be used.

Selection

⚠ Warning

1. When in the locked state, do not apply a load accompanied by an impact shock, strong vibration or turning force, etc.

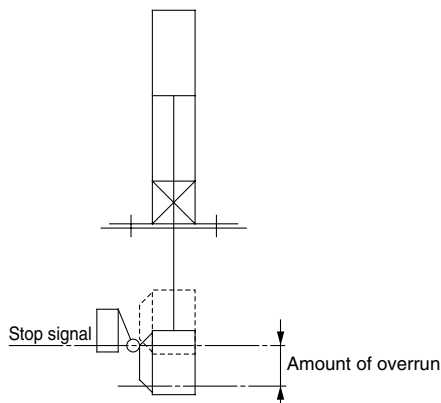
Use caution, because an external action such as an impacting load, strong vibration or turning force, may damage the locking mechanism or reduce its life.

2. Consider stopping accuracy and the amount of overrun when an intermediate stop is performed.

Due to the nature of a mechanical lock, there is a momentary lag with respect to the stop signal, and a time delay occurs before stopping. The cylinder stroke resulting from this delay is the overrun amount. The difference between the maximum and minimum overrun amounts is the stopping accuracy.

- Place a limit switch before the desired stopping position, at a distance equal to the overrun amount.
- The limit switch must have a detection length (dog length) of the overrun amount + α .
- For SMC's auto switches, the operating range is between 8 and 14 mm. (It varies depending on a switch model.) When the overrun amount exceeds this range, selfholding of the contact should be performed at the switch load side.

* For stopping accuracy, refer to page 9-5-9.



Selection

⚠ Warning

3. In order to further improve stopping accuracy, the time from the stop signal to the operation of the lock should be shortened as much as possible.

To accomplish this, use a device such as a highly responsive electric control circuit or solenoid valve driven by direct current, and place the solenoid valve as close as possible to the cylinder.

4. Note that the stopping accuracy will be influenced by changes in piston speed.

When piston speed changes during the course of the cylinder stroke due to variations in the load or disturbances, etc., the dispersion of stopping positions will increase. Therefore, consideration should be given to establishing a standard speed for the piston just before it reaches the stopping position.

Moreover, the dispersion of stopping positions will increase during the cushioned portion of the stroke and during the accelerating portion of the stroke after the start of operation, due to the large changes in piston speed.

Mounting

⚠ Warning

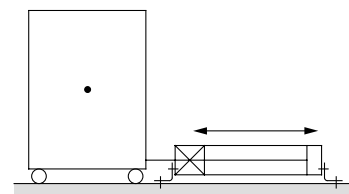
1. Be certain to connect the rod end to the load with the lock released.

If connected in the locked state, a load greater than the turning force or holding force may operate on the piston rod and cause damage to the lock mechanism. Series CNG is equipped with an emergency unlocking mechanism, however, when connecting the rod end to the load this should be done with the lock released by simply connecting an air line to the unlocking port and supplying airpressure of 0.25 MPa or more.

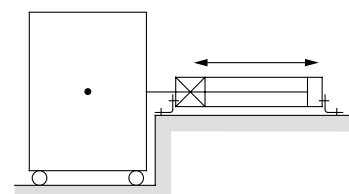
⚠ Caution

1. Do not apply offset loads to the piston rod.

Particular care should be taken to match the load's center of gravity with the center of the cylinder shaft. When there is a large discrepancy, the piston rod may be subjected to uneven wear or damage due to the inertial moment during locking stops.



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



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

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



Adjustment

⚠ Caution

1. Adjust the cylinder's air balance. Balance the load by adjusting the air pressure in the rod and head sides of the cylinder with the load connected to the cylinder and the lock released. Lurching of the cylinder when unlocked can be prevented by carefully adjusting this air balance.
2. Adjust mounting position for detection area of auto switch etc. When intermediate stop is done, adjust the mounting position for detection stop is done, adjust the mounting position for detection area of auto switch etc., with consideration of overrun distance to required stop position.

Pneumatic Circuit

⚠ Warning

1. **Be certain to use an pneumatic circuit which will apply balancing pressure to both sides of the piston when in a locked stop.**

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

2. **Use a solenoid valve for unlocking which has a large effective area, as a rule 50% or more of the effective area of the cylinder drive solenoid valve.**

The larger the effective area is, the shorter the locking time will be (the overrun amount will be shorter), and stopping accuracy will be improved.

3. **Place the solenoid valve for unlocking close to the cylinder, and no farther than the cylinder drive solenoid valve.**

The shorter the distance from the cylinder (the shorter the piping), the shorter the overrun amount will be, and stopping accuracy will be improved.

4. **Allow at least 0.5 seconds from a locked stop (intermediate stop of the cylinder) until release of the lock.**

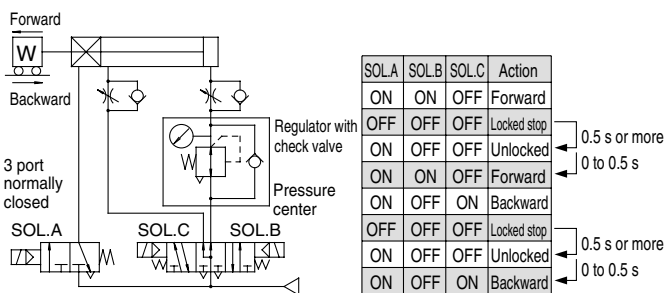
When the locked stop time is too short, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

5. **When restarting, control the switching signal for the unlocking solenoid valve so that it acts before or at the same time as the cylinder drive solenoid valve.**

If the signal is delayed, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

6. **Basic circuit**

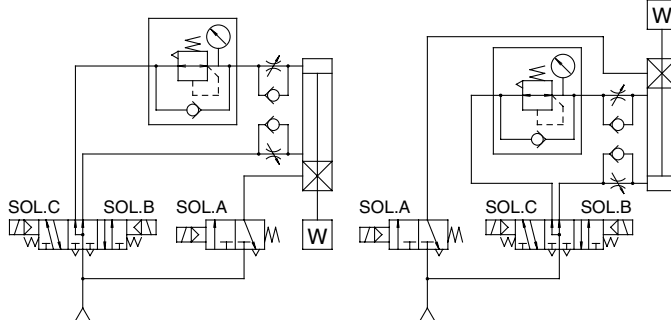
1) [Horizontal]



2) [Vertical]

[Load in the direction of rod extension]

[Load in the direction of rod retraction]





Series CNG

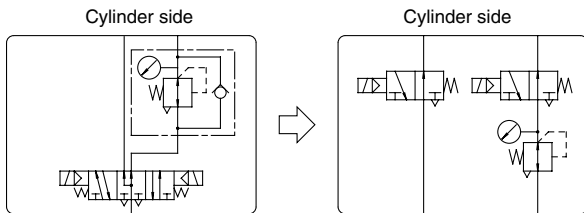
Specific Product Precautions 3

Be sure to read before handling.

Pneumatic Circuit

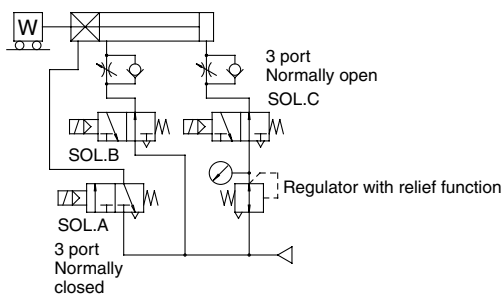
⚠ Caution

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



[Example]

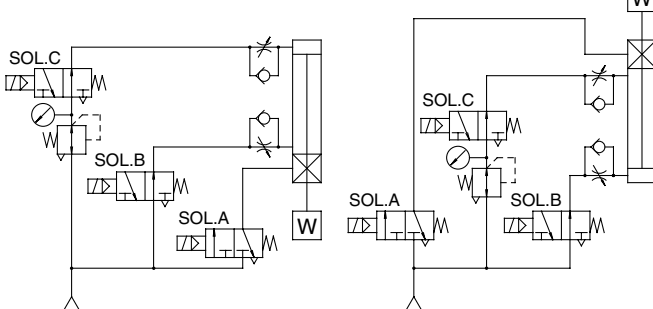
1. [Horizontal]



2. [Vertical]

[Load in the direction of rod extension]

[Load in the direction of rod retraction]



Manually Unlocking

⚠ Warning

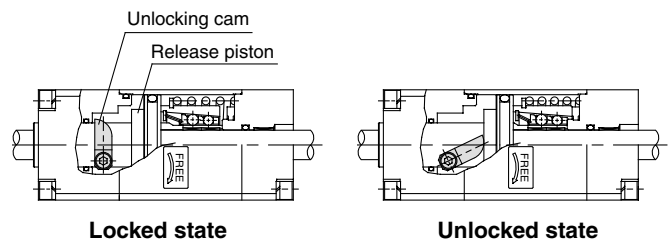
1. **Never operate the unlocking cam until safety has been confirmed. (Do not turn to the FREE side.)**
 - a) When unlocking is performed with air pressure applied to only one side of the cylinder, the moving parts of the cylinder will lurch at high speed causing a serious hazard.
 - b) When unlocking is performed, be sure to confirm that personnel are not within the load movement range and that no other problems will occur if the load moves.
2. **Before operating the unlocking cam, exhaust any residual pressure which is in the system.**
3. **Take measures to prevent the load from dropping when unlocking is performed.**
 - a) Perform work with the load in its lowest position.

⚠ Caution

1. **The unlocking cam is an emergency unlocking mechanism only.**
During an emergency when the air supply is stopped or cut off, this is used to alleviate a problem by forcibly pushing back the release piston and brake spring to release the lock.
2. **When installing the cylinder into equipment or performing adjustments, etc., be sure to apply air pressure of 0.25 MPa or more to the unlocking port, and do not perform work using the unlocking cam.**
3. **When releasing the lock with the unlocking cam, it must be noted that the internal resistance of the cylinder will be high, unlike normally unlocking with air pressure.**

Bore size (mm)	Cylinder internal resistance (N)	Cam operating torque (standard) (N·m)	Max. cam operating torque (N·m)	Applicable hex. wrench size
20	24.6	1.0	2.3	Size 3
25	38.2	2.5	4.7	Size 3
32	62.7	3.0	4.7	Size 3
40	98	4.0	8.2	Size 4

4. **Be sure to operate the unlocking cam on the FREE side (clockwise direction), and do not turn with a torque greater than the maximum cam operating torque. There is a danger of damaging the unlocking cam if it is turned excessively.**
5. **For safety reasons, the unlocking cam is constructed so that it cannot be fixed in the unlocked condition.**



[Principle]

If the unlocking cam is turned in a clockwise direction with a hexagon wrench, the release piston is pushed back and the lock is released. Further, if the unlocking cam is not held it will return to its original position and the unit will lock again. Therefore, the unlocking cam must be held in position for as long as unlocking is required.



Series CNG

Specific Product Precautions 4

Be sure to read before handling.

Maintenance

⚠ Caution

1. Series CNG lock units are replaceable.

(However, please note that lock units cannot be replaced in the case of long stroke specifications.)

To order replacement lock units for Series CNG, use the order numbers given in the table below.

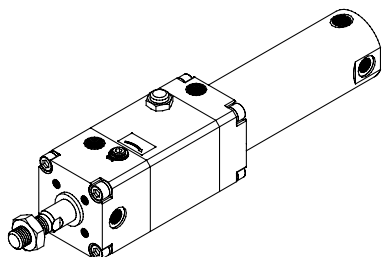
Bore size (mm)	Lock unit part no.	
	Rubber bumper type	Air cushion type
20	CNGN20D-UA	CNGA20D-UA
25	CNGN25D-UA	CNGA25D-UA
32	CNGN32D-UA	CNGA32D-UA
40	CNGN40D-UA	CNGA40D-UA

2. Replacement of lock units.

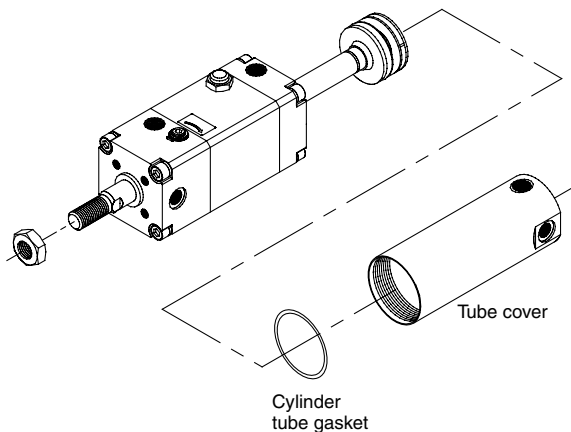
1) Remove the lock unit by securing the square section of the rod cover or the wrench flats of the tube cover in an apparatus such as a vice, and then loosening the other end with a spanner or adjustable angle wrench, etc.

For the dimensions of the square section and the wrench flats, refer to the table below.

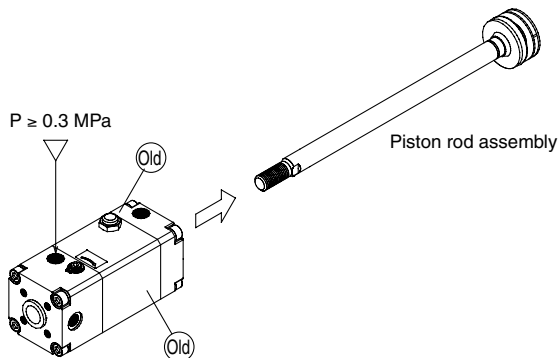
Bore size (mm)	Rod cover square section (mm)	Tube cover wrench flats (mm)
20	38	24
25	45	29
32	45	35.5
40	52	44



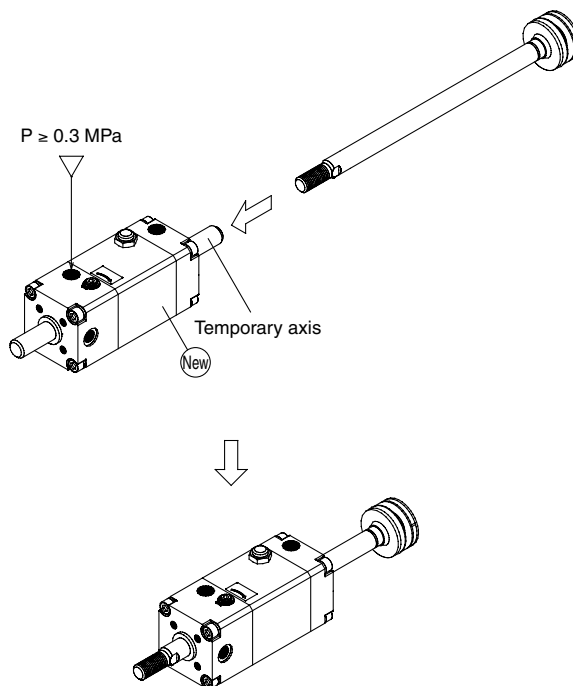
2) Remove the tube cover.



3) Apply 0.3 MPa or more of compressed air to the unlocking port, and pull out the piston rod assembly.



4) Similarly, apply 0.3 MPa or more of compressed air to the unlocking port of the new lock unit, and replace the new lock unit's temporary axis with the previous piston rod assembly.



5) Reassemble in reverse order from steps 2) and 1).
When retightening the sections, turn approximately 2° past their position prior to disassembly.

CL

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

MLGP

RLQ

MLU

ML1C

D-

-X

20-

Data

Series CNG

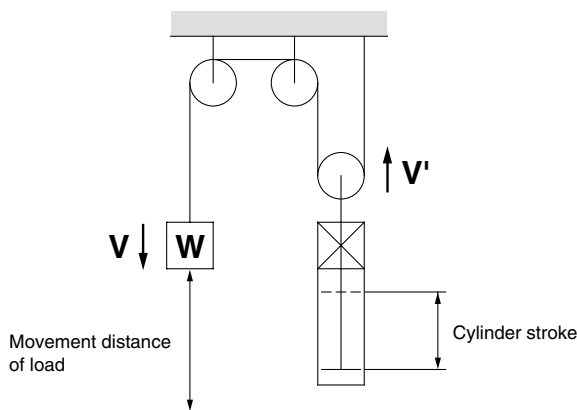
Model Selection

Precautions on Model Selection

⚠ Caution

1. In order that the originally selected maximum speed is not exceeded, be certain to use a speed controller to adjust the total movement distance of the load so that movement takes place in no less than the applicable movement time.
The movement time is the time that is necessary for the load to travel the total movement distance from the start without any intermediate stops.
2. In cases where the cylinder stroke and the movement distance of the load are different (double speed mechanism, etc.), use the movement distance of the load for selection purposes.

