

Cylinder with Lock

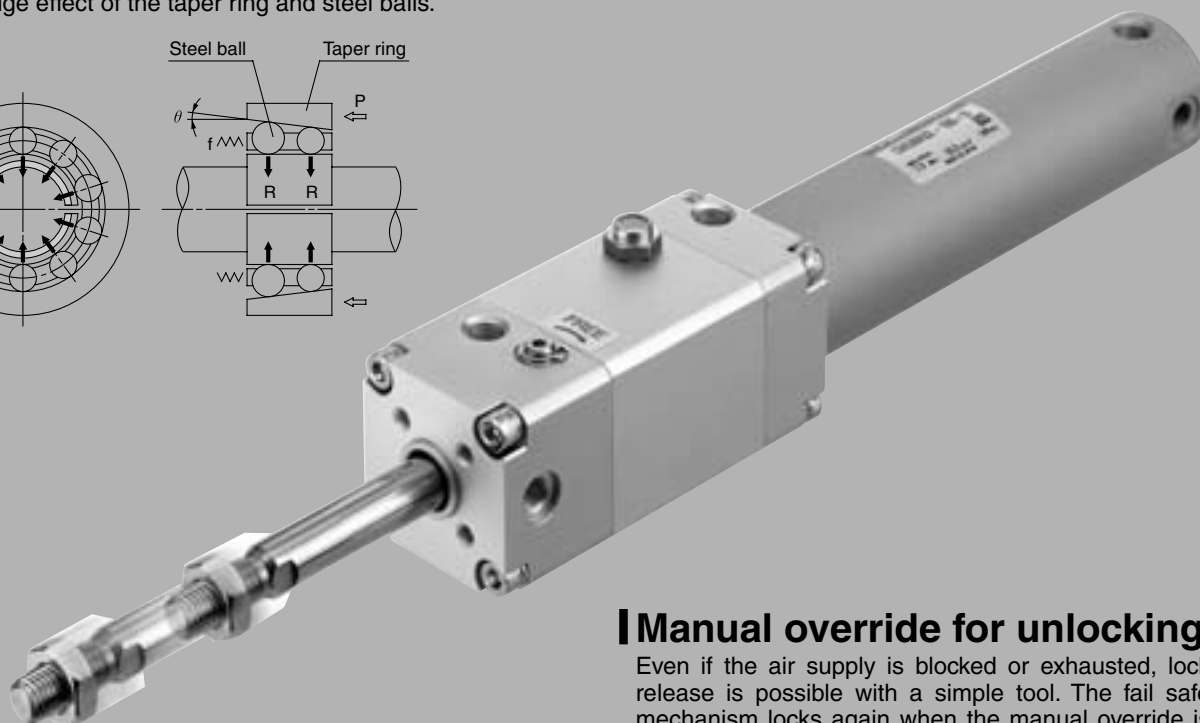
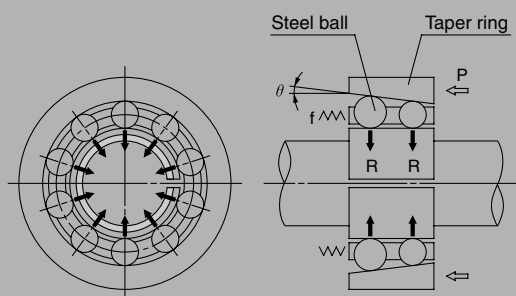
Series CNG

ø20, ø25, ø32, ø40

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

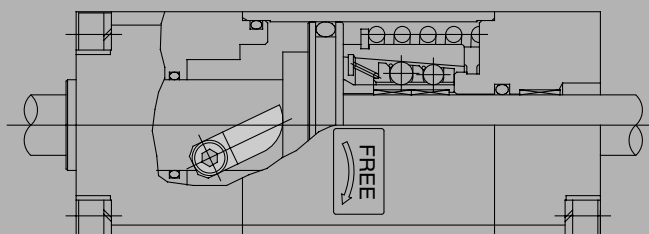
Simple construction

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



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.



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).

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		With rod boot	Bore size (mm)	Lock holding force (N)	Stroke (mm)
		Rubber bumper	Air cushion				
Cylinder with lock Series CNG	Double acting, Single rod	●	●	●	20	215	Max. Up to 1500
		●	●	●	25	335	
		●	●	●	32	550	
		●	●	●	40	860	

Can be locked in both directions

Holding force is equal on either extend or retract.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual -X□

Series CNG

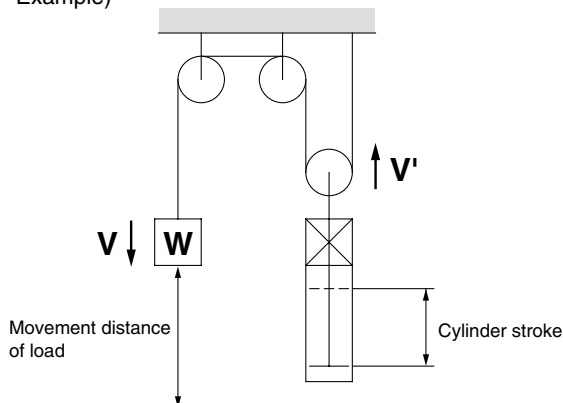
Model Selection

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)



3. The following selection example and procedures are based on use at the intermediate stop (including emergency stops during operation). However, when the cylinder is in a locked state, kinetic energy does not act upon it. Under these conditions, use the load mass at the maximum speed (V) of 100 mm/s shown in graphs (5) to (7) depending on the operating pressure and select models.

Selection Example

- Load mass: $m = 12 \text{ kg}$
- 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.

∴ Maximum speed $V \approx 350 \text{ mm/s}$

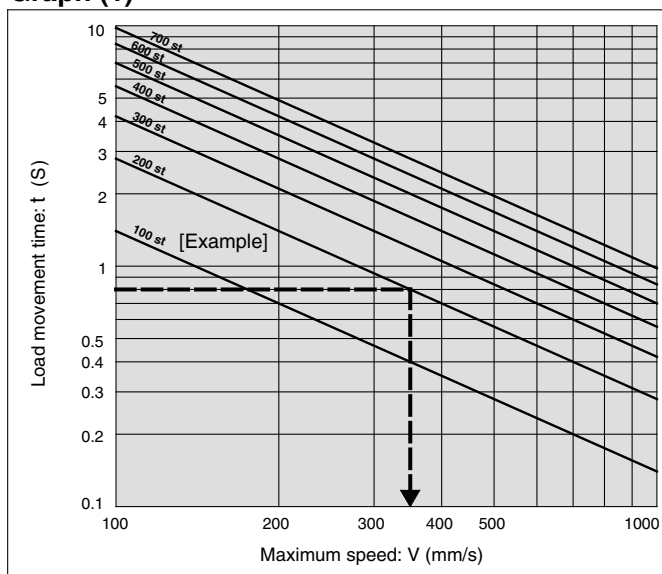
Step (2): Select graph (6) based upon the load condition and operating pressure, and then from the intersection of the maximum speed $V = 350 \text{ mm/s}$ found in Step (1), and the load mass $m = 12 \text{ kg}$

∴ $\phi 32 \rightarrow$ 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)

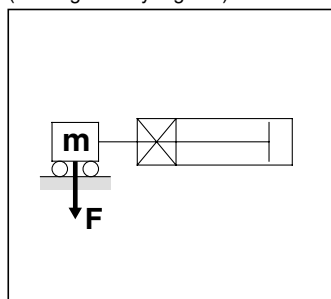


Step (2) Find the bore size.

