Cylinder with Lock

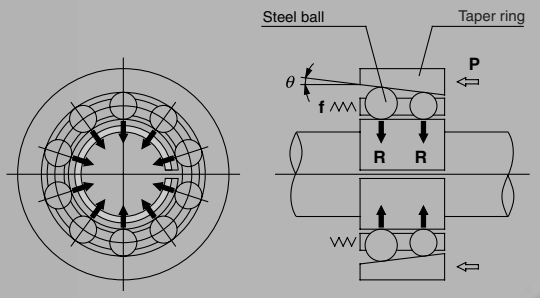
Series MNB

ø32, ø40, ø50, ø63, ø80, ø100

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

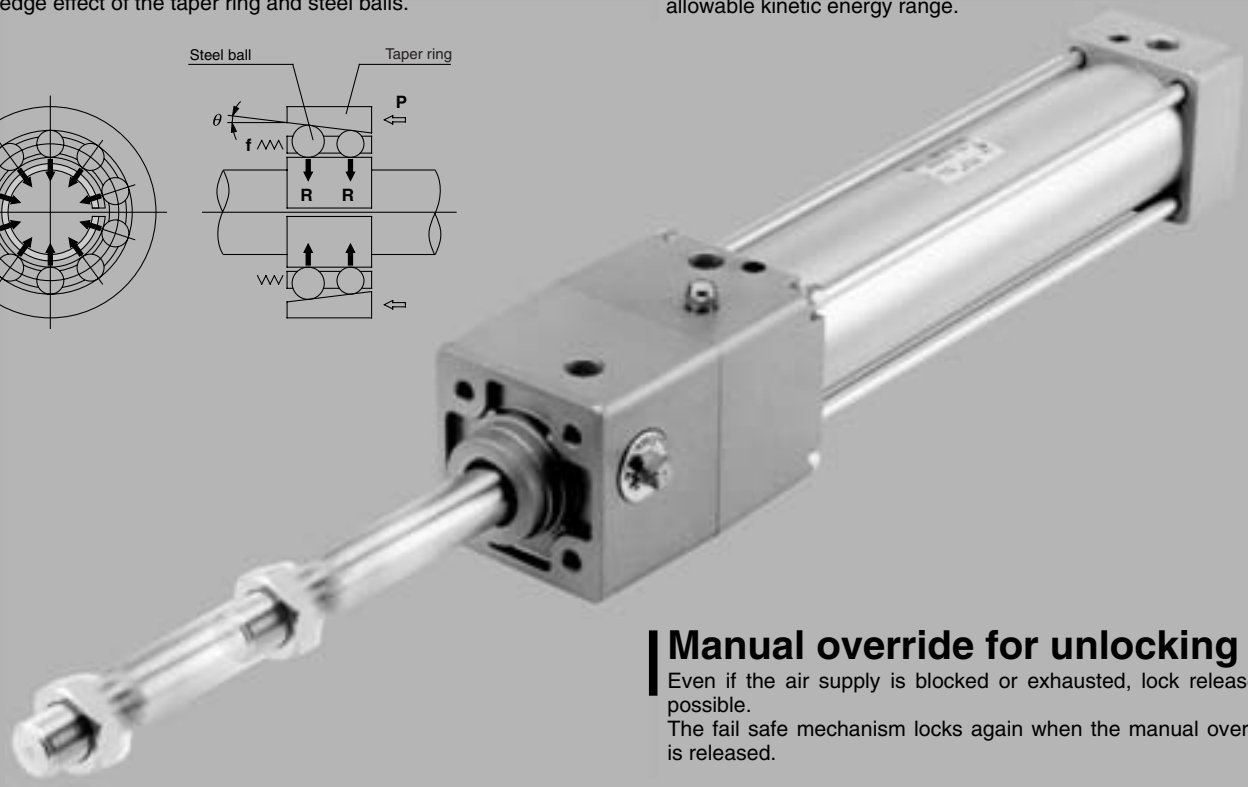
Simple construction

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



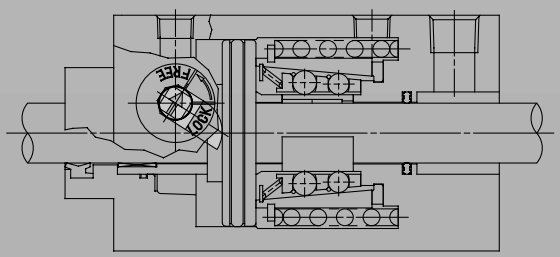
Maximum piston speed: 1000 mm/s

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



Manual override for unlocking

Even if the air supply is blocked or exhausted, lock release is possible.
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.

Can be locked in both directions

An equal holding force can be obtained on either reciprocating stroke of the cylinder.

■ Series Variations

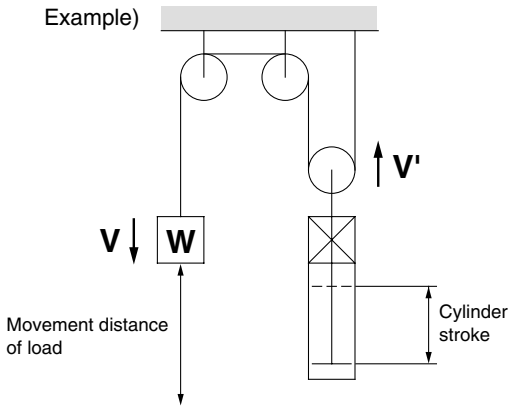
Series	Action	Type	Standard variations: With rod boot	Bore size (mm)	Lock holding force (N)	Max. stroke (mm)
Cylinder with lock Series MNB	Double acting	Single rod Series MNB	○	32	552	700
				40	882	800
				50	1370	1000
				63	2160	
		Double rod Series MNBW	○	80	3430	1000
				100	5390	

Model Selection

Precautions on Model Selection

⚠ Caution

1. In order that the originally selected maximum speed shall not be 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.



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) on page 695 depending on the operating pressure and select models.

Selection Example

- Load mass : **m** = 50 kg
- Movement distance : **st** = 500 mm
- Movement time : **t** = 2 s
- Load condition : Vertical downward = Load in direction of rod extension
- Operating pressure : **P** = 0.4 MPa

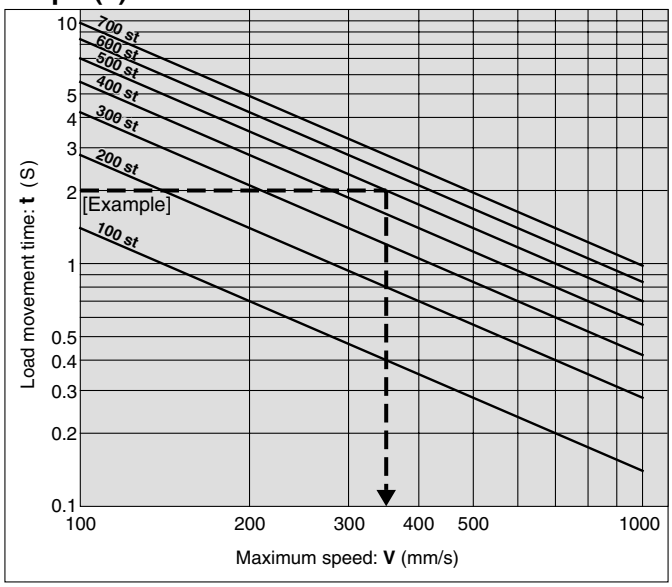
Step (1): From graph (1) find the maximum movement speed of the load
∴ Maximum speed **V**: ≅ 350 mm/s.

Step (2): Select graph (6) based upon the load conditions and operating pressure, and then from the intersection of the maximum speed **V** = 350 mm/s found in Step (1), and the load mass **m** = 50 kg.
∴ ø63 → select a MNB63 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).

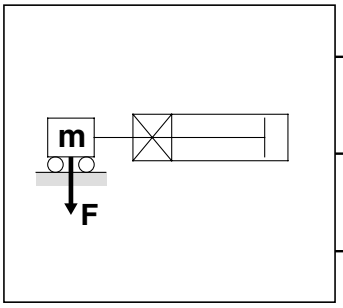
Graph (1)

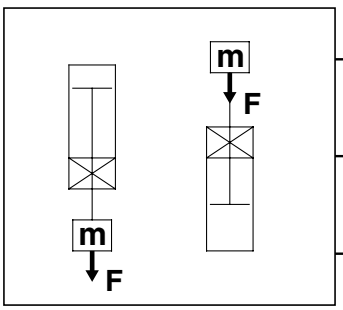


Step (2) Find the bore size.

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	Operating pressure	
Load in the direction at the right angle to rod (∗ Being held by a guide)	**0.3MPa ≤**	**Graph (2)**
	0.4 MPa ≤	**Graph (3)**
	0.5 MPa ≤	**Graph (4)**
Load in the direction of rod extension Load in the direction of rod retraction	**0.3 MPa ≤**	**Graph (5)**
	0.4 MPa ≤	**Graph (6)**
	0.5 MPa ≤	**Graph (7)**

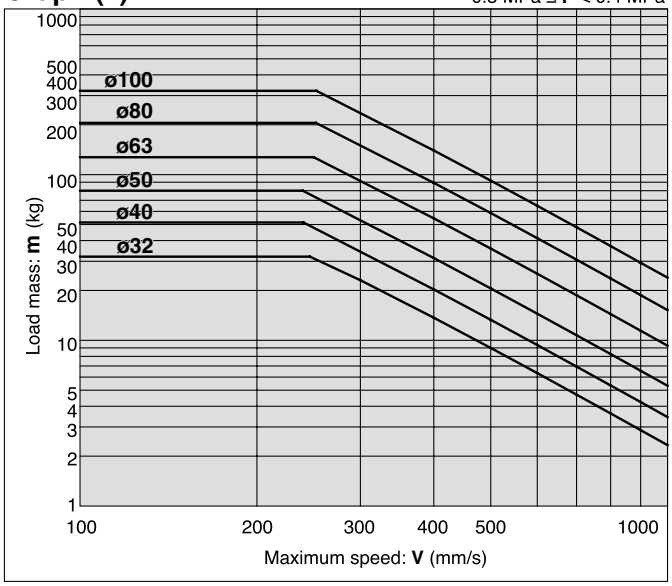




Selection Graph

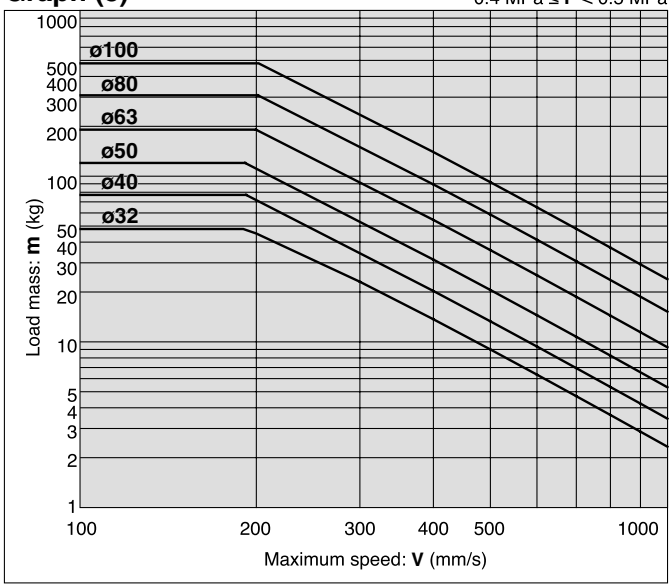
Graph (2)

0.3 MPa ≤ **P** < 0.4 MPa



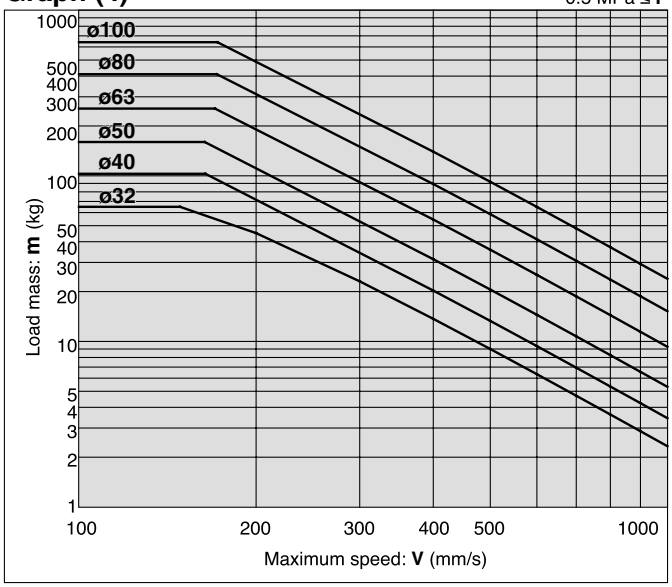
Graph (3)

0.4 MPa ≤ **P** < 0.5 MPa



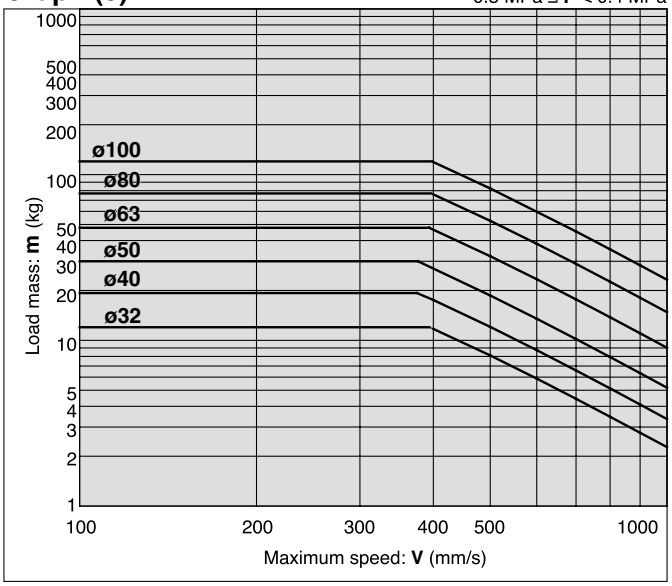
Graph (4)

