

Single Rod
Series MNB

Double Rod
Series MNBW

Cylinder with Lock
Series MNB
ø32, ø40, ø50, ø63, ø80, ø100

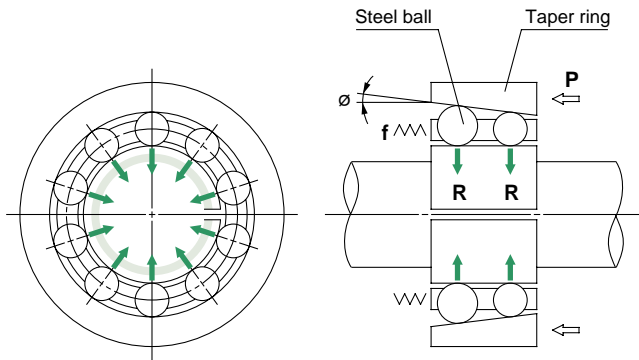


**A locking cylinder ideal for
intermediate stops, emergency stops and drop prevention**

A locking cylinder intermediate stops, emergency

Simple construction

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



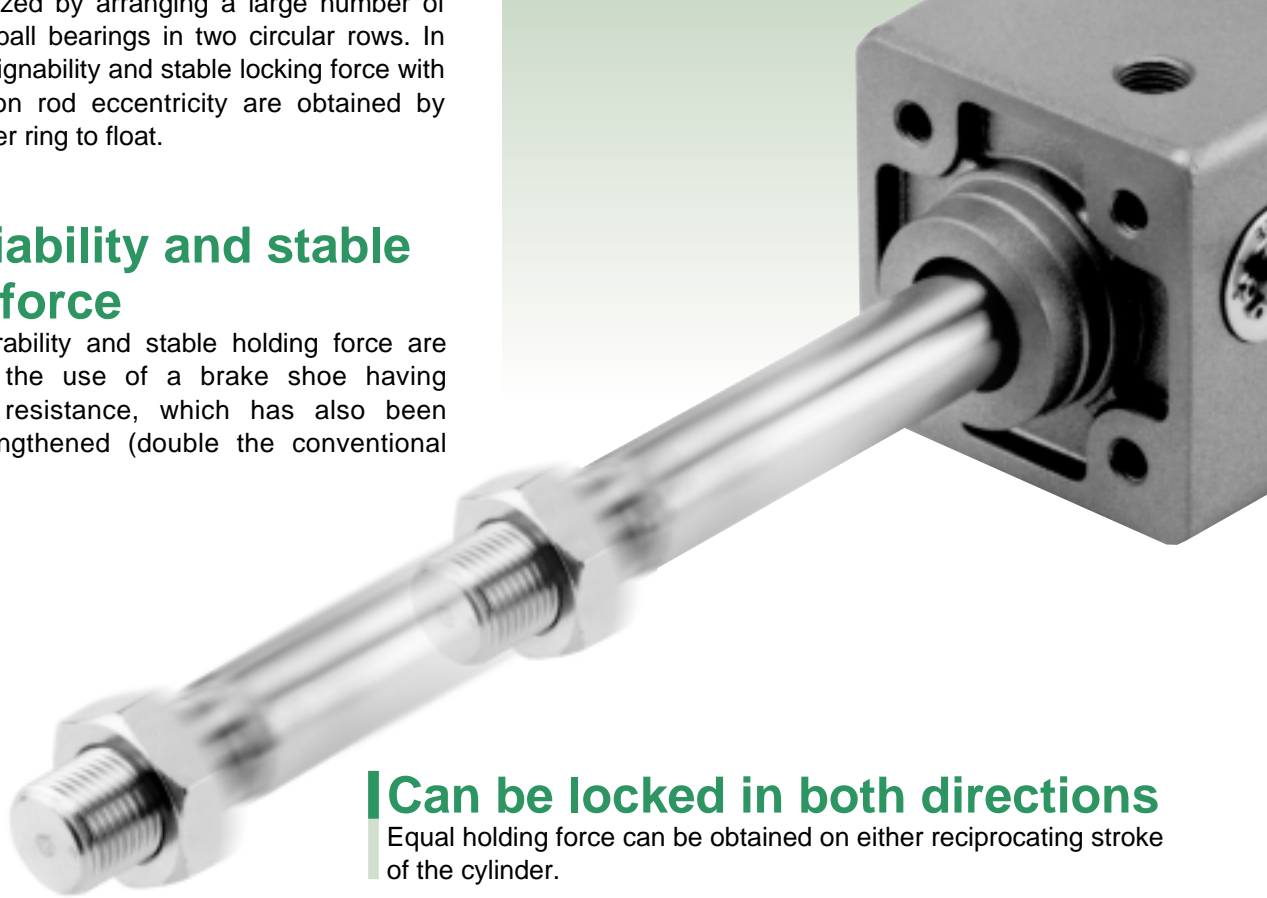
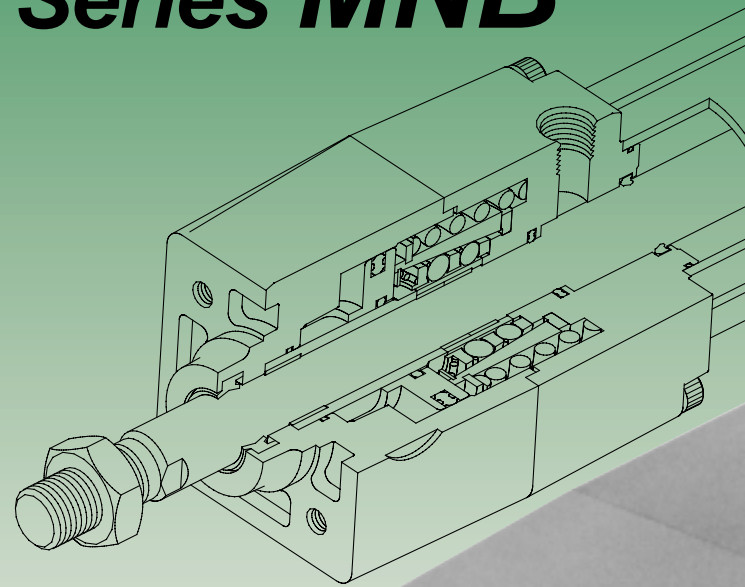
High locking efficiency

Improved locking efficiency, as well as stable locking and unlocking (unlocking pressure 0.25MPa..... $\Delta 0.05$ MPa compared to conventional SMC products) have been realized by arranging a large number of precision steel ball bearings in two circular rows. 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).

Cylinder with Lock Series **MNB**



Can be locked in both directions

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

Compact lock unit saves space

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

Cylinder ideal for stops and drop prevention.

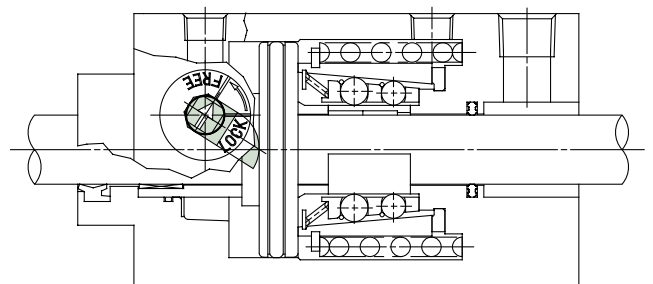


Maximum piston speed: 1000mm/s

Can be operated at 50 to 1000 mm/s within the allowable kinetic energy range.

Manual override for unlocking

In the event that the air supply is cut off or discharged, unlocking can be performed with a commercially available tool. The fail safe mechanism locks again when manual override is released.



Design minimizes influences of unlocking air quality

A structure largely unaffected by factors such as condensate and moisture in compressed air has been realized by separating the locking mechanism and the unlocking chamber.

Series Variations

Series	Action	Model	Standard variations		Lock system	Bore size (mm)	Standard stroke (mm)
			Built-in auto switch magnet	With rod boot	Spring lock		
Cylinder with Lock Series MNB	Double acting	Single rod Series MNB	●	●	●	40	25 to 500
			●	●	●	50	25 to 600
		Double rod Series MNBW	●	●	●	63	25 to 600
			●	●	●	80	25 to 700
			●	●	●	100	25 to 700

Applicable auto switch models

Mounting	Type	Solid state switch		
	Reed switch	Grommet		
Tie-rod mounting type	D-A53	3 wire	3 wire	2 wire
	D-A54	D-F59	D-F59W	D-J59W
	D-A56	D-F5P	D-F5PW	D-F5BAL
	D-A64	(2 color indicator)		(2 color indicator)
	D-A67	2 wire	4 wire	3 wire
	D-A59W	D-J59	D-F59F	D-F5NTL
	(2 color indicator)	D-F5LF	(2 color indicator)	

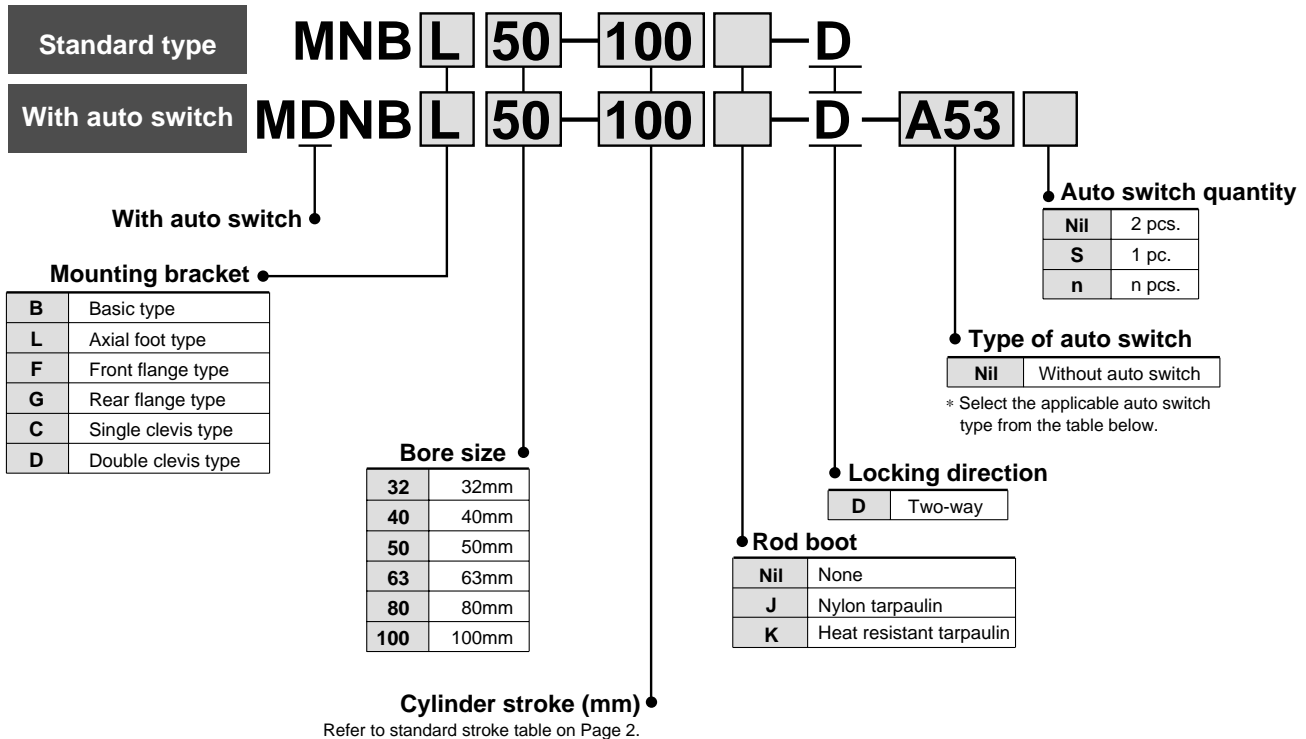
Cylinder
with Lock

Double
Acting:
Single Rod

Series MNB

ø32, ø40, ø50, ø63, ø80, ø100

How to Order



Applicable auto switch types / Tie-rod mount

Type	Special functions	Electrical entry	Indicator light	Wiring (output)	Load voltage		Auto switch part no.	* Lead wire length (m)			Applicable load				
					DC	AC		0.5 (Nil)	3 (L)	5 (Z)					
Reed switch	—	Grommet	Yes	3 wire (NPN equiv.)	—	5V	—	A56	●	●	—	IC circuit			
				2 wire	12V	—	A53	●	●	●	—				
					12V	100V, 200V	A54	●	●	●	—				
					12V	200V or less	A67	●	●	—	IC circuit				
Diagnostic indicator (2 color)	Grommet	No	2 wire	12V	200V or less	A64	●	●	—	IC circuit					
				—	—	A59W	●	●	—	—					
Solid state switch	—	Grommet	Yes	3 wire (NPN)	24V	5V, 12V	—	F59	●	●	○	IC circuit			
				3 wire (PNP)	—	—	100V, 200V	F5P	●	●	○	—			
				2 wire	12V	—	J51	●	●	○	—				
					12V	—	J59	●	●	○	—				
				Diagnostic indicator (2 color)	Grommet	Yes	3 wire (NPN)	5V, 12V	—	F59W	●	●	○	IC circuit	
										F5PW	●	●	○	—	
				Improved water resistance (2 color indicator)	Grommet	Yes	2 wire	24V	12V	—	J59W	●	●	○	—
											F5BA	—	●	○	—
				With timer	Grommet	Yes	3 wire (NPN)	5V, 12V	—	F5NT	—	●	○	IC circuit	
										F59F	●	●	○	—	
With diagnostic output (2 color indicator)	Grommet	Yes	4 wire (NPN)	—	—	—	F5LF	●	●	○	—				
							—	—	—	—	—				

* Lead wire length symbol
0.5m..... Nil (Ex.) A53
3m L (Ex.) A53L
5m Z (Ex.) A53Z

* Solid state switches marked with a O are manufactured upon receipt of order.

Cylinders with built-in magnets

In cases of built-in magnets without auto switches, the symbol for auto switch type will be Nil. (Ex.) MDNBL40-100-D

Mounting bracket parts

Refer to P.3 regarding types of mounting brackets for other than basic type air cylinders.

Auto switch mounting brackets/Part Nos.

Applicable bore size (mm)	32, 40	50, 63	80, 100
Mounting bracket part no.	BT-03	BT-05	BT-06

[Stainless steel mounting screw kit]

The following stainless steel mounting screw kit (including set screws) has been prepared for use, depending upon the operating environment.

(Mounting brackets are not included, and must be arranged separately.)

BBA1: Stainless steel screw kit for D-A5/A6/F5/J5

The above stainless steel screws are used when a cylinder is shipped with D-F5BA type switches. The above screw kit is also included when D-F5BA type switches are shipped separately.