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 mass. 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)



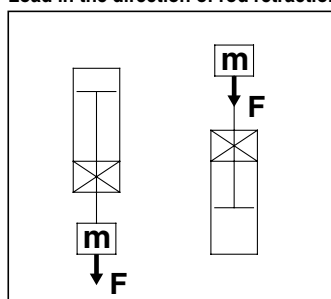
Operating Pressure

$0.3 \text{ MPa} \leq$ → 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)

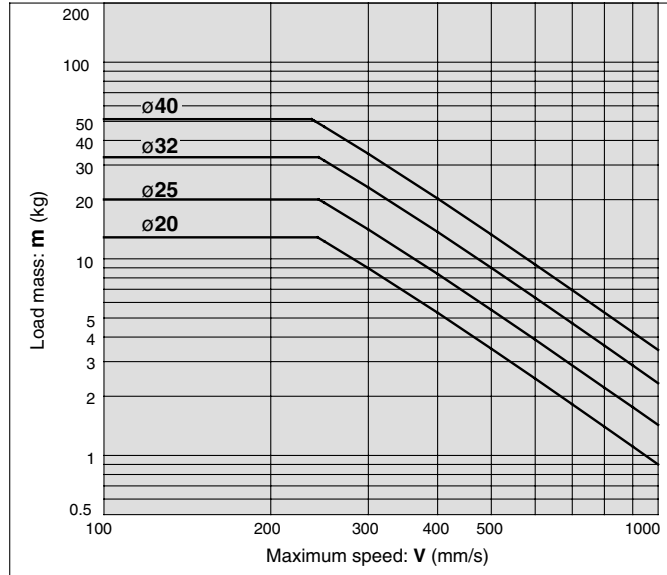
$0.4 \text{ MPa} \leq$ → Graph (6)

$0.5 \text{ MPa} \leq$ → Graph (7)

Selection Graph

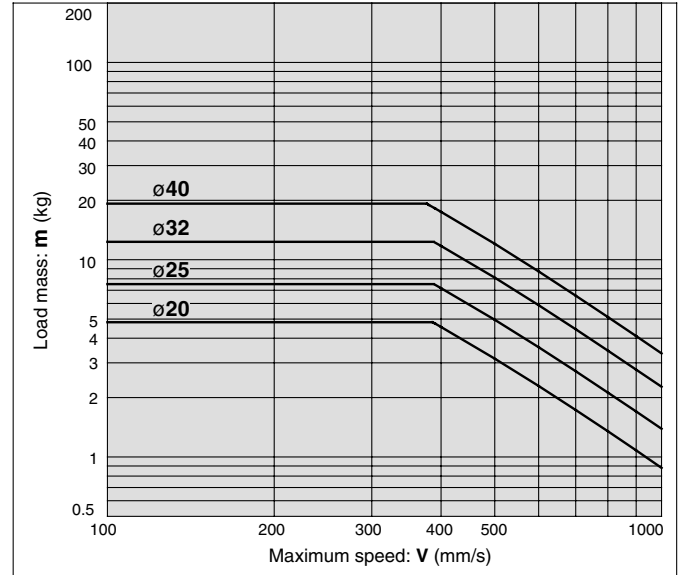
Graph (2)

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



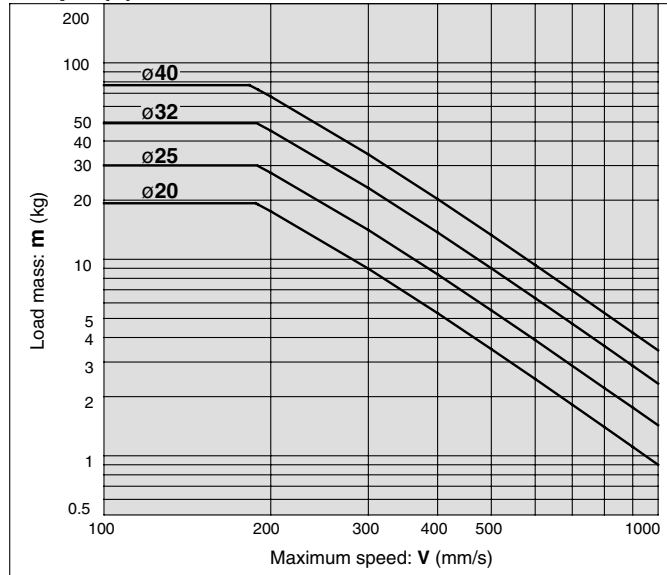
Graph (5)

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



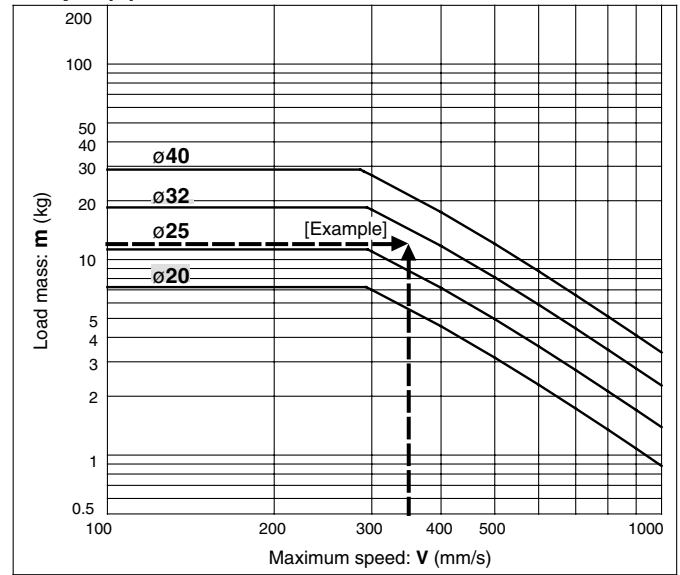
Graph (3)

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



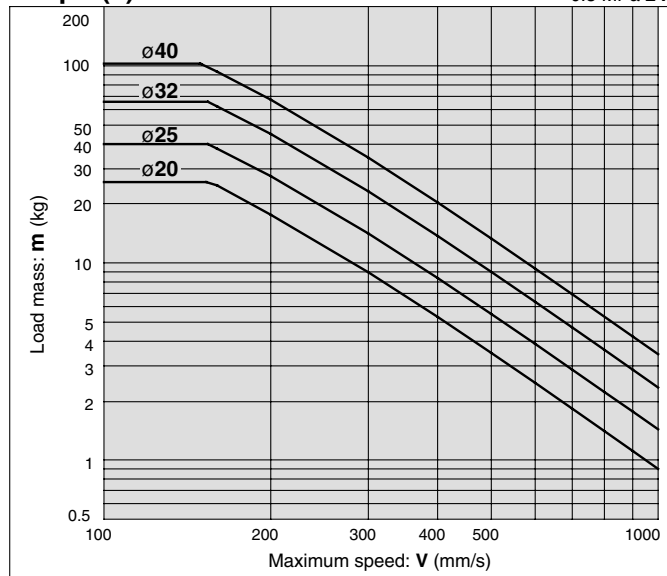
Graph (6)