0.5 MPa ≤ **P**



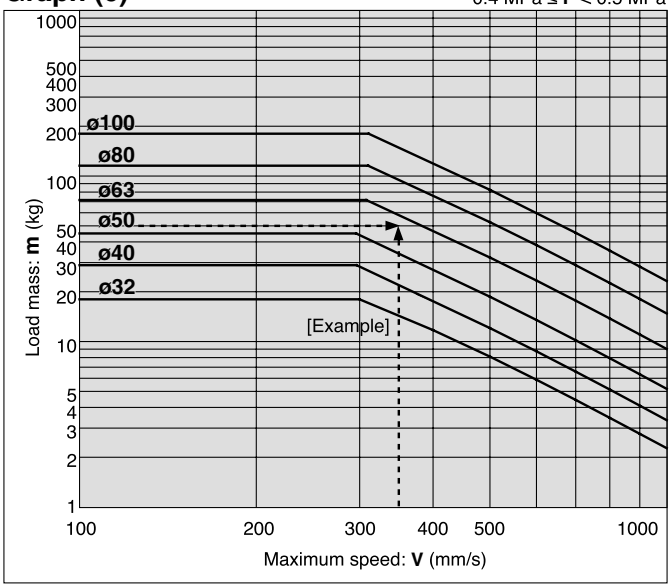
Graph (5)

0.3 MPa ≤ **P** < 0.4 MPa



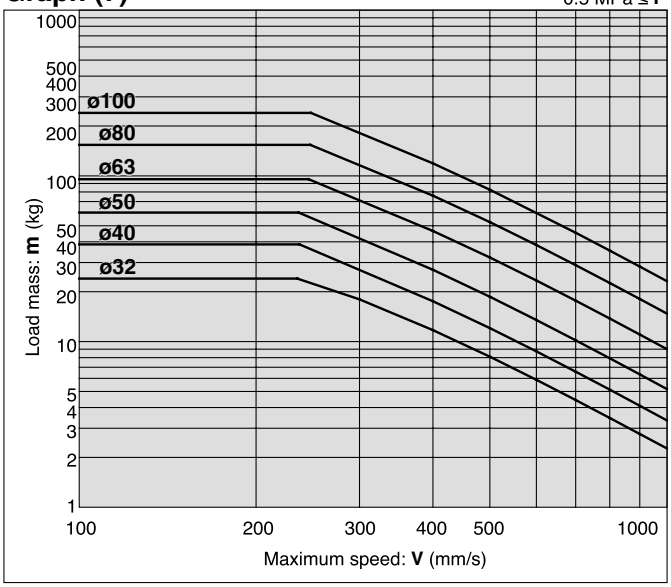
Graph (6)

0.4 MPa ≤ **P** < 0.5 MPa



Graph (7)

0.5 MPa ≤ **P**



Cylinder with Lock
Double Acting, Single Rod
Series MNB
ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MNB **L** **50** **□** – **100** **□** – **D** – **□**

With auto switch **MDNB** **L** **50** **□** – **100** **□** – **D** – **M9BW** **□** – **□**

With auto switch
(Built-in magnet)

Mounting style

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

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 697 for the standard stroke.

With rod boot

Rod boot	**Nil**	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

Locking direction

D	Both directions

Auto switch

Nil	Without auto switch

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

Number of auto switch

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

Made to Order
Refer to page 697 for details.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDNBL40-100-D

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

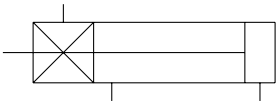
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9N**	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9P**	—	●	●	●	○	○		
				2-wire		12 V		**M9B**	—	●	●	●	○	○		
					—	—	100 V, 200 V	**J51**	—	●	—	●	○	—	—	
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	—	**G39**	—	—	—	—	—		
				2-wire		12 V		—	**K39**	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**M9NW**	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PW**	—	●	●	●	○	○		
				2-wire		12 V		**M9BW**	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		**M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PA**	—	○	○	●	○	○		
				2-wire		12 V		**M9BA**	—	○	○	●	○	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**F59F**	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		**P4DW**	—	—	—	●	●	○	—	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96**	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93**	—	●	—	●	—	—	—	Relay, PLC
			Yes				100 V or less	**A90**	—	●	—	●	—	—	IC circuit	
			No				100 V, 200 V	**A54**	—	●	—	●	●	—	—	
							200 V or less	**A64**	—	●	—	●	—	—		
		Terminal conduit	Yes				—	—	**A33**	—	—	—	—	—	—	
		DIN terminal					100 V, 200V	—	**A34**	—	—	—	—	—		PLC
								—	**A44**	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	–	**A59W**	—	●	—	●	—	—		

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

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

∗ Since there are other applicable auto switches than listed, refer to page 717 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□//M9□W/M9□AL auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment.)

JIS Symbol
Cylinder with brake



Made to Order Specifications

(For details, refer to pages 1836 and 1926.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC35	With coil scraper

Refer to pages 714 to 717 for cylinders with auto switches.

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

Cylinder Specifications

Bore size (mm)	32	40	50	63	80	100
Lubrication	Not required (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	Air cushion on both ends					
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$					
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style					

∗ Load limits exist depending upon piston speed when locked, mounting direction and operating pressure.

Lock Specifications

Bore size (mm)	32	40	50	63	80	100
Locking action	Spring locking (Exhaust locking)					
Unlocking pressure	0.25 MPa or more					
Lock starting pressure	0.20 MPa or less					
Max. operating pressure	1.0 MPa					
Locking direction	Both directions					
Holding force N	552	882	1370	2160	3430	5390

∗ Be sure to select cylinders in accordance with the procedures on page 694.

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for /mounting of auto switches (page 716).

Bore size (mm)	Standard stroke (mm) (1)	Maximum manufacturable stroke (mm)
32, 40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	ø32 : 700 ø40 : 800
50, 63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80, 100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000

Note 1) Intermediate strokes other than the above are produced upon receipt of order. Spacers are not used for intermediate strokes.
Note 2) When exceeding the stroke range for each bracket, determine the maximum strokes referring to the Selection Table (front matter 29 in Best Pneumatics No. 2).

Stopping Accuracy

(mm)

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 mass ····· Upper limit of allowed value
Solenoid valve for locking mounted on the unlocking port
Maximum value of stopping position dispersion from 100 measurements

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot (1)	MB-L03	MB-L04	MB-L05	MNB-L06*	MB-L08	MB-L10
Flange	MNB-F03*	MNB-F04*	MNB-F05*	MNB-F06*	MB-F08	MB-F10
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10

Note 1) When ordering foot bracket, order 2 pieces per cylinder.
Note 2) Accessories for each mounting bracket are as follows.
Foot, Flange, Single clevis: Body mounting bolts
Double clevis: Clevis pin, Cotter pin, Flat washer, Body mounting bolts
Note 3) All are common to the MB series air cylinders, except the sections marked with a "*".

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	20°C
K	Heat resistant tarpaulin	110°C *

* Maximum ambient temperature for the rod boot itself.

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Head side flange style	Single clevis style	Double clevis style
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●
Option	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●

Single Rod Mass/Aluminum Tube

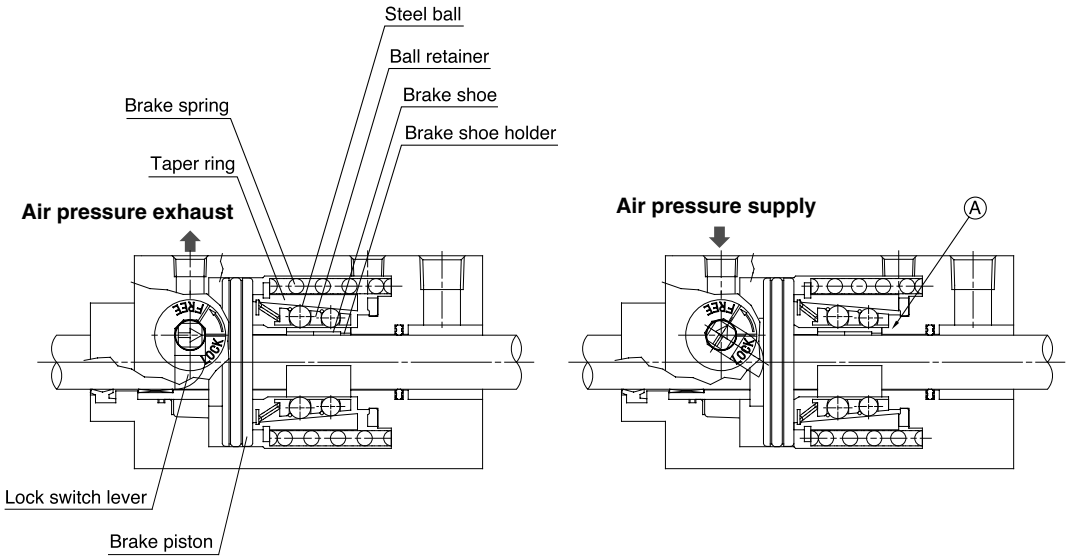
(kg)

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic style	1.20	1.72	2.76	4.06	6.85	10.26
	Foot style	1.30	1.84	2.94	4.32	7.28	10.85
	Flange style	1.44	2.04	3.29	4.80	8.30	13.57
	Single clevis style	1.45	1.98	3.10	4.69	7.96	13.43
	Double clevis style	1.46	1.99	3.19	4.85	8.25	13.95
Additional mass per each 50 mm of stroke	All mounting brackets	0.11	0.16	0.26	0.27	0.42	0.56
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation:
(Example) **MNBB32-100-D** (Basic type, ø32, 100 st)
- Basic mass·····1.20 (Basic style, ø32)
- Additional mass ····· 0.11/50 stroke
- Cylinder stroke ····· 100 stroke

1.20 + 0.11 x 100/50 = 1.42 kg

Construction Principle



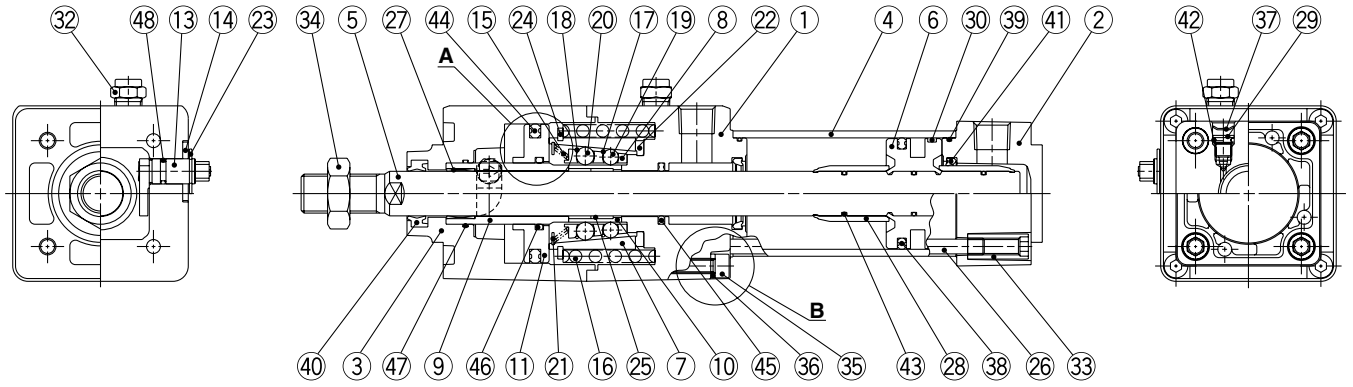
Locked state **Unlocked state**

Spring locking (Exhaust locking)

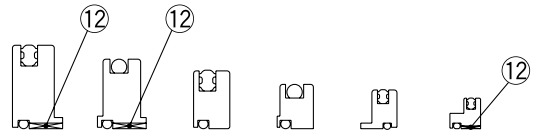
The spring force which acts upon the taper ring is magnified by a wedge effect, and is conveyed to all of the numerous steel balls which are arranged in two circles. These act on the brake shoe holder and brake, which locks the piston rod by tightening against it with a large force.