Example)



Selection Example

- Load weight: $m = 12 \text{ kg}$
- Movement distance: $st = 200 \text{ mm}$
- Movement time: $t = 0.8 \text{ s}$
- Load condition: Vertical downward = Load in direction of rod extension
- Operating pressure: $P = 0.4 \text{ MPa}$

Step (1): From graph (1) find the maximum movement speed of the load.

$\therefore$ Maximum speed $V \cong 350 \text{ mm/s}$

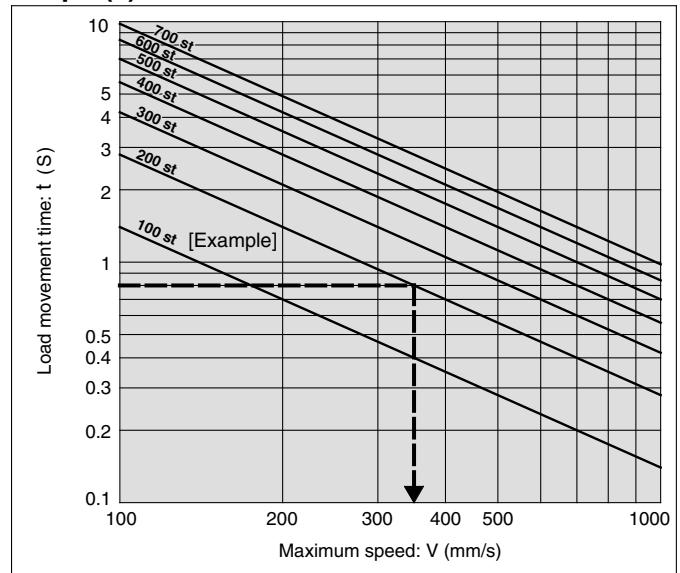
Step (2): Select graph (6) based upon the load condition and operating pressure, and then from the intersection of the maximum speed $V = 350 \text{ mm/s}$ found in Step (1), and the load weight $m = 12 \text{ kg}$

$\therefore \phi 32 \rightarrow$ select a CNG32 or larger bore size.

Step (1) Find the maximum load speed V.

Find the maximum load speed: V (mm/s) from the load movement time: t (s) and the movement distance: st (mm).

Graph (1)



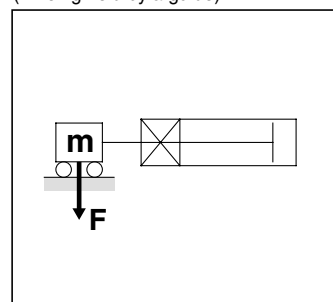
Step (2) Find the bore size.

Select a graph based upon the load condition and operating pressure, and then find the point of intersection for the maximum speed found in Step (1) and the load weight. Select the bore size on the above the point of intersection.

Load Condition

Load in the direction at the right angle to rod

(* Being held by a guide)

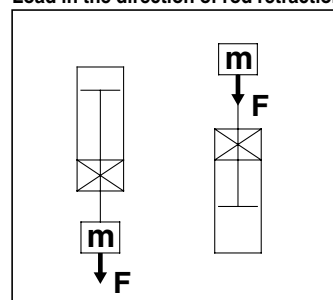


$0.3 \text{ MPa} \leq$ → Graph (2)

$0.4 \text{ MPa} \leq$ → Graph (3)

$0.5 \text{ MPa} \leq$ → Graph (4)

Load in the direction of rod extension
Load in the direction of rod retraction



$0.3 \text{ MPa} \leq$ → Graph (5)

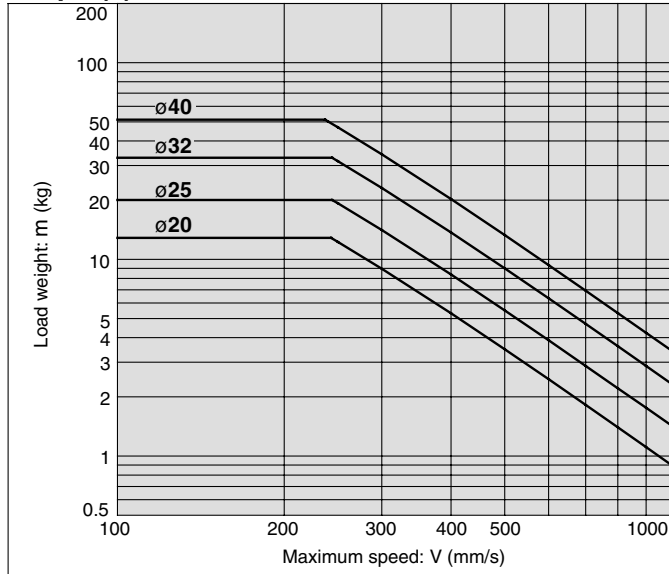
$0.4 \text{ MPa} \leq$ → Graph (6)

$0.5 \text{ MPa} \leq$ → Graph (7)

Selection Graph

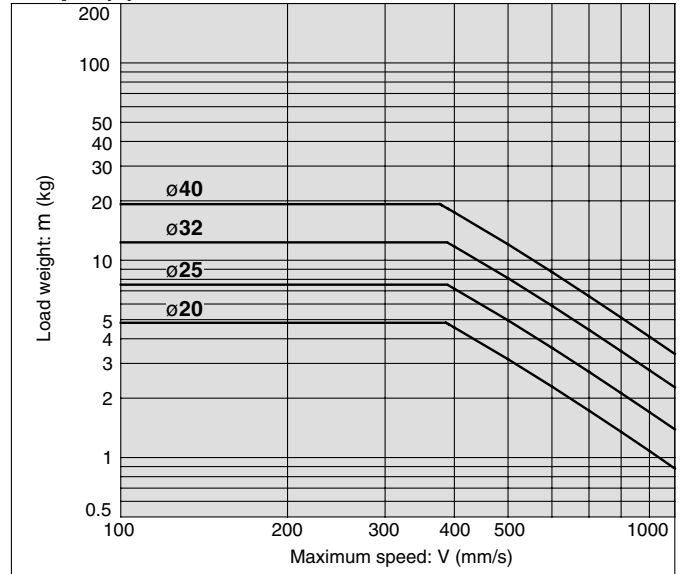
Graph (2)

$0.3 \text{ MPa} \leq P < 0.4 \text{ MPa}$



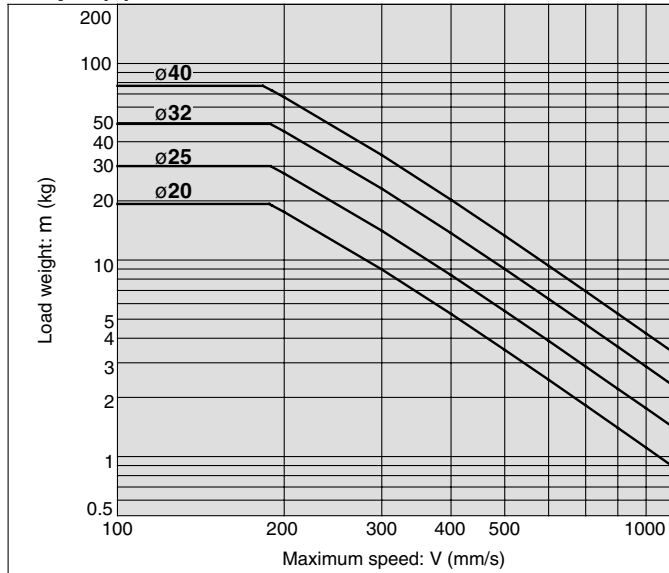
Graph (5)

$0.3 \text{ MPa} \leq P < 0.4 \text{ MPa}$



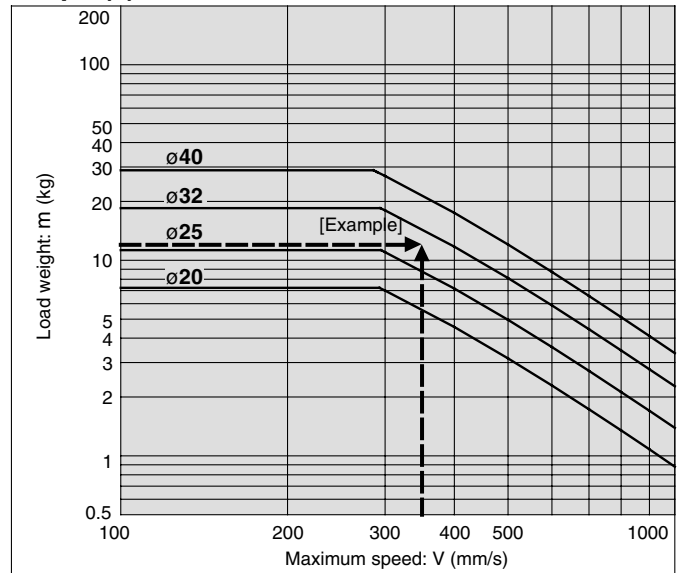
Graph (3)

$0.4 \text{ MPa} \leq P < 0.5 \text{ MPa}$



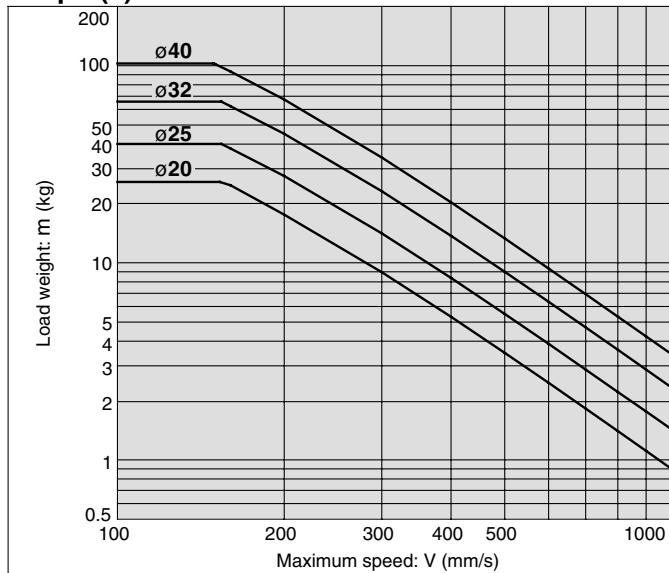
Graph (6)

$0.4 \text{ MPa} \leq P < 0.5 \text{ MPa}$



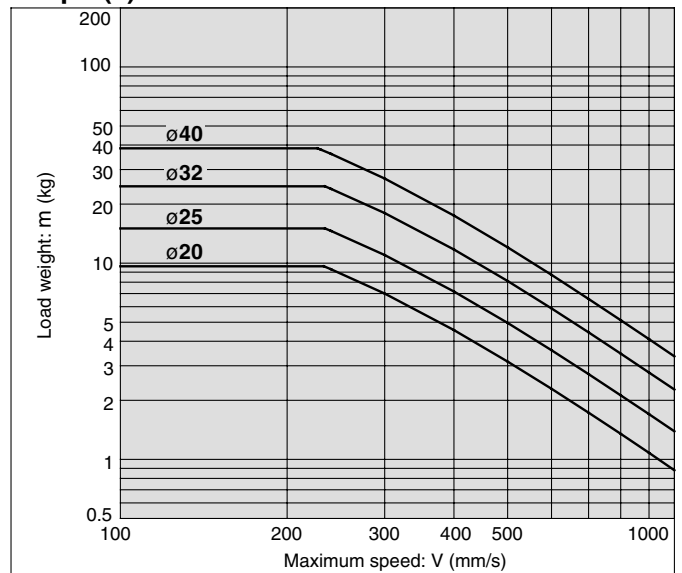
Graph (4)

$0.5 \text{ MPa} \leq P$



Graph (7)

$0.5 \text{ MPa} \leq P$



CL

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

MLGP

RLQ

MLU

ML1C

D-

-X

20-

Data

Cylinder with Lock Double Acting, Single Rod Series *CNG* ø20, ø25, ø32, ø40

How to Order

Without auto switch CNG **L** **N** 32 **100** **D**

With auto switch CDNG **L** **N** 32 **100** **D** **H7BW**

Built-in magnet •

Mounting style •

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

* Mounting brackets are shipped together, (but not assembled).

Cushion type •

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

Bore size •

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

Thread type •

Nil	Rc
TN	NPT

Number of auto switches

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

Auto switch

Nil	Without auto switch
------------	---------------------

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

Locking direction

D	Both directions
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With rod boot

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

* When equipped with rod boot, foot and rod side flange type brackets are attached before shipment.

Cylinder stroke (mm)
Refer to "Standard Stroke" on page 9-5-9.

Built-in Magnet Cylinder Model
In the case of built-in magnet without auto switch, the symbol for auto switch is "Nil".
(Example) CDNGLN40-100-D

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model	Lead wire length (m) *				Pre-wire connector	Applicable load		
					DC	AC		0.5 (Nil)	3 (L)	5 (Z)	None (N)				
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	C76	●	●	—	—	—	IC circuit	—
		2-wire		24 V	12 V	100 V, 200 V	B54	●	●	●	—	—	—		
	100 V					C73	●	●	●	—	—				
	C73C					●	●	●	●	—	—				
Diagnostic indication (2-color indication)	Grommet	12 V	—	B59W	●	●	—	—	—	—	—	—			
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	H7A1	●	●	○	—	○	IC circuit	Relay, PLC
		3-wire (PNP)		12 V		H7A2		●	●	○	—	○			
	2-wire	H7B				●		●	○	—	○				
		H7C				●		●	●	●	—	—			
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V	H7NW		●	●	○	—	○	IC circuit		
				3-wire (PNP)	H7PW	●		●	○	—	○				
				2-wire	H7BW	●		●	○	—	○				
					H7BA	—		●	○	—	○				
				Water resistant (2-color indication)	4-wire (NPN)	5 V, 12 V		H7NF	●	●	○	—	○	IC circuit	
				With diagnostic output (2-color indication)											

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

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

- Since there are other applicable auto switches than listed, refer to page 9-5-22 for details.
- For details about auto switches with pre-wire connector, refer to page 9-15-66.

Cylinder with Lock Double Acting, Single Rod Series CNG



JIS Symbol



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

Symbol	Specifications
-XA□	Change of rod end shape

Minimum Stroke for Auto Switch Mounting

Model	No. of auto switches mounted	
	2	1
D-C7/C8 D-B5/B6 D-H7 D-G5NTL	15 mm	10 mm
D-B59W	20 mm	15 mm

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Model

Series	Type	Action	Bore size (mm)	Lock operation
CNG	Non-lube	Double acting	20, 25, 32, 40	Spring locking

Cylinder Specifications

Type	Non-lube
Fluid	Air
Proof pressure	1.5 MPa
Max. operating pressure	1.0 MPa
Min. operating pressure	0.08 MPa
Piston speed	50 to 1000 mm/s *
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)
Cushion	Rubber bumper, Air cushion
Stroke length tolerance (mm)	Up to 800 st: $^{+1.4}_0$
Thread tolerance	JIS Class 2
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Rod side trunnion style, Head side trunnion style, Clevis style (used for 90° change of port position)

* When the piston is locked, the load weight is limited by the mounting orientation and the operating pressure.

Lock Specifications

Bore size (mm)	20	25	32	40
Locking action	Spring locking (Exhaust locking)			
Unlocking pressure	0.20 MPa or more	0.25 MPa or more		
Lock starting pressure	0.15 MPa or less	0.20 MPa or less		
Operating pressure range	0.2 to 1.0 MPa	0.25 to 1.0 MPa		
Locking direction	Both directions			

Standard Stroke

Bore size (mm)	Standard stroke (mm) ⁽¹⁾	Long stroke (mm)	Max. manufacturable stroke (mm)
20	25, 50, 75, 100, 125, 150, 200	201 to 350	1500
25	25, 50, 75, 100, 125, 150, 200, 250, 300	301 to 400	
32		301 to 450	
40		301 to 800	

Note 1) Intermediate strokes other than the above are produced upon receipt of order. Spacers are not used for intermediate strokes.

Note 2) Long strokes are applicable to the axial foot style and rod side flange style.