Cylinder with Lock **Series MNB**

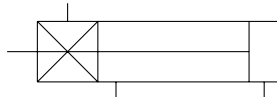
Double Acting: *Single Rod*

Models

Series	Model	Cylinder action	Locking action	Cylinder bore size (mm)
MNB	Non-lube type	Double acting	Spring lock	32, 40, 50, 63, 80, 100



JIS symbol
Cylinder with brake



Cylinder Specifications

Bore size (mm)	32, 40, 50, 63, 80, 100
Model	Non-lube type
Fluid	Air
Proof pressure	1.5MPa {15.3kgf/cm ² }
Maximum operating pressure	1.0MPa {10.2kgf/cm ² }
Minimum operating pressure	0.08MPa {0.82kgf/cm ² }
Piston speed	50 to 1000mm/s ^{Note)}
Ambient and fluid temperature	Without auto switch : -10°C to 70°C (without freezing) With auto switch : -10°C to 70°C (without freezing)
Cushion	Double side air cushion
Stroke length tolerance	to 250: ^{+1.0} ₀ , 251 to 1000: ^{+1.4} ₀ , 1001 to 1500: ^{+1.8} ₀
Bracket type	Basic type, Axial foot type, Front flange type, Rear flange type, Single clevis type, Double clevis type

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

Lock Specifications

Lock actuation	Spring lock (exhaust lock)
Unlocking pressure	0.25MPa {2.5kgf/cm ² } or more
Locking pressure	0.20MPa {2.0kgf/cm ² } or less
Maximum operating pressure	1.0MPa {10.0kgf/cm ² }
Locking direction	Two-way

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for mounting of auto switches on page 12.

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

Stopping Accuracy

Unit: mm

Locking system	Piston speed (mm/s)			
	100	300	500	1000
Spring lock	±0.3	±0.6	±1.0	±2.0

Conditions / Horizontal supply pressure P=0.5MPa{5kgf/cm²}

Load weight Upper limit of allowable value

Solenoid valve for locking mounted on the unlocking port

Maximum value of stopping position dispersion from 100 measurements

Spring Lock Holding Power (Maximum Static Load)

Bore size (mm)	32	40	50	63	80	100
Holding power N {kgf}	552 {56}	882 {90}	1370 {140}	2160 {220}	3430 {350}	5390 {550}

Series MNB

Bracket Part Numbers

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

Note 1) When ordering foot type brackets, 2 pcs. should be arranged for each cylinder.

Note 2) The following parts are included with each mounting bracket.

Foot, Flange, Single clevis: Body mounting bolts

Double clevis: Clevis pin, Cotter pin

Note 3) All are common to the MB series air cylinders, except for the sections marked with a *.

Rod Boot

Symbol	Material	Maximum ambient temperature
J	Nylon tarpaulin	60°C
K	Heat resistant tarpaulin	110°C ^{Note)}

Note) Maximum ambient temperature for the rod boot itself.

Accessories

Mounting		Basic type	Foot type	Front flange type	Rear flange type	Single clevis type	Double clevis type
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●
Options	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●

Single Rod Weight Table/Aluminum Tube

Bore size (mm)		32	40	50	63	80	100
Basic weight	Basic type	1.20	1.72	2.76	4.06	6.85	10.26
	Foot type	1.30	1.84	2.94	4.32	7.28	10.85
	Flange type	1.44	2.04	3.29	4.80	8.30	13.57
	Single clevis type	1.45	1.98	3.10	4.69	7.96	13.43
	Double clevis type	1.46	1.99	3.19	4.85	8.25	13.95
Additional weight per 50mm of stroke	All mounting brackets	0.11	0.16	0.26	0.27	0.42	0.56
Accessories	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

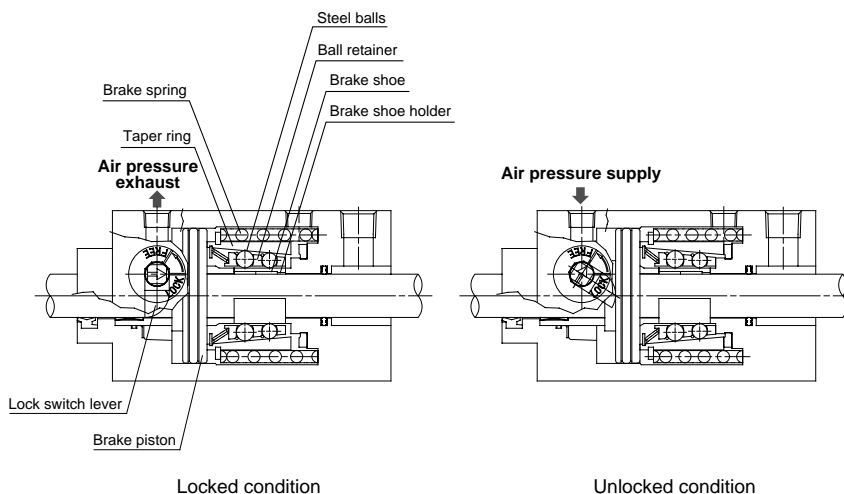
Calculation method

(Example) MNBB32-100 (basic type, ø32, 100st)

- Basic weight 1.20 (basic type, ø32)
- Additional weight 0.11/50mm stroke
- Cylinder stroke 100mm stroke

$$1.20 + 0.11 \times 100/50 = 1.42\text{kg}$$

Construction Principles



Spring lock (exhaust lock)

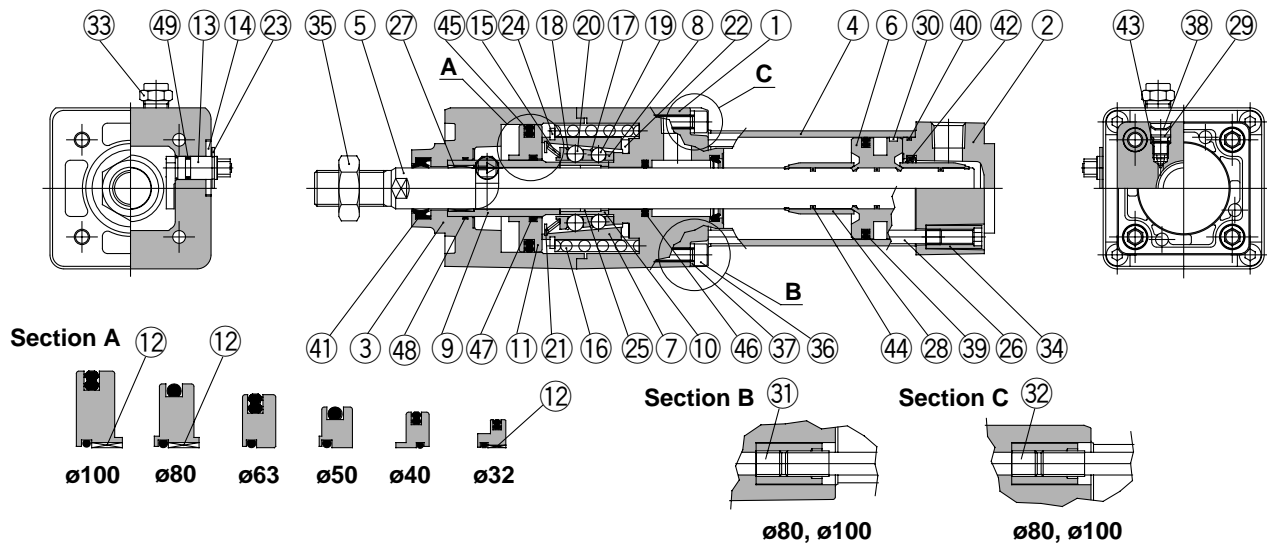
The spring force which acts upon the taper ring is magnified by a wedge effect, and is conveyed to all of the numerous steel balls which are arranged in two circles. These act on the brake shoe holder and brake, which locks the piston rod by tightening against it with a large force.

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.

Cylinder with Lock

Double Acting: Single Rod Series MNB

Construction



Parts list

No.	Description	Material	Note	
①	Rod cover	Aluminum alloy	Hard anodized & metallic coated	
②	Head cover	Die-cast aluminum	Chromated & metallic coated	
③	Cover	Aluminum alloy	Hard anodized & metallic coated	
④	Cylinder tubing	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	ø40	Aluminum alloy	Hard anodized
		ø50		
		ø63		
		ø32	Carbon steel	Zinc chromated
		ø80		
⑫	Release piston bushing	Steel + special resin	ø32, ø80, ø100 only	
⑬	Unlocking cam	Chrome molybdenum steel	Glossy chromated	
⑭	Washer	Carbon steel	Black zinc chromated	
⑮	Retainer pre-load spring	Steel wire	Zinc chromated	
⑯	Brake spring	Steel wire	Zinc chromated	
⑰	Clip A	Stainless steel		
⑱	Clip B	Stainless steel		
⑲	Steel ball A	Carbon steel		
⑳	Steel ball B	Carbon steel		
㉑	Tooth ring	Stainless steel		
㉒	Damper	Polyurethane rubber		
㉓	C type retaining ring for unlocking cam shaft	Carbon steel		
㉔	C type retaining ring for taper ring	Carbon steel		
㉕	Brake shoe	Special friction material		
㉖	Tie-rod	Carbon steel	Chromated	
㉗	Bushing	Lead-bronze casting		
㉘	Cushion ring	Brass		

Parts list

No.	Description	Material	Note
㉙	Cushion valve	Steel wire	Nickel plated
㉚	Wear ring	Resin	
㉛	Unit holding tie-rod A	Carbon steel	Chromated ø80, ø100 only
㉜	Unit holding tie-rod B	Carbon steel	Chromated ø80, ø100 only
㉝	BC element		
㉞	Tie-rod nut	Carbon steel	Nickel plated
㉟	Rod end nut	Carbon steel	Nickel plated
㊱	Hexagon socket head cap screw	Chrome molybdenum steel	Nickel plated ø32 to ø63 only
㊲	Spring washer for hex. socket head cap screw	Steel wire	Nickel plated ø32 to ø63 only
㊳	Retaining ring	Spring steel	
㊴	Piston seal	NBR	
㊵	Cylinder tube gasket	NBR	
㊶	Rod seal A	NBR	
㊷	Cushion seal	NBR	
㊸	Cushion valve seal	NBR	
㊹	Piston gasket	NBR	
㊺	Release piston seal	NBR	
㊻	Rod seal B	NBR	
㊼	Release piston gasket	NBR	
㊽	Piston guide gasket	NBR	
㊾	Unlocking cam gasket	NBR	

Replacement parts list (seal kits)

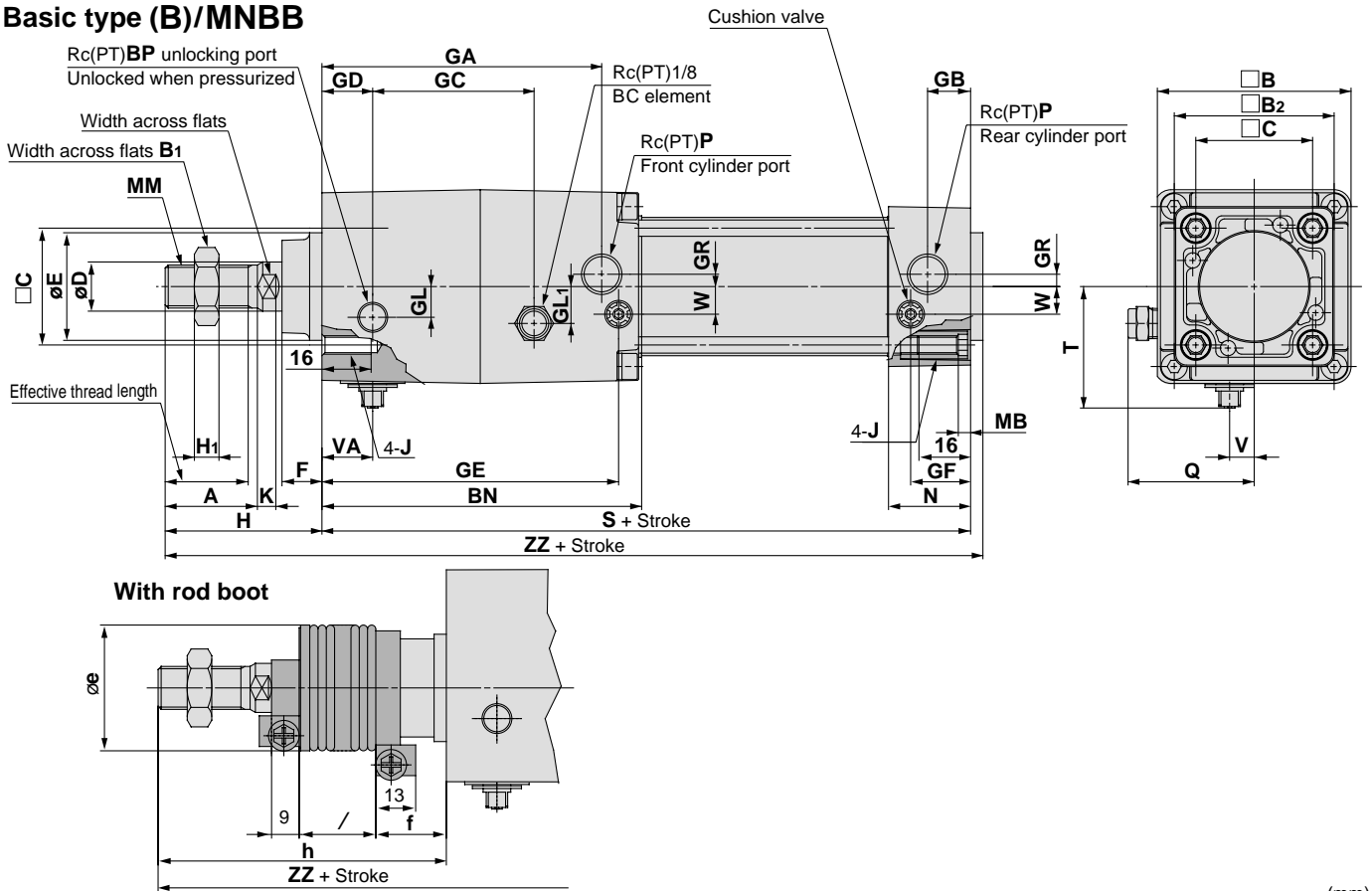
Bore size(mm)	Order No.	Contents
32	MB 32-PS	A kit containing nos. 39, 40, 41 and 42 (2pcs.) from the table above.
40	MB 40-PS	
50	MB 50-PS	
63	MB 63-PS	
80	MB 80-PS	
100	MB100-PS	

* As a general rule, the lock section of the MNB series 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.