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



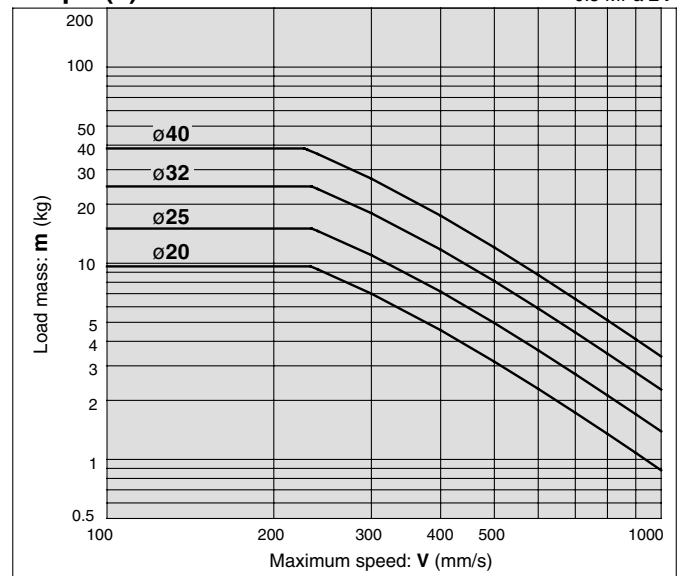
Graph (4)

$0.5 \text{ MPa} \leq P$



Graph (7)

$0.5 \text{ MPa} \leq P$



CLJ2

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D-☐

-X☐

Individual

-X☐

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, retaining ring, and mounting bolt are shipped together with clevis style.

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

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 retaining ring are shipped together with double knuckle joint.

Mass

Bore size (mm)		20	25	32	40
Basic mass	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 mass per each 50 mm of stroke		0.05	0.07	0.09	0.15
Additional mass with air cushion		0.01	0.01	0.02	0.02
Additional mass for long stroke		0.01	0.01	0.02	0.03

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

Basic mass..... 0.63 kg (Foot style, ø20)

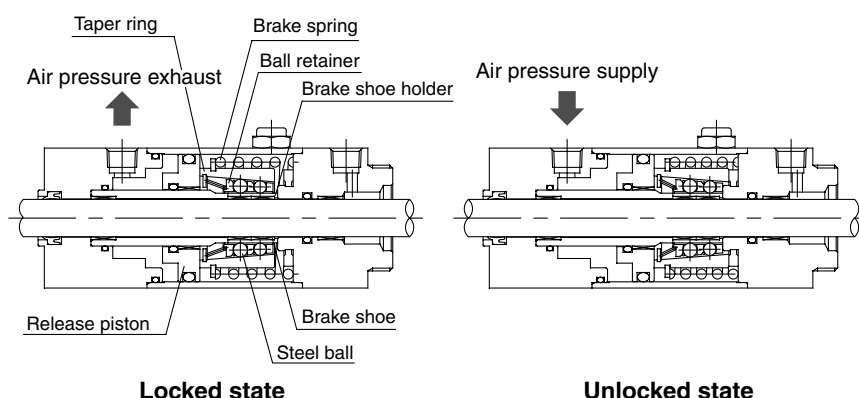
Additional mass 0.05 kg/50 st

Air cylinder stroke 100 st

Air cushion additional mass 0.01 kg

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

Construction Principle



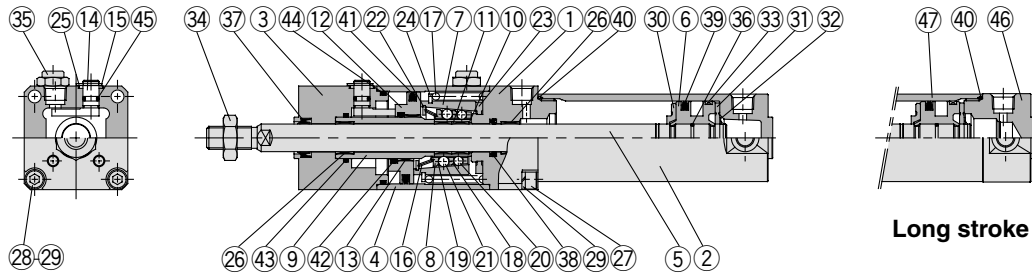
Spring locking (Exhaust locking)

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.

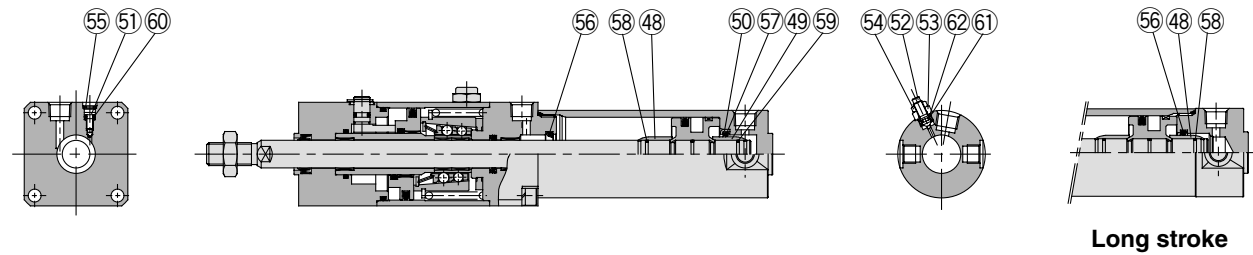
Unlocking is accomplished when air pressure is supplied to the unlocking port. The release piston and taper ring oppose the spring force, moving to the right side, and the ball retainer strikes the cover section. The braking force is released as the steel balls are removed from the taper ring by the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

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	Type C retaining ring for taper ring	Carbon steel	
25	Type C retaining ring for unlocking cam shaft	Carbon steel	
26	Bushing	Oil-impregnated sintered alloy	ø40: Copper alloy
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 bumper A
32	Retaining 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.

Component Parts

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	Aluminum alloy	Anodized
49	Cushion ring B	Aluminum alloy	Same anodized 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	Retaining 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