In the case of other mounting brackets or when long stroke limits are exceeded, the maximum useable stroke is determined by the stroke selection table (information edition).

Stopping Accuracy

Lock type	Piston speed (mm/s)			
	100	300	500	1000
Spring locking	±0.3	±0.6	±1.0	±2.0

Condition: Lateral, Supply pressure P = 0.5 MPa

Load weight Upper limit of allowed value

Solenoid valve for locking: Mounted directly to unlocking port

Maximum value of stopping position dispersion from 100 measurements

Holding Force of Spring Locking (Maximum static load)

Bore size (mm)	20	25	32	40
Holding force (N)	215	335	550	860

Series CNG

Mounting Bracket Part No.

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

* When ordering foot bracket, order 2 pieces per cylinder.

** Clevis pin, snap ring, and mounting bolt are shipped together with double clevis style.

*** Mounting bolts are included with the foot and flange types.

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)			
	20	25	32	40
D-C7/C8	BMA2-020	BMA2-025	BMA2-032	BMA2-040
D-H7				
D-B5/B6	BA-01	BA-02	BA-32	BA-04
D-G5NTL				

* Mounting screws set made of stainless steel

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

BBA3: For D-B5/B6/G5

BBA4: For D-C7/C8/H7

"D-H7BAL" switch is set on the cylinder with the stainless steel screws above when shipped. When the switches are shipped as individual parts, the BBA4 is included.

Accessory

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

* Pin and snap ring are shipped together with double knuckle joint.

Weight

Bore size (mm)		20	25	32	40
Basic weight	Basic style	0.52	0.83	0.91	1.24
	Axial foot style	0.63	0.96	1.07	1.46
	Flange style	0.64	1.01	1.08	1.47
	Trunnion style	0.53	0.85	0.94	1.29
	Clevis style	0.57	0.91	1.06	1.47
Rod side pivot bracket		0.11	0.13	0.20	0.27
Head side pivot bracket		0.08	0.09	0.17	0.25
Single knuckle joint		0.05	0.09	0.09	0.10
Double knuckle joint (with pin)		0.05	0.09	0.09	0.13
Additional weight per each 50 mm of stroke		0.05	0.07	0.09	0.15
Additional weight with air cushion		0.01	0.01	0.02	0.02
Additional weight for long stroke		0.01	0.01	0.02	0.03

Calculation: (Example) CNGLA20-100-D (Foot type, ø20, 100 st)

Basic weight:..... 0.63 kg (Foot type, ø20)

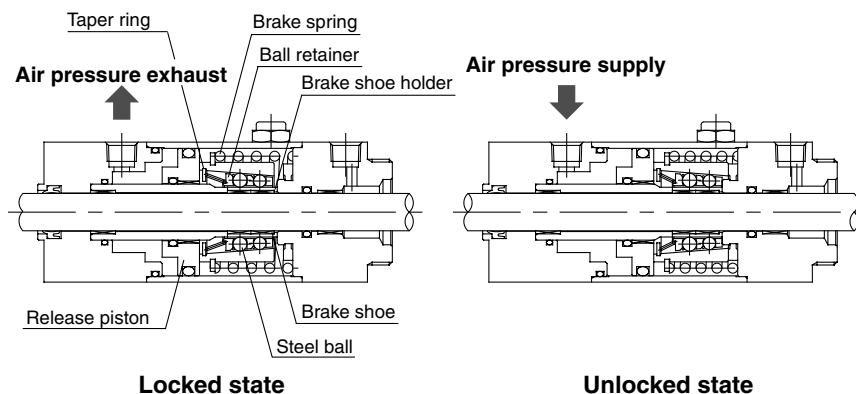
Additional weight 0.05 kg/50 st

Air cylinder stroke 100 st

Air cushion additional weight 0.01 kg

$0.63 + 0.05 \times 100/50 + 0.01 = 0.74 \text{ kg}$

Construction Principle



Spring locking (Exhaust locking)

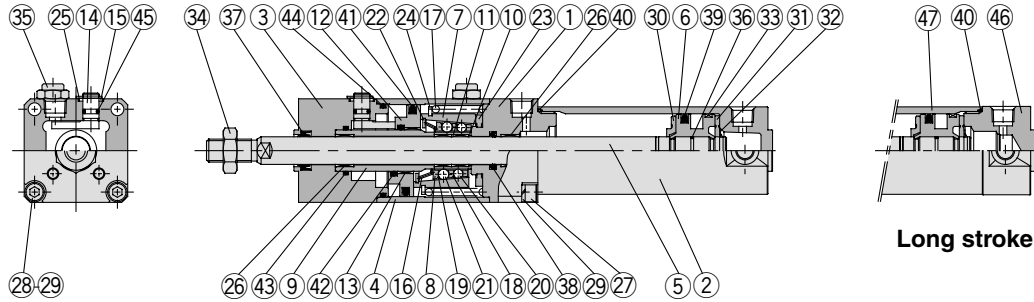
The spring force which acts upon the taper ring is magnified by a wedge effect, and is conveyed to all of the numerous steel balls which are arranged in two circles. These act on the brake shoe holder and brake, which locks the piston rod by tightening against it with a large force.

Unlocking is accomplished when air pressure is supplied to the unlocking port. The release piston and taper ring oppose the spring force, moving to the right side, and the ball retainer strikes the cover section. The braking force is released as the steel balls are removed from the taper ring by the ball retainer.

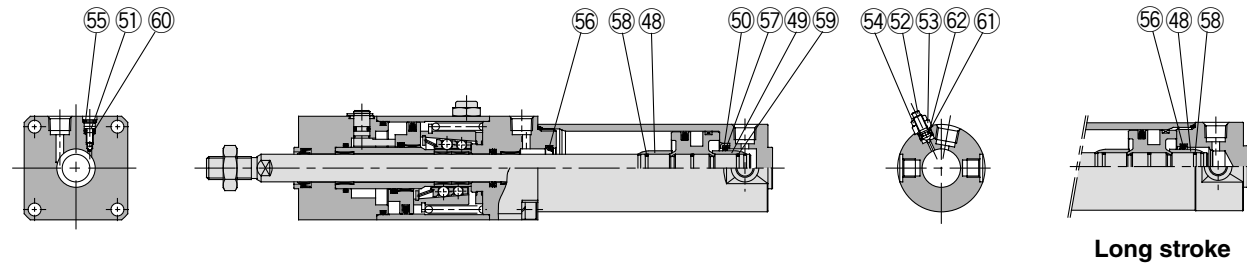
Cylinder with Lock Double Acting, Single Rod Series CNG

Construction

With rubber bumper: CNGBN



With air cushion: CNGBA



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Clear hard anodized
②	Tube cover	Aluminum alloy	Clear hard anodized
③	Cover	Aluminum alloy	Clear hard anodized
④	Intermediate cover	Aluminum alloy	Clear hard anodized
⑤	Piston rod	Carbon steel	Hard chrome plated
⑥	Piston	Aluminum alloy	Chromated
⑦	Taper ring	Carbon steel*	Heat treated
⑧	Ball retainer	Special resin	
⑨	Piston guide	Carbon steel	Zinc chromated
⑩	Brake shoe holder	Special steel	Heat treated
⑪	Brake shoe	Special friction material	
⑫	Release piston	Carbon steel	Zinc chromated
⑬	Release piston bushing	ø20 Oil-impregnated sintered alloy	
		ø25,ø32,ø40 Steel + Special resin	
⑭	Unlocking cam	Chromium molybdenum steel	Electroless nickel plated
⑮	Washer	Rolled steel plate	Electroless nickel plated
⑯	Retainer pre-load spring	Steel wire	Zinc chromated
⑰	Brake spring	Steel wire	Zinc chromated
⑱	Clip A	Stainless steel	ø25, ø32 only
⑲	Clip B	Stainless steel	ø25, ø32 only
⑳	Steel ball A	Carbon steel	
㉑	Steel ball B	Carbon steel	
㉒	Tooth ring	Stainless steel	
㉓	Bumper	Urethane	
㉔	C type retaining ring for taper ring	Carbon steel	
㉕	C type retaining ring for unlocking cam shaft	Carbon steel	
㉖	Bushing	Oil-impregnated sintered alloy	ø40 is lead-bronze casted
㉗	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉘	Hexagon socket head cap screw	Chromium molybdenum steel	Nickel plated
㉙	Spring washer for hex. socket head cap screw	Steel wire	Nickel plated
㉚	Bumper A	Urethane	
㉛	Bumper B	Urethane	ø40 is the same as damper A
㉜	Snap ring	Stainless steel	
㉝	Wear ring	Resin	
㉞	Rod end nut	Rolled steel	Nickel plated
㉟	BC element	Bronze	
㊱	Piston gasket	NBR	

Note) In the case of cylinders with auto switches, magnets are installed in the piston.

* The material for ø20 and ø25 cylinders equipped with auto switches is stainless steel.

No.	Description	Material	Note
㊲	Rod seal A	NBR	
㊳	Rod seal B	NBR	
㊴	Piston seal	NBR	
㊵	Cylinder tube gasket	NBR	
㊶	Release piston seal	NBR	
㊷	Rod seal C	NBR	
㊸	Piston guide gasket	NBR	
㊹	Intermediate cover gasket	NBR	
㊺	Unlocking cam gasket	NBR	
㊻	Head cover	Aluminum alloy	Clear hard anodized
㊼	Cylinder tube	Aluminum alloy	Hard anodized
㊽	Cushion ring A	Brass	
㊾	Cushion ring B	Brass	Same as cushion ring A except ø20, 25 standard stroke
㊿	Seal retainer	Rolled steel	Zinc chromated long strokes not available
51	Cushion valve A	Chromium molybdenum steel	Electroless nickel plated
52	Cushion valve B	Rolled steel	Electroless nickel plated
53	Valve retainer	Rolled steel	Electroless nickel plated
54	Lock nut	Rolled steel	Nickel plated
55	Snap ring	Stainless steel	
56	Cushion seal A	Urethane	
57	Cushion seal B	Urethane	Same as cushion seal A except ø20, 25 standard stroke
58	Cushion ring gasket A	NBR	
59	Cushion ring gasket B	NBR	Same as cushion ring gasket A except ø20, 25 standard stroke
60	Valve seal A	NBR	
61	Valve seal B	NBR	
62	Valve retainer gasket	NBR	

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
20	CG1N20-PS	Set of above nos. ㊲, ㊳, ㊴
25	CG1N25-PS	
32	CG1N32-PS	
40	CG1N40-PS	

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

CL

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

MLGP

RLQ

MLU

ML1C

D-

-X

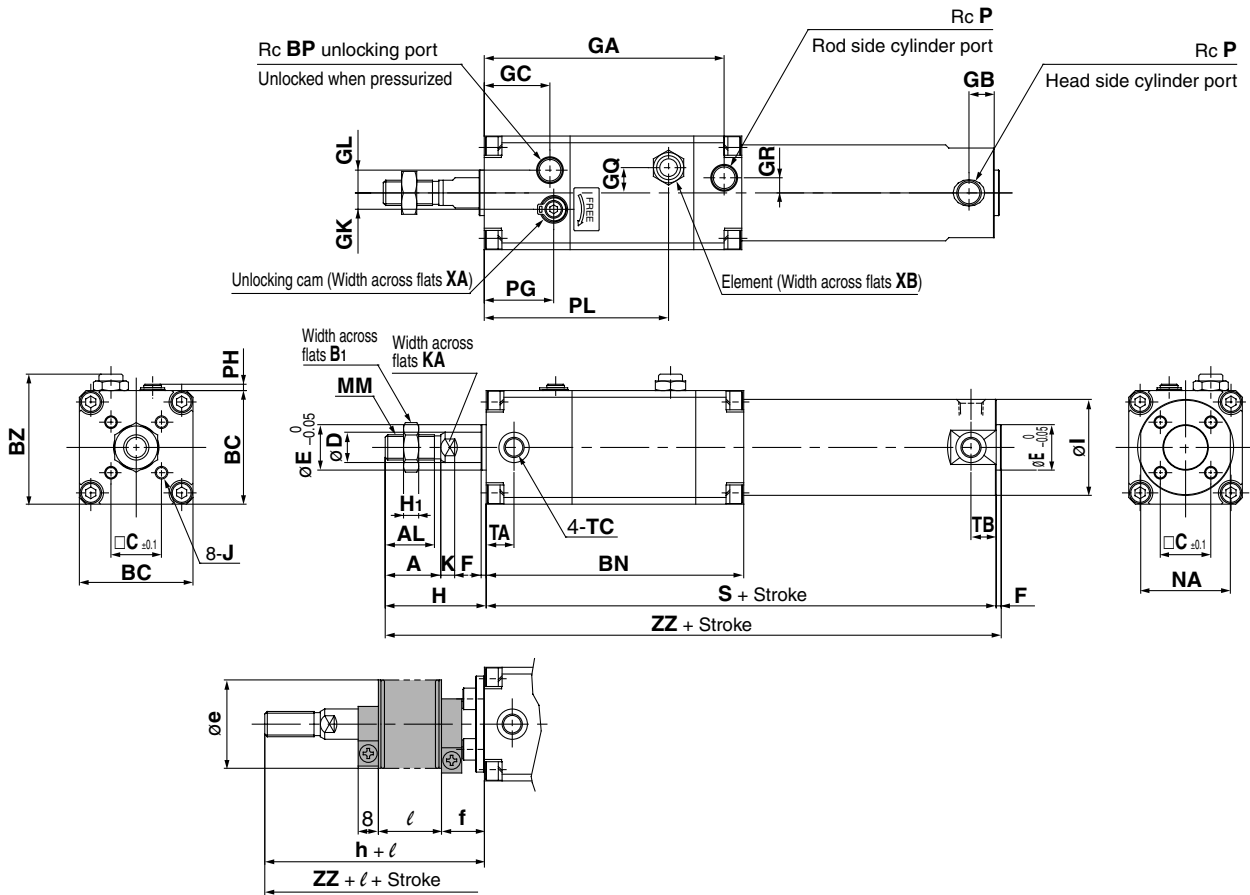
20-

Data

Series CNG

Dimensions

Basic style (B): With rubber bumper CNGBN



With rod boot

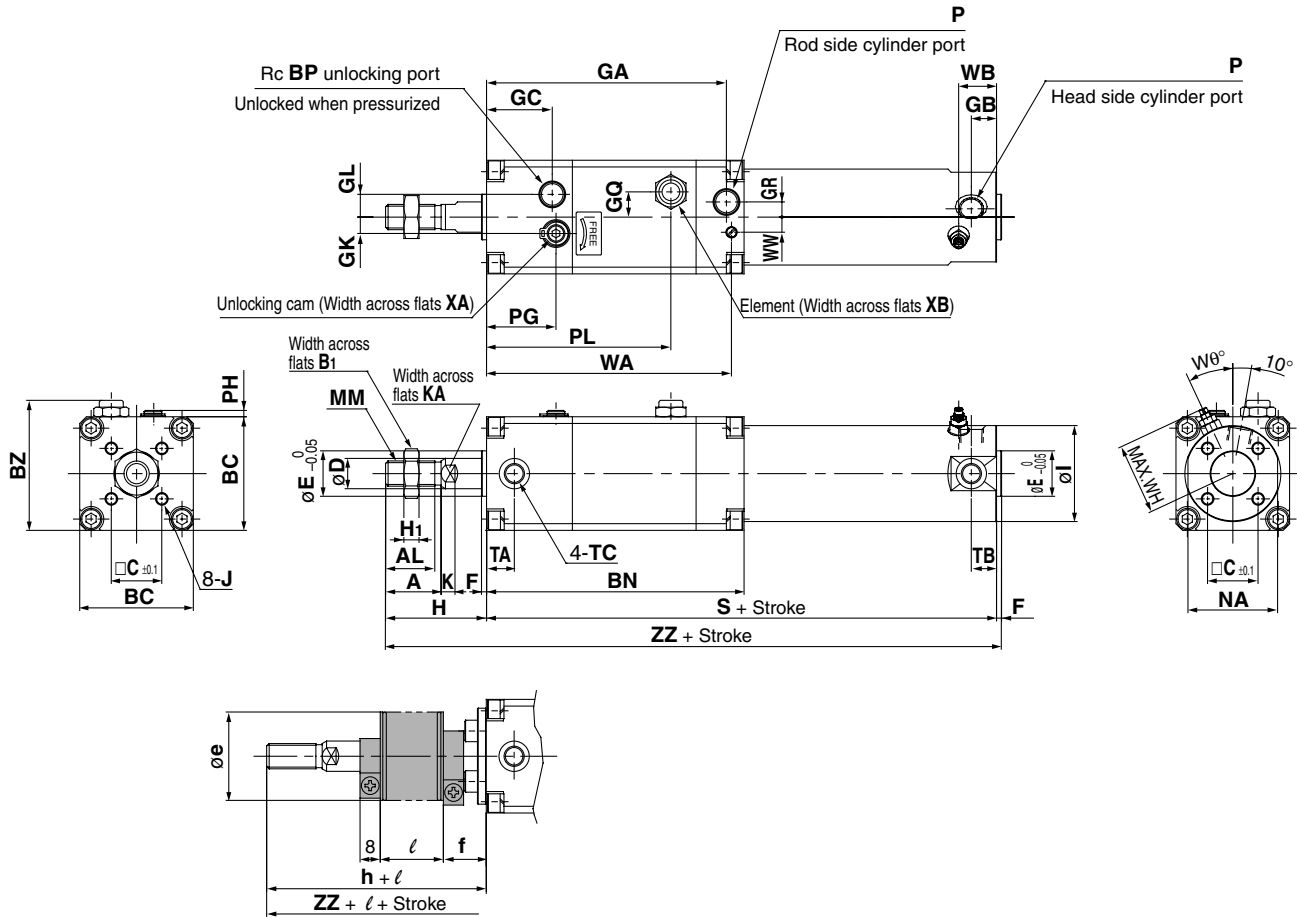
Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	□C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H1	I
	Standard	Long stroke	Standard	Long stroke																				
20	Up to 200	201 to 350	20 to 200	201 to 350	18	15.5	13	38	93	1/8	44.5	14	8	12	2	85	10 (12)	18	5.5	6	4	8	5	26
25	Up to 300	301 to 400	20 to 300	301 to 400	22	19.5	17	45	103	1/8	51.5	16.5	10	14	2	96	10 (12)	25	6.5	9	7	10	6	31
32	Up to 300	301 to 450	20 to 300	301 to 450	22	19.5	17	45	104	1/8	51.5	20	12	18	2	97	10 (12)	25	6.5	9	7	10	6	38
40	Up to 300	301 to 800	20 to 300	301 to 800	30	27	19	52	112	1/8	58.5	26	16	25	2	104	10 (13)	26	7	11	7	12	8	47