Series MNB

Dimensions

Basic type (B)/MNBB



(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	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	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	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	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	to 750	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18
100	to 750	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

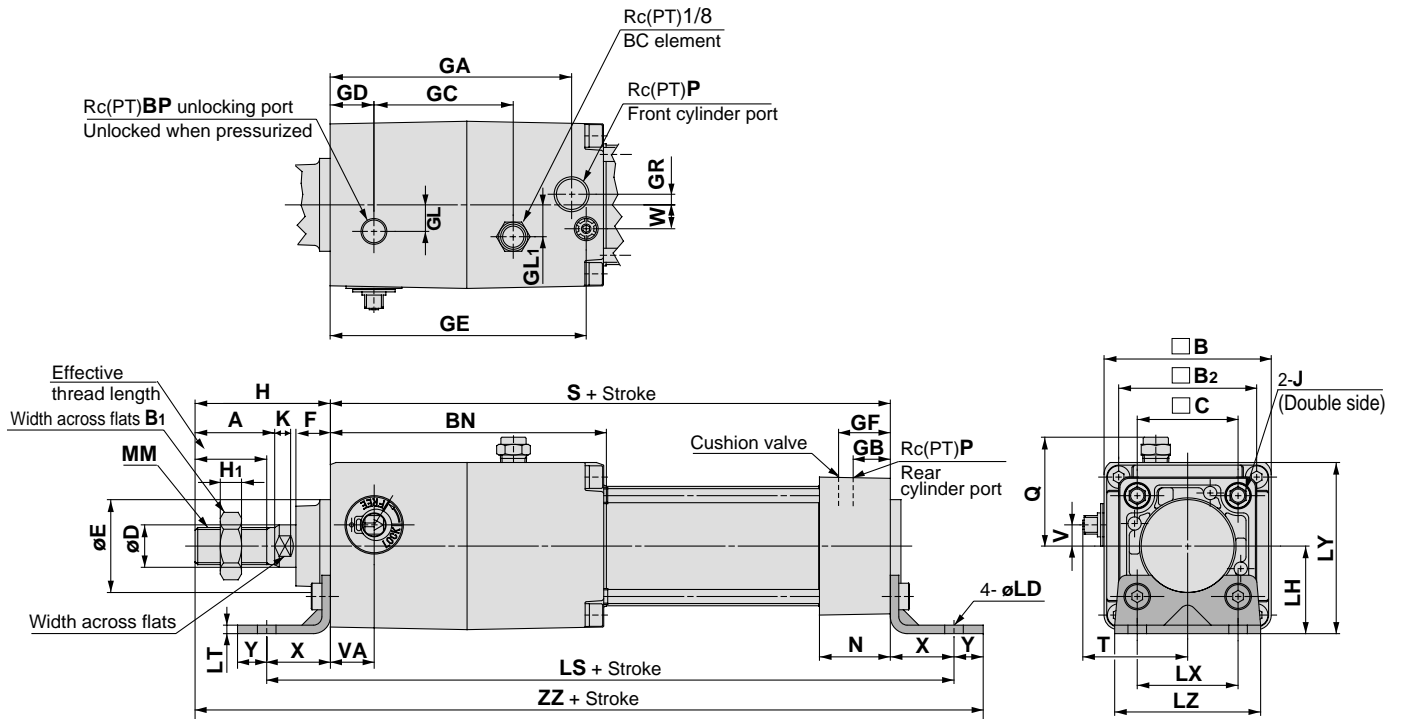
With rod boot

(mm)

Bore size (mm)	e	f	/										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 750	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 750
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	187.5	101	114	126	139	164	189	214	239	264	276
100	61	29	12.5	25	37.5	50	75	100	125	150	175	187.5	101	114	126	139	164	189	214	239	264	276

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 750
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	525
100	370	383	395	408	433	458	483	508	533	545

Axial foot type (L)/MNBL



(mm)

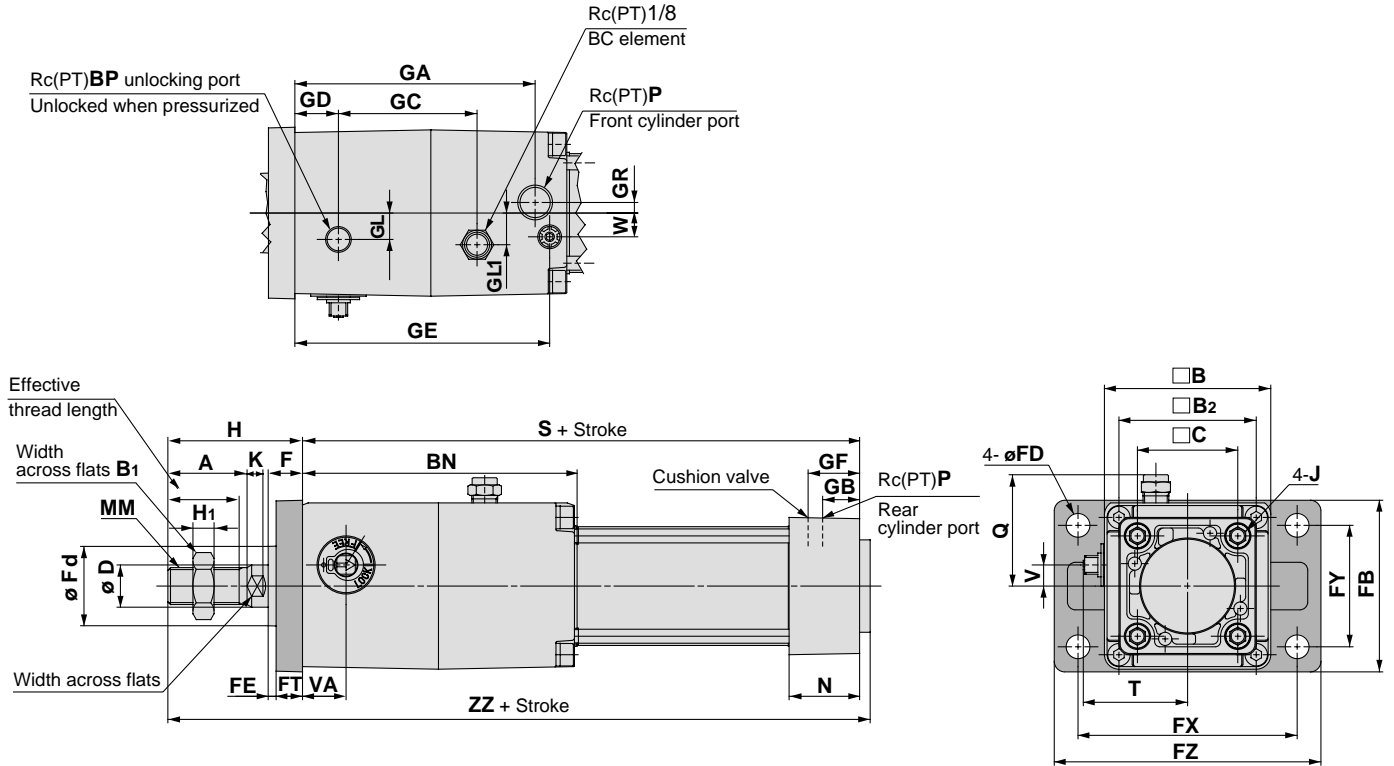
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁	GR	GE	GF
32	to 700	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12	4	88.5	18.3
40	to 800	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12	4	96.5	19.5
50	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	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	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	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

Series MNB

Dimensions

Front flange type (F)/MNBF



(mm)

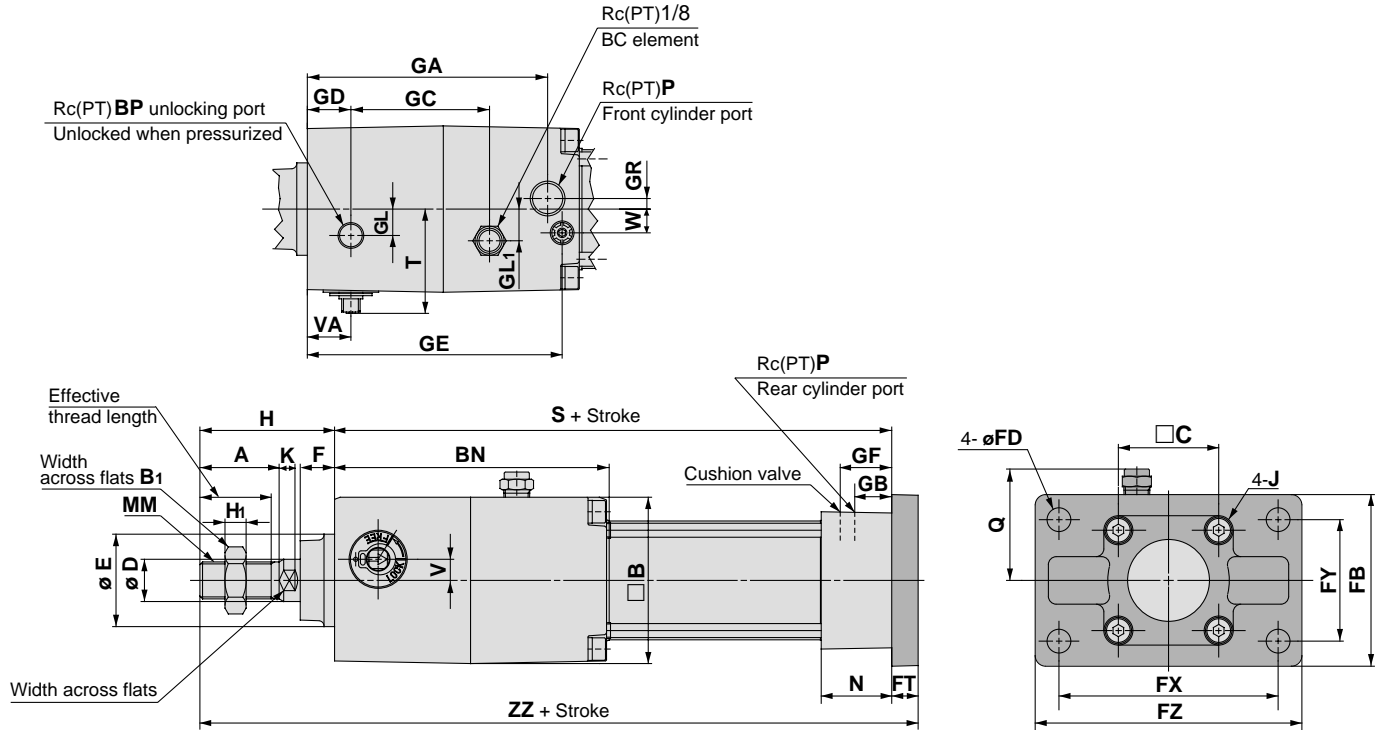
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B ₁	H ₁	B ₂	BN	BP	C	D	F	Fd	FD	FE	FT	FX	FY	FZ	GA	GB
32	to 700	19.5	10	22	56	54	17	6	46	97	1/8	32.5	12	13	25	7	3	10	72	38	87	83	13
40	to 800	27	14	30	65	63	22	8	52	104	1/8	38	16	13	31	9	3	10	83	46	101	91	14
50	to 1000	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	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	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	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	GL ₁	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

Cylinder with Lock **Series MNB**

Double Acting: *Single Rod*

Rear flange type (G)/MNBG



(mm)

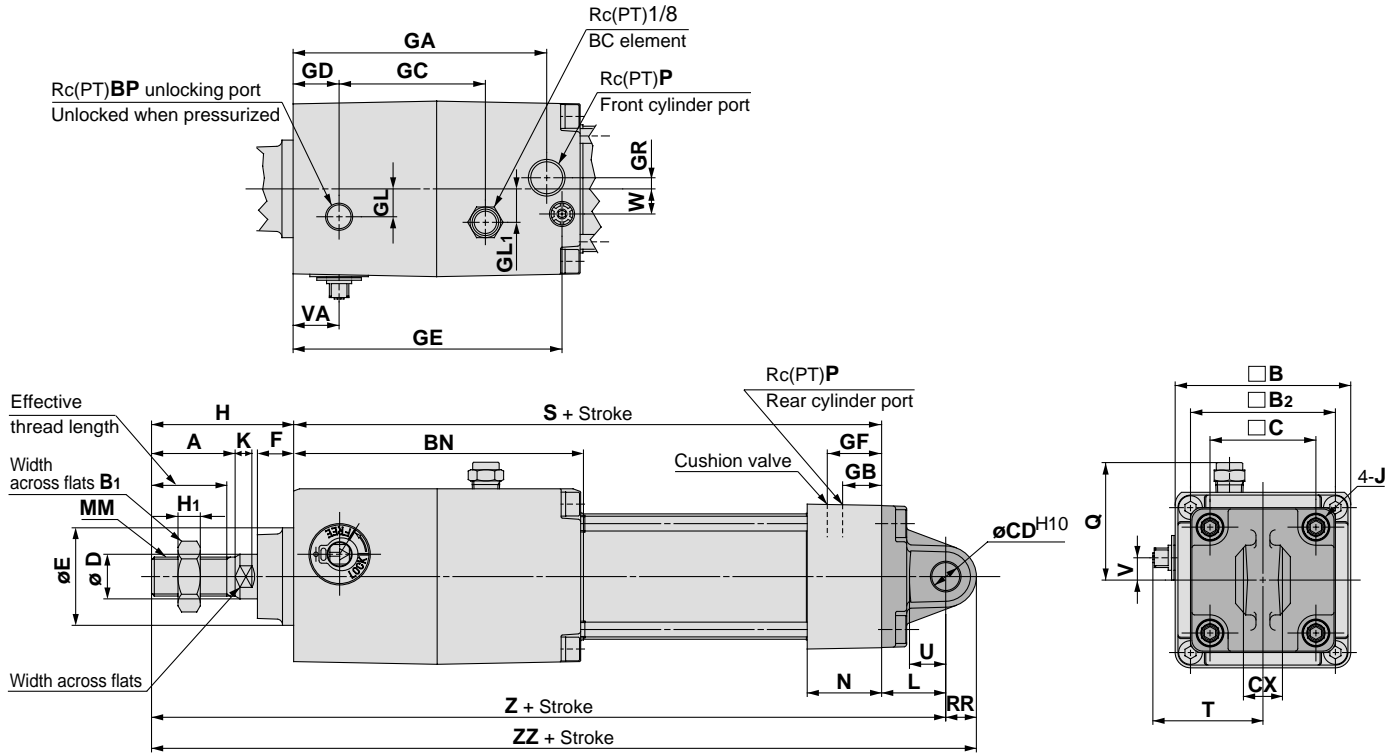
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B ₁	H ₁	BN	BP	C	D	Ee ₁₁	F	FD	FT	FX	FY	FZ	GA	GB	GC	GD
32	to 500	19.5	10	22	56	54	17	6	97	1/8	32.5	12	30	13	7	10	72	38	87	83	13	45.5	13
40	to 500	27	14	30	65	63	22	8	104	1/8	38	16	35	13	9	10	83	46	101	91	14	52.5	16.5
50	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	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	to 750	37	22	40	100	102	32	13	169	1/4	72	25	45	20	12	16	126	63	153	150	19	81	33
100	to 750	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

Series MNB

Dimensions

Single clevis type (C)/MNBC



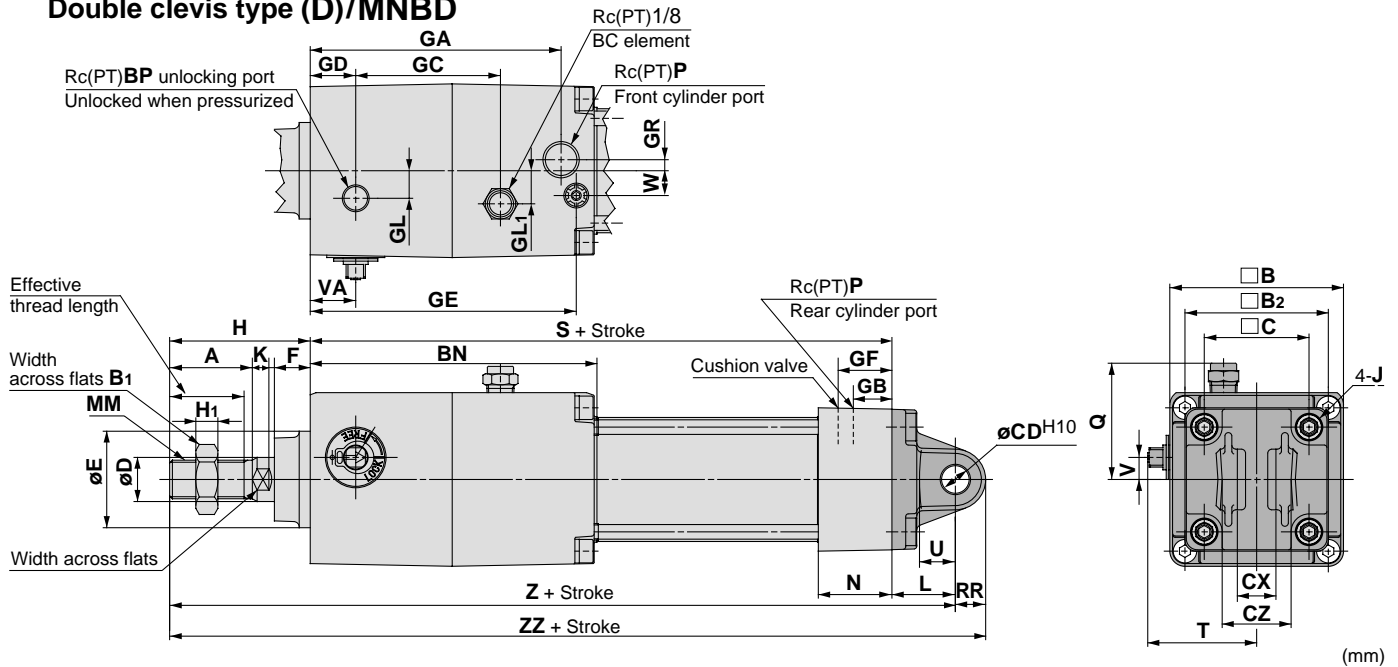
(mm)