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

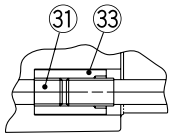
Construction



A section



B section



ø80, ø100

Component Parts

No.	Description		Material	Note
①	**Rod cover**		Aluminum alloy	Hard anodized and metallic painted
②	**Head cover**		Aluminum die-casted	Chromated and metallic painted
③	**Cover**		Aluminum alloy	Hard anodized and metallic painted
④	**Cylinder tube**		Aluminum alloy	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	**Release piston**	**ø32, ø80, ø100**	Aluminum alloy	Chromated
		ø40, ø50, ø63		Hard anodized
⑫	**Release piston bushing**		Steel + Special resin	ø32, ø80, ø100 only
⑬	**Unlocking cam**		Chromium molybdenum steel	Glossy chromated
⑭	**Washer**		Carbon steel	Colorless zinc chromated
⑮	**Retainer pre-load spring**	**ø32**	Steel wire	Zinc chromated
		ø40 to ø100	Stainless steel wire	
⑯	**Brake spring**		Steel wire	
⑰	**Clip A**		Stainless steel	Zinc chromated
⑱	**Clip B**		Stainless steel	
⑲	**Steel ball A**		Carbon steel	
⑳	**Steel ball B**		Carbon steel	
㉑	**Tooth ring**		Stainless steel	
㉒	**Bumper**		Polyurethane rubber	
㉓	**Type C retaining ring for unlocking cam shaft**		Carbon steel	
㉔	**Type C retaining ring for taper ring**		Carbon steel	
㉕	**Brake shoe**		Babbitt	
㉖	**Tie-rod**		Carbon steel	Zinc chromated
㉗	**Bushing**		Copper alloy	
㉘	**Cushion ring**		Brass	

Component Parts

No.	Description	Material	Note
㉙	**Cushion valve**	Steel wire	Nickel plated
㉚	**Wear ring**	Resin	
㉛	**Unit holding tie-rod**	Carbon steel	Chromated ø80, ø100 only
㉜	**BC element**		
㉝	**Tie-rod nut**	Carbon steel	Nickel plated
㉞	**Rod end nut**	Carbon steel	Nickel plated
㉟	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated ø32 to ø63
㊱	**Spring washer for hex. socket head cap screw**	Steel wire	Nickel plated ø32 to ø63
㊲	**Retaining ring**	Spring steel	
㊳	**Piston seal**	NBR	
㊴	**Cylinder tube gasket**	NBR	
㊵	**Rod seal A**	NBR	
㊶	**Cushion seal**	NBR	
㊷	**Cushion valve seal**	NBR	
㊸	**Piston gasket**	NBR	
㊹	**Release piston seal**	NBR	
㊺	**Rod seal B**	NBR	
㊻	**Release piston gasket**	NBR	
㊼	**Piston guide gasket**	NBR	
㊽	**Unlocking cam gasket**	NBR	

Replacement Parts: Seal Kit

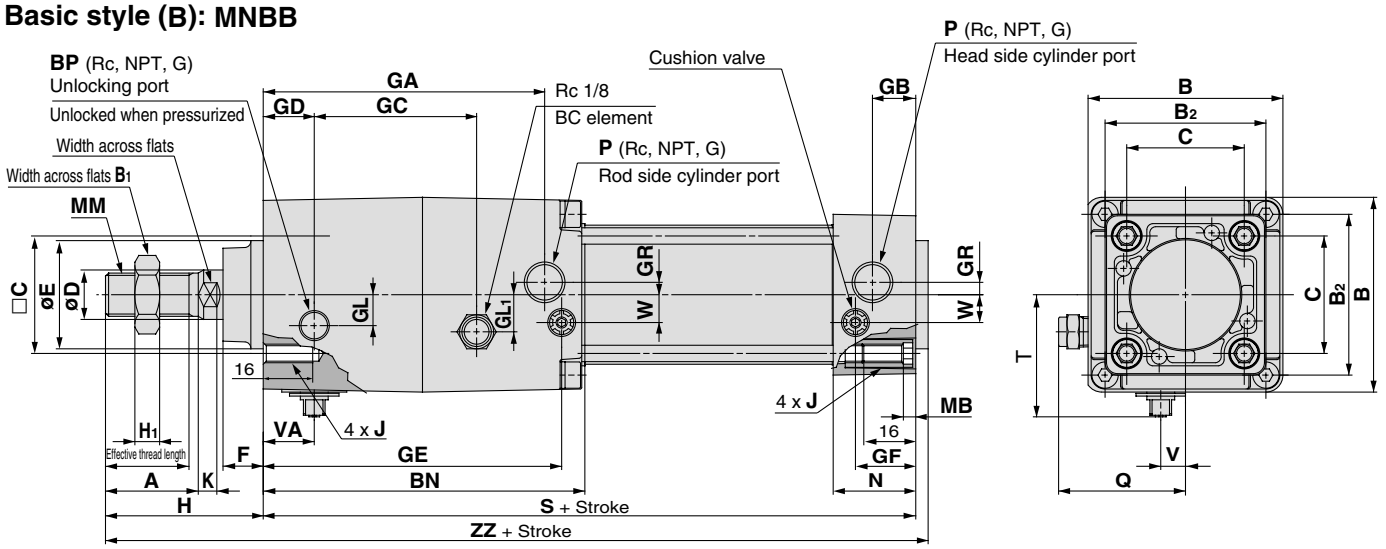
Bore size (mm)	Kit no.	Contents
32	MB32-PS	A set of ㊳, ㊴, ㊵ and ㊶ above
40	MB40-PS	
50	MB50-PS	
63	MB63-PS	
80	MB80-PS	
100	MB100-PS	

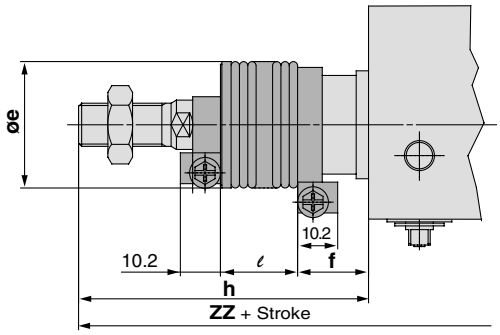
∗ Since the lock section for Series MNB is normally replaced as a unit, kits are for the cylinder section only. These can be ordered using the order number for each bore size.

∗ Seal kit includes a grease pack (ø32 to ø50: 10 g, ø63 and ø80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Dimensions

Basic style (B): MNBB





With rod boot

(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B_1	H_1	B_2	BN	BP	C	D	Ee_{11}	F	GA	GB	GC	GD	GL	GL_1
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20

Bore size (mm)	GR	GE	GF	J	MB	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	4	88.5	18.3	M6 x 1.0	4	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	205
40	4	96.5	19.5	M6 x 1.0	4	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	216
50	5	111.2	22.4	M8 x 1.25	5	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	245
63	9	123.5	20.7	M8 x 1.25	5	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	259
80	11.5	157	26	M10 x 1.5	5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	321
100	17	177	26	M10 x 1.5	5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	341

With Rod Boot

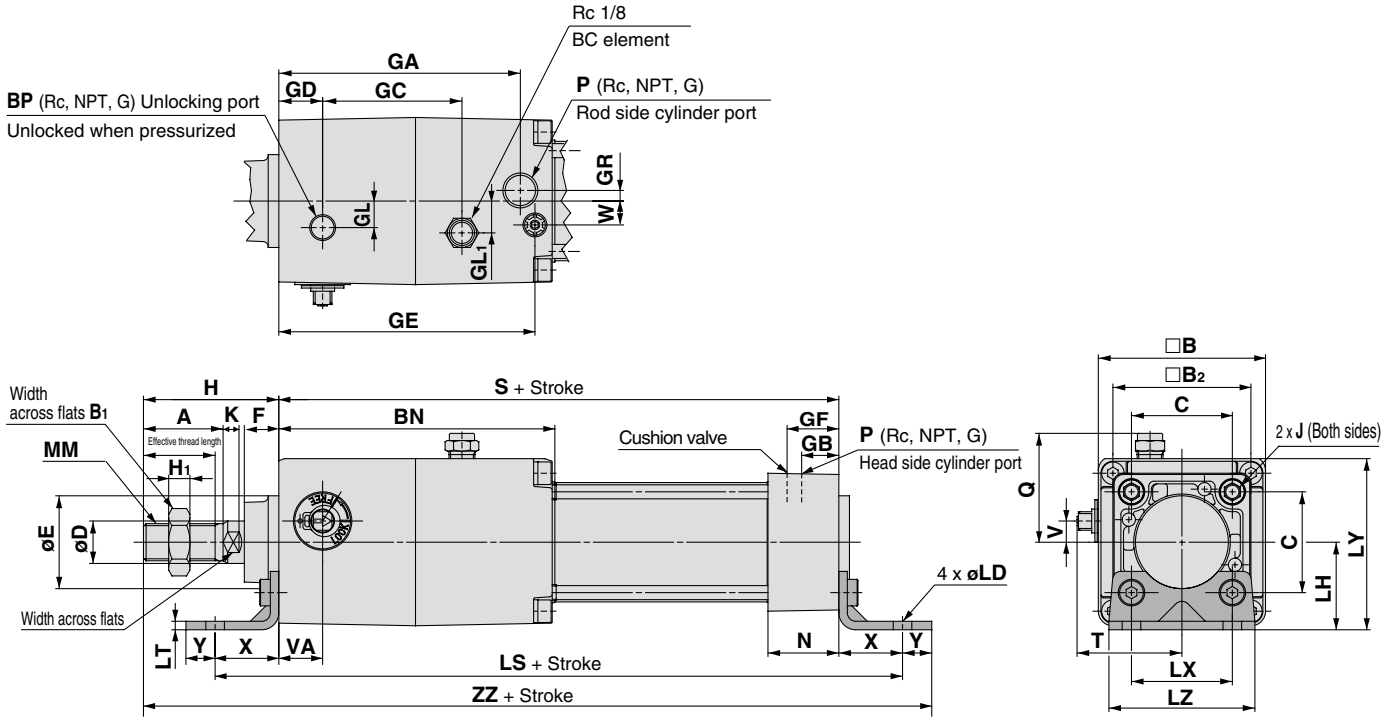
(mm)

Bore size (mm)	e	f	ℓ										h									
			1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800
32	36	23	12.5	25	37.5	50	75	100	125	—	—	—	73	86	98	111	136	161	186	—	—	—
40	41	23	12.5	25	37.5	50	75	100	125	—	—	—	81	94	106	119	144	169	194	—	—	—
50	51	25	12.5	25	37.5	50	75	100	125	150	—	—	89	102	114	127	152	177	202	227	—	—
63	51	25	12.5	25	37.5	50	75	100	125	150	—	—	89	102	114	127	152	177	202	227	—	—
80	56	29	12.5	25	37.5	50	75	100	125	150	175	200	101	114	126	139	164	189	214	239	264	289
100	61	29	12.5	25	37.5	50	75	100	125	150	175	200	101	114	126	139	164	189	214	239	264	289

Bore size (mm)	ZZ									
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800
32	231	244	256	269	294	319	344	—	—	—
40	246	259	271	284	309	334	359	—	—	—
50	276	289	301	314	339	364	389	414	—	—
63	290	303	315	328	353	378	403	428	—	—
80	350	363	375	388	413	438	463	488	513	538
100	370	383	395	408	433	458	483	508	533	538

Dimensions

Axial foot style (L): MNBL



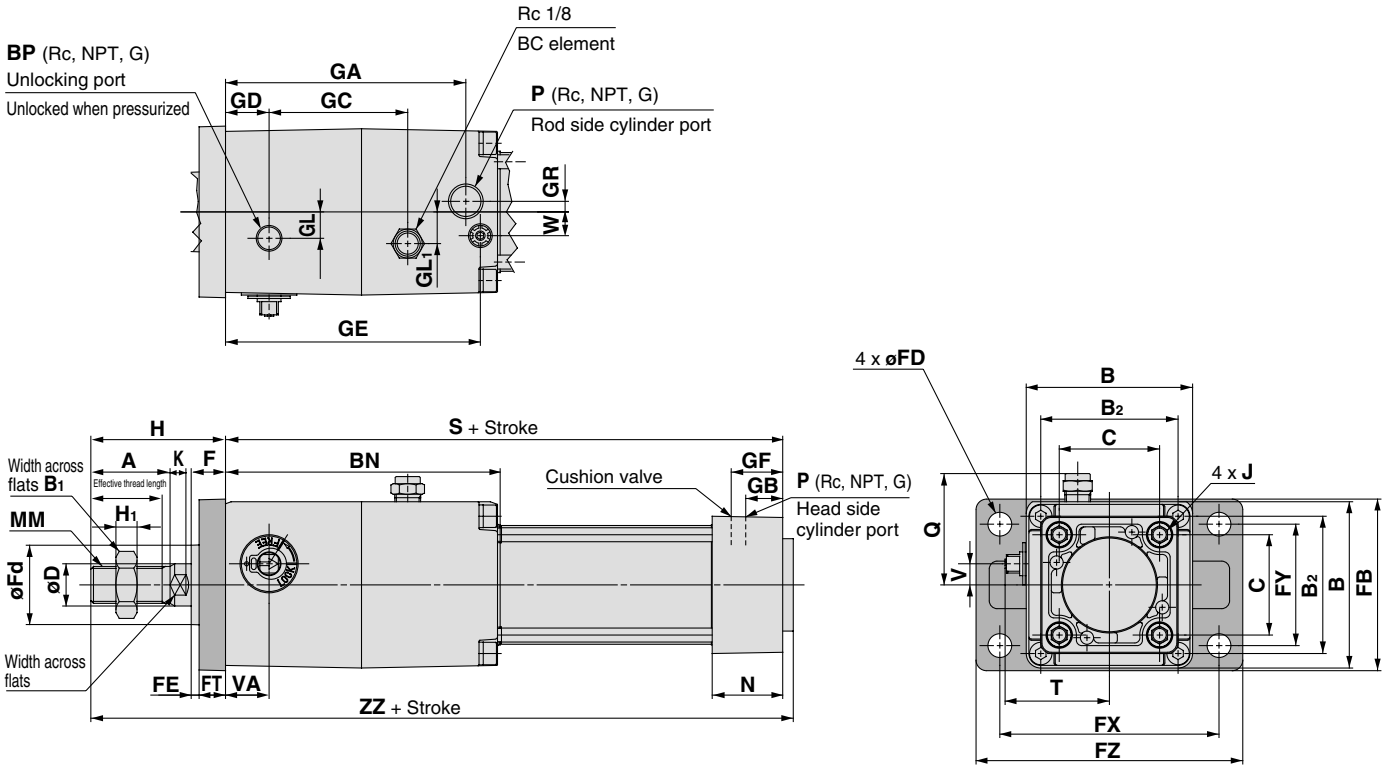
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B_1	H_1	B_2	BN	BP	C	D	Ee_{11}	F	GA	GB	GC	GD	GL	GL_1	GR	GE	GF
32	Up to 700	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12	4	88.5	18.3
40	Up to 800	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12	4	96.5	19.5
50	Up to 1000	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4
63	Up to 1000	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12	9	123.5	20.7
80	Up to 1000	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18	11.5	157	26
100	Up to 1000	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20	17	177	26

Bore size (mm)	J	LD	LH	LS	LT	LX	LY	LZ	K	MM	N	P	Q	H	S	T	V	VA	W	X	Y	ZZ
32	M6 x 1.0	7	30	198	3.2	32	57	50	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	22	9	232
40	M6 x 1.0	9	33	209	3.2	38	64.5	55	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	24	11	247
50	M8 x 1.25	9	40	237	3.2	46	77.5	70	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	27	11	279
63	M8 x 1.25	12	48	251	3.6	56	93	80	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	27	14	296
80	M10 x 1.5	12	55	305	4.5	72	106	100	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	30	14	361
100	M10 x 1.5	14	65	329	4.5	89	123	120	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	32	16	385

∗ Refer to page 701 for cylinders with a rod boot.