Bore size (mm)	J	K	KA	MM	NA	P	PG	PH	PL	S	TA	TB	TC	XA	XB	Without rod boot		With rod boot				
																H	ZZ	e	f	h	ℓ	ZZ
20	M4 x 0.7 depth 7	5	6	M8 x 1.25	24	1/8	21.5	2	65	141 (149)	11	11	M5 x 0.8	3	12	35	178 (186)	30	16	55	0.25 x Stroke	198 (206)
25	M5 x 0.8 depth 7.5	5.5	8	M10 x 1.25	29	1/8	26.5	2.5	73	151 (159)	11	11	M6 x 0.75	3	12	40	193 (201)	30	17	62		215 (223)
32	M5 x 0.8 depth 8	5.5	10	M10 x 1.25	35.5	1/8	26.5	2.5	73	154 (162)	11	10 (11)	M8 x 1.0	3	12	40	196 (204)	35	17	62		218 (226)
40	M6 x 1 depth 12	6	14	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	12	10 (12)	M10 x 1.25	4	12	50	221 (230)	35	17	70		241 (250)

Note) (): Denotes the dimensions for long stroke.

Cylinder with Lock Double Acting, Single Rod Series **CNG**

Basic style (B): With air cushion CNGBA



With rod boot

Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁	I
	Standard	Long stroke	Standard	Long stroke																				
20	Up to 200	201 to 350	20 to 200	201 to 350	18	15.5	13	38	93	1/8	44.5	14	8	12	2	87	10 (12)	18	5.5	6	4	8	5	26
25	Up to 300	301 to 400	20 to 300	301 to 400	22	19.5	17	45	103	1/8	51.5	16.5	10	14	2	97	10 (12)	25	6.5	9	7	10	6	31
32	Up to 300	301 to 450	20 to 300	301 to 450	22	19.5	17	45	104	1/8	51.5	20	12	18	2	97	10 (12)	25	6.5	9	7	10	6	38
40	Up to 300	301 to 800	20 to 300	301 to 800	30	27	19	52	112	1/8	58.5	26	16	25	2	104	10 (13)	26	7	11	7	12	8	47

Bore size (mm)	J	K	KA	MM	NA	P	PG	PH	PL	S	TA	TB	TC	WA	WB	WH	WW	Wθ	XA	XB
20	M4 x 0.7 depth 7	5	6	M8 x 1.25	24	M5 x 0.8	21.5	2	65	141 (149)	11	11	M5 x 0.8	88	15 (16)	23	5.5	30°	3	12
25	M5 x 0.8 depth 7.5	5.5	8	M10 x 1.25	29	M5 x 0.8	26.5	2.5	73	151 (159)	11	11	M6 x 0.75	98	15 (16)	25	6	30°	3	12
32	M5 x 0.8 depth 8	5.5	10	M10 x 1.25	35.5	Rc 1/8	26.5	2.5	73	154 (162)	11	10 (11)	M8 x 1.0	99	15 (16)	28.5	6	25°	3	12
40	M6 x 1 depth 12	6	14	M14 x 1.5	44	Rc 1/8	28	2.5	81	169 (178)	12	10 (12)	M10 x 1.25	107	15 (16)	33	8	20°	4	12

Bore size (mm)	Without rod boot		With rod boot						
	H	ZZ	e	f	h	ℓ	ZZ		
20	35	178 (186)	30	16	55		198 (206)		
25	40	193 (201)	30	17	62		215 (223)		
32	40	196 (204)	35	17	62	0.25 x Stroke	218 (226)		
40	50	221 (230)	35	17	70		241 (250)		

Note) (): Denotes the dimensions for long stroke.

Dimensions with mounting bracket are the same as dimensions with rubber bumper.

CL

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

MLGP

RLQ

MLU

ML1C

D-

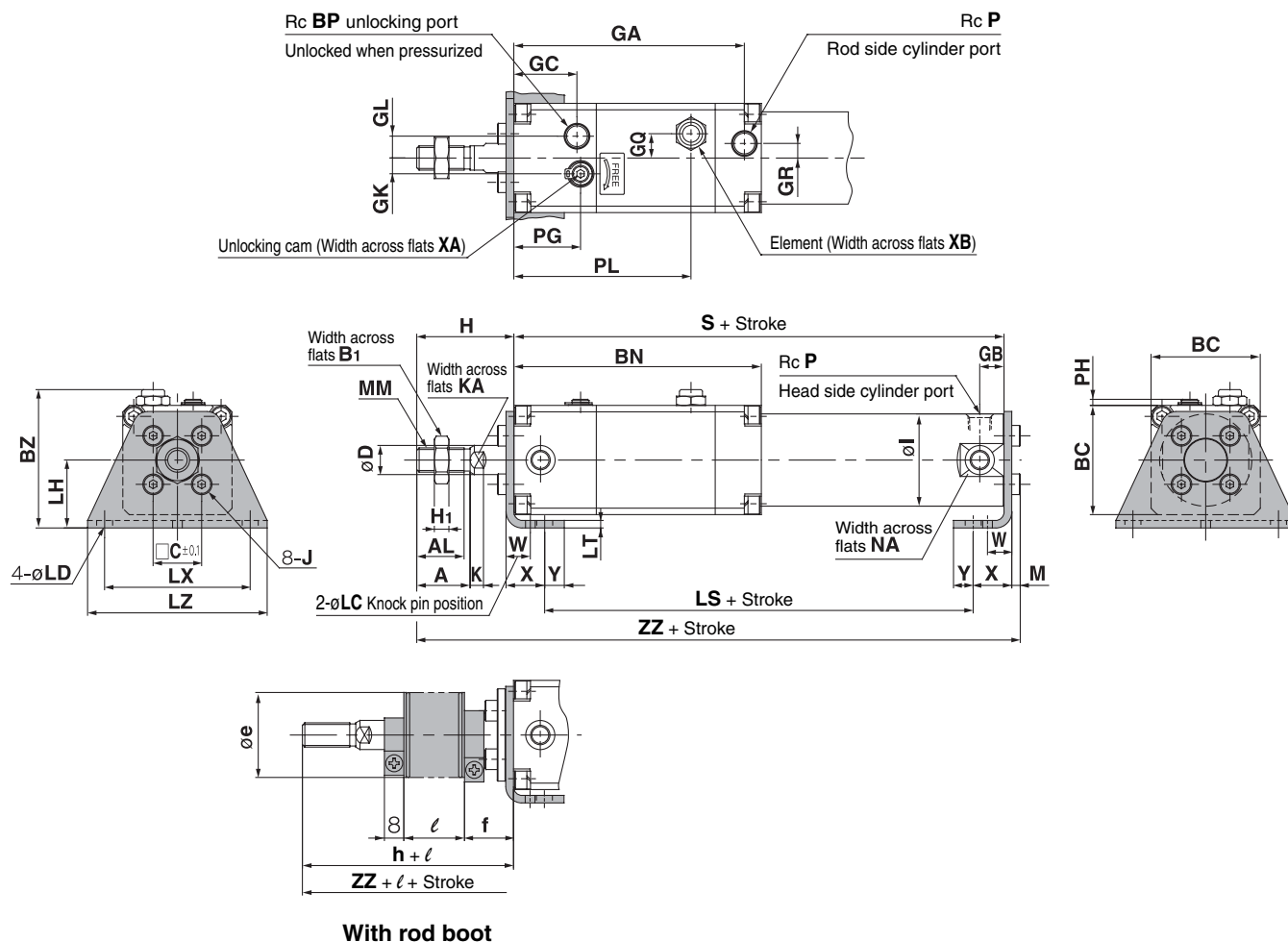
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20-

Data

Dimensions

Axial foot style (L): With rubber bumper CNGLN



With rod boot

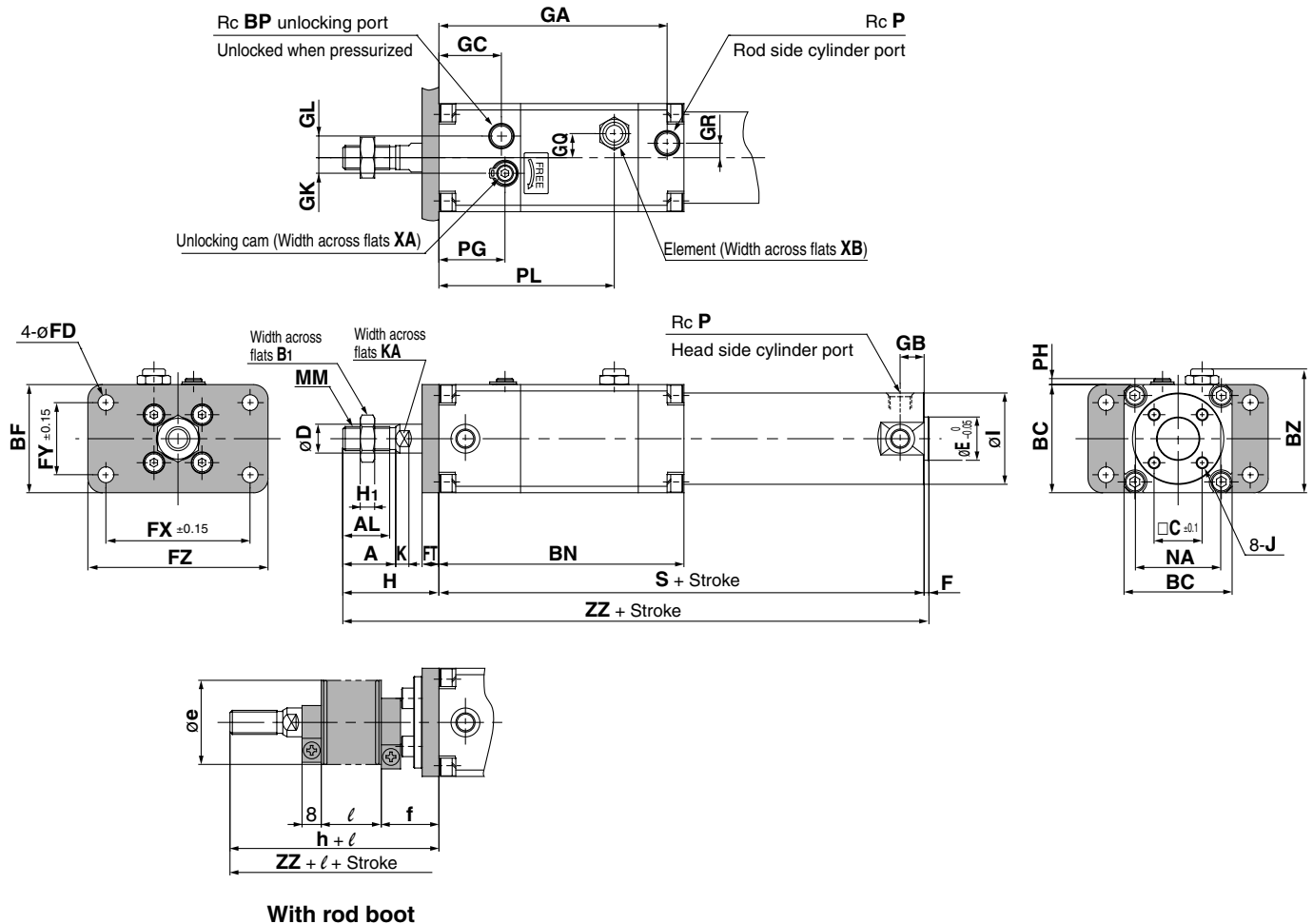
Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	C	D	GA	GB	GC	GK	GL	GR	GQ	H1	I	J
	Standard	Long stroke	Standard	Long stroke																			
20	Up to 200	201 to 350	20 to 200	201 to 350	18	15.5	13	38	93	1/8	50.5	14	8	85	10 (12)	18	5.5	6	4	8	5	26	M4 x 0.7
25	Up to 300	301 to 400	20 to 300	301 to 400	22	19.5	17	45	103	1/8	57	16.5	10	96	10 (12)	25	6.5	9	7	10	6	31	M5 x 0.8
32	Up to 300	301 to 450	20 to 300	301 to 450	22	19.5	17	45	104	1/8	57	20	12	97	10 (12)	25	6.5	9	7	10	6	38	M5 x 0.8
40	Up to 300	301 to 800	20 to 300	301 to 800	30	27	19	52	112	1/8	65.5	26	16	104	10 (13)	26	7	11	7	12	8	47	M6 x 1

Bore size (mm)	K	KA	M	MM	NA	P	PG	PH	PL	S	LC	LD	LH	LS	LT	LX	LZ	X	Y	W	XA	XB
20	5	6	3	M8 x 1.25	24	1/8	21.5	2	65	141 (149)	4	6	25	117 (125)	3	50	62	15	7	10	3	12
25	5.5	8	3.5	M10 x 1.25	29	1/8	26.5	2.5	73	151 (159)	4	6	28	127 (135)	3	57	70	15	7	10	3	12
32	5.5	10	3.5	M10 x 1.25	35.5	1/8	26.5	2.5	73	154 (162)	4	6.6	28	128 (136)	3	60	74	16	8	10	3	12
40	6	14	4	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	4	6.6	33	142 (151)	3	68	84	16.5	8.5	10	4	12

Bore size (mm)	Without rod boot			With rod boot				
	H	ZZ		e	f	h	ℓ	ZZ
20	35	182	(190)	30	19	55	0.25 x Stroke	202 (210)
25	40	197.5	(205.5)	30	20	62		219.5 (227.5)
32	40	200.5	(208.5)	35	20	62		222.5 (230.5)
40	50	226	(235)	35	20	70		246 (255)

Note) (): Denotes the dimensions for long stroke.