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	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	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	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	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	to 750	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	to 750	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

Cylinder with Lock Double Acting: *Single Rod* Series **MNB**

Double clevis type (D)/MNBD

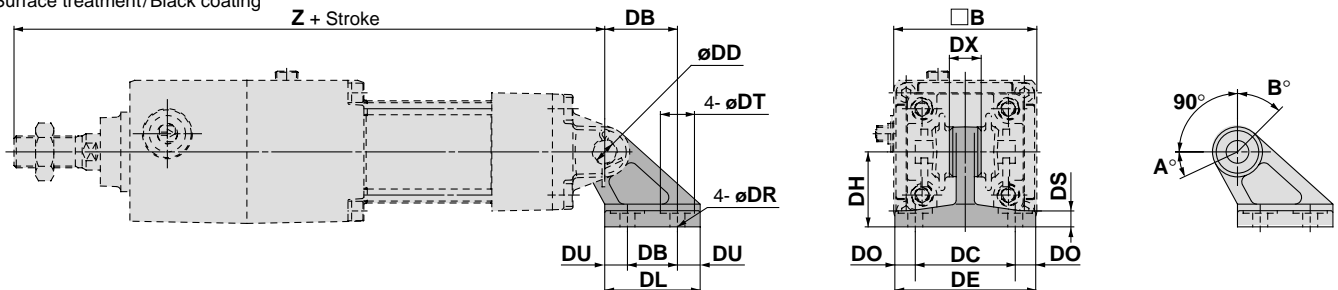


Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B ₁	H ₁	B ₂	BN	BP	C	CD ^{H10}	CX ^{+0.3} / _{-0.1}	CZ	D	Ee ₁₁	F	GA	GB	GC	GD	GL	GL ₁
32	to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	10	14	28	12	30	13	83	13	45.5	13	8.5	12
40	to 500	27	14	30	63	22	8	52	104	1/8	38	10	14	28	16	35	13	91	14	52.5	16.5	10	12
50	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	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	to 750	37	22	40	102	32	13	95	169	1/4	72	22	30	60	25	45	20	150	19	81	33	22	18
100	to 750	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

Double Clevis Bracket

Material/Cast iron • Strength is the same as cylinder brackets.
Surface treatment/Black coating



No.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z	DD _{H10} (Aperture)
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 ^{+0.084} / 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

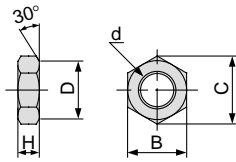
Rotation			
Bore size (mm)	A°	B°	A°+B°+90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°

Series MNB

Dimensions of Accessories

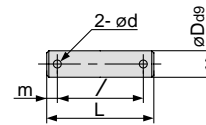
Dimensions of Accessories

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

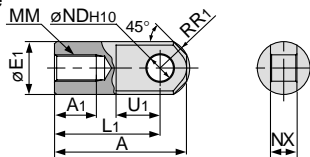
Knuckle joint pin
Clevis pin



Part No.	Bore size (mm)		D _{d9}	L	/	m	d (Drill through)	Cotter pin ^{Note 1)}
	Clevis	Knuckle						
CD-M03	32, 40	10	44	36	4	3	ø3 x 18 /	
CD-M05	50, 63	14	60	51	4.5	4	ø4 x 25 /	
CD-M08	80, 100	22	82	72	5	4	ø4 x 35 /	

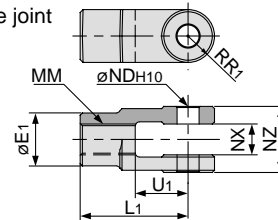
Note 1) A cotter pin should be used together with a plain washer.

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	M10x1.25	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 joint



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 included with the double knuckle joint.

Series MDNB Auto Switch Specifications



Applicable auto switches

Auto switch type	Auto switch model	Electrical entry
Reed switch	D-A5□, A6□	Grommet
	D-A59W	Grommet (2 color indication type)
Solid state switch	D-F5□, J5□	Grommet
	D-F5□W, J59W	Grommet (2 color indication type)
	D-F5BAL	Grommet (2 color indication, water resistant type)
	D-F5□F	Grommet (2 color indication type with diagnostic output)
	D-F5NTL	Grommet (with timer)

! Specific Product Precautions

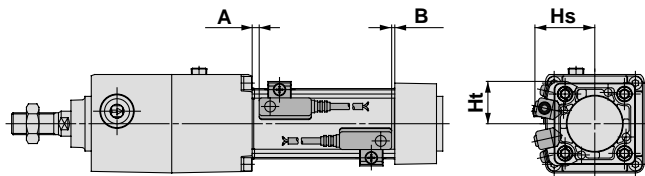
Be sure to read before handling.
Refer to pages 24 through 26 for auto switch precautions.

Minimum stroke for mounting of auto switches

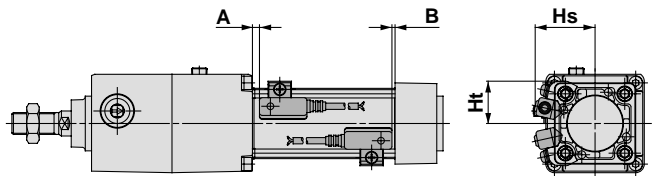
Type	Auto switch model	Number of auto switches	ø32	ø40	ø50	ø63	ø80	ø100
Reed switch	D-A5, D-A6	2 pcs. (different sides or same side)		15				20
		1 pc.						
Reed switch	D-A59W	2 pcs. (different sides or same side)		20				25
		1 pc.		15				
Solid state switch	D-F5, J5	2 pcs. (different sides or same side)		15				25
		1 pc.		10				
	D-F5NTL	2 pcs. (different sides or same side)		15				25
		1 pc.		10				
	D-F5□W D-J59W D-F5BAL D-F5□F D-F5LF	2 pcs. (different sides or same side)		15				25
1 pc.			10					

Auto Switches/Proper Mounting Position and Height for Stroke End Detection

Reed switch



Solid state switch



Auto switch mounting position

Bore size (mm)	D-A5, D-A6		D-A59W		D-F5□ D-J5□		D-F5□W D-J59W D-F5BAL		D-F5NTL	
	A	B	A	B	A	B	A	B	A	B
32	1.5	0	5.5	2	8	4.5	12	8.5	13	9.5
40	1.5	0	5.5	2	8	4.5	12	8.5	13	9.5
50	3.5	0	7.5	2.5	10	5	14	9	15	10
63	3.5	0	7.5	2.5	10	5	14	9	15	10
80	5	2.5	9	6.5	11.5	9	15.5	13	16.5	14
100	5	2.5	9	6.5	11.5	9	15.5	13	16.5	14

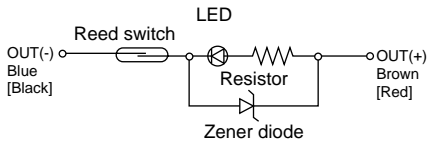
Auto switch mounting height

Bore size (mm)	D-A5 D-A6 D-A59W		D-F5, D-J5□ D-F5□W, D-J59W D-F5BAL, D-F5NTL	
	Ht	Hs	Ht	Hs
32	24.5	35	25	32.5
40	27.5	38.5	27.5	36.5
50	34.5	43.5	34	41
63	39.5	48.5	39	46
80	46.5	55	46.5	52.5
100	55	62	55	59.5

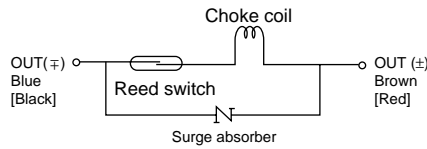
Series MDNB Auto Switch Internal Circuits

Reed Switch Internal Circuits

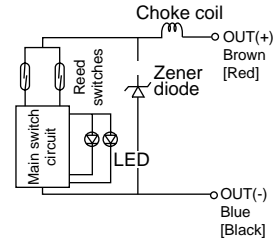
D-A53



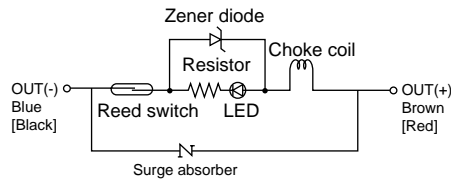
D-A64



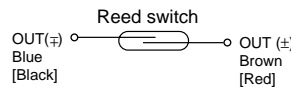
D-A59W



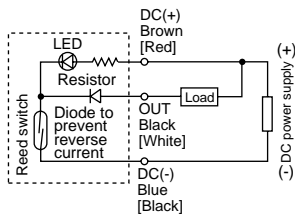
D-A54



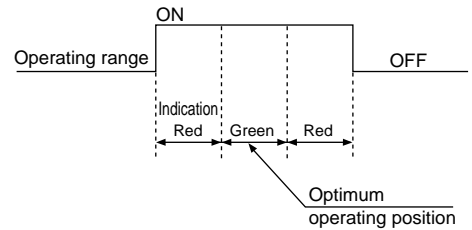
D-A67



D-A56

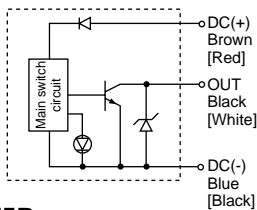


Indicator light

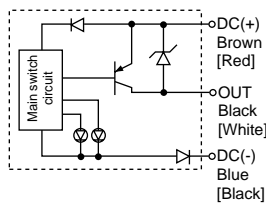


Solid State Switch Internal Circuits

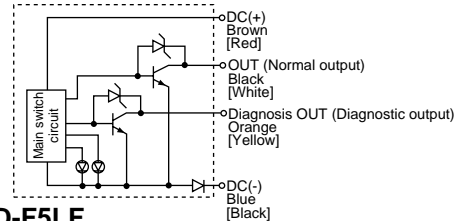
D-F59



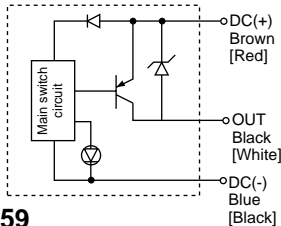
D-F5PW



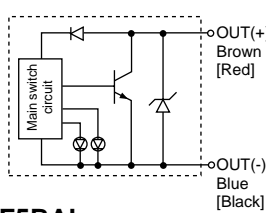
D-F59F



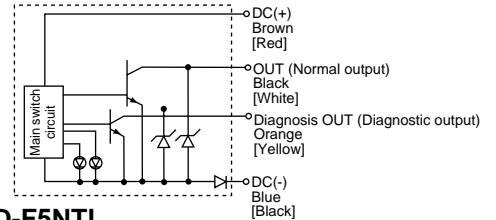
D-F5P



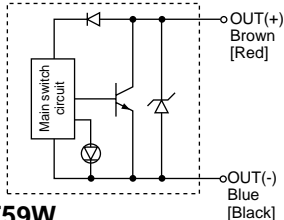
D-J59W



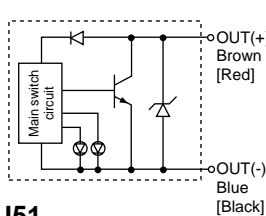
D-F5LF



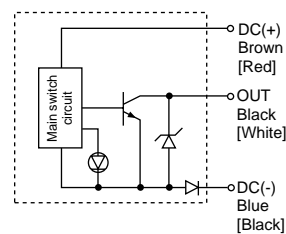
D-J59



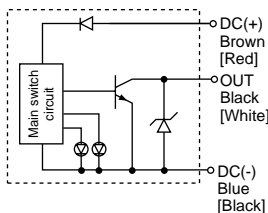
D-F5BAL



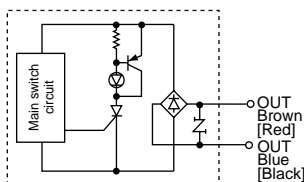
D-F5NTL



D-F59W



D-J51

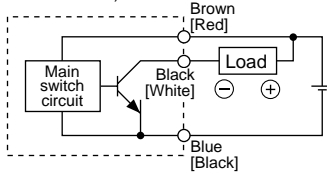


Series MDNB Auto Switches Connections and Examples

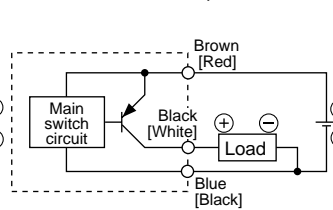
Basic Wiring

Solid state 3 wire, NPN

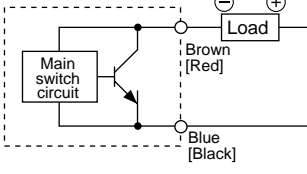
(Power supply for switch and load are the same.)



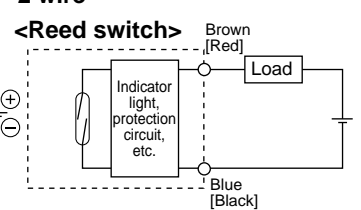
Solid state 3 wire, PNP



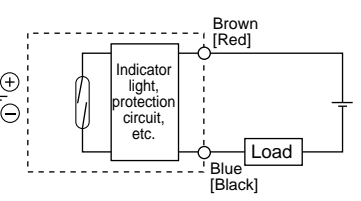
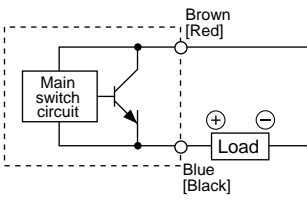
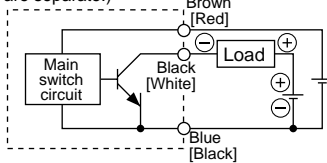
2 wire <Solid state>



2 wire <Reed switch>



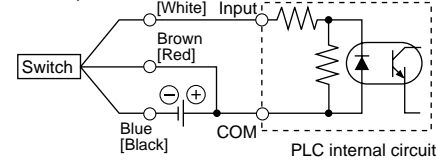
(Power supply for switch and load are separate.)