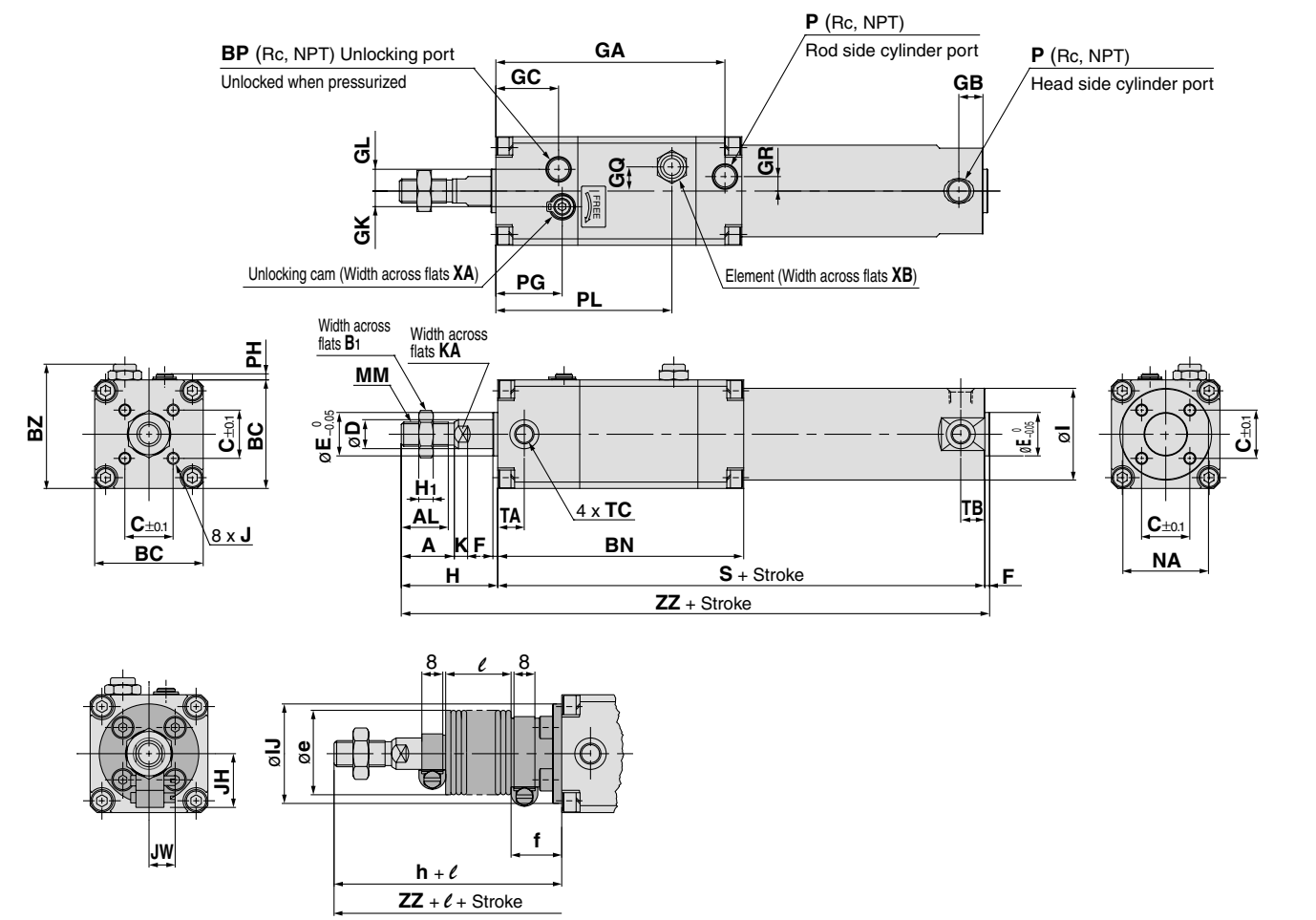
Bore size (mm)	Kit no.	Contents
20	CG1N20-PS	Set of above nos. 37, 39, 40
25	CG1N25-PS	
32	CG1N32-PS	
40	CG1N40-PS	

* 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.

* Seal kit includes a grease pack (10 g). Order with the following part number when only the grease pack is needed. **Grease pack part number: GR-S-010 (10 g)**

Dimensions

Basic style (B): With rubber bumper CNGBN



With rod boot

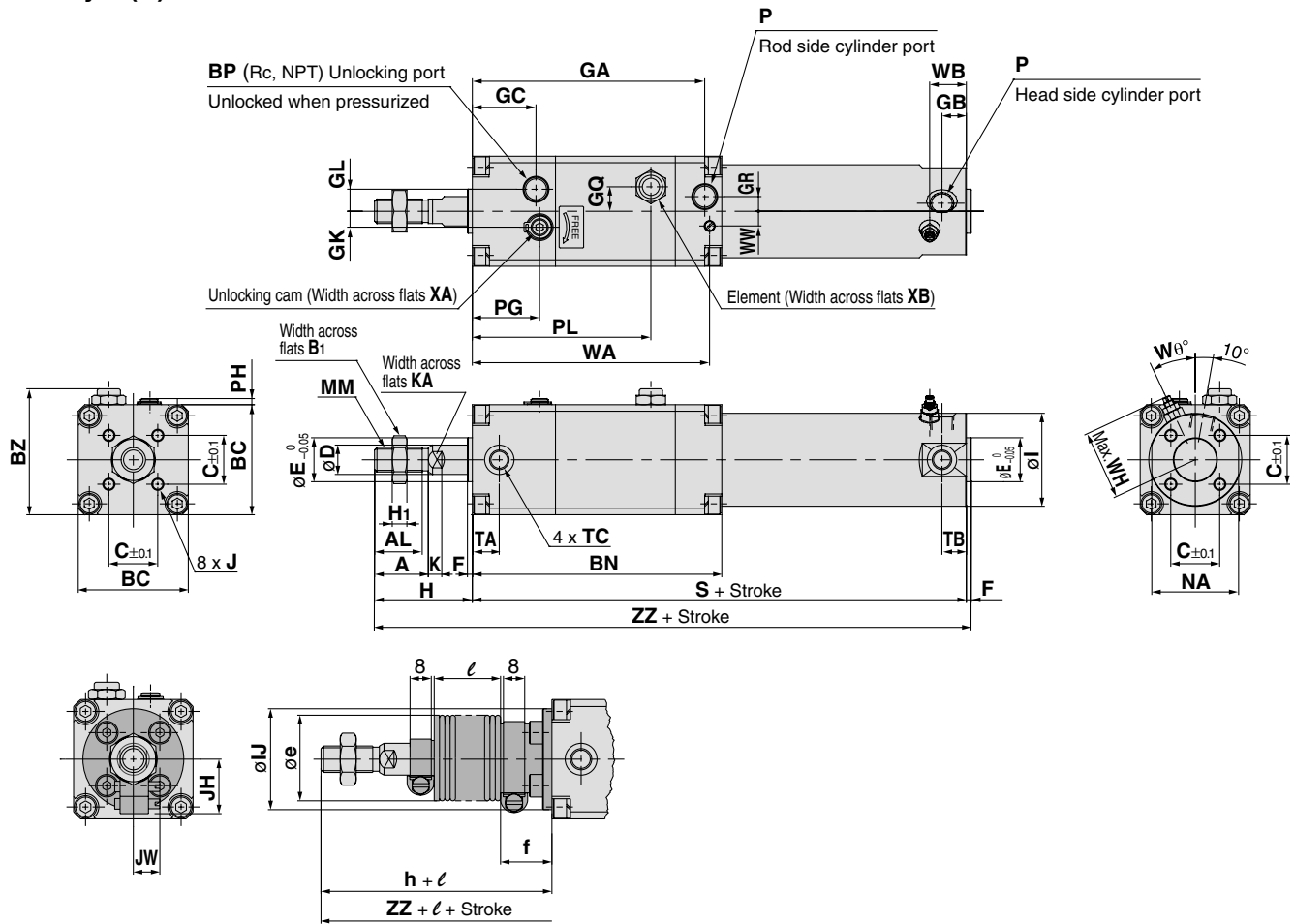
Bore size (mm)		Stroke range without rod boot		Stroke range with rod boot		A	AL	B ₁	BC	BN	BP	BZ	C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁	I
		Standard	Long stroke	Standard	Long stroke																				
20		Up to 200	201 to 350	20 to 200	201 to 350	18	15.5	13	38	93	1/8	44.5	14	8	12	2	85	10 (12)	18	5.5	6	4	8	5	26
25		Up to 200	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	
																	H	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)
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)
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)
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)