Rod side flange style (F): With rubber bumper CNGFN



With rod boot

Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B1	BC	BF	BN	BP	BZ	□C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H1
	Standard	Long stroke	Standard	Long stroke																				
20	Up to 200	201 to 350	20 to 200	201 to 350	18	15.5	13	38	38	93	1/8	44.5	14	8	12	2	85	10 (12)	18	5.5	6	4	8	5
25	Up to 300	301 to 400	20 to 300	301 to 400	22	19.5	17	45	45	103	1/8	51.5	16.5	10	14	2	96	10 (12)	25	6.5	9	7	10	6
32	Up to 300	301 to 450	20 to 300	301 to 450	22	19.5	17	45	45	104	1/8	51.5	20	12	18	2	97	10 (12)	25	6.5	9	7	10	6
40	Up to 300	301 to 800	20 to 300	301 to 800	30	27	19	52	52	112	1/8	58.5	26	16	25	2	104	10 (13)	26	7	11	7	12	8

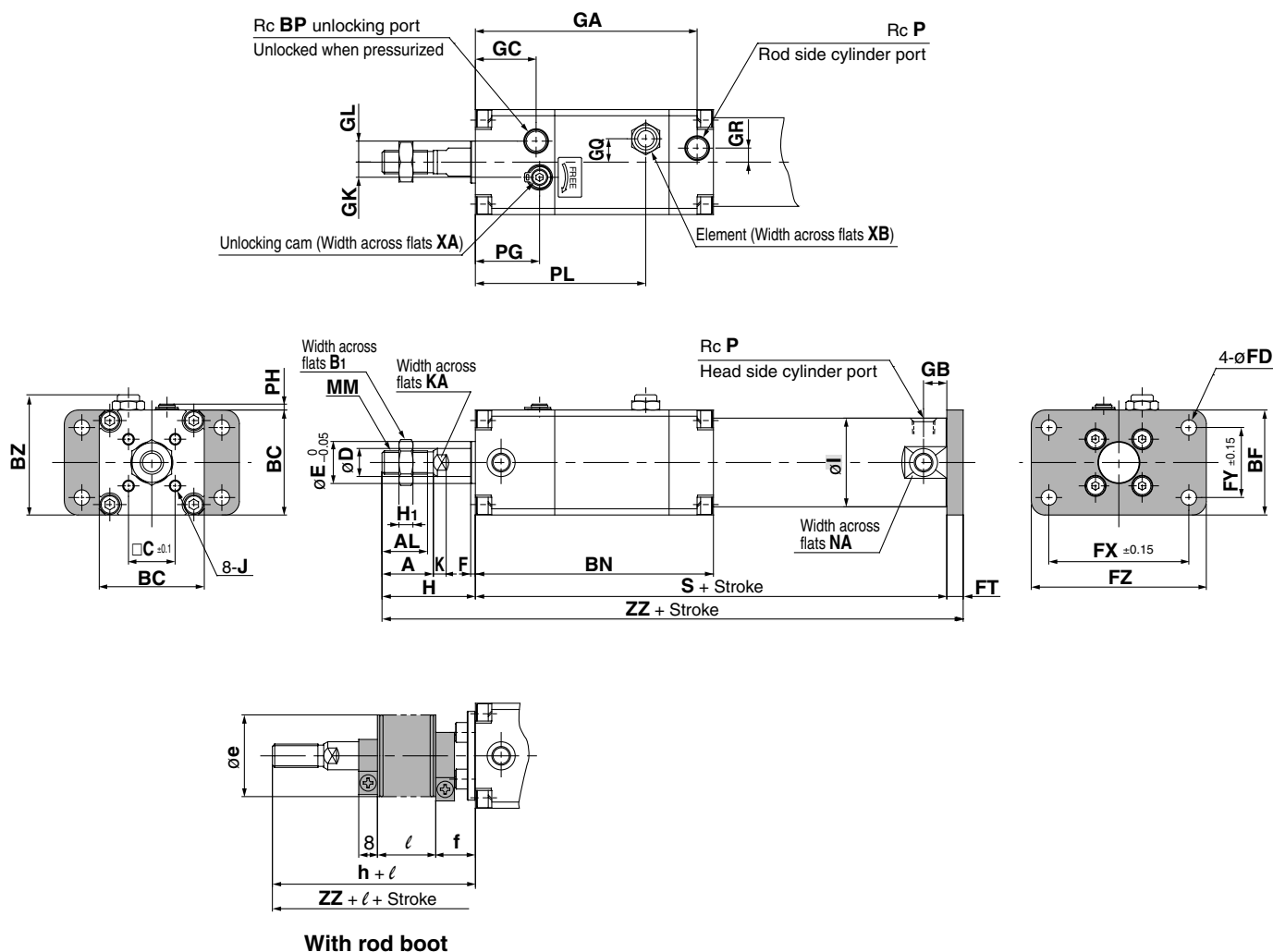
Bore size (mm)	I	J	K	KA	MM	NA	P	PG	PH	PL	S	FD	FT	FX	FY	FZ	XA	XB	Without rod boot		With rod boot					
																			H	ZZ	e	f	h	ℓ	ZZ	
20	26	M4 x 0.7	5	6	M8 x 1.25	24	1/8	21.5	2	65	141 (149)	5.5	6	52	25	65	3	12	35	178 (186)	30	22	55	0.25 x Stroke	198 (206)	
25	31	M5 x 0.8	5.5	8	M10 x 1.25	29	1/8	26.5	2.5	73	151 (159)	5.5	7	60	30	75	3	12	40	193 (201)	30	24	62		215 (223)	
32	38	M5 x 0.8	5.5	10	M10 x 1.25	35.5	1/8	26.5	2.5	73	154 (162)	6.6	7	60	30	75	3	12	40	196 (204)	35	24	62		218 (226)	
40	47	M6 x 1	6	14	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	6.6	8	66	36	82	4	12	50	221 (230)	35	25	70		241 (250)	

Note) (): Denotes the dimensions for long stroke.

CL
CL1
MLGC
CNG
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RLQ
MLU
ML1C
D-
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20-
Data

Dimensions

Head side flange style (G): With rubber bumper CNGGN



With rod boot

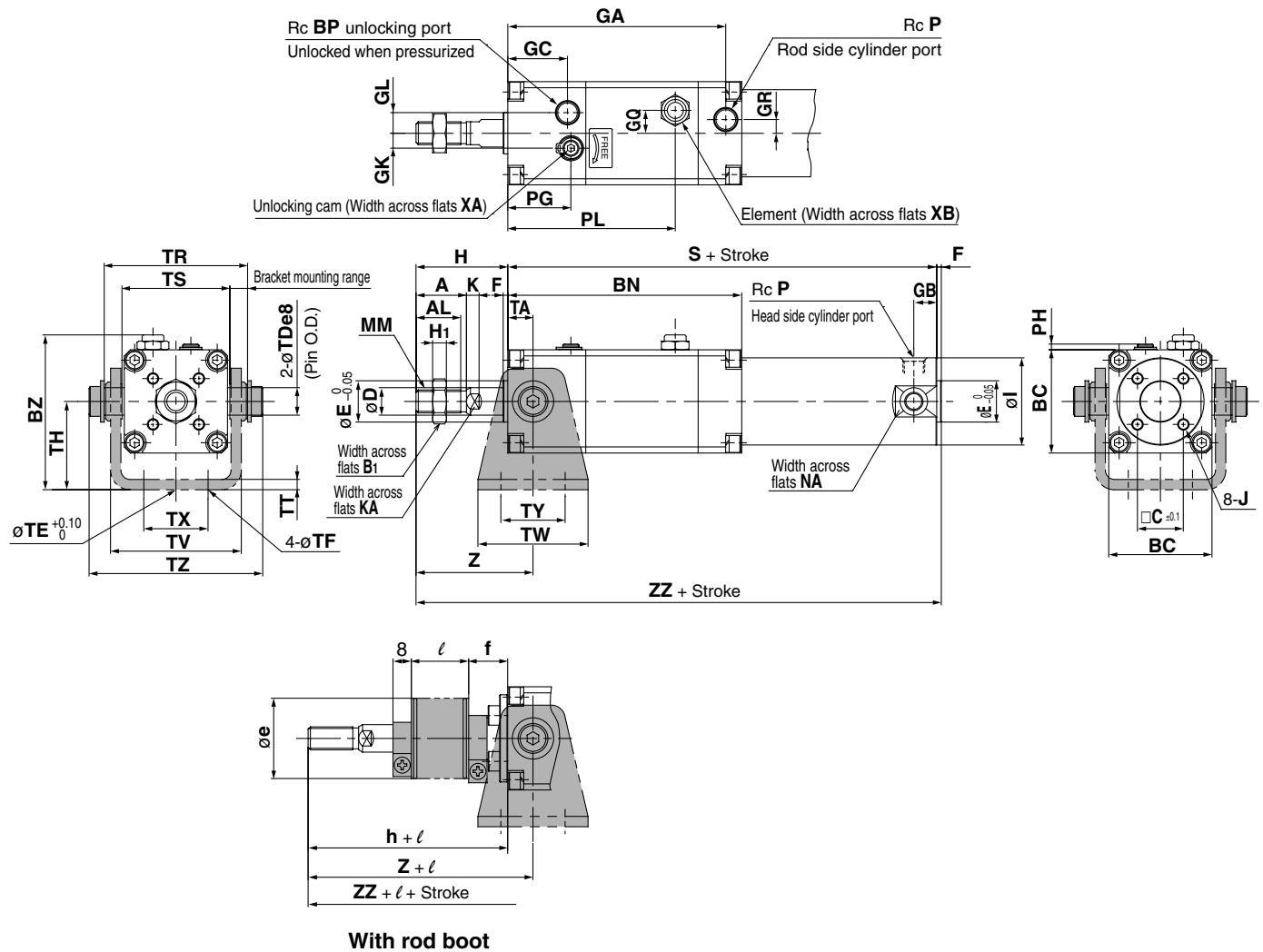
Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BF	BN	BP	BZ	□C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁	I
	Standard	Long stroke	Standard	Long stroke																					
20	Up to 200	—	20 to 200	—	18	15.5	13	38	38	93	1/8	44.5	14	8	12	2	85	10	18	5.5	6	4	8	5	26
25	Up to 300	—	20 to 300	—	22	19.5	17	45	45	103	1/8	51.5	16.5	10	14	2	96	10	25	6.5	9	7	10	6	31
32	Up to 300	—	20 to 300	—	22	19.5	17	45	45	104	1/8	51.5	20	12	18	2	97	10	25	6.5	9	7	10	6	38
40	Up to 300	301 to 500	20 to 300	301 to 500	30	27	19	52	52	112	1/8	58.5	26	16	25	2	104	10 (13)	26	7	11	7	12	8	47

Bore size (mm)	J	K	KA	MM	NA	P	PG	PH	PL	S	FD	FT	FX	FY	FZ	XA	XB	Without rod boot		With rod boot					
																		H	ZZ	e	f	h	ℓ	ZZ	
20	M4 x 0.7	5	6	M8 x 1.25	24	1/8	21.5	2	65	141	5.5	6	52	25	65	3	12	35	182	30	16	55	0.25 x Stroke	202	
25	M5 x 0.8	5.5	8	M10 x 1.25	29	1/8	26.5	2.5	73	151	5.5	7	60	30	75	3	12	40	198	30	17	62		220	
32	M5 x 0.8	5.5	10	M10 x 1.25	35.5	1/8	26.5	2.5	73	154	6.6	7	60	30	75	3	12	40	201	35	17	62		223	
40	M6 x 1	6	14	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	6.6	8	66	36	82	4	12	50	227 (236)	35	17	70		247 (256)	

Note) (): Denotes the dimensions for long stroke.

Cylinder with Lock Double Acting, Single Rod Series **CNG**

Rod side trunnion style (U): With rubber bumper CNGUN



Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	□C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁	I
	Standard	Long stroke	Standard	Long stroke																				
20	Up to 200	—	20 to 200	—	18	15.5	13	38	93	1/8	56.5	14	8	12	2	85	10	18	5.5	6	4	8	5	26
25	Up to 300	—	20 to 300	—	22	19.5	17	45	103	1/8	66	16.5	10	14	2	96	10	25	6.5	9	7	10	6	31
32	Up to 300	—	20 to 300	—	22	19.5	17	45	104	1/8	67.5	20	12	18	2	97	10	25	6.5	9	7	10	6	38
40	Up to 300	301 to 500	20 to 300	301 to 500	30	27	19	52	112	1/8	75	26	16	25	2	104	10 (13)	26	7	11	7	12	8	47

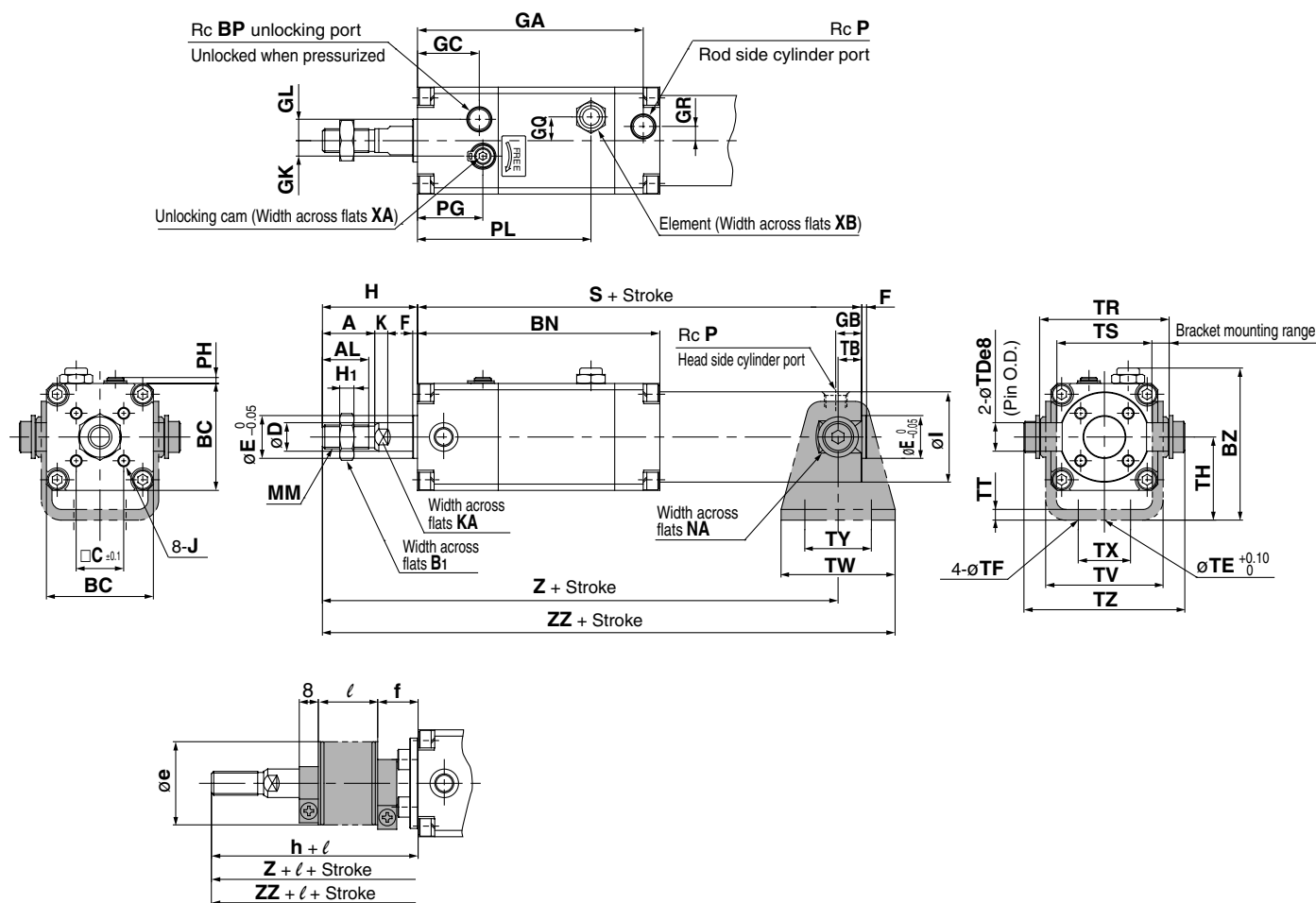
Bore size (mm)	J	K	KA	MM	NA	P	PG	PH	PL	S	TA	TDe8	TE	TF	TH	TR	TS	TT	TV	TW	TX	TY	TZ	XA	XB
20	M4 x 0.7	5	6	M8 x 1.25	24	1/8	21.5	2	65	141	11	8 ^{-0.025 -0.047}	10	5.5	31	51	40	3.2	47.8	42	26	28	59.6	3	12
25	M5 x 0.8	5.5	8	M10 x 1.25	29	1/8	26.5	2.5	73	151	11	10 ^{-0.025 -0.047}	10	5.5	37	58	47	3.2	54.8	42	28	28	68	3	12
32	M5 x 0.8	5.5	10	M10 x 1.25	35.5	1/8	26.5	2.5	73	154	11	12 ^{-0.032 -0.059}	10	6.6	38.5	62.5	47	4.5	57.4	48	28	28	75.7	3	12
40	M6 x 1	6	14	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	12	14 ^{-0.032 -0.059}	10	6.6	42.5	72.5	54	4.5	65.4	56	36	30	85.7	4	12

Bore size (mm)	Without rod boot			With rod boot							
	H	Z	ZZ	e	f	h	l	Z	ZZ		
20	35	46	178	30	16	55	0.25 x Stroke	66	198		
25	40	51	193	30	17	62		73	215		
32	40	51	196	35	17	62		73	218		
40	50	62	221 (230)	35	17	70		82	241 (250)		

Note) (): Denotes the dimensions for long stroke.
For the pivot bracket, refer to page 9-5-20.