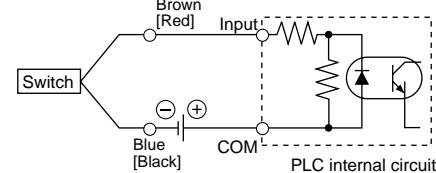
Examples of Connection to PLC (Sequence Controller)

Specification for sink input

3 wire, NPN

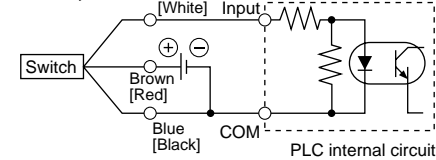


2 wire

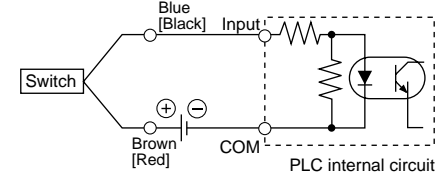


Specification for source input

3 wire, PNP



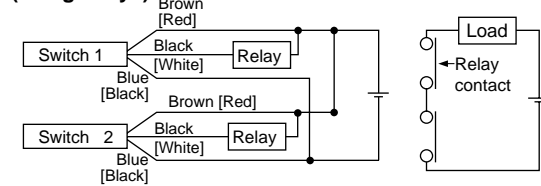
2 wire



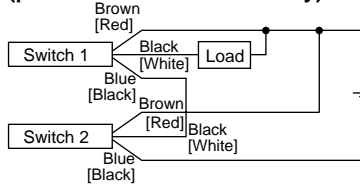
Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

Connection Examples for AND (Series) and OR (Parallel)

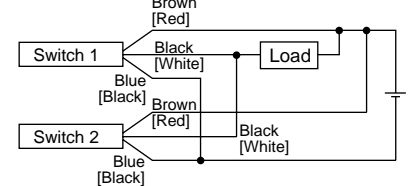
3 wire AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

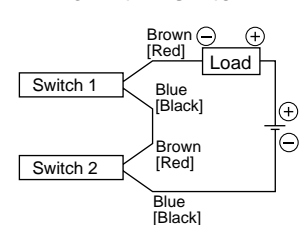


OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

2 wire with 2 switch AND connection

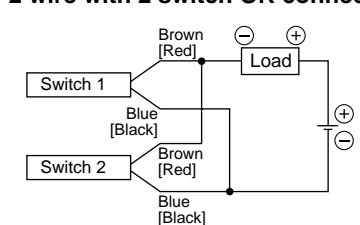


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Residual voltage} \times 2 \text{ pcs.} \\ &= 24\text{V} - 4\text{V} \times 2 \text{ pcs.} \\ &= 16\text{V} \end{aligned}$$

Example: Power supply is 24VDC
Voltage decline in switch is 4V

2 wire with 2 switch OR connection



<Solid state>
When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

<Reed switch>
Because there is no current leakage, the load voltage will not increase when turned OFF, but due to the number of switches in the ON state, the indicator lights will sometimes get dark or not light up, because of variance and reduction of the current flowing to the switches.

$$\begin{aligned} \text{Load voltage at OFF} &= \frac{\text{Leakage current}}{\text{Load impedance}} \times 2 \text{ pcs.} \times \text{Load impedance} \\ &= 1\text{mA} \times 2 \text{ pcs.} \times 3\text{k}\Omega \\ &= 6\text{V} \end{aligned}$$

Example: Load impedance is 3kΩ
Leakage current from switch is 1mA

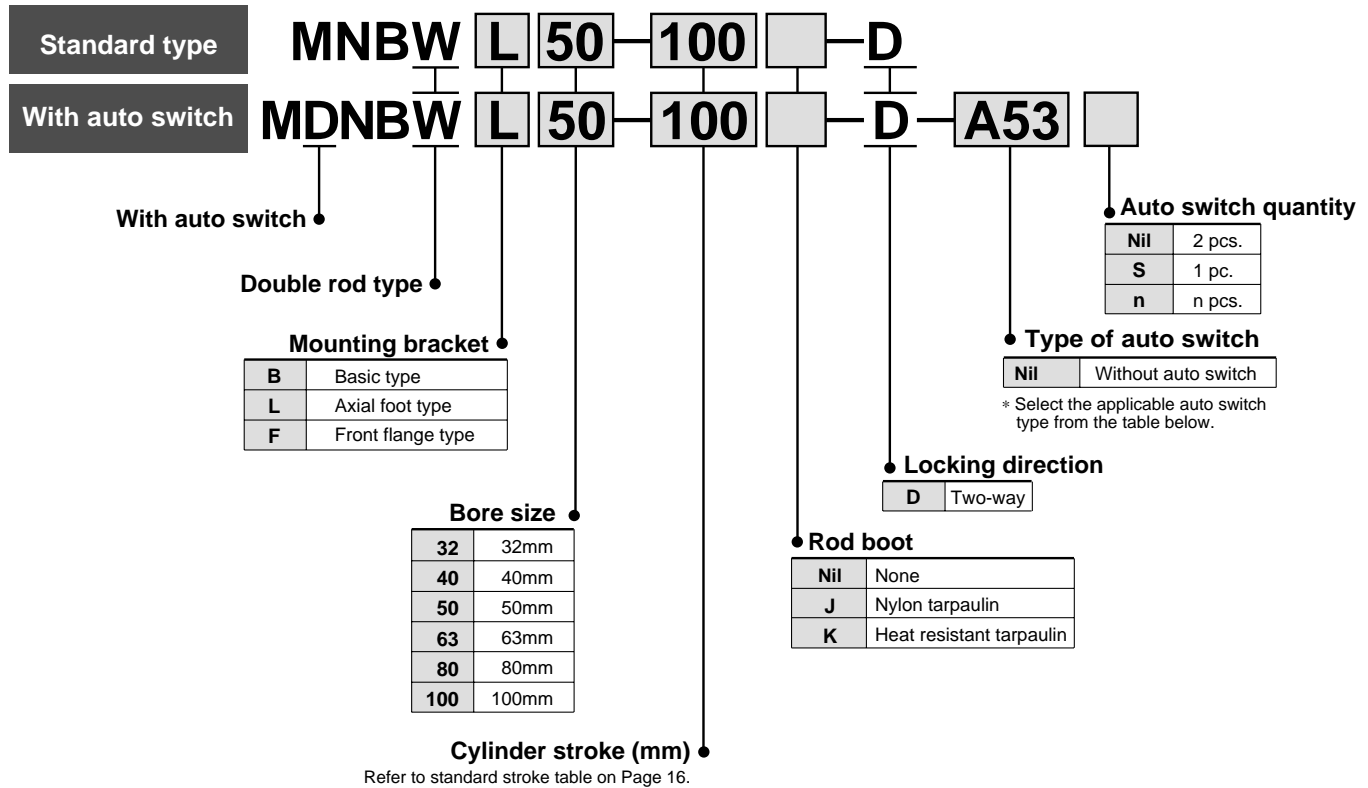
Cylinder
with Lock

Double
Acting:
Double Rod

Series *MNBW*

ø32, ø40, ø50, ø63, ø80, ø100

How to Order



Applicable auto switch types / Tie-rod mount

Type	Special Functions	Electrical entry	Indicator lights	Wiring (output)	Load voltage		Auto switch part no.	* Lead wire length (m)			Applicable load	
					DC	AC		0.5 (Nil)	3 (L)	5 (Z)		
Reed switch	—	Grommet	Yes	3 wire (NPN equiv.)	24V	5V	—	A56	●	●	—	IC circuit
						12V	—	A53	●	●	●	—
						12V	100V, 200V	A54	●	●	●	—
						12V	200V or less	A67	●	●	—	IC circuit
Solid state switch	Diagnostic indicator (2 color)	Grommet	Yes	2 wire	24V	5V, 12V	—	A64	●	●	—	IC circuit
						—	—	A59W	●	●	—	—
						5V, 12V	100V, 200V	J51	●	●	○	—
						12V	—	J59	●	●	○	—
						5V, 12V	—	F59W	●	●	○	IC circuit
						5V, 12V	—	F5P	●	●	○	IC circuit
						5V, 12V	—	F5PW	●	●	○	—
						5V, 12V	—	F59W	●	●	○	IC circuit
2 wire	24V	12V	—	F5BA	—	●	○	—				
3 wire (NPN)	5V, 12V	—	—	F5NT	—	●	○	IC circuit				
3 wire (PNP)	5V, 12V	—	—	F59F	●	●	○	—				
4 wire (NPN)	—	—	—	F5LF	●	●	○	—				

* Lead wire length symbol
 0.5m..... Nil (Ex.) A53
 3m L (Ex.) A53L
 5m Z (Ex.) A53Z

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

Cylinders with built-in magnets

In cases of built-in magnets without auto switches, the symbol for auto switch type will be Nil. (Ex.) MDNBL40-100-D

Mounting bracket parts

Refer to P.17 regarding types of mounting brackets for other than basic type air cylinders.

Auto switch mounting brackets/Part Nos.

Applicable bore size (mm)	32, 40	50, 63	80, 100
Mounting bracket part no.	BT-03	BT-05	BT-06

[Stainless steel mounting screw kit]

The following stainless steel mounting screw kit (including set screws) has been prepared for use, depending upon the operating environment.

(Mounting brackets are not included, and must be arranged separately.)

BBA1: Stainless steel screw kit for D-A5/A6/F5/J5

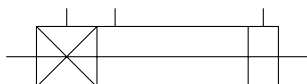
The above stainless steel screws are used when a cylinder is shipped with D-F5BA type switches. The above screw kit is also included when D-F5BA type switches are shipped separately.

Cylinder with Lock

Double Acting: *Double Rod* Series **MNBW**



JIS symbol
Cylinder with brake



Models

Series	Model	Cylinder action	Locking action	Cylinder bore size (mm)
MNB	Non-lube type	Double acting	Spring lock	32, 40, 50, 63, 80, 100

Cylinder Specifications

Bore size (mm)	32, 40, 50, 63, 80, 100
Model	Non-lube type
Fluid	Air
Proof pressure	1.5MPa {15.3kgf/cm ² }
Maximum operating pressure	1.0MPa {10.2kgf/cm ² }
Minimum operating pressure	0.08MPa {0.82kgf/cm ² }
Piston speed	50 to 1000mm/s ^{Note}
Ambient and fluid temperature	Without auto switch : -10°C to 70°C (without freezing) With auto switch : -10°C to 70°C (without freezing)
Cushion	Double side air cushion
Stroke length tolerance	to 250: ^{+1.0} ₀ , 251 to 1000: ^{+1.4} ₀ , 1001 to 1500: ^{+1.8} ₀
Bracket type	Basic type, Axial foot type, Front flange type

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

Lock Specifications

Lock actuation	Spring lock (exhaust lock)
Unlocking pressure	0.25MPa {2.5kgf/cm ² } or more
Locking pressure	0.20MPa {2.0kgf/cm ² } or less
Maximum operating pressure	1.0MPa {10.0kgf/cm ² }
Locking direction	Two-way

Standard Stroke /

For cases with auto switches, refer to the table of minimum strokes for mounting of auto switches on page 12.

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

Stopping Accuracy

Unit: mm

Locking system	Piston speed (mm/s)			
	100	300	500	1000
Spring lock	±0.3	±0.6	±1.0	±2.0

Conditions/Horizontal supply pressure P=0.5MPa{5kgf/cm²}

Load weight Upper limit of allowable value

Solenoid valve for locking mounted on the unlocking port

Maximum value of stopping position dispersion from 100 measurements

Spring Lock Holding Power (Maximum Static Load)

Bore size (mm)	32	40	50	63	80	100
Holding power N {kgf}	552 {56}	882 {90}	1370 {140}	2160 {220}	3430 {350}	5390 {550}

Series MNBW

Bracket Part Numbers

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

Note 1) When ordering foot type brackets, 2 pcs. should be arranged for each cylinder.

Note 2) The following parts are included with each mounting bracket.

Foot, Flange: Body mounting bolts

Note 3) All are common to the MB series air cylinders, except for the sections marked with a *.

Rod Boot

Symbol	Material	Maximum ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C ^{Note)}

Note) Maximum ambient temperature for the rod boot itself.

Accessories

Mounting		Basic type	Foot type	Front flange type
Standard equipment	Rod end nut	•	•	•
Options	With rod boot	•	•	•

Double Rod Weight Table/Aluminum Tube

Bore size (mm)		32	40	50	63	80	100
Basic weight	Basic type	1.26	1.82	2.91	4.24	7.23	10.70
	Foot type	1.36	1.94	3.09	4.50	7.66	11.29
	Flange type	1.50	2.14	3.44	4.98	8.68	14.01
Additional weight per 50mm of stroke	All mounting brackets	0.15	0.24	0.34	0.35	0.61	0.84
Accessories	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 method

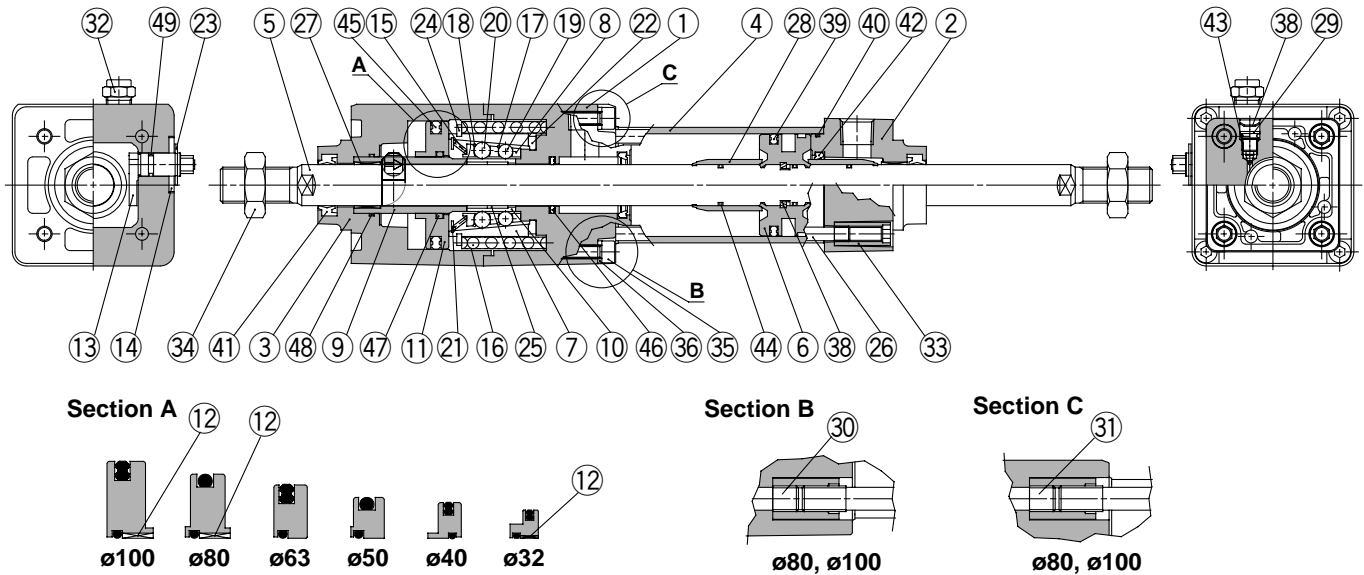
(Example) MNBWB32-100 (basic type, ø32, 100st)