Bore size (mm)	With rod boot							
	IJ	JH (Reference)	JW (Reference)	e	f	h	ℓ	ZZ
20	27	15.5	10.5	30	18	55	1/4 stroke	198 (206)
25	32	16.5	10.5	30	19	62		215 (223)
32	38	18.5	10.5	35	19	62		218 (226)
40	48	21.5	10.5	35	19	70		241 (250)

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

Basic style (B): With air cushion CNGBA



With rod boot

(mm)																								
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

(mm)																				
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

(mm)										
Bore size (mm)	Without rod boot		With rod boot							
	H	ZZ	IJ	JH (Reference)	JW (Reference)	e	f	h	ℓ	ZZ
20	35	178 (186)	27	15.5	10.5	30	18	55	1/4 stroke	198 (206)
25	40	193 (201)	32	16.5	10.5	30	19	62		215 (223)
32	40	196 (204)	38	18.5	10.5	35	19	62		218 (226)
40	50	221 (230)	48	21.5	10.5	35	19	70		241 (250)

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

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

CLJ2

CLM2

CLG1

CL1

MLGC

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CLQ

RLQ

MLU

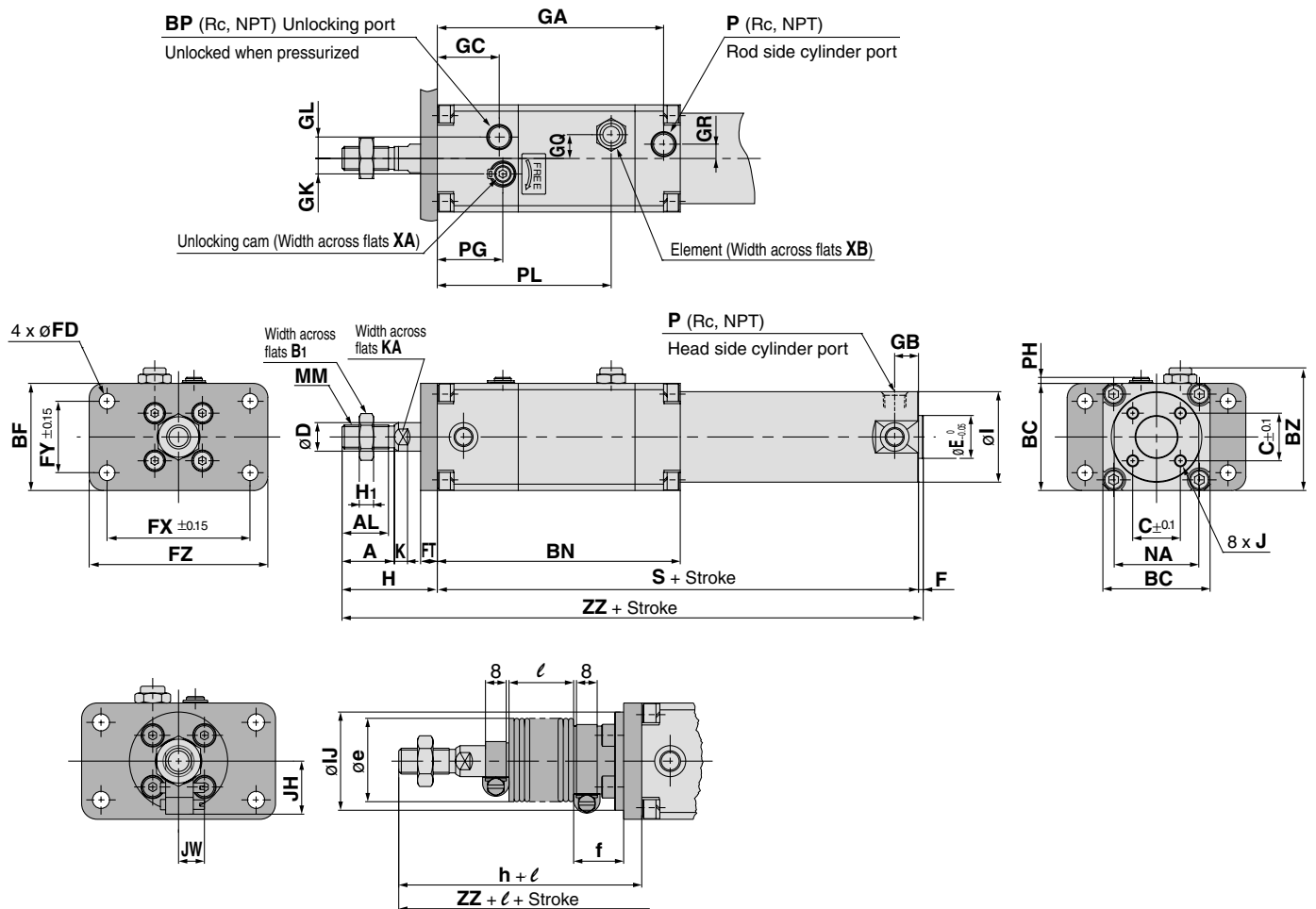
MLGP

ML1CD-☐

-X ☐

Individual ☒

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	B ₁	BC	BF	BN	BP	BZ	C	D	E	F	GA	GB	GC	GK	GL	GR	GQ	H ₁
	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	
																			H	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)
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)
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)
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)

Bore size (mm)	With rod boot							ZZ
	IJ	JH (Reference)	JW (Reference)	e	f	h	ℓ	
20	27	15.5	10.5	30	18	55	1/4 stroke	198 (206)
25	32	16.5	10.5	30	19	62		215 (223)
32	38	18.5	10.5	35	19	62		218 (226)
40	48	21.5	10.5	35	19	70		241 (250)

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

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CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