Dimensions

Head side trunnion style (T): With rubber bumper CNGTN



With rod boot

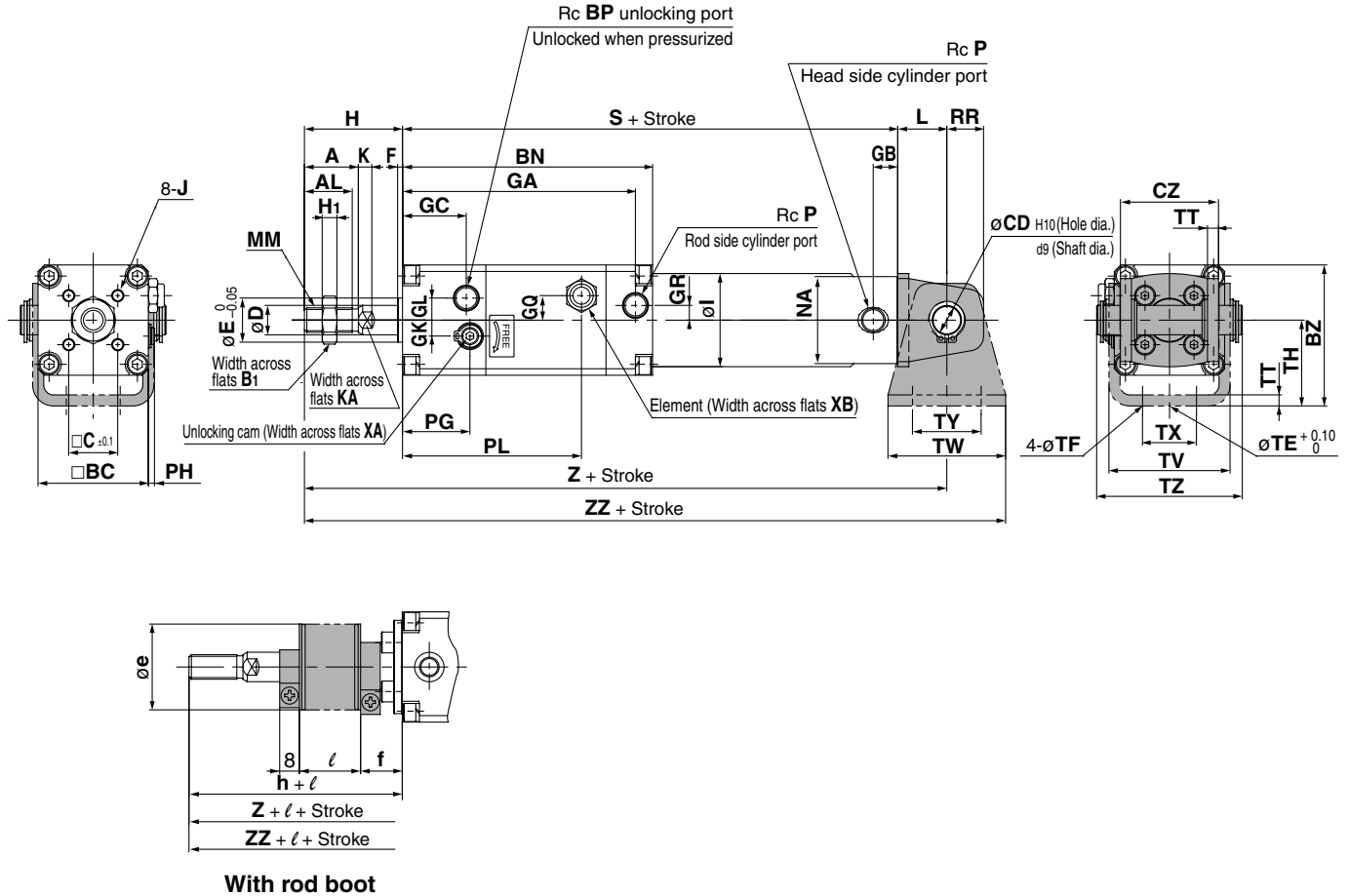
Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	□C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁	I
	Standard	Long stroke	Standard	Long stroke																				
20	Up to 200	—	20 to 200	—	18	15.5	13	38	93	1/8	50.5	14	8	12	2	85	10	18	5.5	6	4	8	5	26
25	Up to 300	—	20 to 300	—	22	19.5	17	45	103	1/8	59	16.5	10	14	2	96	10	25	6.5	9	7	10	6	31
32	Up to 300	—	20 to 300	—	22	19.5	17	45	104	1/8	64	20	12	18	2	97	10	25	6.5	9	7	10	6	38
40	Up to 300	301 to 500	20 to 300	301 to 500	30	27	19	52	112	1/8	72.5	26	16	25	2	104	10 (13)	26	7	11	7	12	8	47

Bore size (mm)	J	K	KA	MM	NA	P	PG	PH	PL	S	TB	TDe8	TE	TF	TH	TR	TS	TT	TV	TW	TX	TY	TZ	XA	XE
20	M4 x 0.7	5	6	M8 x 1.25	24	1/8	21.5	2	65	141	11	8 ^{-0.025} _{-0.047}	10	5.5	25	39	28	3.2	35.8	42	16	28	47.6	3	12
25	M5 x 0.8	5.5	8	M10 x 1.25	29	1/8	26.5	2.5	73	151	11	10 ^{-0.025} _{-0.047}	10	5.5	30	43	33	3.2	39.8	42	20	28	53	3	12
32	M5 x 0.8	5.5	10	M10 x 1.25	35.5	1/8	26.5	2.5	73	154	10	12 ^{-0.032} _{-0.059}	10	6.6	35	54.5	40	4.5	49.4	48	22	28	67.7	3	12
40	M6 x 1	6	14	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	10 (12)	14 ^{-0.032} _{-0.059}	10	6.6	40	65.5	49	4.5	58.4	56	30	30	78.7	4	12

Bore size (mm)	Without rod boot			With rod boot					
	H	Z	ZZ	e	f	h	ℓ	Z	ZZ
20	35	165	186	30	16	55	0.25 x Stroke	185	206
25	40	180	201	30	17	62		202	223
32	40	184	208	35	17	62		206	230
40	50	209 (216)	237 (244)	35	17	70		229 (236)	257 (264)

Note) (): Denotes the dimensions for long stroke.
For the pivot bracket, refer to page 9-5-20.

Clevis style (D): With rubber bumper CNGDN



Bore size (mm)	Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	□C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁	I
	Standard	Long stroke	Standard	Long stroke																				
20	Up to 200	—	20 to 200	—	18	15.5	13	38	93	1/8	44	14	8	12	2	85	10	18	5.5	6	4	8	5	26
25	Up to 300	—	20 to 300	—	22	19.5	17	45	103	1/8	52.5	16.5	10	14	2	96	10	25	6.5	9	7	10	6	31
32	Up to 300	—	20 to 300	—	22	19.5	17	45	104	1/8	57.5	20	12	18	2	97	10	25	6.5	9	7	10	6	38
40	Up to 300	301 to 500	20 to 300	301 to 500	30	27	19	52	112	1/8	66	26	16	25	2	104	10 (13)	26	7	11	7	12	8	47

Bore size (mm)	J	K	KA	MM	NA	P	PG	PH	PL	S	CD	CZ	L	RR	TE	TF	TH	TT	TV	TW	TX	TY	TZ	XA	XB
20	M4 x 0.7	5	6	M8 x 1.25	24	1/8	21.5	2	65	141	8	29	14	11	10	5.5	25	3.2	35.8	42	16	28	43.4	3	12
25	M5 x 0.8	5.5	8	M10 x 1.25	29	1/8	26.5	2.5	73	151	10	33	16	13	10	5.5	30	3.2	39.8	42	20	28	48	3	12
32	M5 x 0.8	5.5	10	M10 x 1.25	35.5	1/8	26.5	2.5	73	154	12	40	20	15	10	6.6	35	4.5	49.4	48	22	28	59.4	3	12
40	M6 x 1	6	14	M14 x 1.5	44	1/8	28	2.5	81	169 (178)	14	49	22	18	10	6.6	40	4.5	58.4	56	30	30	71.4	4	12

Bore size (mm)	Without rod boot			With rod boot					
	H	Z	ZZ	e	f	h	l	Z	ZZ
20	35	190	211	30	16	55	0.25 x Stroke	210	231
25	40	207	228	30	17	62		229	250
32	40	214	238	35	17	62		236	260
40	50	241 (250)	269 (278)	35	17	70		261 (270)	289 (298)

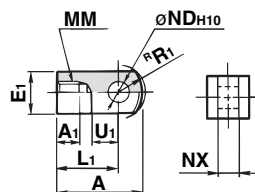
Note) (): Denotes the dimensions for long stroke.
Clevis pin and snap ring are attached.
For the pivot bracket, refer to page 9-5-20.

Accessory Bracket Dimensions

Single Knuckle Joint

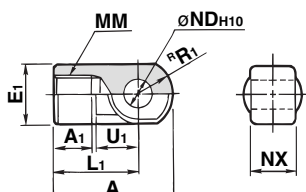
I-G02/G03

Material: Rolled steel



I-G04

Material: Cast iron

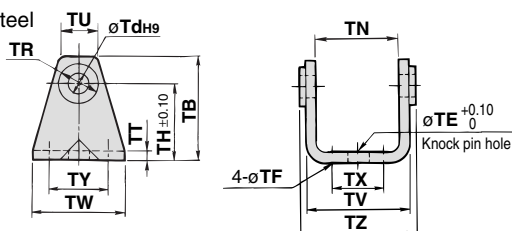


Part no.	Applicable bore size (mm)	A	A1	E1	L1	MM	R1	U1	NDH10	NX
I-G02	2	34	8.5	16	25	M8 x 1.25	10.3	11.5	8 ^{+0.058} ₀	8 ^{-0.2} _{-0.4}
I-G03	25, 32	41	10.5	20	30	M10 x 1.25	12.8	14	10 ^{+0.058} ₀	10 ^{-0.2} _{-0.4}
I-G04	40	42	14	22	30	M14 x 1.5	12	14	10 ^{+0.058} ₀	18 ^{-0.3} _{-0.5}

Rod Side Pivot Bracket

ø20 to ø40

Material: Rolled steel

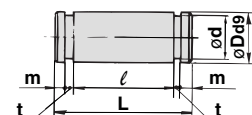


Part no.	Applicable bore size (mm)	TB	TdH9	TE	TF	TH	TN
CNG-020-24	20	42	8 ^{+0.036} ₀	10	5.5	31	41 ^{+0.4} _{+0.1}
CNG-025-24	25	48	10 ^{+0.036} ₀	10	5.5	37	48 ^{+0.4} _{+0.1}
CNG-032-24	32	53	12 ^{+0.043} ₀	10	6.6	38.5	48 ^{+0.5} _{+0.1}
CNG-040-24	40	60	14 ^{+0.043} ₀	10	6.6	42.5	56 ^{+0.5} _{+0.1}

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

Knuckle Pin

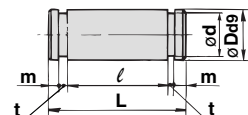
Material: Carbon steel



Part no.	Applicable bore size (mm)	Dø9	L	d	ℓ	m	t	Applicable snap ring
IY-G02	20	8 ^{-0.040} _{-0.076}	21	7.6	16.2	1.5	0.9	Type C 8 for axis
IY-G03	25, 32	10 ^{-0.040} _{-0.076}	25.6	9.6	20.2	1.55	1.15	Type C 10 for axis
IY-G04	40	10 ^{-0.040} _{-0.076}	41.6	9.6	36.2	1.55	1.15	Type C 10 for axis

Clevis Pin

Material: Carbon steel



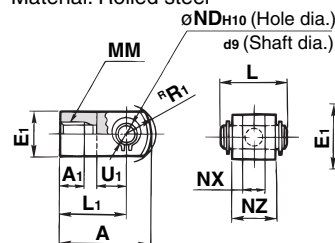
Part no.	Applicable bore size (mm)	Dø9	L	d	ℓ	m	t	Applicable snap ring
CD-G02	20	8 ^{-0.040} _{-0.076}	43.4	7.6	38.6	1.5	0.9	Type C 8 for axis
CD-G25	25	10 ^{-0.040} _{-0.076}	48	9.6	42.6	1.55	1.15	Type C 10 for axis
CD-G03	32	12 ^{-0.050} _{-0.093}	59.4	11.5	54	1.55	1.15	Type C 12 for axis
CD-G04	40	14 ^{-0.050} _{-0.093}	71.4	13.4	65	2.05	1.15	Type C 14 for axis

Double Knuckle Joint

* Knuckle pin and snap ring are attached.

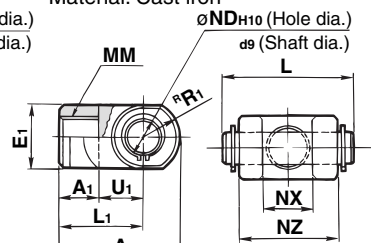
Y-G02/G03

Material: Rolled steel



Y-G04

Material: Cast iron

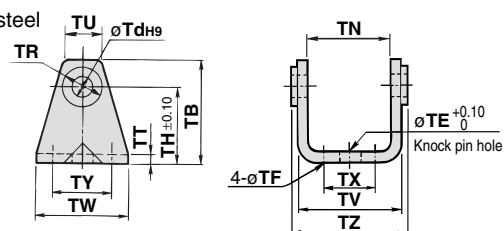


Part no.	Applicable bore size (mm)	A	A1	E1	L1	MM	R1	U1	ND	NX	NZ	L	Applicable pin part no.
Y-G02	20	34	8.5	16	25	M8 x 1.25	10.3	11.5	8	8 ^{+0.4} _{+0.2}	16	21	IY-G02
Y-G03	25, 32	41	10.5	20	30	M10 x 1.25	12.8	14	10	10 ^{+0.4} _{+0.2}	20	25.6	IY-G03
Y-G04	40	42	16	22	30	M14 x 1.5	12	14	10	18 ^{+0.5} _{+0.3}	36	41.6	IY-G04

Head Side Pivot Bracket

ø20 to ø40

Material: Rolled steel

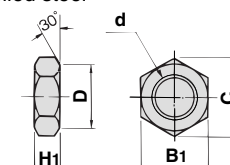


Part no.	Applicable bore size (mm)	TB	TdH9	TE	TF	TH	TN
CG-020-24A	20	36	8 ^{+0.036} ₀	10	5.5	25	(29.3)
CG-025-24A	25	43	10 ^{+0.036} ₀	10	5.5	30	(33.1)
CG-032-24A	32	50	12 ^{+0.043} ₀	10	6.6	35	(40.4)
CG-040-24A	40	58	14 ^{+0.043} ₀	10	6.6	40	(49.2)