Rod side flange style (F): MNBF



(mm)

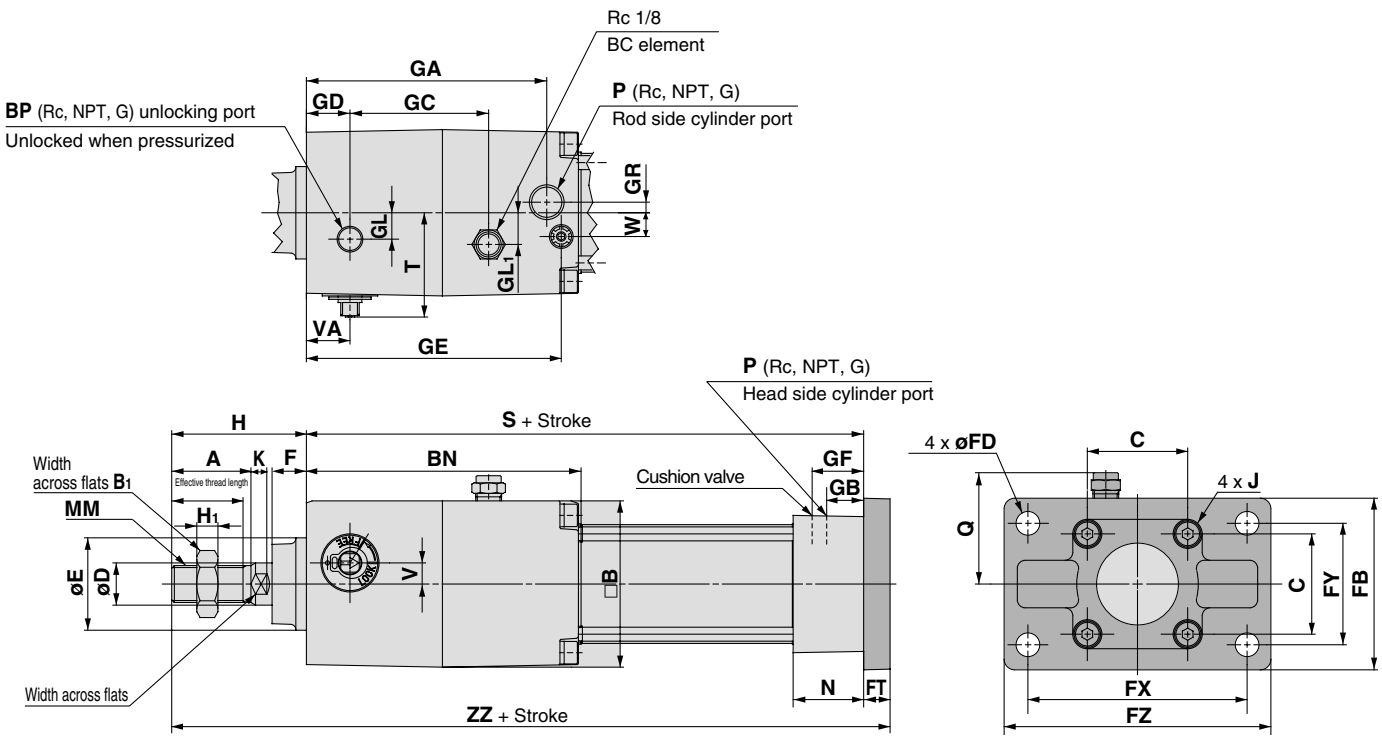
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B1	H1	B2	BN	BP	C	D	F	Fd	FD	FE	FT	FX	FY	FZ	GA	GB
32	Up to 700	19.5	10	22	56	54	17	6	46	97	1/8	32.5	12	13	25	7	3	10	72	38	87	83	13
40	Up to 800	27	14	30	65	63	22	8	52	104	1/8	38	16	13	31	9	3	10	83	46	101	91	14
50	Up to 1000	32	18	35	77	75	27	11	65	120.5	1/4	46.5	20	14	38.5	9	2	12	100	52	120	104.5	15.5
63	Up to 1000	32	18	35	92	90	27	11	75	134.5	1/4	56.5	20	14	39.5	9	2	12	115	62	135	119.5	16.5
80	Up to 1000	37	22	40	100	102	32	13	95	169	1/4	72	25	20	45.5	12	4	16	126	63	153	150	19
100	Up to 1000	37	26	40	120	116	41	16	114	189	1/4	89	30	20	54	14	4	16	150	75	178	170	19

Bore size (mm)	GC	GD	GL	GL1	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	45.5	13	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	205
40	52.5	16.5	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	216
50	58.5	19	12.5	15	5	111.2	22.4	M8 x 1.25	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	245
63	68	23	17.5	12	9	123.5	20.7	M8 x 1.25	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	259
80	81	33	22	18	11.5	157	26	M10 x 1.5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	321
100	96	37.5	25	20	17	177	26	M10 x 1.5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	341

∗ Refer to page 701 for cylinders with a rod boot.

Dimensions

Head side flange style (G): MNBG



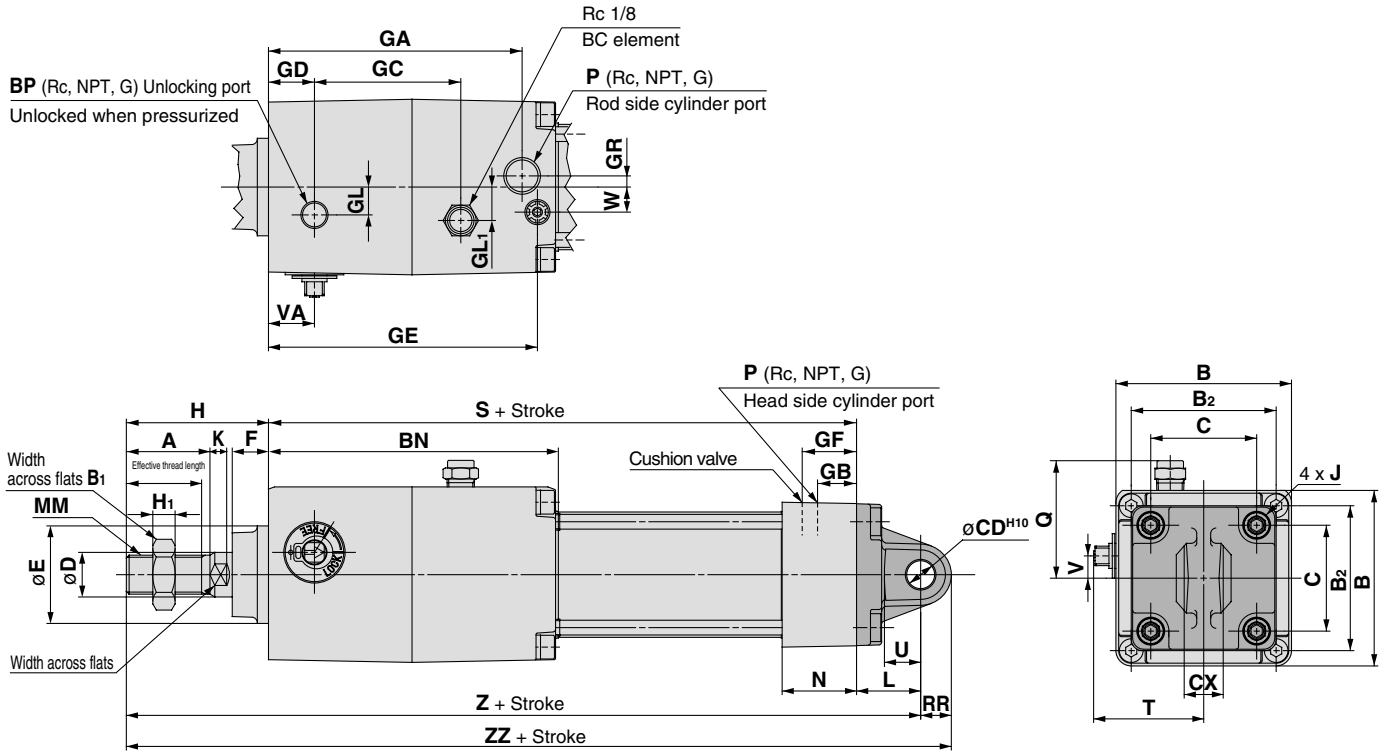
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B_1	H_1	BN	BP	C	D	Ee_{11}	F	FD	FT	FX	FY	FZ	GA	GB	GC	GD
32	Up to 500	19.5	10	22	56	54	17	6	97	1/8	32.5	12	30	13	7	10	72	38	87	83	13	45.5	13
40	Up to 500	27	14	30	65	63	22	8	104	1/8	38	16	35	13	9	10	83	46	101	91	14	52.5	16.5
50	Up to 600	32	18	35	77	75	27	11	120.5	1/4	46.5	20	40	14	9	12	100	52	120	104.5	15.5	58.5	19
63	Up to 600	32	18	35	92	90	27	11	134.5	1/4	56.5	20	45	14	9	12	115	62	135	119.5	16.5	68	23
80	Up to 800	37	22	40	100	102	32	13	169	1/4	72	25	45	20	12	16	126	63	153	150	19	81	33
100	Up to 800	37	26	40	120	116	41	16	189	1/4	89	30	55	20	14	16	150	75	178	170	19	96	37.5

Bore size (mm)	GL	GL_1	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	211
40	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	222
50	12.5	15	5	111.2	22.4	M8 x 1.25	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	253
63	17.5	12	9	123.5	20.7	M8 x 1.25	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	267
80	22	18	11.5	157	26	M10 x 1.5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	333
100	25	20	17	177	26	M10 x 1.5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	353

∗ Refer to page 701 for cylinders with a rod boot.

Single clevis style (C): MNBC



(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B_1	H_1	B_2	BN	BP	C	CD^{H10}	$CX^{-0.1}_{-0.3}$	D	Ee_{11}	F	GA	GB	GC	GD	GL	GL_1	GR
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	10	14	12	30	13	83	13	45.5	13	8.5	12	4
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	10	14	16	35	13	91	14	52.5	16.5	10	12	4
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	14	20	20	40	14	104.5	15.5	58.5	19	12.5	15	5
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	14	20	20	45	14	119.5	16.5	68	23	17.5	12	9
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	22	30	25	45	20	150	19	81	33	22	18	11.5
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	22	30	30	55	20	170	19	96	37.5	25	20	17

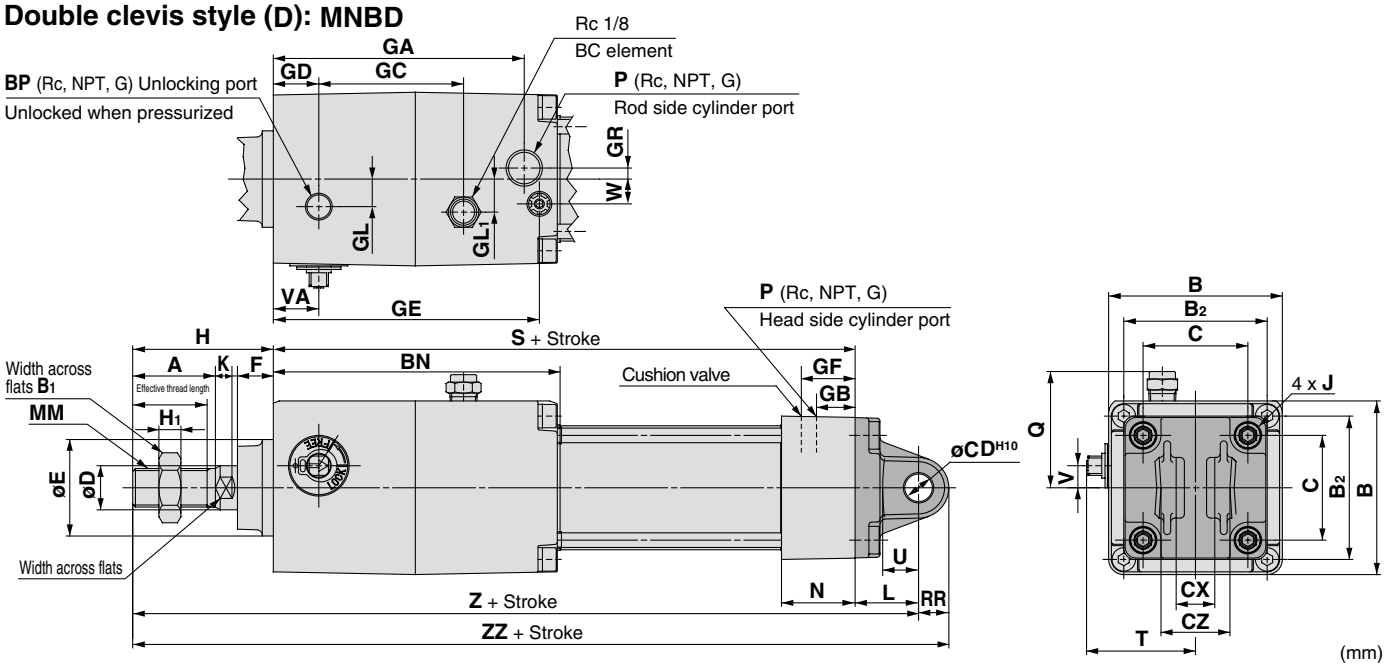
Bore size (mm)	GE	GF	J	K	L	MM	N	P	Q	RR	H	S	T	U	V	VA	W	Z	ZZ
32	88.5	18.3	M6 x 1.0	6	23	M10 x 1.25	27	1/8	37	10.5	47	154	34	13	6.5	13	6.5	224	234.5
40	96.5	19.5	M6 x 1.0	6	23	M14 x 1.5	27	1/4	41.5	11	51	161	39.5	13	8	16.5	9	235	246
50	111.2	22.4	M8 x 1.25	7	30	M18 x 1.5	31.5	1/4	47.5	15	58	183	47	17	9	20	10.5	271	286
63	123.5	20.7	M8 x 1.25	7	30	M18 x 1.5	31.5	3/8	55	15	58	197	55.5	17	8.5	23	12	285	300
80	157	26	M10 x 1.5	10	42	M22 x 1.5	38	3/8	61	23	72	245	61.5	26	10.5	33	14	359	382
100	177	26	M10 x 1.5	10	42	M26 x 1.5	38	1/2	68	23	72	265	69.5	26	10.5	37.5	15	379	402

∗ Refer to page 701 for cylinders with a rod boot.