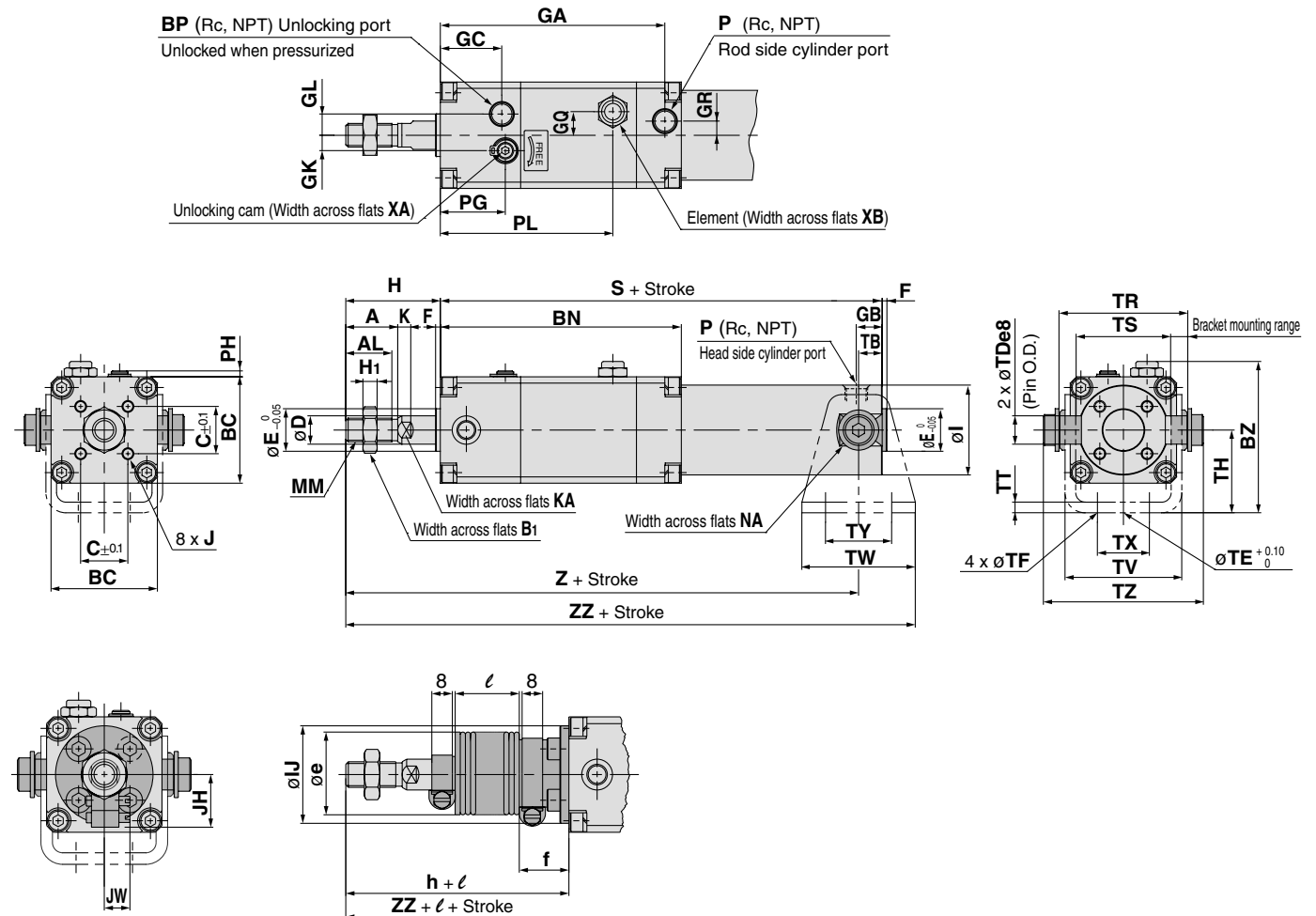
Individual

-X□

Series CNG

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

(mm)																									
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	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	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

(mm)												
Bore size (mm)	Without rod boot			With rod boot								
	H	Z	ZZ	IJ	JH (Reference)	JW (Reference)	e	f	h	ℓ	Z	ZZ
20	35	165	186	27	15.5	10.5	30	18	55	1/4 stroke	185	206
25	40	180	201	32	16.5	10.5	30	19	62		202	223
32	40	184	208	38	18.5	10.5	35	19	62		206	230
40	50	209 (216)	237 (244)	48	21.5	10.5	35	19	70		229 (236)	257 (264)

Note) (): Denotes the dimensions for long stroke.
For the pivot bracket, refer to page 684.

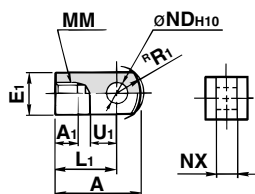
Series CNG

Accessory Bracket Dimensions

Single Knuckle Joint

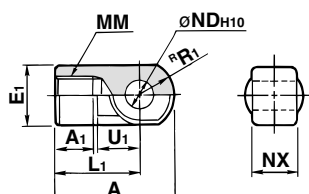
I-G02/G03

Material: Rolled steel



I-G04

Material: Cast iron



Part no.	Applicable bore size (mm)	A	A ₁	E ₁	L ₁	MM	R _{R1}	U ₁	ND _{H10}	NX
I-G02	20	34	8.5	16	25	M8 x 1.25	10.3	11.5	8 ^{+0.058} ₀	8 ^{-0.2} _{-0.4}
I-G03	25, 32	41	10.5	20	30	M10 x 1.25	12.8	14	10 ^{+0.058} ₀	10 ^{-0.2} _{-0.4}
I-G04	40	42	14	22	30	M14 x 1.5	12	14	10 ^{+0.058} ₀	18 ^{-0.3} _{-0.5}

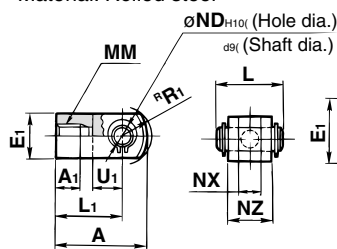
(mm)

Double Knuckle Joint

* Knuckle pin and retaining ring are attached.

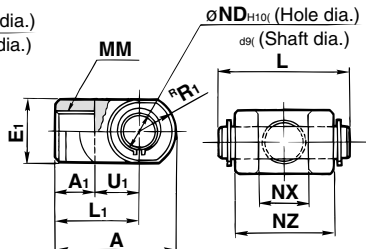
Y-G02/G03

Material: Rolled steel



Y-G04

Material: Cast iron



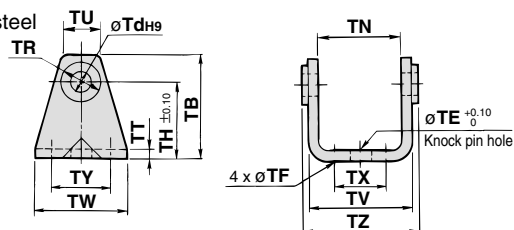
Part no.	Applicable bore size (mm)	A	A ₁	E ₁	L ₁	MM	R _{R1}	U ₁	ND	NX	NZ	L	Applicable pin part no.
Y-G02	20	34	8.5	16	25	M8 x 1.25	10.3	11.5	8	8 ^{+0.4} _{+0.2}	16	21	IY-G02
Y-G03	25, 32	41	10.5	20	30	M10 x 1.25	12.8	14	10	10 ^{+0.4} _{+0.2}	20	25.6	IY-G03
Y-G04	40	42	16	22	30	M14 x 1.5	12	14	10	18 ^{+0.5} _{+0.3}	36	41.6	IY-G04

(mm)

Rod Side Pivot Bracket

ø20 to ø40

Material: Rolled steel



Part no.	Applicable bore size (mm)	TB	Td _{H9}	TE	TF	TH	TN
CNG-020-24	20	42	8 ^{+0.036} ₀	10	5.5	31	(41.4)
CNG-025-24	25	48	10 ^{+0.036} ₀	10	5.5	37	(48.4)
CNG-032-24	32	53	12 ^{+0.043} ₀	10	6.6	38.5	(48.4)
CNG-040-24	40	60	14 ^{+0.043} ₀	10	6.6	42.5	(56.4)

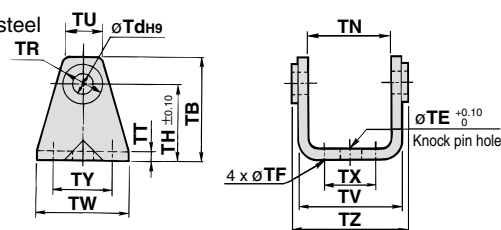
(mm)

Part no.	Applicable bore size (mm)	TR	TT	TU	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