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

Rod End Nut

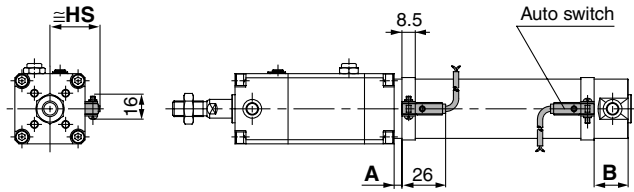
Material: Rolled steel



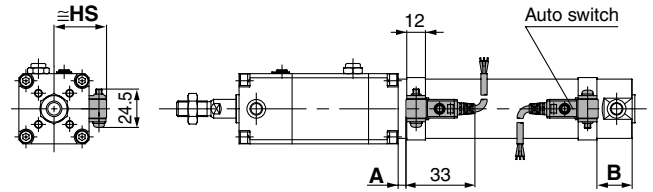
Part no.	Applicable bore size (mm)	B1	C	D	d	H1
NT-02	20	13	(15)	12.5	M8 x 1.25	5
NT-03	25, 32	17	(19.6)	16.5	M10 x 1.25	6
NT-G04	40	19	(21.9)	18	M14 x 1.5	8

Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

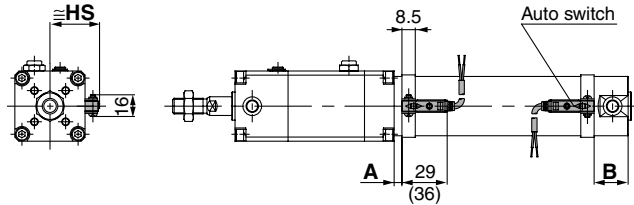
D-C7, D-C8



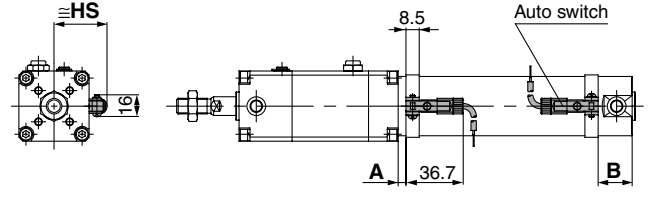
D-G5NTL



D-H7□, D-H7□W
D-H7NF, D-H7BAL

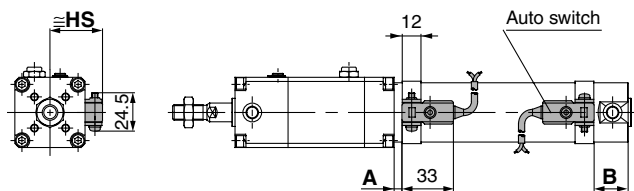


D-C73C, D-C80C

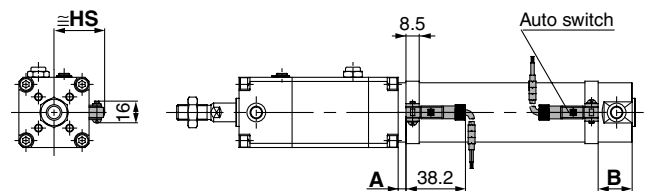


* () : denotes the values of D-H7LF.

D-B5, D-B6, D-B59W



D-H7C



Proper Auto Switch Mounting Position

Auto switch model Bore size (mm)	D-C7□/C80 D-C73C D-C80C		D-B5□/B64		D-B59W		D-H7□ D-H7C D-H7□W D-H7BAL D-H7NF		D-G5NTL	
	A	B	A	B	A	B	A	B	A	B
20	8.5	20.5 (28.5)	2.5	14.5 (22.5)	5.5	17.5 (25.5)	7.5	19.5 (27.5)	4	16 (24)
25	8.5	20.5 (28.5)	2.5	14.5 (22.5)	5.5	17.5 (25.5)	7.5	19.5 (27.5)	4	16 (24)
32	9.5	21.5 (29.5)	3.5	15.5 (23.5)	6.5	18.5 (26.5)	8.5	20.5 (28.5)	5	17 (25)
40	14.5	23.5 (33)	8.5	17.5 (27)	11	20.5 (30)	13.5	22.5 (32)	10	19 (28.5)

() : Denotes the dimensions for long stroke.

Auto Switch Mounting Height

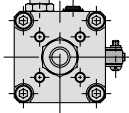
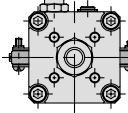
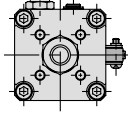
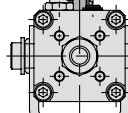
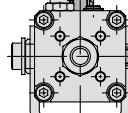
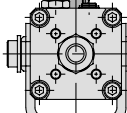
D-C7□/C80 D-H7□ D-H7□W D-H7NF D-H7BAL	D-C73C D-C80C	D-B5□/B64 D-B59W	D-G5NTL D-H7C
HS	HS	HS	HS
24.5	27	27.5	
27	29.5	30	
30.5	33	33.5	
35	37.5	38	

Operating Range

Auto switch model	Bore size (mm)			
	20	25	32	40
D-C7□/C-80 D-C73C/C-80C	8	10	9	10
D-B5□/B64	8	10	9	10
D-B59W	13	13	14	14
D-H7□, D-H7□W H7BAL/H7NF	4	4	4.5	5
D-H7C	7	8.5	9	10
D-G5NTL	4	4	4.5	5
D-G5NBL	35	40	40	45

* Since this is a guideline including hysteresis, not meant to be guaranteed.
(Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting Brackets by Stroke/Mounting Surfaces

st: Stroke (mm)						
Mounting bracket	Basic style, Foot style, Flange style, Clevis style			Trunnion style		
No. of auto switches mounted	1 (Rod cover side)	2 (Different sides)	2 (Mounted on the same side)	1	2 (Different sides)	2 (Mounted on the same side)
Switch mounting surface	Port surface 	Port surface 	Port surface 			
Switch type						
D-C7□/C80	10 st or more	15 to 49 st	50 st or more	10 st or more	15 to 49 st	50 st or more
D-H7□/H7□W D-H7BAL/H7NF	10 st or more	15 to 59 st	60 st or more	10 st or more	15 to 59 st	60 st or more
D-C73C/C80C/H7C	10 st or more	15 to 64 st	65 st or more	10 st or more	15 to 64 st	65 st or more
D-B5□/B64/G5NTL	10 st or more	15 to 74 st	75 st or more	10 st or more	15 to 74 st	75 st or more
D-B59W	15 st or more	20 to 74 st	75 st or more	15 st or more	20 to 74 st	75 st or more

Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted. For detailed specifications, refer to page 9-15-1.

Type	Model	Electrical entry	Features	Applicable bore size (mm)
Reed switch	D-C80	Grommet	Without indicator light	20 to 40
	D-C80C	Connector		
	D-B53	Grommet	—	
	D-B64	Grommet	Without indicator light	
Solid state switch	D-G5NTL	Grommet	With timer	

* Wide range detection type, solid state auto switch (D-G5NBL type) is also available. For details, refer to page 9-15-65.

* With pre-wire connector is available for D-G5NTL, G5NBL type, too. For details, refer to page 9-15-66.



Safety Instructions

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

 **Caution :** Operator error could result in injury or equipment damage.

 **Warning :** Operator error could result in serious injury or loss of life.

 **Danger :** In extreme conditions, there is a possible result of serious injury or loss of life.

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

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

Warning

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

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

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

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Actuator Precautions 1

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Caution on Design

Warning

1. **There is a possibility of dangerous sudden action by air cylinders if sliding parts of machinery are twisted due to external forces, etc.**

In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

2. **A protective cover is recommended to minimize the risk of personal injury.**

If a stationary object and moving parts of a cylinder are in close proximity, personal injury may occur. Design the structure to avoid contact with the human body.

3. **Securely tighten all stationary parts and connected parts so that they will not become loose.**

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

4. **A deceleration circuit or shock absorber may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact.

In this case, the rigidity of the machinery should also be examined.

5. **Consider a possible drop in circuit pressure due to a power outage, etc.**

When a cylinder is used in a clamping mechanism, there is a danger of workpieces dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and human injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

6. **Consider a possible loss of power source.**

Measures should be taken to protect against bodily injury and equipment damage in the event that there is a loss of power to equipment controlled by pneumatics, electricity, or hydraulics.

7. **Design circuitry to prevent sudden lurching of driven objects.**

When a cylinder is driven by an exhaust center type directional control valve or when starting up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will lurch at high speed if pressure is applied to one side of the cylinder because of the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits designed to prevent sudden lurching, because there is a danger of human injury and/or damage to equipment when this occurs.

8. **Consider emergency stops.**

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

Caution on Design

9. **Consider the action when operation is restarted after an emergency stop or abnormal stop.**

Design the machinery so that human injury or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the starting position, install manual safety equipment.

Selection

Warning

1. **Confirm the specifications.**

The products featured in this catalog are designed for use in industrial compressed air systems. If the products are used in conditions where pressure and/or temperature are outside the range of specifications, damage and/or malfunctions may occur. Do not use in these conditions. (Refer to the specifications.)

Please consult with SMC if you use a fluid other than compressed air.

2. **About intermediate stop**

In the case of 3 position closed center of a valve, it is difficult to make a piston stop at the required position as accurately and precisely as with hydraulic pressure due to compressibility of air.

Furthermore, since valves and cylinders, etc. are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Please contact SMC in the case it is necessary to hold a stopped position for an extended period.

Caution

1. **Operate within the limits of the maximum usable stroke.**

Refer to the selection procedures for the air cylinder to be used for the maximum usable stroke.

2. **Operate the piston within a range such that collision damage will not occur at the stroke end.**

The operation range should prevent damage from occurring when a piston, having inertial force, stops by striking the cover at the stroke end. Refer to the cylinder model selection procedure for the maximum usable stroke.

3. **Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.**

4. **Provide intermediate supports for long stroke cylinders.**

An intermediate support should be provided in order to prevent damage to a cylinder having a long stroke, due to problems such as sagging of the rod, deflection of the cylinder tube, vibration and external load.



Actuator Precautions 2

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Mounting

⚠ Caution

1. **Be certain to match the rod shaft center with the load and direction of movement when connecting.**

When not properly matched, problems may arise with the rod and tube, and damage may be caused due to friction on areas such as the inner tube surface, bushings, rod surface, and seals.

2. **When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.**
3. **Do not scratch or gouge the sliding portion of the cylinder tube or the piston rod by striking it with an object, or squeezing it.**

The tube bore is manufactured under precise tolerances. Thus, even a slight deformation could lead to a malfunction.

Moreover, scratches or gouges, etc. in the piston rod may lead to damaged seals and cause air leakage.

4. **Prevent the seizure of rotating parts.**

Prevent the seizure of rotating parts (pins, etc.) by applying grease.

5. **Do not use until you verify that the equipment can operate properly.**

After mounting, repairs, or modification, etc., connect the air supply and electric power, and then confirm proper mounting by means of appropriate function and leak tests.

6. **Instruction manual**

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

Piping

⚠ Caution

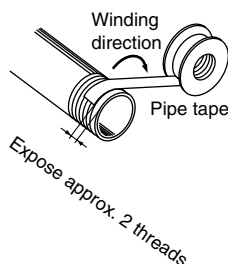
1. **Before piping**

Before piping, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. **Wrapping of pipe tape**

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not get inside the piping.

Also, when the pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Cushion

⚠ Caution

1. **Readjust with the cushion needle.**

Cushions are adjusted at the time of shipment, however, the cushion needle on the cover should be readjusted when the product is put into service, based upon factors such as the size of the load and the operating speed. When the cushion needle is turned clockwise, the restriction becomes smaller and the cushion's effectiveness is increased. Tighten the lock nut securely after adjustment is performed.

2. **Do not operate the actuator with the cushion needle fully closed.**

This could damage the seals.

Lubrication

⚠ Caution

1. **Lubricating the lube style cylinder.**

Install a lubricator in the circuit, and use Class 1 turbine oil (with no additive) ISO VG32.

Do not use machine oil or spindle oil.

2. **Lubrication of cylinder**

The cylinder has been lubricated for life at the factory and can be used without any further lubrication.

However, in the event that it is lubricated additionally, be sure to use Class 1 turbine oil (with no additive) ISO VG32.

Stopping lubrication later may lead to malfunctions because the new lubricant will cancel out the original lubricant. Therefore, lubrication must be continued once it has been started.

Air Supply

⚠ Warning

1. **Use clean air.**

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.

⚠ Caution

1. **Install air filters.**

Install air filters close to valves at their upstream side. A filtration degree of 5 μm or less should be selected.

2. **Install an aftercooler, air dryer, or water separator (Drain Catch).**

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, aftercooler or water separator, etc.

3. **Use the product within the specified range of fluid and ambient temperature.**

Take measures to prevent freezing when below 5°C, since moisture in circuits can freeze and cause damage to seals and lead to malfunctions.

For compressed air quality, refer to "Air Preparation Equipment" catalog.



Actuator Precautions 3

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Operating Environment

Warning

1. **Do not use in atmospheres or locations where corrosion hazards exist.**

Refer to the construction drawings regarding cylinder materials.

2. **In dusty locations or where water or oil, etc., splash on the equipment, take suitable measures to protect the rod.**

Use the heavy duty scraper type (-XC4) in situations where there is a lot of dust. Use a water resistant cylinder when there is splash or spray of liquids.

3. **When using auto switches, do not operate in an environment with strong magnetic fields.**

Maintenance

Warning

1. **Perform maintenance procedures as shown in the instruction manual.**

If it is handled improperly, malfunction or damage of machinery or equipment may occur.

2. **Removal of equipment, and supply/exhaust of compressed air**

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

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

Caution

1. **Drain flushing**

Remove drainage from air filters regularly. (Refer to the specifications.)

Air-hydro

Caution on Design

Warning

1. **Do not use air-hydro cylinder near flames, or in equipment or machinery that exceeds an ambient temperatures of 60°C.**

There is a danger of causing a fire because the air-hydro cylinder uses a flammable hydraulic fluid.

Caution

1. **Do not use it in an environment, equipment, or machine that is not compatible with oil mist.**

Air-hydro cylinders generate an oil mist during operation which may affect the environment.

2. **Be sure to install an exhaust cleaner on the directional control valve for the air-hydro cylinder.**

A very small amount of hydraulic fluid is discharged from the exhaust port of the air-hydro cylinder's directional control valve, and this may contaminate the surrounding area.

3. **Install an air-hydro cylinder in locations where it can be serviced easily.**

Since the air-hydro cylinder requires maintenance, such as refilling of hydraulic fluid and bleeding of air, ensure sufficient space for these activities.

Selection

Caution

1. **Select an air-hydro cylinder in combination with an air-hydro unit.**

Since good operation of an air-hydro cylinder depends on combination with an air-hydro unit, be sure to select an appropriate air-hydro unit.

2. **Set the load of the air-hydro cylinder to be 50% or less of the theoretical force.**

For an air-hydro cylinder to obtain constant speed and stopping accuracy close to that of a hydraulic cylinder, it is necessary to keep the load at 50% or less of the theoretical output.

Piping

Caution

1. **For air-hydro cylinder piping, use self-aligning fittings.**

Do not use One-touch fittings in the piping for an air-hydro cylinder, as oil leakage may occur.

2. **For air-hydro cylinder piping, use hard nylon tubing or copper piping.**

As in the case of hydraulic circuits, surge pressures greater than the operating pressure may occur in an air-hydro cylinder's piping, making it necessary to use safer piping materials.

Lubrication

Warning

1. **Make sure to completely discharge the compressed air in the system before filling the air-hydro unit with hydraulic oil.**

When supplying hydraulic fluid to the air-hydro unit, first confirm that safety measures are implemented to prevent dropping of driven objects and release of clamped objects, etc. Then, shut off the air supply and the equipment's electric power, and exhaust the compressed air in the system.

If the air-hydro unit is supply port is opened with compressed air still remaining in the system, there is a danger of hydraulic fluid being blown out.

Maintenance

Caution

1. **Bleed air from the air-hydro cylinder on a regular basis.**

Since air may accumulate inside an air-hydro cylinder, bleed air from it at times such as before starting work. Bleed air from a bleeder valve provided on the air-hydro cylinder or the piping.

2. **Verify the oil level of the air hydro system on a regular basis.**

Since a very small amount of hydraulic fluid is discharged from the air-hydro cylinder and air-hydro unit circuit, the fluid will gradually decrease. Therefore, check the fluid regularly and refill as necessary. The oil level can be checked with a level gauge in the air-hydro converter.

Quality Assurance Information (ISO 9001, ISO 14001)

Reliable quality of products in the global market

To enable our customers throughout the world to use our products with even greater confidence, SMC has obtained certification for international standards “ISO 9001” and “ISO 14001”, and created a complete structure for quality assurance and environmental controls. SMC products pursue to meet its customers’ expectations while also considering company’s contribution in society.