- Basic weight 1.26 (basic type, ø32)
- Additional weight 0.11/50mm stroke
- Cylinder stroke 100mm stroke

$$1.26 + 0.11 \times 100/50 = 1.48\text{kg}$$

Cylinder with Lock *Double Acting: Double Rod Series MNBW*

Construction



Parts list

No.	Description	Material	Note	
①	Rod cover A	Aluminum alloy	Hard anodized & metallic coated	
②	Rod cover B	Die-cast aluminum	Chromated & metallic coated	
③	Cover	Aluminum alloy	Hard anodized & metallic coated	
④	Cylinder tubing	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	ø40	Aluminum alloy Hard anodized	
		ø50		
		ø63		
		ø32		Carbon steel Zinc chromated
		ø80		
		ø100		
⑫	Release piston bushing	Steel + special resin	ø32, ø80, ø100 only	
⑬	Unlocking cam	Chrome molybdenum steel	Glossy chromated	
⑭	Washer	Carbon steel	Black zinc chromated	
⑮	Retainer pre-load spring	Steel wire	Zinc chromated	
⑯	Brake spring	Steel wire	Zinc chromated	
⑰	Clip A	Stainless steel		
⑱	Clip B	Stainless steel		
⑲	Steel ball A	Carbon steel		
⑲	Steel ball B	Carbon steel		
⑲	Tooth ring	Stainless steel		
⑲	Damper	Polyurethane rubber		
⑲	C type retaining ring for unlocking cam shaft	Carbon steel		
⑲	C type retaining ring for taper ring	Carbon steel		
⑲	Brake shoe	Special friction material		
⑲	Tie-rod	Carbon steel	Chromated	
⑲	Bushing	Lead-bronze casting		
⑲	Cushion ring	Brass		

Parts list

No.	Description	Material	Note
⑲	Cushion valve	Steel wire	Nickel plated
⑳	Unit holding tie-rod A	Carbon steel	Chromated ø80, ø100 only
㉑	Unit holding tie-rod B	Carbon steel	Chromated ø80, ø100 only
㉒	BC element		
㉓	Tie-rod nut	Carbon steel	Nickel plated
㉔	Rod end nut	Carbon steel	Nickel plated
㉕	Hexagon socket head cap screw	Chrome molybdenum steel	Nickel plated ø32 to ø63 only
㉖	Spring washer for hex. socket head cap screw	Steel wire	Nickel plated ø32 to ø63 only
㉗	Retaining ring	Spring steel	
㉘	Piston holder	Urethane	
㉙	Piston seal	NBR	
㉚	Cylinder tube gasket	NBR	
㉛	Rod seal A	NBR	
㉜	Cushion seal	NBR	
㉝	Cushion valve seal	NBR	
㉞	Piston gasket	NBR	
㉟	Release piston seal	NBR	
㊱	Rod seal B	NBR	
㊲	Release piston gasket	NBR	
㊳	Piston guide gasket	NBR	
㊴	Unlocking cam gasket	NBR	

Replacement parts list (seal kits)

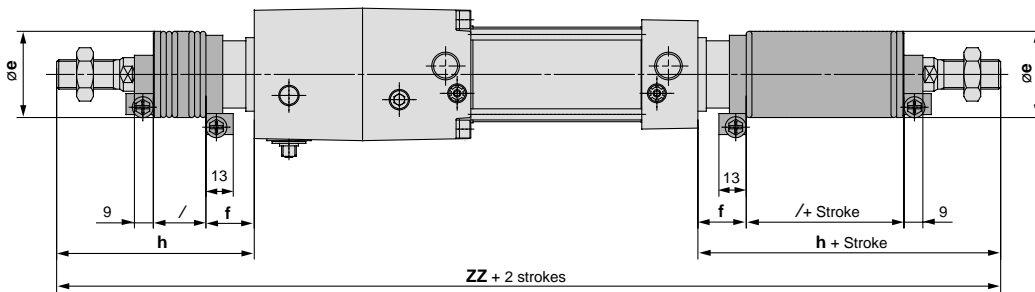
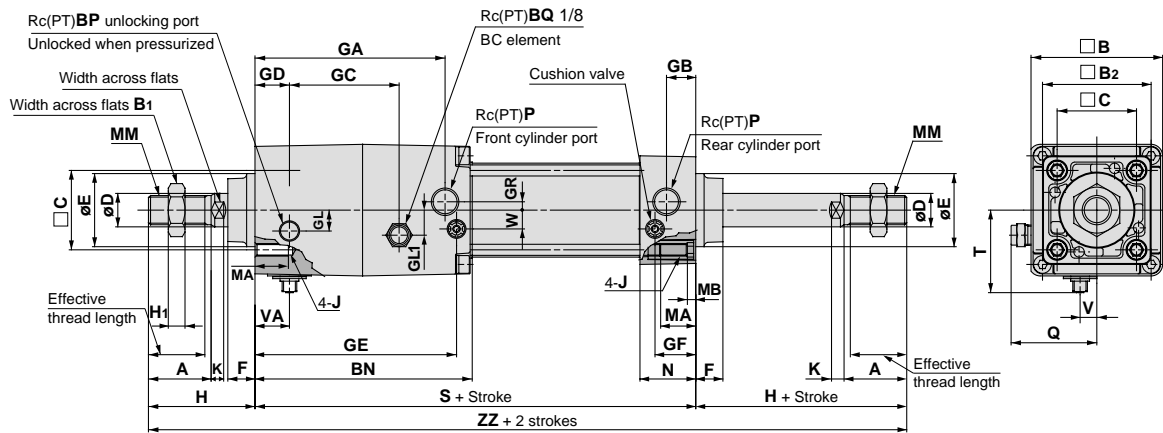
Bore size (mm)	Order No.	Contents
32	MB 32-PS	A kit containing nos. 39, 40, 41 and 42 (2pcs.) from the table above.
40	MB 40-PS	
50	MB 50-PS	
63	MB 63-PS	
80	MB 80-PS	
100	MB100-PS	

* As a general rule, the lock section of the MNBW series 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.

Series MNBW

Dimensions

Basic type (B)/MNBWB



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	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	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	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	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	to 750	37	22	40	102	32	13	95	169	1/4	72	25	45	20	150	19	81	33	22	18
100	to 750	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

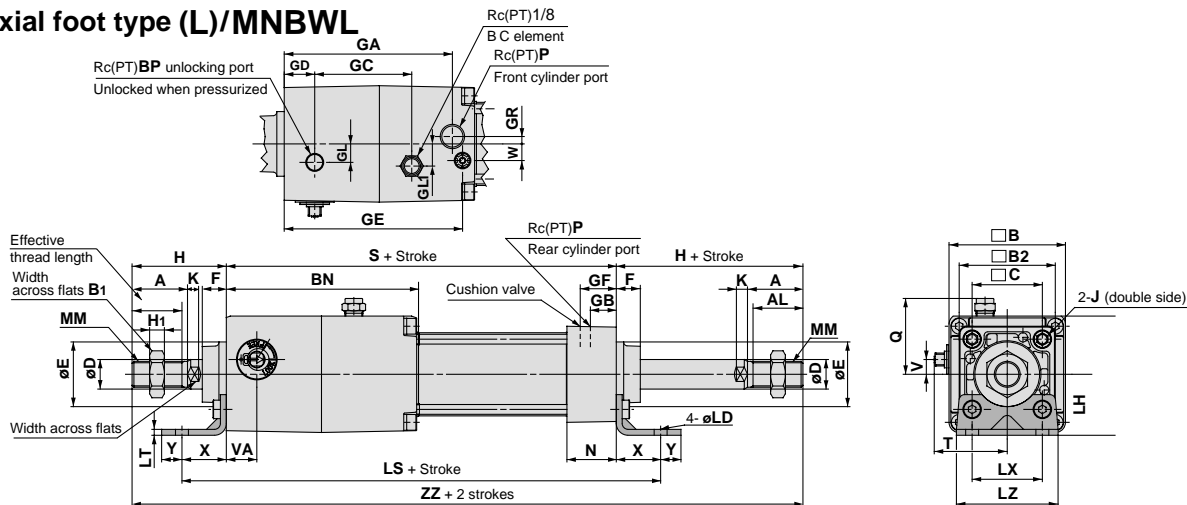
Note) ZZ indicates dimensions for double side rod boot.

Bore size (mm)	e	f	R										h										* 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 750	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 750	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 750
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	187.5	101	114	126	139	164	189	214	239	264	276	447	473	497	523	573	623	673	723	773	797
100	61	29	12.5	25	37.5	50	75	100	125	150	175	187.5	101	114	126	139	164	189	214	239	264	276	467	493	517	543	593	643	693	743	793	817

Cylinder with Lock

Double Acting: Double Rod Series **MNBW**

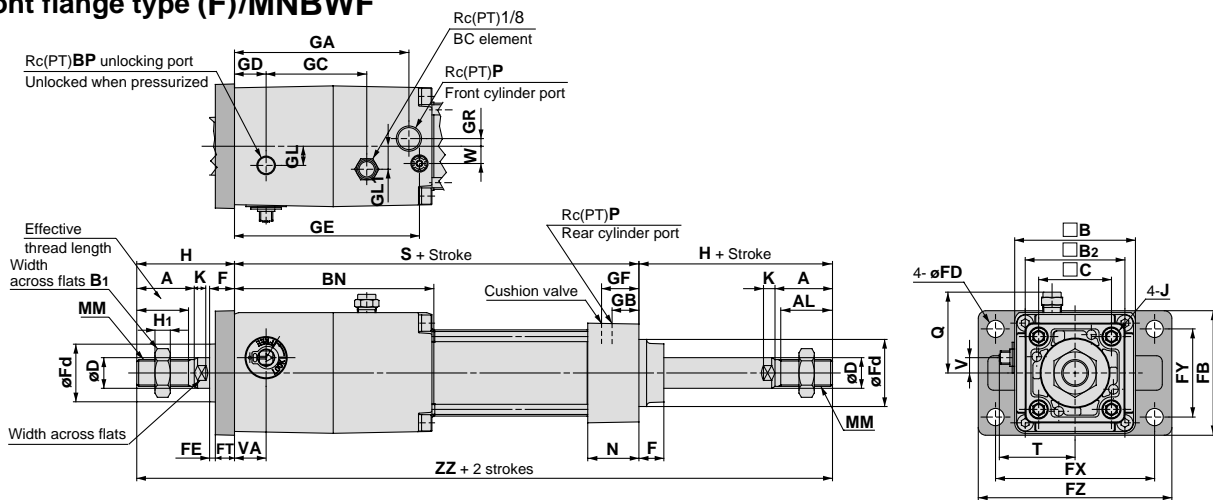
Axial foot type (L)/MNBWL



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	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	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	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	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	to 750	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	to 750	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

Front flange type (F)/MNBWF




Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B ₁	H ₁	B ₂	BN	BP	BQ	C	D	F	Fd	FD	FE	FT	FX	FY	FZ
32	to 500	19.5	10	22	56	54	17	6	46	97	1/8	1/8	32.5	12	13	25	7	3	10	72	38	87
40	to 500	27	14	30	65	63	22	8	52	104	1/8	1/8	38	16	13	31	9	3	10	83	46	101
50	to 600	32	18	35	77	75	27	11	65	120.5	1/4	1/8	46.5	20	14	38.5	9	2	12	100	52	120
63	to 600	32	18	35	92	90	27	11	75	134.5	1/4	1/8	56.5	20	14	39.5	9	2	12	115	62	135
80	to 750	37	22	40	100	102	32	13	95	169	1/4	1/8	72	25	20	45.5	12	4	16	126	63	153
100	to 750	37	26	40	120	116	41	16	114	189	1/4	1/8	89	30	20	54	14	4	16	150	75	178


Bore size (mm)	GA	GB	GC	GD	GL	GL ₁	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	18.5	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




Series *MNB* Safety Instructions

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

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

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

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

Note 1) ISO 4414: Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems.

Note 2) JIS B 8370: Pneumatic system axiom.

Warning

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

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

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

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

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

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.

2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.

3. Before machinery/equipment is re-started, take measures to prevent shooting-out of cylinder piston rod, etc. (Bleed air into the system gradually to create back-pressure.)

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

1. Conditions and environments beyond the given specifications, or if product is used outdoors.

2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, press applications, or safety equipment.

3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Series MNB Actuator Precautions 1

Be sure to read before handling.

Precautions on design

⚠ Warning

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

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

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

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

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

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

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

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the shock. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the shock. In this case, the rigidity of the machinery should also be examined.

5. **Consider emergency stops.**

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

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

Design the machinery so that human injury or equipment damage will not occur upon restart of operation. When the cylinder has to be reset at the starting position, install manual safety equipment.

Selection

⚠ Warning

1. **Check the specifications.**

The products advertised in this catalog are designed according to use in industrial compressed air systems. If the products are used in conditions where pressure, temperature, etc., are out of specification, damage and/or malfunction may be caused. Do not use in these conditions.

Consult SMC if you use a fluid other than compressed air.

⚠ Caution

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

The piston rod will be damaged if operated beyond the maximum stroke.

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

Operate within a range such that damage will not occur when the piston having inertial force stops by striking the cover at the stroke end. Refer to the cylinder type selection procedure for the range within which damage will not occur.

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

4. **Provide an intermediate support for cylinders having a long stroke length.**

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

Mounting

⚠ Caution

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

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

2. **When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.**

3. **Do not scratch or dent the sliding parts of the cylinder tube or piston rod, etc., by striking or grasping them with other objects.**

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation. Moreover, scratches or dents, etc. in the piston rod may lead to damaged seals and cause air leakage.

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

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

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

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

6. **Instruction manual.**

The product should be mounted and operated after thoroughly reading the manual and understanding its contents.

Keep the instruction manual where it can be referred to as needed.



Series MNB Actuator Precautions 2

Be sure to read before handling.

Piping

⚠ Caution

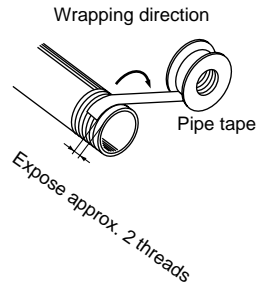
1. Preparation before piping.

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

2. Wrapping of pipe tape.

When screwing together pipes and fittings, etc., be certain that cutting chips from the pipe threads and sealing material do not get inside the piping.

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



Cushions

⚠ Caution

1. Readjust using the cushion needle.

Cushions are adjusted at the time of shipment, however, the cushion needle on the cover should be readjusted when the product is put into service, based upon factors such as the size of the load and the operating speed. When the cushion needle is turned clockwise, the cushion contracts and its effectiveness is increased.

2. Do not operate with the cushion needle in a fully closed condition.

This will cause damage to the seals.

Lubrication

⚠ Caution

1. Lubrication of non-lube type cylinder.

The cylinder is prelubricated and can be used without any further lubrication.

However, in the event that it will be lubricated, use turbine oil class 1 (with no additives) ISO VG32.

Stopping lubrication later may lead to malfunction due to the loss of the original lubricant. Therefore, lubrication must be continued once it has been started.

Air Supply

⚠ Warning

1. Use clean air.

If compressed air includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., it can cause damage or malfunction.

⚠ Caution

1. Install air filters.

Install air filters at the upstream side of valves. The filtration degree should be 5µm or less.

2. Install an air dryer or after cooler, etc.

Air that includes much condensate causes malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer or after cooler, etc.

3. Use the product within the range of specifications for fluid temperature and ambient temperature.

Take measures to prevent freezing, since moisture in circuits will be frozen under -5°C, and this may cause damage to seals and lead to malfunction.

Refer to the "Air Cleaning Equipment" catalog for details on compressed air quality.

Operating Environment

⚠ Warning

1. Do not use in environments where there is a danger of corrosion.

Refer to the construction drawings regarding cylinder materials.

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

Maintenance

⚠ Warning

1. Maintenance should be done according to the procedure indicated in the instruction manual.

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

2. Machine maintenance, and supply and exhaust of compressed air.

When machinery is serviced, first check measures to prevent dropping of driven objects and run-away of equipment, etc. Then cut off the supply pressure and electric power, and exhaust all compressed air from the system.