CLJ2
CLM2
CLG1
CL1
MLGC
CNG
MNB
CNA
CNS
CLS
CLQ
RLQ
MLU
MLGP
ML1C
D-□
-X□
Individual -X□

Dimensions

Double clevis style (D): MNBD



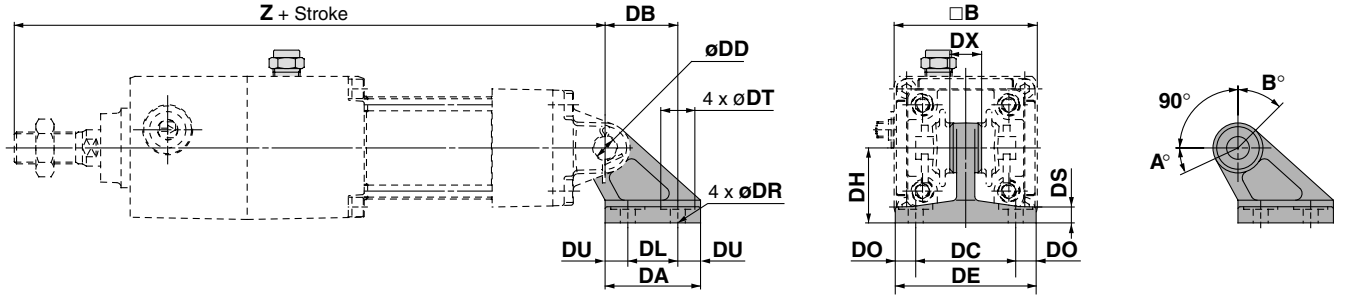
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B1	H1	B2	BN	BP	C	CDH10	CX+0.3 +0.1	CZ	D	Ee11	F	GA	GB	GC	GD	GL	GL1
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	10	14	28	12	30	13	83	13	45.5	13	8.5	12
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	10	14	28	16	35	13	91	14	52.5	16.5	10	12
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	14	20	40	20	40	14	104.5	15.5	58.5	19	12.5	15
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	14	20	40	20	45	14	119.5	16.5	68	23	17.5	12
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	22	30	60	25	45	20	150	19	81	33	22	18
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	22	30	60	30	55	20	170	19	96	37.5	25	20

Bore size (mm)	GR	GE	GF	J	K	L	MM	N	P	Q	RR	H	S	T	U	V	VA	W	Z	ZZ
32	4	88.5	18.3	M6 x 1.0	6	23	M10 x 1.25	27	1/8	37	10.5	47	154	34	13	6.5	13	6.5	224	234.5
40	4	96.5	19.5	M6 x 1.0	6	23	M14 x 1.5	27	1/4	41.5	11	51	161	39.5	13	8	16.5	9	235	246
50	5	111.2	22.4	M8 x 1.25	7	30	M18 x 1.5	31.5	1/4	47.5	15	58	183	47	17	9	20	10.5	271	286
63	9	123.5	20.7	M8 x 1.25	7	30	M18 x 1.5	31.5	3/8	55	15	58	197	55.5	17	8.5	23	12	285	300
80	11.5	157	26	M10 x 1.5	10	42	M22 x 1.5	38	3/8	61	23	72	245	61.5	26	10.5	33	14	359	382
100	17	177	26	M10 x 1.5	10	42	M26 x 1.5	38	1/2	68	23	72	265	69.5	26	10.5	37.5	15	379	402

∗ Refer to page 701 for cylinders with a rod boot.

Double Clevis Pivot Bracket



(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z	DDH10 (Hole)
MB-B03	**32**	54	42	32	22	10	44	14	62	9	6.6	15	7	33	224	$10^{+0.058}_{0}$
	40	63	42	32	22	10	44	14	62	9	6.6	15	7	33	235	$10^{+0.058}_{0}$
MB-B05	**50**	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	271	$14^{+0.070}_{0}$
	63	90	53	43	30	11.5	60	20	81	10.5	9	18	8	45	285	$14^{+0.070}_{0}$
MB-B08	**80**	102	73	64	45	14	86	30	111	12.5	11	22	10	65	359	$22^{+0.084}_{0}$
	100	116	73	64	45	14	86	30	111	12.5	11	22	10	65	379	$22^{+0.084}_{0}$

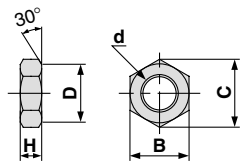
Rotating Angle

Bore size (mm)	A°	B°	A° + B° + 90°
32, **40**	25°	45°	160°
50, **63**	40°	60°	190°
80, **100**	30°	55°	175°

Accessory Bracket Dimensions

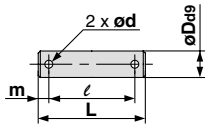
Accessory Bracket Dimensions

Rod End Nut (Standard equipment)



Part no.	Bore size (mm)	B	C	D	H	d
NT-03	32	17	19.6	16.5	6	M10 x 1.25
NT-04	40	22	25.4	21	8	M14 x 1.5
NT-05	50, 63	27	31.2	26	11	M18 x 1.5
NT-08	80	32	37.0	31	13	M22 x 1.5
NT-10	100	41	47.3	39	16	M26 x 1.5

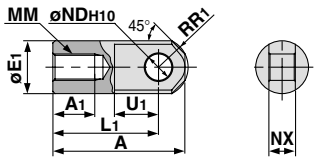
Knuckle Joint Pin, Clevis Pin



Part no.	Bore size (mm)		D_{d9}	L	ℓ	m	d (Drill through)	Cotter pin Note)
	Clevis	Knuckle						
CD-M03	32, 40		$10^{-0.040}_{-0.076}$	44	36	4	3	ø3 x 18 ℓ
CD-M05	50, 63		$14^{-0.050}_{-0.093}$	60	51	4.5	4	ø4 x 25 ℓ
CD-M08	80, 100		$22^{-0.065}_{-0.117}$	82	72	5	4	ø4 x 35 ℓ

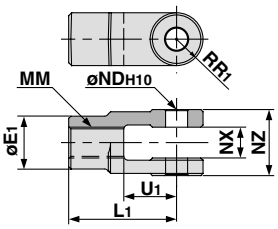
Note) Cotter pins and flat washers are included.

I Type Single Knuckle Joint



Part no.	Bore size (mm)	A	A_1	E_1	L_1	MM	R_1	U_1	ND_{H10}	NX
I-03M	32	40	14	20	30	M10 x 1.25	12	16	$10^{+0.058}_{0}$	$14^{-0.10}_{-0.30}$
I-04M	40	50	19	22	40	M14 x 1.5	12.5	19	$10^{+0.058}_{0}$	$14^{-0.10}_{-0.30}$
I-05M	50, 63	64	24	28	50	M18 x 1.5	16.5	24	$14^{+0.070}_{0}$	$20^{-0.10}_{-0.30}$
I-08M	80	80	26	40	60	M22 x 1.5	23.5	34	$22^{+0.084}_{0}$	$30^{-0.10}_{-0.30}$
I-10M	100	80	26	40	60	M26 x 1.5	23.5	34	$22^{+0.084}_{0}$	$30^{-0.10}_{-0.30}$

Y Type Double Knuckle Join



Part no.	Bore size (mm)	E_1	L_1	MM	R_1	U_1	ND_{H10}	NX	NZ
Y-03M	32	20	30	M10 x 1.25	10	16	$10^{+0.058}_{0}$	$14^{+0.30}_{+0.10}$	$28^{-0.10}_{-0.30}$
Y-04M	40	22	40	M14 x 1.5	11	19	$10^{+0.058}_{0}$	$14^{+0.30}_{+0.10}$	$28^{-0.10}_{-0.30}$
Y-05M	50, 63	28	50	M18 x 1.5	14	24	$14^{+0.070}_{0}$	$20^{+0.30}_{+0.10}$	$40^{-0.10}_{-0.30}$
Y-08M	80	40	65	M22 x 1.5	20	34	$22^{+0.084}_{0}$	$30^{+0.30}_{+0.10}$	$60^{-0.10}_{-0.30}$
Y-10M	100	40	65	M26 x 1.5	20	34	$22^{+0.084}_{0}$	$30^{+0.30}_{+0.10}$	$60^{-0.10}_{-0.30}$

Note) Pin, cotter pin and plain washer are attached with double knuckle joint.

Cylinder with Lock
Double Acting, Double Rod
Series MNBW
ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MNBW L 50 □ – 100 □ – D

With auto switch **MDNBW L 50 □ – 100 □ – D – M9BW □**

With auto switch (Built-in magnet)

Double rod type

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 709 for the standard stroke.

With rod boot

Rod boot	**Nil**	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

∗ Rod boot comes with both sides. If only single-sided is required, please consult with SMC.

Locking direction

D	Both directions

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.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDNBWL40-100-D

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

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9N**	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9P**	—	●	●	●	○	○		
				2-wire		12 V		**M9B**	—	●	●	●	○	○		
					—	—	100 V, 200 V	**J51**	—	●	–	●	○	–	—	
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	—	**G39**	–	–	–	–	–		
				2-wire		12 V		—	**K39**	–	–	–	–	–		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**M9NW**	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PW**	—	●	●	●	○	○		
				2-wire		12 V		**M9BW**	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		**M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PA**	—	○	○	●	○	○		
				2-wire		12 V		**M9BA**	—	○	○	●	○	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**F59F**	—	●	–	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		**P4DW**	—	–	–	●	●	○	—	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96**	—	●	–	●	–	–	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93**	—	●	–	●	–	–	—	Relay, PLC
			Yes				100 V or less	**A90**	—	●	–	●	–	–	IC circuit	
			No				100 V, 200 V	**A54**	—	●	–	●	●	–	—	
							200 V or less	**A64**	—	●	–	●	–	–		
		Terminal conduit	Yes				—	—	**A33**	–	–	–	–	–		
							100 V, 200 V	—	**A34**	–	–	–	–	–		PLC
		DIN terminal						—	**A44**	–	–	–	–	–		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	–	**A59W**	—	●	–	●	–	–		

∗ Lead wire length symbols: 0.5 m·····Nil (Example) M9NW
1 m·····M (Example) M9NWM
3 m····· L (Example) M9NWL
5 m····· Z (Example) M9NWZ

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

∗ Since there are other applicable auto switches than listed, refer to page 717 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W/M9□AL auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment.)

JIS Symbol
Cylinder with brake

Refer to pages 714 to 717 for cylinders with auto switches.

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

Cylinder Specifications

Bore size (mm)	32	40	50	63	80	100
Lubrication	Not required (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	Air cushion on both ends					
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$					
Mounting	Basic style, Axial foot style, Rod side flange style					

∗ Load limits exist depending upon piston speed when locked, mounting direction and operating pressure.

Lock Specifications

Bore size (mm)	32	40	50	63	80	100
Locking action	Spring locking (Exhaust locking)					
Unlocking pressure	0.25 MPa or more					
Lock starting pressure	0.20 MPa or less					
Max. operating pressure	1.0 MPa					
Locking direction	Both directions					
Holding force N	552	882	1370	2160	3430	5390

∗ Be sure to select cylinders in accordance with the procedures on page 694.

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for /mounting of auto switches (page 716).

Bore size (mm)	Standard stroke (mm)
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800

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

Stopping Accuracy

(mm)

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 mass ····· Upper limit of allowed value
Solenoid valve for locking mounted on the unlocking port
Maximum value of stopping position dispersion from 100 measurements

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100
Foot (1)	MB-L03	MB-L04	MB-L05	MNB-L*	MB-L08	MB-L10
Flange	MNB-F03*	MNB-F04*	MNB-F05*	MNB-F06*	MB-F08	MB-F10

Note 1) When ordering foot bracket, order 2 pieces per cylinder.
Note 2) Accessories for each mounting bracket are as follows.
Foot, Flange: Body mounting bolts
Note 3) All are common to the MB series air cylinders, except the sections marked with a *.