Head Side Pivot Bracket

ø20 to ø40

Material: Rolled steel



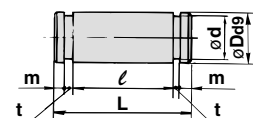
Part no.	Applicable bore size (mm)	TB	Td _{H9}	TE	TF	TH	TN
CG-020-24A	20	36	8 ^{+0.036} ₀	10	5.5	25	(29.3)
CG-025-24A	25	43	10 ^{+0.036} ₀	10	5.5	30	(33.1)
CG-032-24A	32	50	12 ^{+0.043} ₀	10	6.6	35	(40.4)
CG-040-24A	40	58	14 ^{+0.043} ₀	10	6.6	40	(49.2)

(mm)

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

Knuckle Pin

Material: Carbon steel

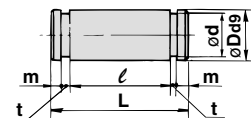


Part no.	Applicable bore size (mm)	Dd ₉	L	d	ℓ	m	t	Applicable retaining ring
IY-G02	20	8 ^{-0.040} _{-0.076}	21	7.6	16.2	1.5	0.9	Type C 8 for axis
IY-G03	25, 32	10 ^{-0.040} _{-0.076}	25.6	9.6	20.2	1.55	1.15	Type C 10 for axis
IY-G04	40	10 ^{-0.040} _{-0.076}	41.6	9.6	36.2	1.55	1.15	Type C 10 for axis

* Retaining rings are included.

Clevis Pin

Material: Carbon steel

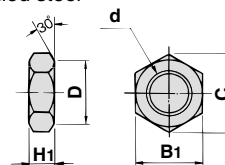


Part no.	Applicable bore size (mm)	Dd ₉	L	d	ℓ	m	t	Applicable retaining ring
CD-G02	20	8 ^{-0.040} _{-0.076}	43.4	7.6	38.6	1.5	0.9	Type C 8 for axis
CD-G25	25	10 ^{-0.040} _{-0.076}	48	9.6	42.6	1.55	1.15	Type C 10 for axis
CD-G03	32	12 ^{-0.050} _{-0.093}	59.4	11.5	54	1.55	1.15	Type C 12 for axis
CD-G04	40	14 ^{-0.050} _{-0.093}	71.4	13.4	65	2.05	1.15	Type C 14 for axis

* Retaining rings are included.

Rod End Nut

Material: Rolled steel



Part no.	Applicable bore size (mm)	B ₁	C	D	d	H ₁
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

Minimum Auto Switch Mounting Stroke

n: No. of auto switches (mm)

Auto switch model	No. of auto switches mounted				
	1	2		n	
		Different surfaces	Same surface	Different surfaces	Same surface
D-A9□ D-M9□ D-M9□W	10	15 Note 1)	45 Note 1)	$15 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6...)	45 + 45 (n - 2)
D-C7□ D-C80	10	15	50	$15 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6...)	50 + 45 (n - 2)
D-H7□ D-H7□W D-H7BAL D-H7NF	10	15	60	$15 + 45 \frac{(n-2)}{2}$ (n = 2, 4, 6...)	60 + 45 (n - 2)
D-C73C D-C80C	10	15	65	$15 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6...)	65 + 50 (n - 2)
D-B5□ D-B64 D-G5□NTL	10	15	75	$15 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6...)	75 + 55 (n - 2)
D-B59W	15	20	75	$20 + 50 \frac{(n-2)}{2}$ (n = 2, 4, 6...)	75 + 55 (n - 2)

Note 1) Auto switch mounting

Auto switch model	With 2 auto switches	
	Different surfaces Note 1)	Same surface Note 1)
	Auto switch D-M9□ D-M9□W The proper auto switch mounting position is 6 mm inward from the switch holder edge.	The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	Less than 50 strokes Note 2)
D-M9□ D-M9□W	Less than 20 strokes Note 2)	Less than 55 strokes Note 2)

Note 2) Minimum stroke for mounting auto switches in the other mounting styles mentioned in note 1.

Operating Range

(mm)

Auto switch model	Bore size (mm)			
	20	25	32	40
D-A9□	7	6	8	8
D-M9□ D-M9□W	4.5	5	4.5	5.5
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□/H7□W D-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 the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.



Series CNG

Specific Product Precautions 1

Be sure to read before handling.

Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

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 (pages 689 and 690) should be used.

Selection

⚠ Warning

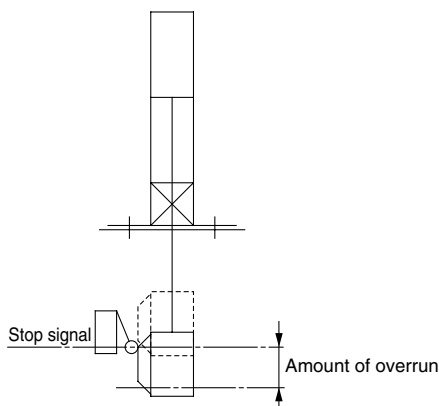
1. When in the locked state, do not apply a load accompanied by an impact shock, strong vibration or turning force, etc.

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 673.



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.

5. The holding force (max. static load) indicates the maximum capability to hold a static load without loads, vibration and impact. This does not indicate a load that can be held in ordinary conditions.

Select the most suitable bore sizes for the operating conditions in accordance with the selection procedures. The Model Selection (pages 670 and 671) is based on use at the intermediate stop (including emergency stops during operation). However, when the cylinder is in a locked state, kinetic energy does not act upon it. Under these conditions, use the load mass at the maximum speed (V) of 100 mm/s shown in graphs (5) to (7) on page 671 depending on the operating pressure and select models.

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.



Series CNG

Specific Product Precautions 2

Be sure to read before handling.

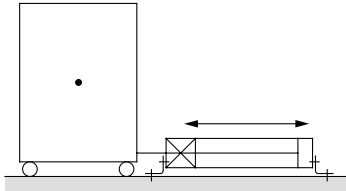
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Mounting

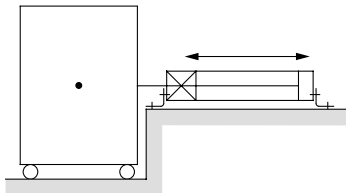
⚠ Caution

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.



○ 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.

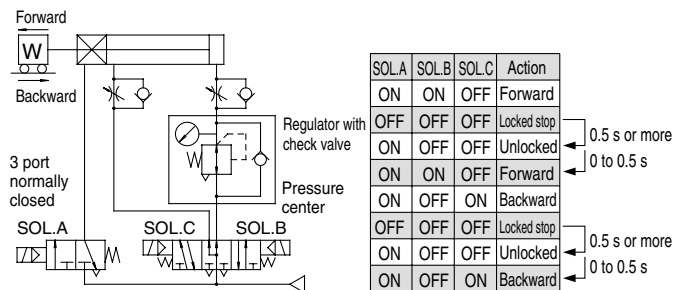
When the locked stop time is too short, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

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

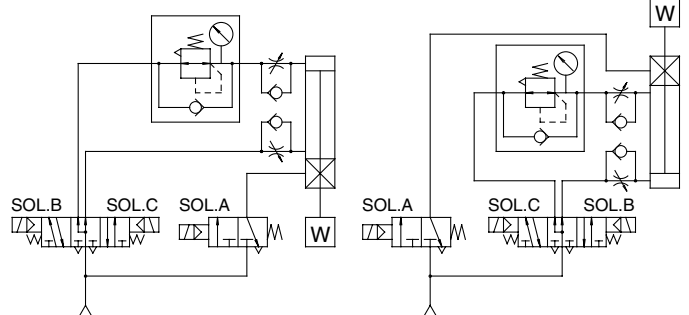
1) [Horizontal]



2) [Vertical]

[Load in the direction of rod extension]

[Load in the direction of rod retraction]



CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□



Series CNG

Specific Product Precautions 3

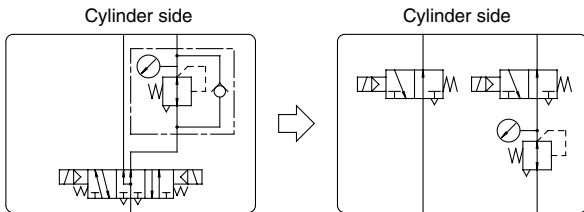
Be sure to read before handling.

Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

Pneumatic Circuit

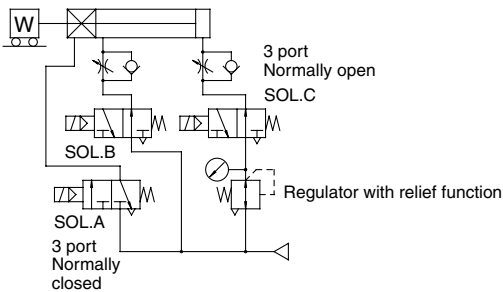
⚠ Caution

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]

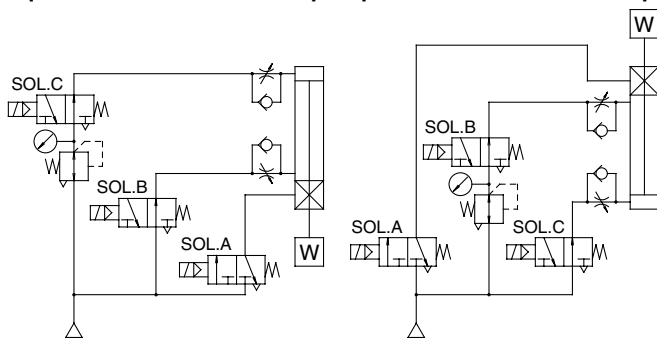
1. [Horizontal]



2. [Vertical]

[Load in the direction of rod extension]

[Load in the direction of rod retraction]



Manually Unlocking

⚠ Warning

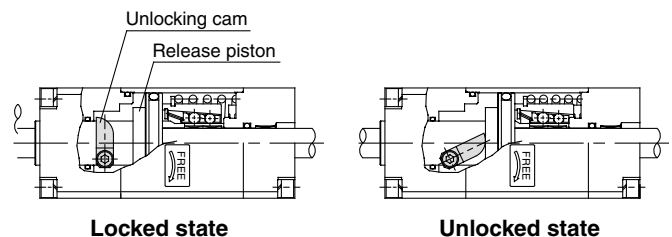
1. **Never operate the unlocking cam until safety has been confirmed. (Do not turn to the FREE side.)**
 - a) When unlocking is performed with air pressure applied to only one side of the cylinder, the moving parts of the cylinder will lurch at high speed causing a serious hazard.
 - b) When unlocking 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.
 - b) Take measures for drop prevention by strut, etc.

⚠ 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.

Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

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.

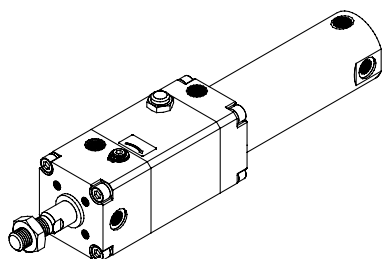
Bore size (mm)	Lock unit part no.	
	Rubber bumper type	Air cushion type
20	CNGN20D-UA	CNGA20D-UA
25	CNGN25D-UA	CNGA25D-UA
32	CNGN32D-UA	CNGA32D-UA
40	CNGN40D-UA	CNGA40D-UA

2. Replacement of lock units.

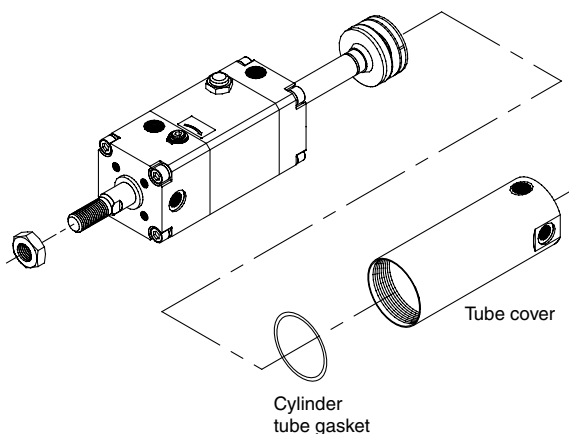
1) Remove the lock unit by securing the square section of the rod cover or the wrench flats of the tube cover in an apparatus such as a vice, and then loosening the other end with a spanner or adjustable angle wrench, etc.

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

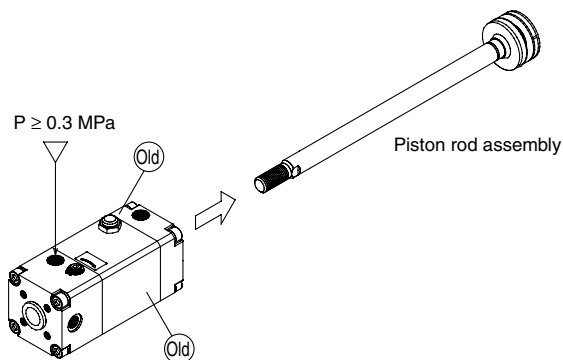
Bore size (mm)	Rod cover square section (mm)	Tube cover wrench flats (mm)
20	38	24
25	45	29
32	45	35.5
40	52	44



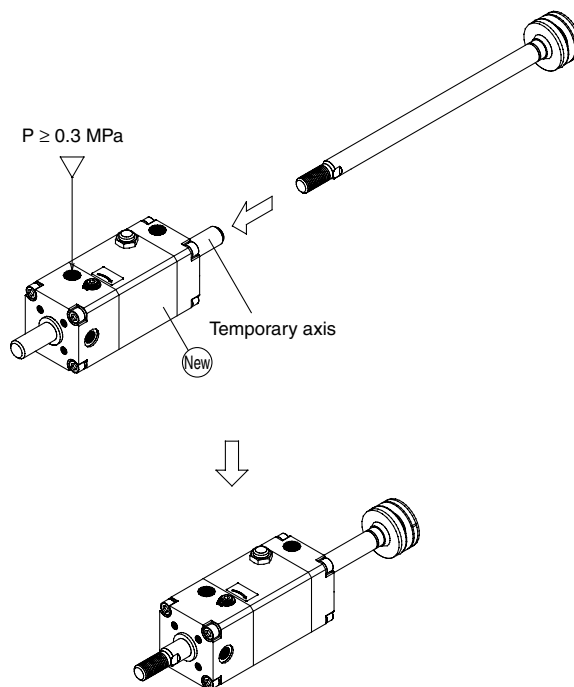
2) Remove the tube cover.



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.

CLJ2

CLM2

CLG1

CL1

MLGC

CNG

MNB

CNA

CNS

CLS

CLQ

RLQ

MLU

MLGP

ML1C

D-□

-X□

Individual
-X□