When machinery is restarted, check that operation is normal with actuators in the proper positions.

⚠ Caution

1. Drain flushing.

Remove condensate from air filters regularly. (Refer to specifications.)



Series MNB Auto Switch Precautions 1

Be sure to read before handling.

Design & Selection

⚠ Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications of current load, voltage, temperature or impact.

2. Take precautions when multiple cylinders are used close together.

When multiple auto switch cylinders are used in close proximity, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm. (When the allowable separation is indicated for each cylinder series, use the specified value.)

3. Pay attention to the length of time that a switch is ON at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V(\text{mm/s}) = \frac{\text{Auto switch operating range (mm)}}{\text{Time load applied (ms)}} \times 1000$$

In cases of high piston speed, the use of an auto switch (D-F5NT) with a built-in OFF delay timer (approx. 200ms) makes it possible to extend the load operating time.

4. Wiring should be kept as short as possible.

<Reed switch>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

- 1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5m or longer.
- 2) Even if an auto switch has a built-in contact protection circuit, when the wiring is more than 30m long, it is not able to adequately absorb the rush current and its life may be reduced. It is again necessary to connect a contact protection box in order to extend its life. Please contact SMC in this case.

<Solid state switch>

- 3) Although wire length should not affect switch function, use a wire 100m or shorter.

5. Take precautions for the internal voltage drop of the switch.

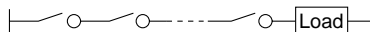
<Reed switch>

- 1) Switches with an indicator light (Except D-A56)

• If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diode. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



• In the same way, when operating under a specified voltage, although an auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

Supply voltage - Internal voltage drop of switch > Minimum operating voltage of load

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Model D-A6).

<Solid state switch>

- 3) Generally, the internal voltage drop will be greater with a 2 wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also, note that a 12VDC relay is not applicable.

6. Pay attention to leakage current.

<Solid state switch>

With a 2 wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

Operating current of load > Leakage current (OFF condition)

If the criteria given in the above formula are not met, it will not reset correctly (stays ON). Use a 3 wire switch if this specification will not be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Reed switch>

If driving a load such as a relay that generates a surge voltage, use a switch with a built-in contact protection circuit or use a contact protection box.

<Solid state switch>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

8. Cautions for use in an interlock circuit.

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch. Also perform periodic maintenance and confirm proper operation.

9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.



Series MNB Auto Switch Precautions 2

Be sure to read before handling.

Mounting & Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300m/s² or more for reed switches and 1000m/s² or more for solid state switches) while handling.

Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper fastening torque.

When a switch is tightened beyond the range of fastening torque, the mounting screws, mounting bracket or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position.

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON).

(The mounting position shown in a catalog indicates the optimum position at stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), operation will be unstable.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from applying bending stress or stretching force to the lead wires.

2. Be sure to connect the load before power is applied.

<2 wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits, including auto switches, may malfunction due to noise from these other lines.

5. Do not allow short circuit of loads.

<Reed switch>

If the power is turned ON with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switch>

Model D-J51 and all models of PNP output type switches do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged.

* Take special care to avoid reverse wiring with the power supply line (brown) and the output line (black) on 3 wire type switches.

6. Avoid incorrect wiring.

<Reed switch>

* A 24VDC switch with indicator light has polarity. The brown lead wire is (+) and the blue lead wire is (-).

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also note that a current greater than that specified will damage a light emitting diode and it will no longer operate.

Applicable models: D-A53, A54

2) Note however, that in the case of 2 color indicator type auto switches (D-A59W), if the wiring is reversed, the switch will be in a normally ON condition.

<Solid state switch>

1) If connections are reversed on a 2 wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

* 2) If connections are reversed (power supply line + and power supply line -) on a 3 wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue wire and the power supply line (-) is connected to the black wire, the switch will be damaged.

* Lead wire color changes

Lead wire colors of SMC switches and related products have been changed in order to meet NECA (Nippon Electric Control Equipment Industries Association) Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided. Special care should be taken regarding wire polarity during the time that the old colors still coexist with the new colors.

2 wire

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

Solid state with diagnostic output

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

3 wire

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black

Solid state with latch type diagnostic output

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange



Series MNB Auto Switch Precautions 3

Be sure to read before handling.

Operating Environment

Warning

1. Never use in an atmosphere of explosive gases.

The structure of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Consult SMC regarding the availability of a magnetic field resistant auto switch.)

3. Do not use in an environment where the auto switch will be continually exposed to water.

Although switches, satisfy IEC standard IP67 construction (JIS C 0920: watertight construction), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in an environment with oil or chemicals.

Consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Consult SMC if switches are used where there are temperature cycles other than normal temperature changes, as they may be adversely affected.

6. Do not use in an environment where there is excessive impact shock.

<Reed switch>

When excessive impact (300m/s² or more) is applied to a reed switch during operation, the contact point will malfunction and generate or cut off a signal momentarily (1ms or less). Consult SMC regarding the need to use a solid state switch depending upon the environment.

7. Do not use in an area where surges are generated.

<Solid state switch>

When there are units (solenoid type lifter, high frequency induction furnace, motor, etc.) which generate a large amount of surge in the area around cylinders with solid state auto switches, this may cause deterioration or damage to the switch. Avoid sources of surge generation and disorganized lines.

8. Avoid accumulation of iron powder or close contact with magnetic substances.

When a large amount of ferrous powder such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the cylinder.

Maintenance

Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

- 1) Secure and tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

- 2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

- 3) Confirm the lighting of the green light on the 2 color indicator type switch.

Confirm that the green LED is on when stopped at the established position. If the red LED is on, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

Other

Warning

1. Consult SMC concerning water resistance, elasticity of lead wires, and usage at welding sites, etc.



Series MNB Specific Product Precautions 1

Be sure to read before handling. Refer to pages 21 through 26 for safety precautions, actuator precautions and auto switch precautions.

Design of Equipment & 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 of causing damage to the equipment. In order to prevent this lurching, a balance circuit such as the recommended air pressure circuits (p. 29) should be used.

Selection

Warning

1. When in a locked condition, 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.

Selection

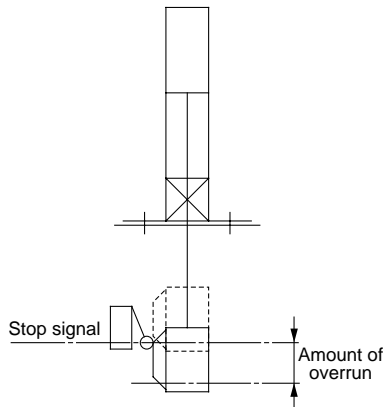
Warning

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 .
- SMC's auto switches have operating ranges from 8 to 14mm (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.

* Refer to page 2 regarding stopping accuracy.



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 stopping accuracy will be influenced by changes in piston speed.

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

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

Mounting

Warning

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

- If connected when in the locked condition, a load greater than the turning force or holding force, etc. may operate on the piston rod and cause damage to the lock mechanism. The MNB series 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 0.25MPa{2.5kgf/cm²} or more.



Series MNB Specific Product Precautions 2

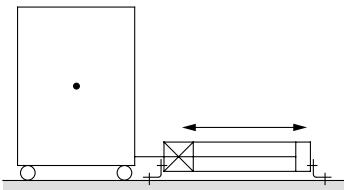
Be sure to read before handling. Refer to pages 21 through 26 for safety precautions, actuator precautions and auto switch precautions.

Mounting

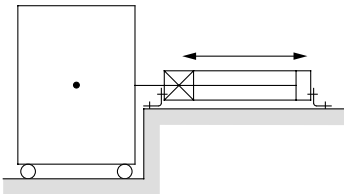
Warning

2. Do not apply an offset load to the piston rod.

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



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



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

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

Caution

1. Use the hexagon wrenches shown below when replacing brackets.

Bore size (mm)	Bolt	Width across flats	Torque (N·m)
32, 40	MB-32-48-C1247	4	6.9
50, 63	MB-50-48-C1249	5	11
80, 100	Foot MB-80-48-AC1251	6	25
	Other MB-80-48-BC1251		

2. The air cylinder series CA1 and cylinder with lock series CNA are not compatible for mounting.

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	Width across flats	Hexagon wrench
32, 40, 50	MB-32-10-C1247	2.5	JIS 4648 Hexagon wrench key 2.5
63, 80, 100	MB-63-10-C1250	4	JIS 4648 Hexagon wrench key 4

2. Be certain to use an air cushion at the end of the 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 front and rear 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.

Air Pressure Circuits

Warning

1. Be certain to use an air pressure 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 locked stop, when restarting or when manually unlocking, a circuit should be used 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 sectional area, as a rule 50% or more of the effective sectional area of the cylinder drive solenoid valve.

The larger the effective sectional 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 less distance there is 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.



Series MNB

Specific Product Precautions 3

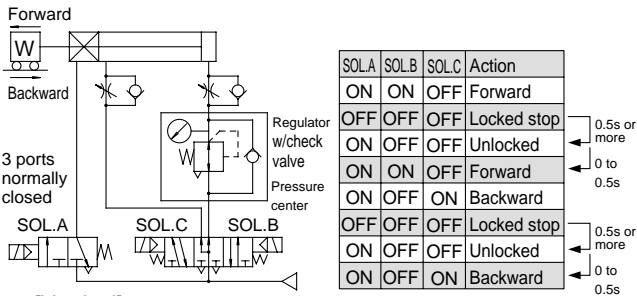
Be sure to read before handling. Refer to pages 21 through 26 for safety precautions, actuator precautions and auto switch precautions.

Air Pressure Circuits

Warning

6. Basic circuits.

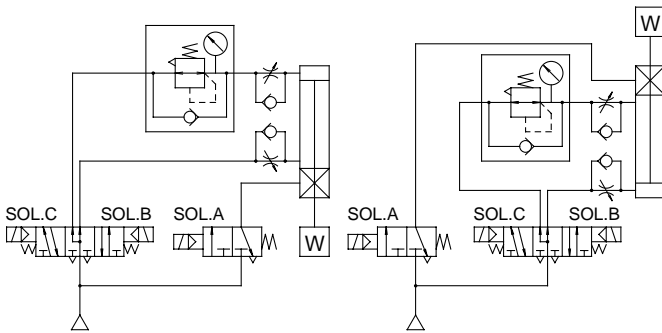
1. [Horizontal]



2. [Vertical]

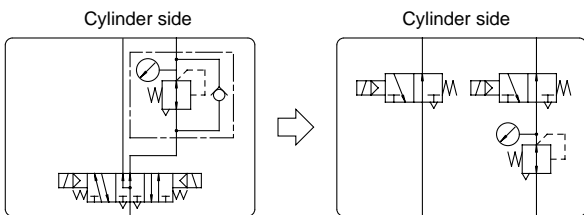
[Load in direction of rod extension]

[Load in direction of rod retraction]



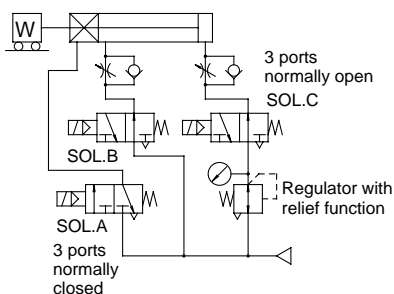
Caution

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]



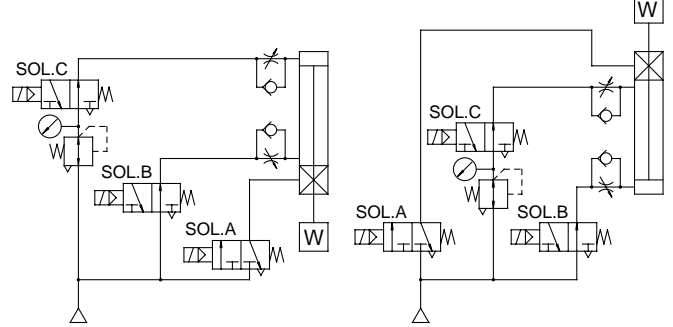
Air Pressure Circuits

Caution

2. [Vertical]

[Load in direction of rod extension]

[Load in direction of rod retraction]



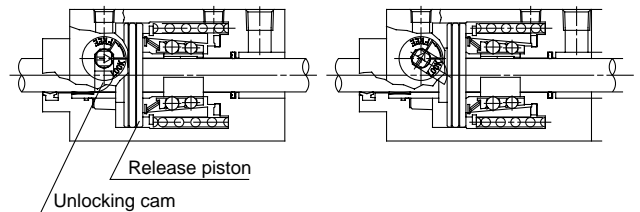
Manual Unlocking

Caution

1. The unlocking cam provided on the MNB series is an emergency unlocking mechanism only.

During an emergency when the air supply is cut off, it is used to alleviate a problem by forcibly pushing the release piston back to release the lock. However, take note that the sliding resistance of the piston rod will be high compared to unlocking with air pressure.

2. When installing into equipment or machinery, etc., in cases where it will be necessary to hold an unlocked condition for an extended time, air pressure of 0.25MPa or more should be applied to the unlocking port.
3. Do not turn the unlocking cam (the arrow ← on the unlocking cam head) past the FREE position. If it is turned too far there is a danger of damaging the unlocking cam.



Locked condition

Manually unlocked condition

[Principle]

If the unlocking cam is turned counter clockwise 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.



Series MNB Specific Product Precautions 4

Be sure to read before handling. Refer to pages 21 through 26 for safety precautions, actuator precautions and auto switch precautions.

Maintenance

⚠ Caution

1. The lock units for the MNB series are replaceable.

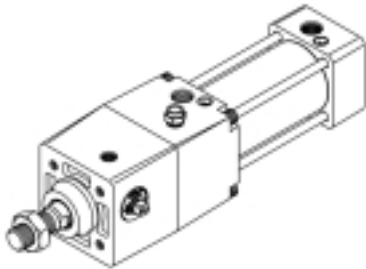
To order replacement lock units for the MNB series use the order numbers given in the table below.

Bore size (mm)	Lock unit order number
40	MNB 40D-UA
50	MNB 50D-UA
63	MNB 63D-UA
80	MNB 80D-UA
100	MNB100D-UA

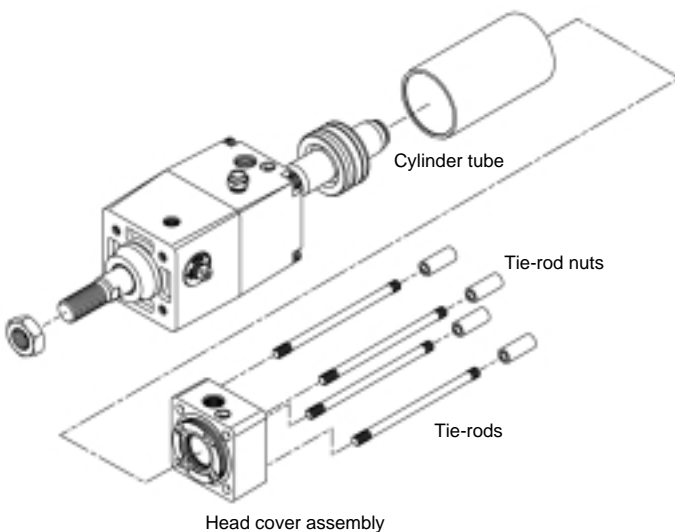
2. Replacement of lock units.

1) Loosen the tie-rod nuts (4pcs.) on the cylinder head cover using a hexagon wrench. Refer to the table below for the applicable hexagon wrench.