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Accessory

Mounting		Basic style	Foot style	Rod side flange style
Standard equipment	Rod end nut	●	●	●
Option	With rod boot	●	●	●

Double Rod Mass/Aluminum Tube

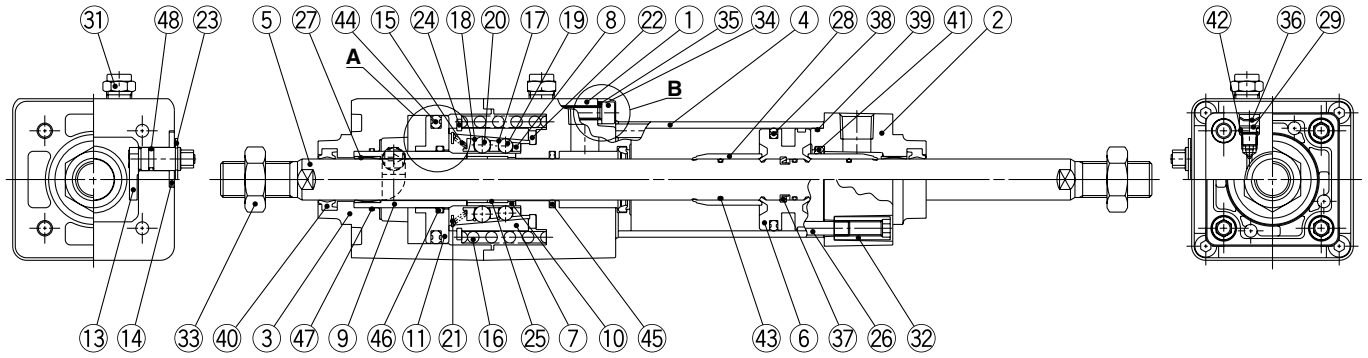
(kg)

Bore size (mm)		32	40	50	63	80	100
Basic mass	Basic style	1.26	1.82	2.91	4.24	7.23	10.70
	Foot style	1.36	1.94	3.09	4.50	7.66	11.29
	Flange style	1.50	2.14	3.44	4.98	8.68	14.01
Additional mass per each 50 mm of stroke	All mounting brackets	0.15	0.24	0.34	0.35	0.61	0.84
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27

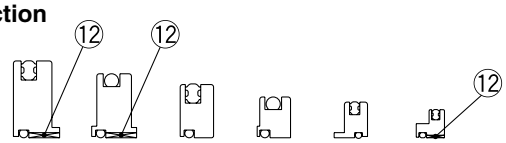
Calculation:
(Example) **MNBWB32-100-D** (Basic type, ø32, 100 st)
- Basic mass·····1.26 (Basic style, ø32)
- Additional mass ·····0.11/50 stroke
- Cylinder stroke ····· 100 stroke

1.26 + 0.11 x 100/50 = 1.48 kg

Construction

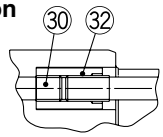


A section



ø100 ø80 ø63 ø50 ø40 ø32

B section



ø80, ø100

Component Parts

No.	Description		Material	Note
1	**Rod cover A**		Aluminum alloy	Hard anodized and metallic painted
2	**Rod cover B**		Aluminum die-casted	Chromated and metallic painted
3	**Cover**		Aluminum alloy	Hard anodized and metallic painted
4	**Cylinder tube**		Aluminum alloy	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	**Release piston**	**ø32, ø80, ø100**	Aluminum alloy	Chromated
		ø40, ø50, ø63		Hard anodized
12	**Release piston bushing**		Steel + Special resin	ø32, ø80, ø100 only
13	**Unlocking cam**		Chromium molybdenum steel	Glossy chromated
14	**Washer**		Carbon steel	Colorless zinc chromated
15	**Retainer pre-load spring**	**ø32**	Steel wire	Zinc chromated
		ø40 to ø100	Stainless steel wire	
16	**Brake spring**		Steel wire	
17	**Clip A**		Stainless steel	Zinc chromated
18	**Clip B**		Stainless steel	
19	**Steel ball A**		Carbon steel	
20	**Steel ball B**		Carbon steel	
21	**Tooth ring**		Stainless steel	
22	**Bumper**		Polyurethane rubber	
23	**Type C retaining ring for unlocking cam shaft**		Carbon steel	
24	**Type C retaining ring for taper ring**		Carbon steel	
25	**Brake shoe**		Babbitt	
26	**Tie-rod**		Carbon steel	Zinc chromated
27	**Bushing**		Copper alloy	
28	**Cushion ring**		Brass	

Component Parts

No.	Description	Material	Note
29	**Cushion valve**	Steel wire	Nickel plated
30	**Unit holding tie-rod**	Carbon steel	Chromated ø80, ø100 only
31	**BC element**		
32	**Tie-rod nut**	Carbon steel	Nickel plated
33	**Rod end nut**	Carbon steel	Nickel plated
34	**Hexagon socket head cap screw**	Chromium molybdenum steel	Nickel plated ø32 to ø63
35	**Spring washer for hex. socket head cap screw**	Steel wire	Nickel plated ø32 to ø63
36	**Retaining ring**	Spring steel	
37	**Piston holder**	Urethane	
38	**Piston seal**	NBR	
39	**Cylinder tube gasket**	NBR	
40	**Rod seal A**	NBR	
41	**Cushion seal**	NBR	
42	**Cushion valve seal**	NBR	
43	**Piston gasket**	NBR	
44	**Release piston seal**	NBR	
45	**Rod seal B**	NBR	
46	**Release piston gasket**	NBR	
47	**Piston guide gasket**	NBR	
48	**Unlocking cam gasket**	NBR	

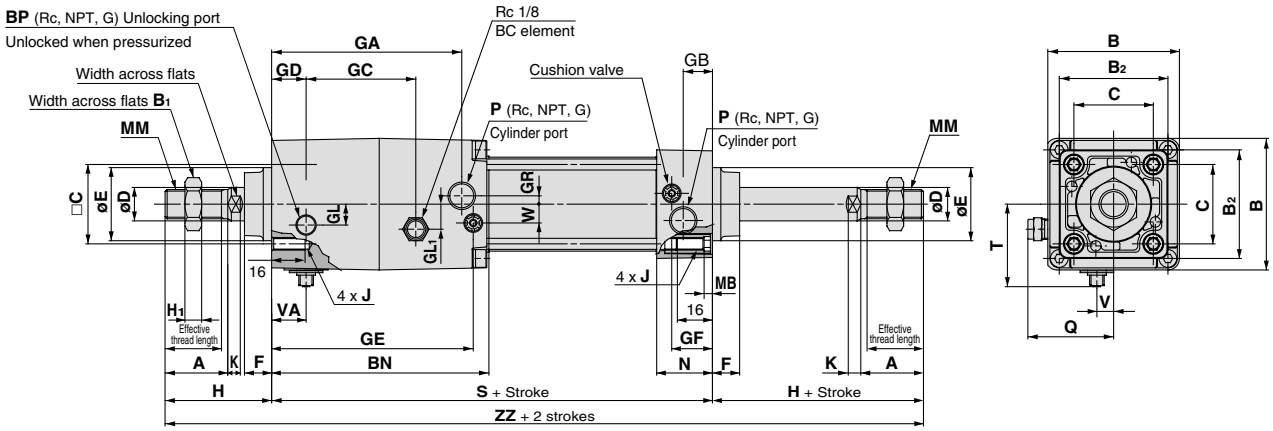
Replacement Parts: Seal Kit

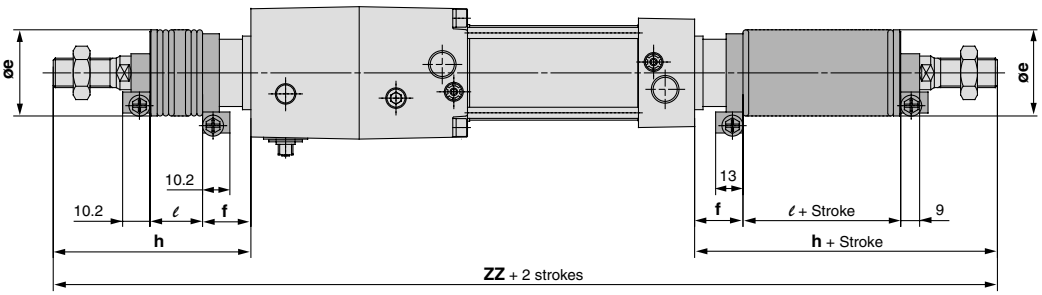
Bore size (mm)	Kit no.	Contents
32	MBW32-PS	A set of ㊳, ㊴, ㊵ and ㊶ above
40	MBW40-PS	
50	MBW50-PS	
63	MBW63-PS	
80	MBW80-PS	
100	MBW100-PS	

∗ As a general rule, the lock section of Series MNBW is replaced as a unit, and therefore, the replacement seal 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 (ø32 to ø50: 10 g, ø63 and ø80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Dimensions

Basic style (B): MNBWB





With rod boot

(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B1	H1	B2	BN	BP	C	D	Ee11	F	GA	GB	GC	GD	GL	GL1
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20

Bore size (mm)	GR	GE	GF	J	MB	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	4	88.5	18.3	M6 x 1.0	4	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	248
40	4	96.5	19.5	M6 x 1.0	4	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	263
50	5	111.2	22.4	M8 x 1.25	5	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	299
63	9	123.5	20.7	M8 x 1.25	5	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	313
80	11.5	157	26	M10 x 1.5	5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	389
100	17	177	26	M10 x 1.5	5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	409

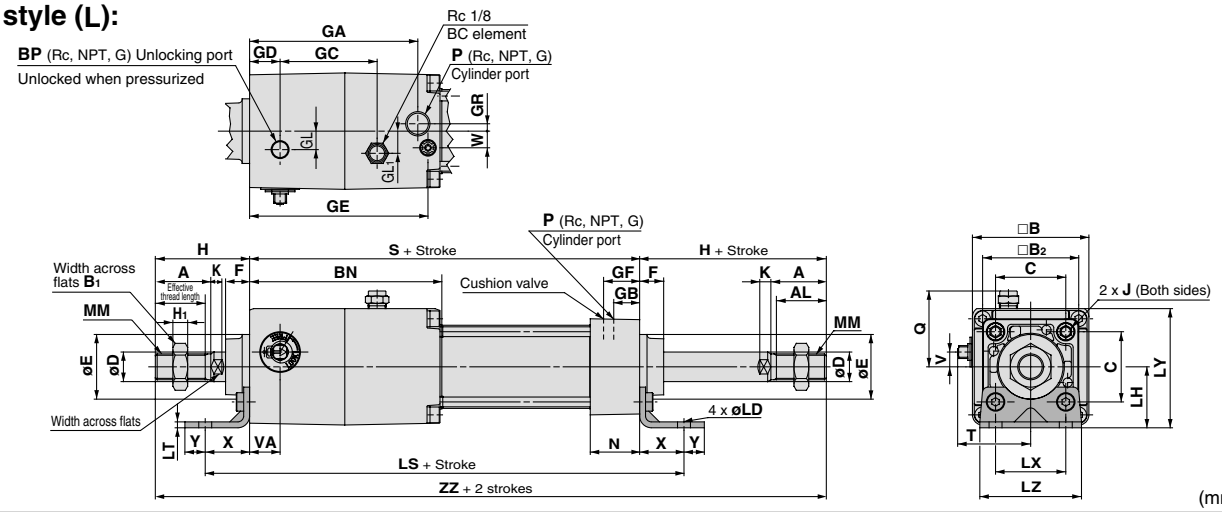
With Rod Boot

Note) ZZ: Dimensions for cylinders with a rod boot on both sides.

Bore size (mm)	e	f	ℓ										h										ZZ Note)									
			1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800
32	36	23	12.5	25	37.5	50	75	100	125	—	—	—	73	86	98	111	136	161	186	—	—	—	300	326	350	376	426	476	526	—	—	—
40	41	23	12.5	25	37.5	50	75	100	125	—	—	—	81	94	106	119	144	169	194	—	—	—	323	349	373	399	449	499	549	—	—	—
50	51	25	12.5	25	37.5	50	75	100	125	150	—	—	89	102	114	127	152	177	202	227	—	—	361	387	411	437	487	537	587	637	—	—
63	51	25	12.5	25	37.5	50	75	100	125	150	—	—	89	102	114	127	152	177	202	227	—	—	375	401	425	451	501	551	601	651	—	—
80	56	29	12.5	25	37.5	50	75	100	125	150	175	200	101	114	126	139	164	189	214	239	264	289	447	473	497	523	573	623	673	723	773	823
100	61	29	12.5	25	37.5	50	75	100	125	150	175	200	101	114	126	139	164	189	214	239	264	289	467	493	517	543	593	643	693	743	793	843

Dimensions

Axial foot style (L): MNBWL



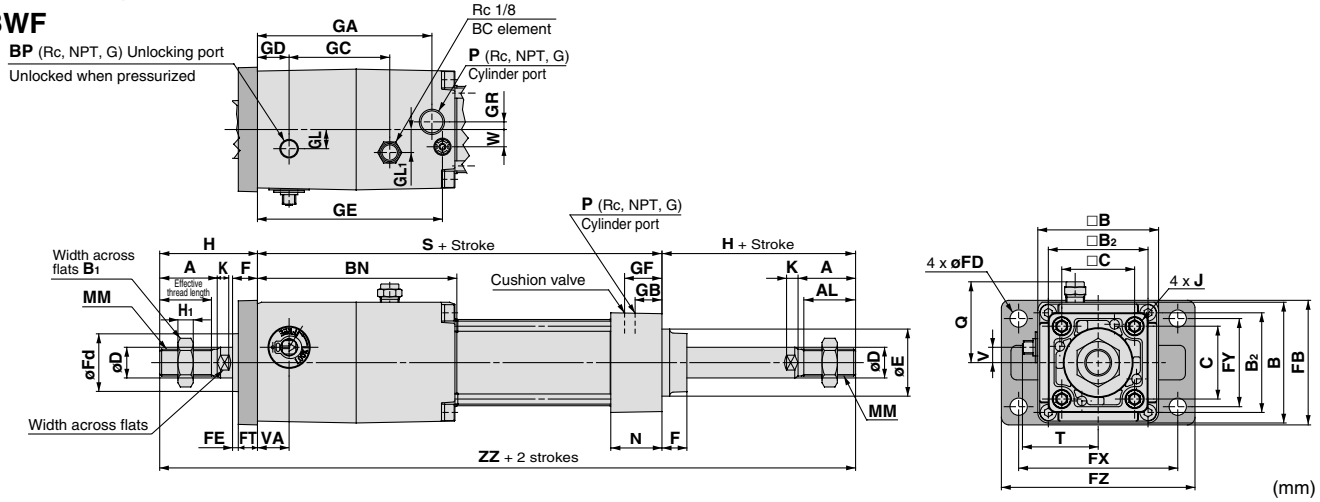
(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B1	H1	B2	BN	BP	C	D	Ee11	F	GA	GB	GC	GD	GL	GL1	GR	GE	GF
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12	4	88.5	18.3
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12	4	96.5	19.5
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	20	40	14	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	20	45	14	119.5	16.5	68	23	17.5	12	9	123.5	20.7
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18	11.5	157	26
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	30	55	20	170	19	96	37.5	25	20	17	177	26

Bore size (mm)	J	LD	LH	LS	LT	LX	LY	LZ	K	MM	N	P	Q	H	S	T	V	VA	W	X	Y	ZZ
32	M6 x 1.0	7	30	198	3.2	32	57	50	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	22	9	248
40	M6 x 1.0	9	33	209	3.2	38	64.5	55	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	24	11	263
50	M8 x 1.25	9	40	237	3.2	46	77.5	70	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	27	11	299
63	M8 x 1.25	12	48	251	3.6	56	93	80	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	27	14	313
80	M10 x 1.5	12	55	305	4.5	72	106	100	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	30	14	389
100	M10 x 1.5	14	65	329	4.5	89	123	120	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	32	16	409

∗ Refer to page 712 for cylinders with a rod boot.