Quality management system ISO 9001

This is an international standard for quality control and quality assurance. SMC has obtained a large number of certifications in Japan and overseas, providing assurance to our customers throughout the world.

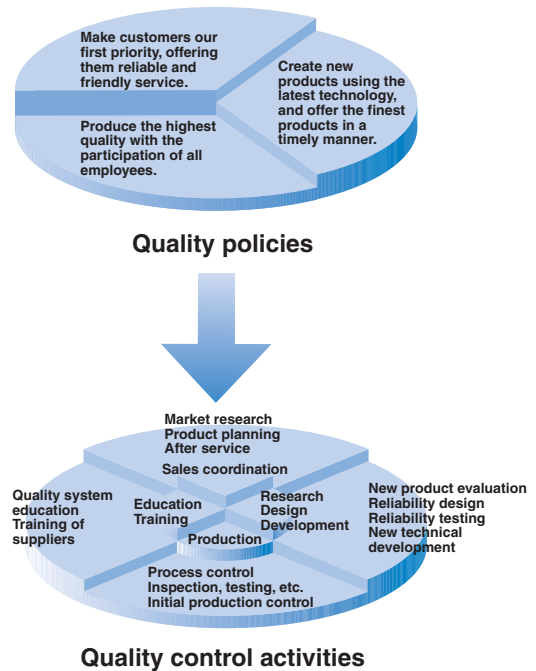


Environmental management system ISO 14001

This is an international standard related to environmental management systems and environmental inspections. While promoting environmentally friendly automation technology, SMC is also making diligent efforts to preserve the environment.



SMC's quality control system



SMC Product Conforming to Inter

SMC products complying with EN/ISO, CSA/UL standards are supporting



The CE mark indicates that machines and components meet essential requirements of all the EC Directives applied.

It has been obligatory to apply CE marks indicating conformity with EC Directives when machines and components are exported to the member Nations of the EU.

Once “A manufacturer himself” declares a product to be safe by means of CE marking (declaration of conformity by manufacturer), free distribution inside the member Nations of the EU is permissible.

■ CE Mark

SMC provides CE marking to products to which EMC and Low Voltage Directives have been applied, in accordance with CETOP (European hydraulics and pneumatics committee) guide lines.

■ As of February 1998, the following 18 countries will be obliged to conform to CE mark legislation

Iceland, Ireland, United Kingdom, Italy, Austria, Netherlands, Greece, Liechtenstein, Sweden, Spain, Denmark, Germany, Norway, Finland, France, Belgium, Portugal, Luxembourg

■ EC Directives and Pneumatic Components

• Machinery Directive

The Machinery Directive contains essential health and safety requirements for machinery, as applied to industrial machines e.g. machine tools, injection molding machines and automatic machines. Pneumatic equipment is not specified in Machinery Directive. However, the use of SMC products that are certified as conforming to EN Standards, allows customers to simplify preparation work of the Technical Construction File required for a Declaration of Conformity.

• Electromagnetic Compatibility (EMC) Directive

The EMC Directive specifies electromagnetic compatibility. Equipment which may generate electromagnetic interference or whose function may be compromised by electromagnetic interference is required to be immune to electromagnetic affects (EMS/immunity) without emitting excessive electromagnetic affects (EMI/emission).

• Low Voltage Directive

This directive is applied to products, which operate above 50 VAC to 1000 VAC and 75 VDC to 1500 VDC operating voltage, and require electrical safety measures to be introduced.

• Simple Pressure Vessels Directive

This directive is applied to welded vessels whose maximum operating pressure (PS) and volume of vessel (V) exceed 50 bar/L. Such vessels require EC type examination and then CE marking.

national Standards

you to comply with EC directives and CSA/UL standards.



■ CSA Standards & UL Standards

UL and CSA standards have been applied in North America (U.S.A. and Canada) symbolizing safety of electric products, and are defined to mainly prevent danger from electric shock or fire, resulting from trouble with electric products. Both UL and CSA standards are acknowledged in North America as the first class certifying body. They have a long experience and ability for issuing product safety certificate. Products approved by CSA or UL standards are accepted in most states and governments beyond question.

Since CSA is a test certifying body as the National Recognized Testing Laboratory (NRTL) within the jurisdiction of Occupational Safety and Health Administration (OSHA), SMC was tested for compliance with CSA Standards and UL Standards at the same time and was approved for compliance with the two Standards. The above CSA NRTL/C logo is described on a product label in order to indicate that the product is approved by CSA and UL Standards.

■ TSSA (MCCR) Registration Products

TSSA is the regulation in Ontario State, Canada. The products that the operating pressure is more than 5 psi (0.03 MPa) and the piping size is bigger than 1 inch. fall into the scope of TSSA regulation.

Products conforming to CE Standard

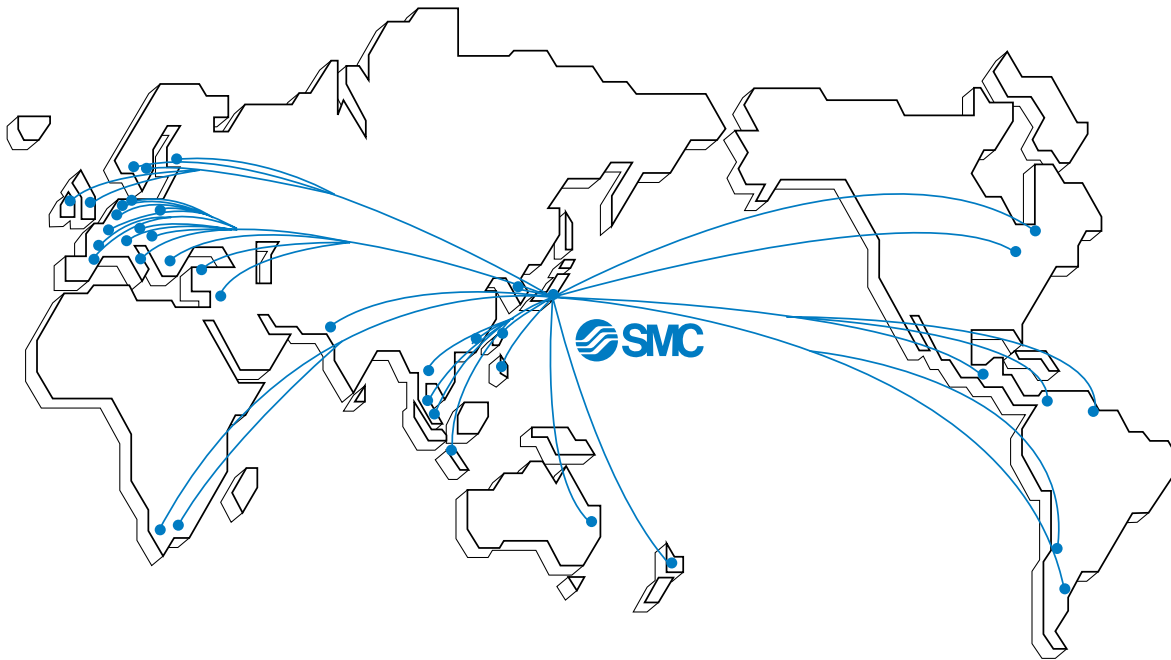


With CE symbol for simple visual recognition

In this catalog each accredited product series is indicated with a CE mark symbol. However, in some cases, every available models may not meet CE compliance. Please visit our web site for the latest selection of available models with CE mark.

<http://www.smcworld.com>

SMC's Global Service Network



America

U.S.A. **SMC Corporation of America**

3011 North Franklin Road Indianapolis, IN 46226, U.S.A.
TEL: 317-899-4440 FAX: 317-899-3102

CANADA **SMC Pneumatics (Canada) Ltd.**

6768 Financial Drive Mississauga, Ontario, L5N 7J6 Canada
TEL: 905-812-0400 FAX: 905-812-8686

MEXICO **SMC Corporation (Mexico), S.A. DE C.V.**

Carr. Silao-Trejo K.M. 2.5 S/N, Predio San Jose del Duranzo
C.P. 36100, Silao, Gto., Mexico
TEL: 472-72-2-55-00 FAX: 472-72-2-59-44/2-59-46

CHILE **SMC Pneumatics (Chile) S.A.**

Av. La Montaña 1,115 km. 16,5 P. Norte Parque
Industrial Valle Grande, Lampa Santiago, Chile
TEL: 02-270-8600 FAX: 02-270-8601

ARGENTINA **SMC Argentina S.A.**

Teodoro Garcia 3860 (1427) Buenos Aires, Argentina
TEL: 011-4555-5762 FAX: 011-4555-5762

BOLIVIA **SMC Pneumatics Bolivia S.R.L.**

Avenida Beni Numero 4665
Santa Cruz de la Sierra-Casilla de Correo 2281, Bolivia
TEL: 591-3-3428383 FAX: 591-3-3449900

VENEZUELA **SMC Neumatica Venezuela S.A.**

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Local 5, Caracas 1040-A, Venezuela
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Europe

U.K. **SMC Pneumatics (U.K.) Ltd.**

Vincent Avenue, Crownhill, Milton Keynes, MK8 0AN, Buckinghamshire, U.K.
TEL: 01908-563888 FAX: 01908-561185

GERMANY **SMC Pneumatik GmbH**

Boschring 13-15 D-63329 Egelsbach, Germany
TEL: 06103-4020 FAX: 06103-402139

ITALY **SMC Italia S.p.A.**

Via Garibaldi 62 I-20061 Carugate Milano, Italy
TEL: 02-9271365 FAX: 02-9271365

FRANCE **SMC Pneumatique S.A.**

1 Boulevard de Strasbourg, Parc Gustave Eiffel, Bussy Saint Georges, F-77600
Marne La Vallee Cedex 3 France
TEL: 01-64-76-10-00 FAX: 01-64-76-10-10

SWEDEN **SMC Pneumatics Sweden AB**

Ekhagsvägen 29-31, S-141 05 Huddinge, Sweden
TEL: 08-603-07-00 FAX: 08-603-07-10

SWITZERLAND **SMC Pneumatik AG**

Dorfstrasse 7, Postfach 117, CH-8484 Weisslingen, Switzerland
TEL: 052-396-3131 FAX: 052-396-3191

AUSTRIA **SMC Pneumatik GmbH (Austria)**

Girakstrasse 8, A-2100 Korneuburg, Austria
TEL: 0-2262-6228-0 FAX: 0-2262-62285

SPAIN **SMC España, S.A.**

Zuazobidea 14 Pol. Ind. Jundiz 01015 Vitoria, Spain
TEL: 945-184-100 FAX: 945-184-510

IRELAND **SMC Pneumatics (Ireland) Ltd.**

2002 Citywest Business Campus, Naas Road, Saggart, Co. Dublin, Ireland
TEL: 01-403-9000 FAX: 01-466-0385

NETHERLANDS (Associated company) **SMC Pneumatics BV**

De Ruyterkade 120, NL-1011 AB Amsterdam, Netherlands
TEL: 020-5318888 FAX: 020-5318880

GREECE (Distributor) **S.Parianopoulos S.A.**

7, Konstantinoupoleos Street 11855 Athens, Greece
TEL: 01-3426076 FAX: 01-3455578

DENMARK **SMC Pneumatik A/S**

Knudsminde 4 B DK-8300
Odder, Denmark
TEL: 70252900 FAX: 70252901

Europe

FINLAND **SMC Pneumatics Finland OY**

PL72, Tiistiniityntie 4, SF-02231 ESP00, Finland
TEL: 09-8595-80 FAX: 09-8595-8595

NORWAY **SMC Pneumatics Norway A/S**

Vollsveien 13C, Granfoss Næringspark N-1366 LYSAKER, Norway
TEL: 67-12-90-20 FAX: 67-12-90-21

BELGIUM (Distributor) **SMC Pneumatics N.V./S.A.**

Nijverheidsstraat 20 B-2160 Wommelgem Belgium
TEL: 03-355-1464 FAX: 03-355-1466

POLAND **SMC Industrial Automation Polska Sp.z.o.o.**

ul. Konstruktorska 11A, PL-02-673 Warszawa, Poland
TEL: 022-548-5085 FAX: 022-548-5087

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Perpa Tic. Merkezi Kat:11 No.1625 80270 Okmeydani Istanbul, Türkiye
TEL: 0212-221-1512 FAX: 0212-221-1519

RUSSIA **SMC Pneumatik LLC.**

36/40 Sredny prospect V.O. St. Petersburg 199004, Russia
TEL: 812-118-5445 FAX: 812-118-5449

CZECH **SMC Industrial Automation CZ s.r.o.**

Hudcova 78a, CZ-61200 Brno, Czech Republic
TEL: 05-4121-8034 FAX: 05-4121-8034

HUNGARY **SMC Hungary Ipari Automatizálási kft.**

Budafoki ut 107-113 1117 Budapest
TEL: 01-371-1343 FAX: 01-371-1344

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Str. Frunzei, Nr. 29, Sector 2, Bucharest, Romania
TEL: 01-3205111 FAX: 01-3261489

SLOVAKIA **SMC Priemyselná automatizácia, s.r.o.**

Nova 3, SK-83103 Bratislava
TEL: 02-4445-6725 FAX: 02-4445-6028

SLOVENIA **SMC Industrijska Avtomatila d.o.o.**

Grajski trg 15, SLO- 8360 Zuzemberk, Slovenia
TEL: 07388-5240 FAX: 07388-5249

LATVIA **SMC Pneumatics Latvia SIA**

Šmerļa ielā 1-705, Rīga LV-1006
TEL: 777 94 74 FAX: 777 94 75

SOUTH AFRICA (Distributor) **Hyflo Southern Africa (Pty.) Ltd.**

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TEL: 021-511-7021 FAX: 021-511-4456

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TEL: 3-548-50-34 FAX: 3-548-50-34

Oceania/Asia

AUSTRALIA **SMC Pneumatics (Australia) Pty.Ltd.**

14-18 Hudson Avenue Castle Hill NSW 2154, Australia
TEL: 02-9354-8222 FAX: 02-9894-5719

NEW ZEALAND **SMC Pneumatics (New Zealand) Ltd.**

8C Sylvia Park Road Mt.Wellington Auckland, New Zealand
TEL: 09-573-7007 FAX: 09-573-7002

TAIWAN **SMC Pneumatics (Taiwan) Co.,Ltd.**

17, Lane 205, Nansan Rd., Sec.2, Luzhu-Hsiang, Taoyuan-Hsien, TAIWAN
TEL: 03-322-3443 FAX: 03-322-3387

HONG KONG **SMC Pneumatics (Hong Kong) Ltd.**

29/F, Clifford Centre, 778-784 Cheung, Sha Wan Road, Lai Chi Kok, Kowloon, Hong Kong
TEL: 2744-0121 FAX: 2785-1314

SINGAPORE **SMC Pneumatics (S.E.A.) Pte. Ltd.**

89 Tuas Avenue 1, Jurong Singapore 639520
TEL: 6861-0888 FAX: 6861-1889

PHILIPPINES **SHOKETSU SMC Corporation**

Unit 201 Common Goal Tower, Madrigal Business Park, Ayala Alabang Muntinlupa, Philippines
TEL: 02-8090565 FAX: 02-8090586

MALAYSIA **SMC Pneumatics (S.E.A.) Sdn. Bhd.**

Lot 36 Jalan Delima1/1, Subang Hi-Tech Industrial Park, Batu 3 40000 Shah Alam Selangor, Malaysia
TEL: 03-56350590 FAX: 03-56350602

SOUTH KOREA **SMC Pneumatics Korea Co., Ltd.**

Woolim e-BIZ Center (Room 1008), 170-5, Guro-Dong, Guro-Gu, Seoul, 152-050, South Korea
TEL: 02-3219-0700 FAX: 02-3219-0702

CHINA **SMC (China) Co., Ltd.**

7 Wan Yuan St. Beijing Economic & Technological Development Zone 100176, China
TEL: 010-67882111 FAX: 010-67881837

THAILAND **SMC Thailand Ltd.**

134/6 Moo 5, Tiwanon Road, Bangkok, Amphur Muang, Patumthani 12000, Thailand
TEL: 02-963-7099 FAX: 02-501-2937

INDIA **SMC Pneumatics (India) Pvt. Ltd.**

D-107 to 112, Phase-2, Extension, Noida, Dist. Gautaim Budh Nagar, U.P. 201 305, India
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