Rod side flange style (F): MNBWF



(mm)

Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B1	H1	B2	BN	BP	C	D	Ee11	F	Fd	FD	FE	FT	FX	FY	FZ
32	Up to 500	19.5	10	22	56	54	17	6	46	97	1/8	32.5	12	30	13	25	7	3	10	72	38	87
40	Up to 500	27	14	30	65	63	22	8	52	104	1/8	38	16	35	13	31	9	3	10	83	46	101
50	Up to 600	32	18	35	77	75	27	11	65	120.5	1/4	46.5	20	40	14	38.5	9	2	12	100	52	120
63	Up to 600	32	18	35	92	90	27	11	75	134.5	1/4	56.5	20	45	14	39.5	9	2	12	115	62	135
80	Up to 800	37	22	40	100	102	32	13	95	169	1/4	72	25	45	20	45.5	12	4	16	126	63	153
100	Up to 800	37	26	40	120	116	41	16	114	189	1/4	89	30	55	20	54	14	4	16	150	75	178

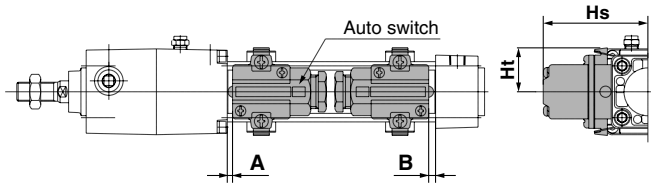
Bore size (mm)	GA	GB	GC	GD	GL	GL1	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	83	13	45.5	13	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	248
40	91	14	52.5	16.5	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	263
50	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4	M8 x 1.25	7	M18 x 1.5	31.5	1/4	47.5	58	183	47	9	20	10.5	299
63	119.5	16.5	68	23	17.5	12	9	123.5	20.7	M8 x 1.25	7	M18 x 1.5	31.5	3/8	55	58	197	55.5	8.5	23	12	313
80	150	19	81	33	22	18	11.5	157	26	M10 x 1.5	10	M22 x 1.5	38	3/8	61	72	245	61.5	10.5	33	14	389
100	170	19	96	37.5	25	20	17	177	26	M10 x 1.5	10	M26 x 1.5	38	1/2	68	72	265	69.5	10.5	37.5	15	409

∗ Refer to page 712 for cylinders with a rod boot.

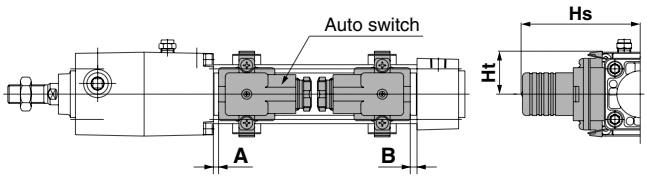
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

<Band mounting style>

D-A3□/G39/K39

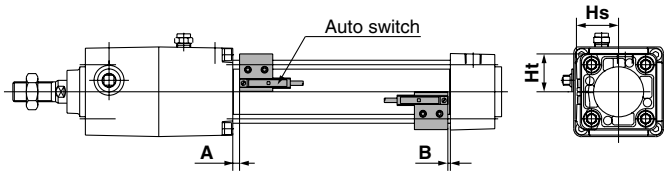


D-A44

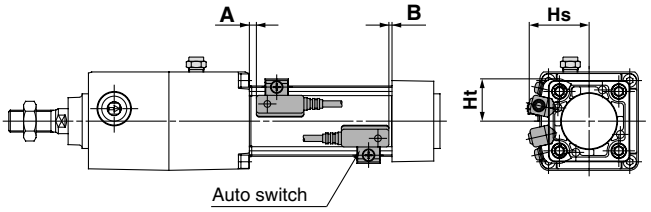


<Tie-rod mounting style>

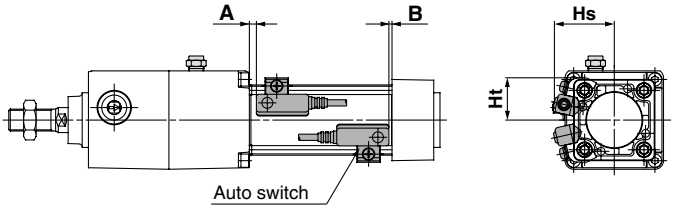
D-A9□/A9□V
D-M9□/M9□V
D-M9□W/M9□WV
D-M9□AL/M9□AVL
D-Z7□/Z80
D-Y59/Y69/Y7P/Y7PV
D-Y7□W/Y7□WV/Y7BAL



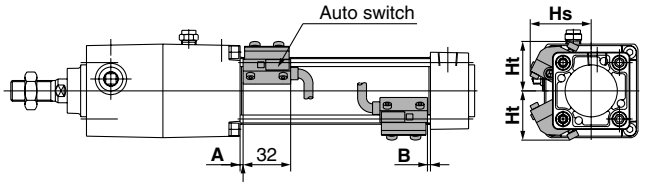
D-A5□/A6□
D-A59W



D-F5□/J5□
D-F5□W/J59W/F5BAL
D-F59F/F5NTL



D-P4DWL



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

Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL		D-A5□ D-A6□		D-A59W		D-F5□W D-J59W D-F5□ D-J5□ D-F5BAL D-F59F		D-F5NTL		D-A3□ D-A44 D-G39 D-K39		D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BAL		D-P4DWL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
32	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	3.5	1
40	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	3.5	1
50	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	4	1.5
63	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	4	1.5
80	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	7	5.5
100	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	7	5.5

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

Auto Switch Mounting Height

(mm)

Auto switch model / Bore size (mm)	D-A9□ D-M9□ D-M9□W D-M9□AL		D-A9□V		D-M9□V D-M9□WV D-M9□AVL		D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F59F D-F5□W D-J59W D-F5BAL D-F5NTL		D-A3□ D-G39 D-K39		D-A44		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W D-Y7BAL		D-Y69□ D-Y7PV D-Y7□WV		D-P4DWL	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	24.5	23	27.5	23	30.5	23	35	24.5	32.5	25	67	27.5	77	27.5	25.5	23	26.5	23	38	31
40	28.5	25.5	31.5	25.5	34	25.5	38.5	27.5	36.5	27.5	71.5	27.5	81.5	27.5	29.5	26	30	26	42	33
50	33.5	31	36	31	38.5	31	43.5	34.5	41	34	77	—	87	—	33.5	31	34.5	31	46.5	39
63	38.5	36	40.5	36	43	36	48.5	39.5	46	39	83.5	—	93.5	—	39	36	40	36	51.5	44
80	46.5	45	49	45	52	45	55	46.5	52.5	46.5	92.5	—	103	—	47.5	45	48.5	45	58	51.5
100	54	53.5	57	53.5	59.5	53.5	62	55	59.5	55	103	—	113.5	—	55.5	53.5	56.5	53.5	65.5	60.5

Operating Range

(mm)

Auto switch model	Bore size (mm)					
	32	40	50	63	80	100
D-A9□/A9□V	7	7.5	8.5	9.5	9.5	10.5
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	4	4.5	5	6	6	6
D-Z7□/Z80	7.5	8.5	7.5	9.5	9.5	10.5
D-A5□/A6□	9	9	10	11	11	11
D-A59W	13	13	13	14	14	15
D-A3□/A44	9	9	10	11	11	11
D-Y59□/Y69□ D-Y7P/Y7□V D-Y7□W/Y7□WV D-Y7BAL	5.5	5.5	7	7.5	6.5	5.5
D-F5□/J5□ D-F5□W/J59W D-F5BAL/F5NTL D-F59F	3.5	4	4	4.5	4.5	4.5
D-G39/K39	9	9	10	11	11	11
D-P4DWL	4	4	4	4.5	4	4.5

∗ 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.

Minimum Stroke for Auto Switch Mounting

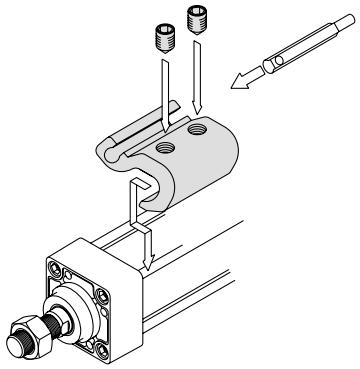
n: No. of auto switches (mm)

Auto switch model	No. of auto switches mounted	ø32, ø40, ø50, ø63	ø80, ø100
D-A9□	2 (Different surfaces, same surface), 1	15	
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	
D-A9□V	2 (Different surfaces, same surface), 1	10	
	n	$10 + 30\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	
D-M9□ D-M9□W D-M9□AL	2 (Different surfaces, same surface), 1	15	
	n	$15 + 40\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	
D-M9□V D-M9□WV D-M9□AVL	2 (Different surfaces, same surface), 1	10	
	n	$10 + 30\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	
D-A3□ D-G39 D-K39	2 (Different surfaces)	35	
	2 (Same surface)	100	
	n (Different surfaces)	35 + 30 (n–2) (n = 2, 3, 4···)	
	n (Same surface)	100 + 100 (n–2) (n = 2, 3, 4···)	
	1	10	
D-A44	2 (Different surfaces)	35	
	2 (Same surface)	55	
	n (Different surfaces)	35 + 30 (n–2) (n = 2, 3, 4···)	
	n (Same surface)	55 + 50 (n–2) (n = 2, 3, 4···)	
	1	10	

Auto switch model	No. of auto switches mounted	ø32, ø40, ø50, ø63	ø80, ø100
D-A5□ D-A6□	2 (Different surfaces, same surface), 1	15	20
	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	$20 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)
D-A59W	2 (Different surfaces, same surface)	20	25
	n (Same surface)	$20 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	$25 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)
	1	15	25
D-F5□/J5□ D-F5□W D-J59W D-F5BAL D-F59F D-F5NTL	2 (Different surfaces, same surface)	15	25
	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	$25 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)
	1	10	25
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	2 (Different surfaces, same surface), 1	15	
	n	$15 + 40\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, same surface), 1	10	
	n	$10 + 30\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	
D-Y7BAL	2 (Different surfaces, same surface), 1	20	
	n	$20 + 45\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	
D-P4DWL	2 (Different surfaces, same surface), 1	15	
	n	$15 + 65\frac{(n-2)}{2}$ (n=2, 4, 6, 8···)	

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)					
	ø32	ø40	ø50	ø63	ø80	ø100
D-A9□/A9□V **D-M9□/M9□V** **D-M9□W/M9□WV** **D-M9□AL/M9□AVL**	BMB5-032	BMB5-032	BA7-040	BA7-040	BA7-063	BA7-063
D-A3□/A44 **D-G39/K39**	BMB2-032	BMB2-040	BMB1-050	BMB1-063	BMB1-080	BMB1-100
D-A5□/A6□ **D-A59W** **D-F5□/J5□** **D-F5□W/J59W** **D-F5□F** **D-F5BAL** **D-F5NTL**	BT-03	BT-03	BT-05	BT-05	BT-06	BT-06
D-P4DWL	BMB3T-040	BMB3T-040	BMB3T-050	BMB3T-050	BMB3T-080	BMB3T-080
D-Z7□/Z80 **D-Y59□/Y69□** **D-Y7P/Y7PV** **D-Y7□W** **D-Y7□WV** **D-Y7BAL**	BMB4-032	BMB4-032	BMB4-050	BMB4-050	BA4-063	BA4-063



• The above figure shows the mounting example of D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V)L.

[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 auto switch mounting bracket separately, since it is not included.)

BBA1: For D-A5/A6/F5/J5 types

D-F5BAL auto switch is set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA1 is attached.

Note 1) Refer to page 1821 for the details of BBA1.

Note 2) When using D-M9□A(V)L/Y7BAL, do not use the steel set screws which is included with the auto switch mounting brackets above (BMB5-032, BA7-□□□, BMB4-□□□, BA4-□□□). Order a stainless steel screw set (BBA1) separately, and select and use the M4 x 6L stainless steel set screws included in the BBA1.

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

Auto switch type	Model	Electrical entry (Fetching direction)	Features
Reed	D-A93V, A96V	Grommet (Perpendicular)	—
	D-A90V		Without indicator light
	D-A53, A56, Z73, Z76	Grommet (In-line)	—
	D-A67, Z80		Without indicator light
Solid state	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	—
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color indication)
	D-Y7NWV, Y7PWV, Y7BWV		
	D-M9NAVL, M9PAVL, M9BAVL		Water resistant (2-color indication)
	D-F59, F5P, J59	Grommet (In-line)	—
	D-Y59A, Y59B, Y7P		
	D-F59W, F5PW, J59W		Diagnostic indication (2-color indication)
	D-Y7NW, Y7PW, Y7BW		
	D-F5BAL, Y7BAL		Water resistant (2-color indication)
	D-F5NTL		With timer
	D-P5DWL		Magnetic field resistant (2-color indication)

∗ With pre-wired connector is available for solid state auto switches. For details, refer to pages 1784 and 1785.

∗ Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H/Y7G/Y7H type) are also available. For details, refer to pages 1746 and 1748.

Series MNB
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 the cylinders with lock.

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 719) 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.

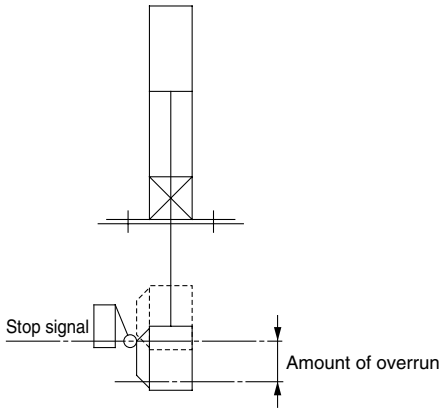
Use caution, because an external action such as an impacting load, strong vibration or turning force, may damage the locking mechanism or reduce its life.

2. Consider stopping accuracy and the amount of over-run 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.**
- **SMC's auto switches have operating ranges from 8 to 14 mm (depending on the switch model).**
  When the overrun amount exceeds this range, self-holding of the contact should be performed at the switch load side.

∗ For stopping accuracy, refer to page 697.



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 694 and 695) 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 695 depending on the operating pressure and select models.

Mounting

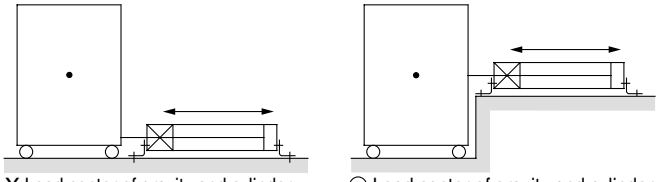
⚠ Warning

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, etc. may operate on the piston rod and cause damage to the lock mechanism. Series MNB is equipped with an emergency unlocking mechanism, however, when connecting the rod end to the load, this should be done with the lock released. This can be accomplished by simply connecting an air line to the unlocking port and supplying air pressure of 0.25 MPa or more.

2. 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.

Series MNB
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. Use the hexagon wrenches shown below when replacing brackets.

Bore size (mm)		Bolt	Width across flats	Tightening torque (N·m)
32, 40		MB-32-48-C1247	4	5.1
50, 63		MB-50-48-C1249	5	11
80, 100	Foot	MB-80-48AC1251	6	25
	Others	MB-80-48BC1251		

2. When replacing the head side bracket, the tie-rod nut on the cylinder body also loosens.
After retightening the tie-rod nut at the proper tightening torque (Refer to Adjustment 1. below.), install the bracket.

3. Mounting between air cylinder Series CA1 and cylinder with lock Series CNA has no interchangeability.

Adjustment

⚠ Warning

1. Do not open the cushion valve beyond the stopper.
As a retaining mechanism for the cushion valve, a crimped section (ø32 head cover) or retaining ring is installed (ø40 to ø100), and the cushion valve should not be opened beyond that point.
If not operated in accordance with the above precautions, the cushion valve may be ejected from the cover when air pressure is supplied.

Bore size (mm)	Cushion valve	Hexagon wrench
32, 40	2.5	JIS 4648 Hexagon wrench key 2.5
50, 63	3.0	JIS 4648 Hexagon wrench key 3
80, 100	4.0	JIS 4648 Hexagon wrench key 4

2. Use the air cushion at the end of cylinder stroke.
If this is not done, the tie-rod or piston assembly will be damaged.

⚠ 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 the mounting positions of the detectors on auto switches, etc.
When intermediate stops are to be performed, adjust the mounting positions of detectors on auto switches, etc., taking into consideration the overrun amount with respect to the desired stopping positions.

Pneumatic Circuit

⚠ Warning

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

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

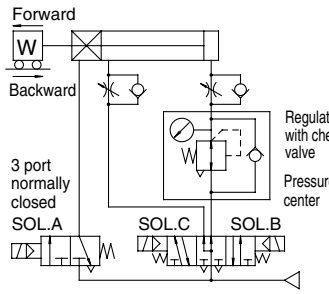
3. Place the solenoid valve for unlocking close to the cylinder, and no farther than the cylinder drive solenoid valve.
The shorter the distance from the cylinder (the shorter the piping), the shorter the overrun amount will be, and stopping accuracy will be improved.

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

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

6. Basic circuit

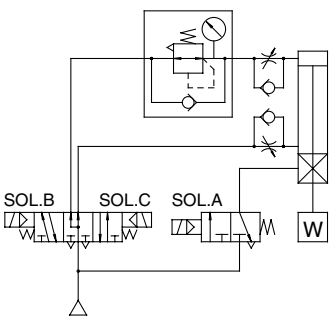
1) [Horizontal]



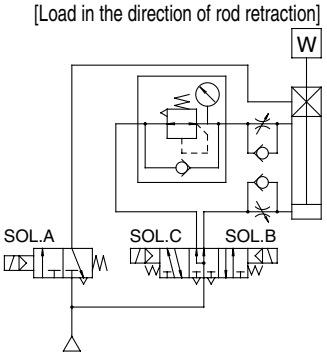
SOL.A	SOL.B	SOL.C	Action	
ON	ON	OFF	Forward	
OFF	OFF	OFF	Locked stop	0.5 s or more
ON	OFF	OFF	Unlocked	0 to 0.5 s
ON	ON	OFF	Forward	
ON	OFF	ON	Backward	
OFF	OFF	OFF	Locked stop	0.5 s or more
ON	OFF	OFF	Unlocked	0 to 0.5 s
ON	OFF	ON	Backward	

2) [Vertical]

[Load in the direction of rod extension]



[Load in the direction of rod retraction]



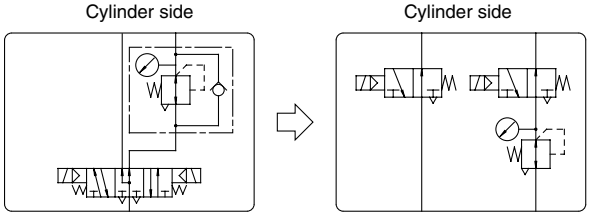
Series MNB
Specific Product Precautions 3

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

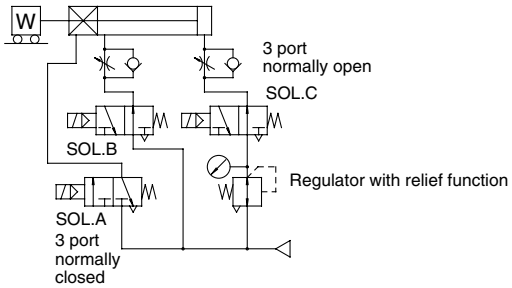
⚠ Caution

1. 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.



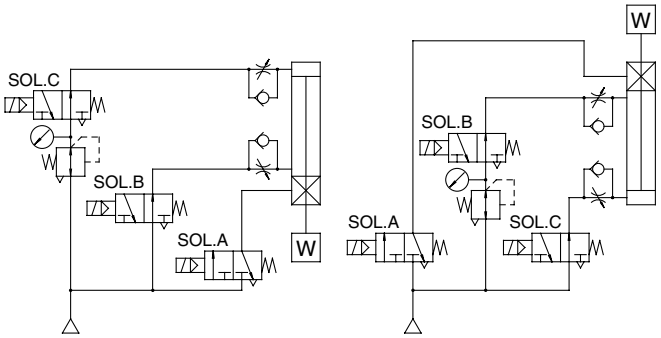
[Example]

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.)
- 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.
- 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.
- Perform work with the load in its lowest position.
- Take measures for drop prevention by strut, etc.

Manually Unlocking

⚠ 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.

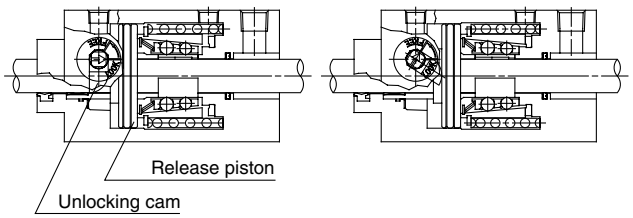
2. When installing the cylinder into equipment or performing adjustments, etc., be sure to apply air pressure of 0.25 MPa or more to the unlocking port, and do not perform work using the unlocking cam.

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 unlocking torque (standard) (N•m)	Width across flats (mm)
32	69	2.0	5.5
40	108	5.9	7
50	275	11.8	8
63	432	12.8	10
80	686	20.6	10
100	765	23.5	12

4. Do not turn the unlocking cam (the arrow or mark on the unlocking cam head) past the position marked FREE.
If it is turned too far there is a danger of damaging the unlocking cam.

5. For safety reasons, the unlocking cam is constructed so that it cannot be fixed in the unlocked condition.



Locked state **Manually unlocked state**

[Principle]

If the unlocking cam is turned counterclockwise with a tool such as an adjustable angle wrench, the release piston is pushed back and the lock is released. Since the lever will return to its original position when released and become locked again, it should be held in this position for as long as unlocking is needed.

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.The lock units for Series MNB are replaceable.

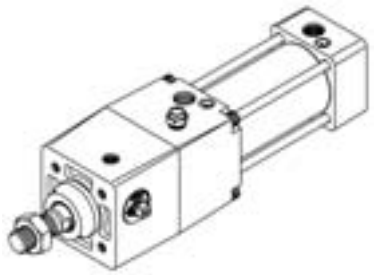
To order replacement lock units for Series MNB, use the order numbers given in the table below.

Bore size (mm)	Lock unit part no.
32	MNB 32D-UA
40	MNB 40D-UA
50	MNB 50D-UA
63	MNB 63D-UA
80	MNB 80D-UA
100	MNB100D-UA

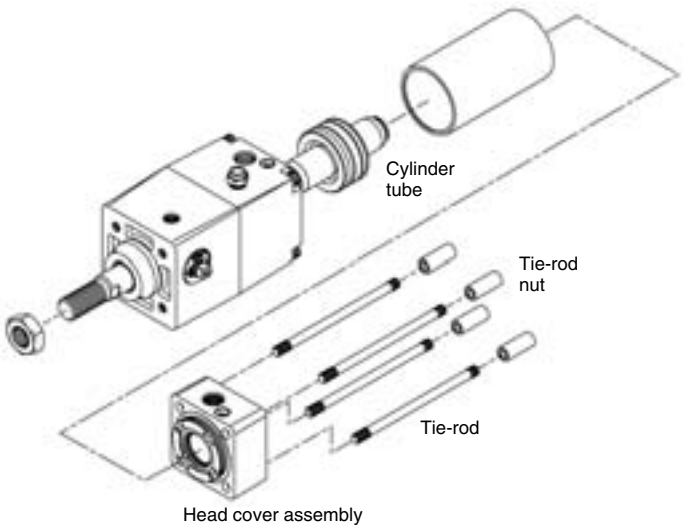
2. How to replace lock unit

1) Loosen the tie-rod nuts (4 pcs.) on the cylinder head cover side by using a hexagon wrench.
For the applicable hexagon wrench, refer to the table below.

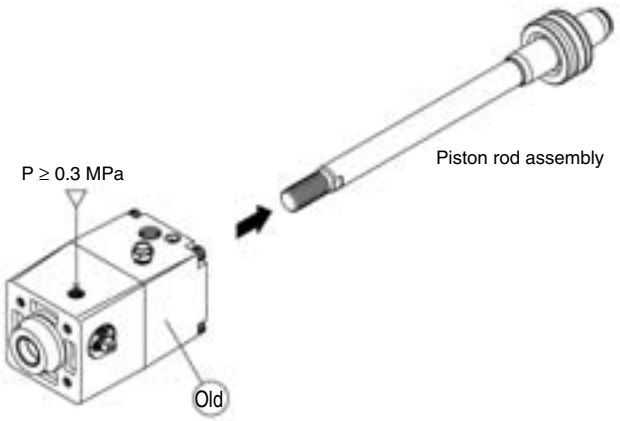
Bore size (mm)	Tie-rod nut socket width across flats (mm)
32, 40	6
50, 63	8
80, 100	10



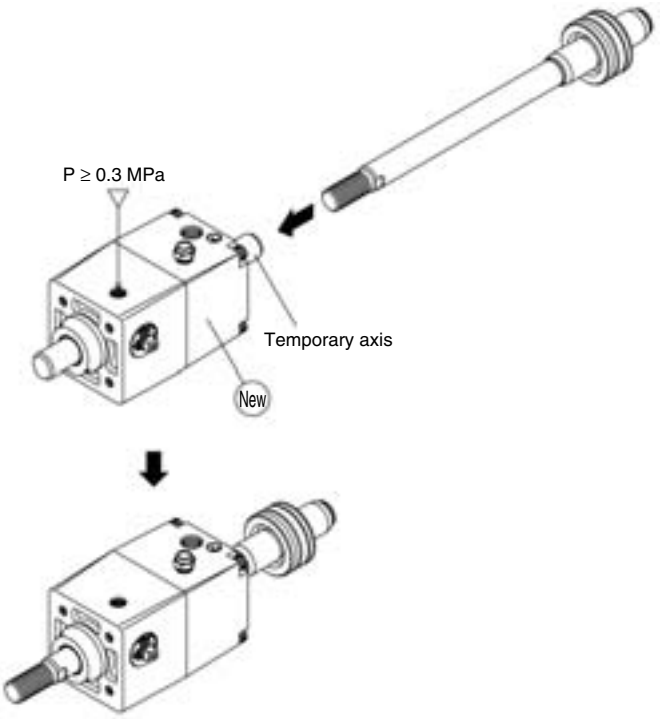
2) Remove the tie-rods, head cover and cylinder tube.



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).