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

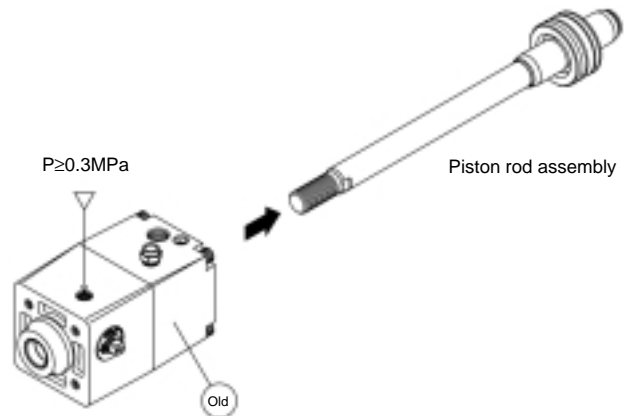


2) Remove the tie-rods, head cover and cylinder tube.

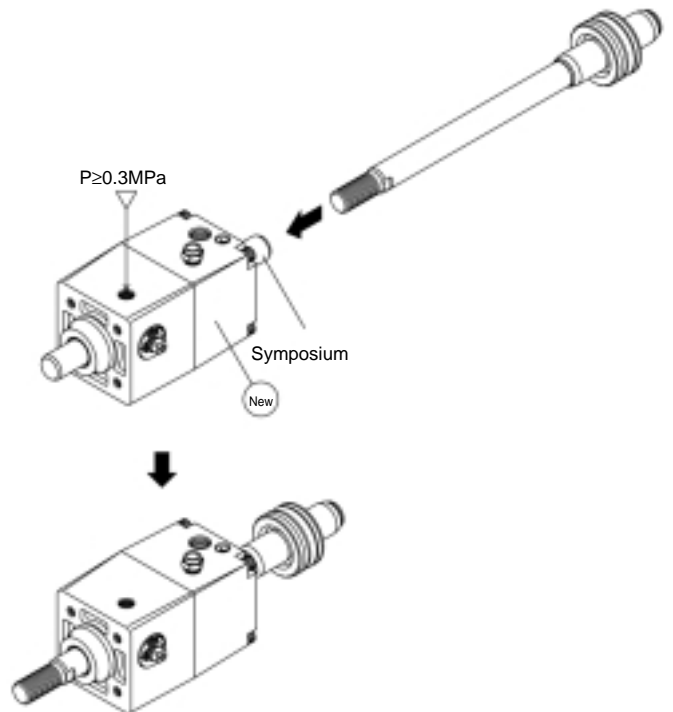


⚠ Caution

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



4) Similarly, apply 0.3MPa or more of compressed air to the unlocking port of the new lock unit, and replace the symposium with the previously mentioned piston rod assembly.



5) Reassemble in reverse order from steps 2) and 1).

Series MNB Selection of Models

Precautions on Model Selection

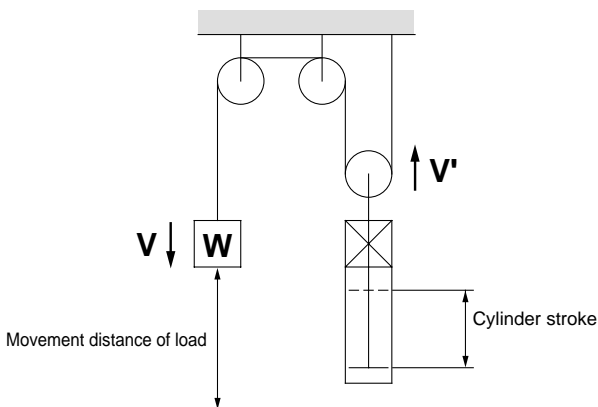
⚠ Caution

1. In order that the originally selected maximum speed is not exceeded, be certain to use a speed controller to adjust the total movement distance of the load so that movement takes place in no less than the applicable movement time.

The movement time is the time that is necessary for the load to travel the total movement distance from the start without any intermediate stops.

2. In cases where the cylinder stroke and the movement distance of the load are different (double speed mechanism, etc.), use the movement distance of the load for selection purposes.

Example)



Selection Example

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

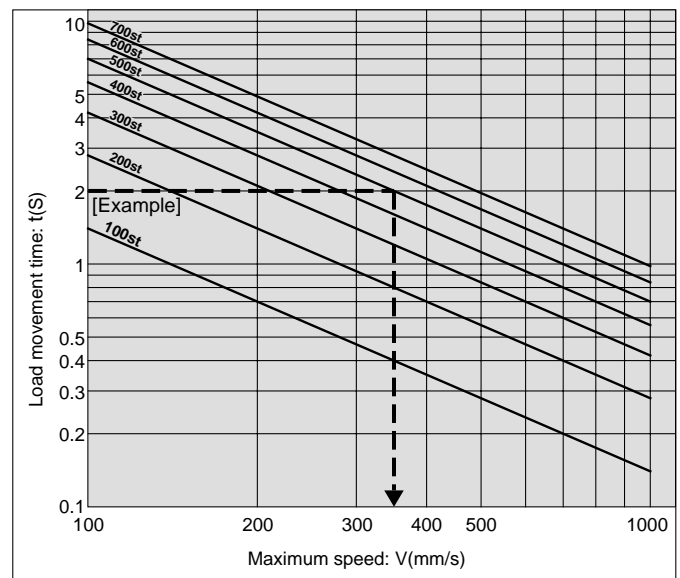
Step 1: From graph 1 find the maximum movement speed of the load
 \therefore Maximum speed V : approx. 350mm/s

Step 2: Select Graph 6 based upon the load condition and operating pressure, and then from the intersection of the maximum speed $V=350\text{mm/s}$ found in Step 1, and the load weight $m=50\text{kg}$
 $\therefore \phi 63 \rightarrow$ select a MNB63 or larger bore size.

Step 1 Find the maximum load speed: V

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

Graph 1



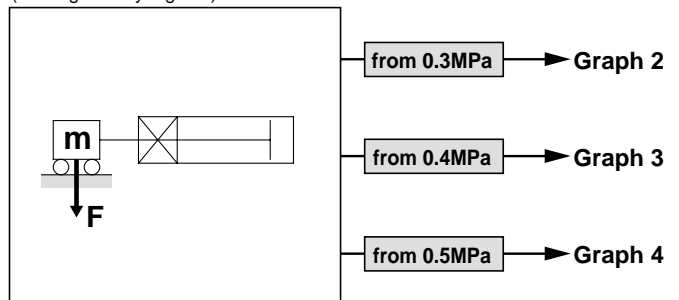
Step 2 Find the cylinder bore size.

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

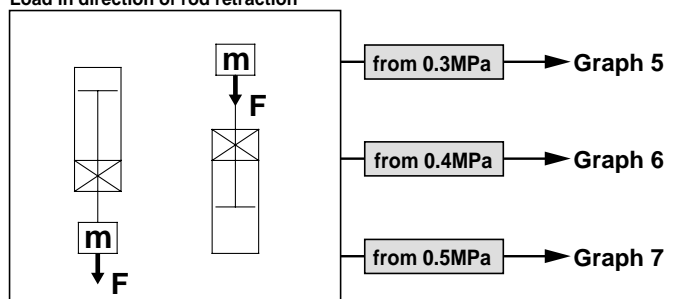
Load condition

Operating pressure

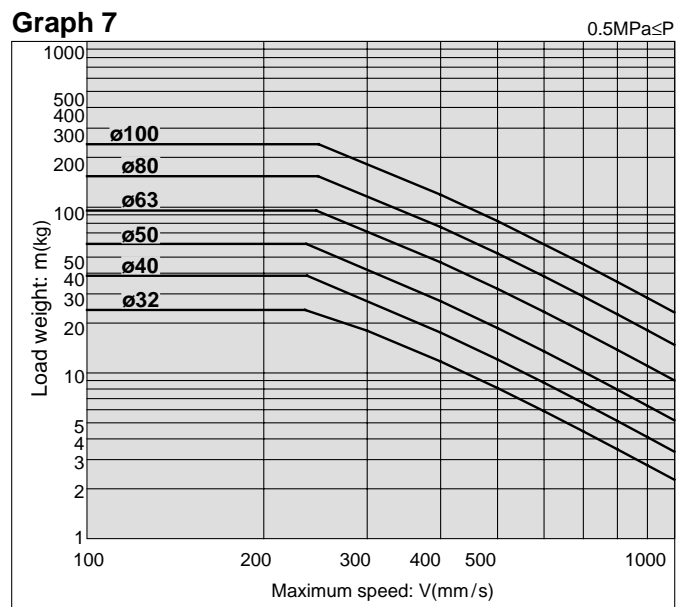
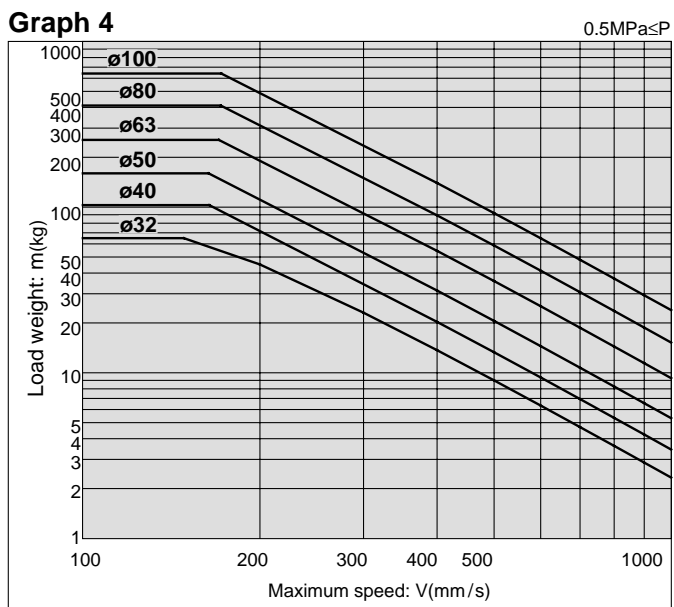
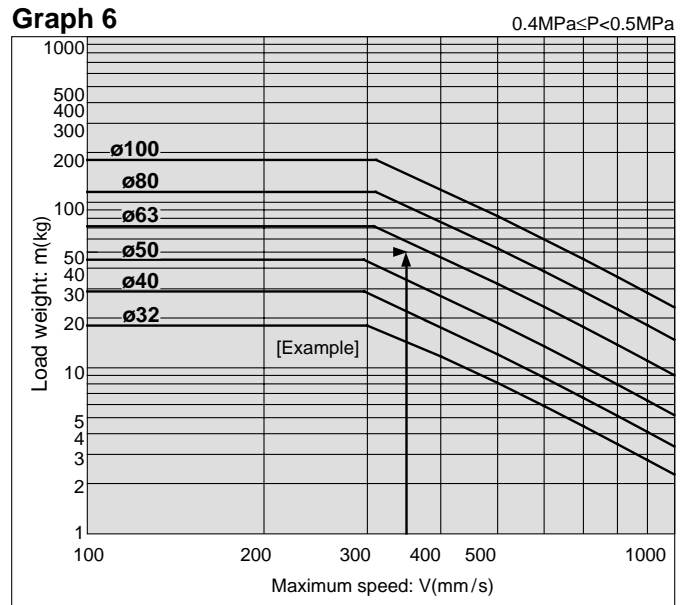
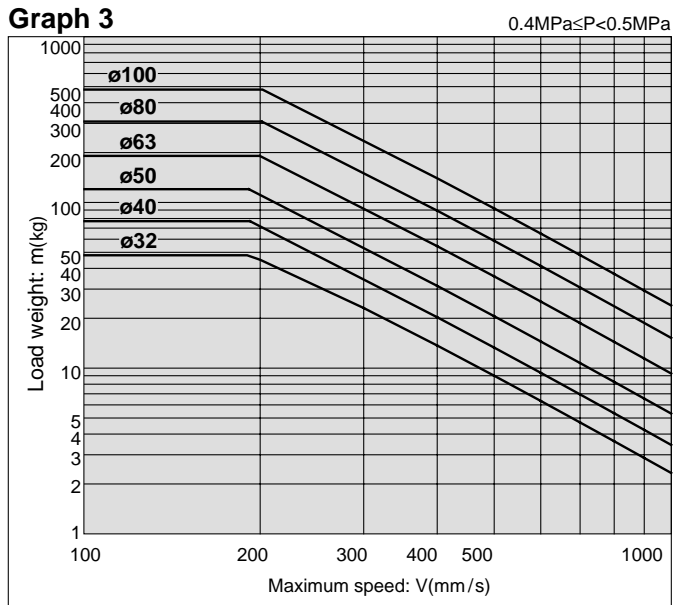
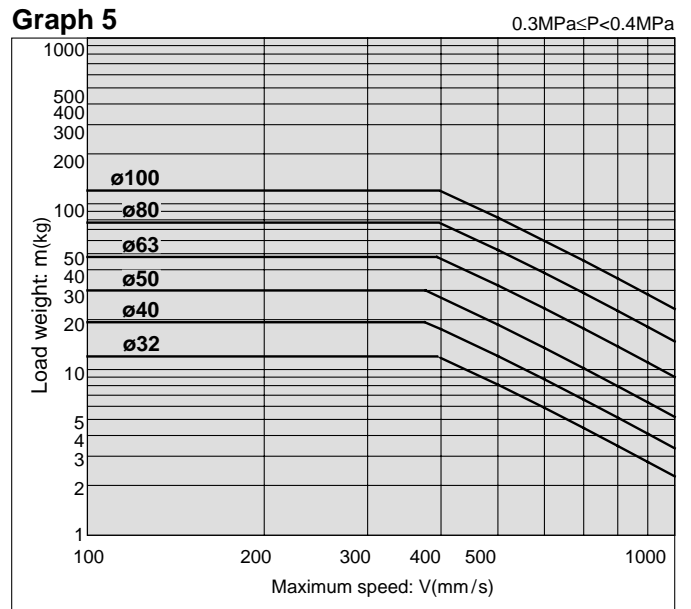
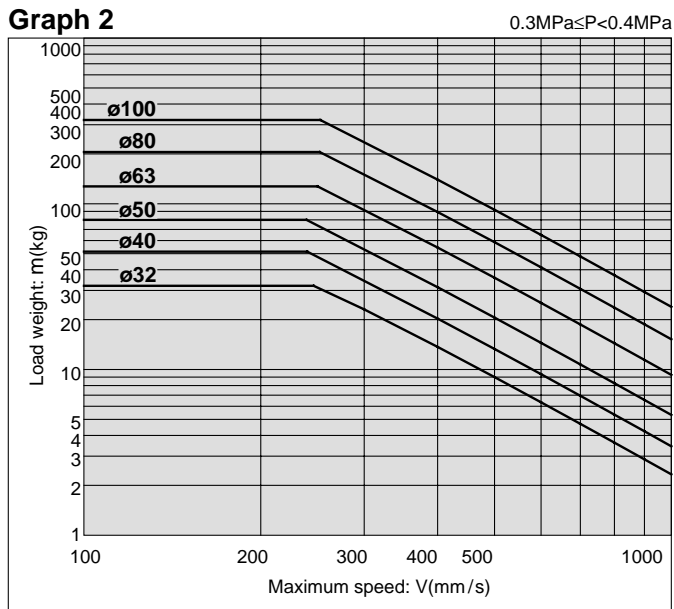
Direction of load at right angle to rod
 (* Being held by a guide)



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

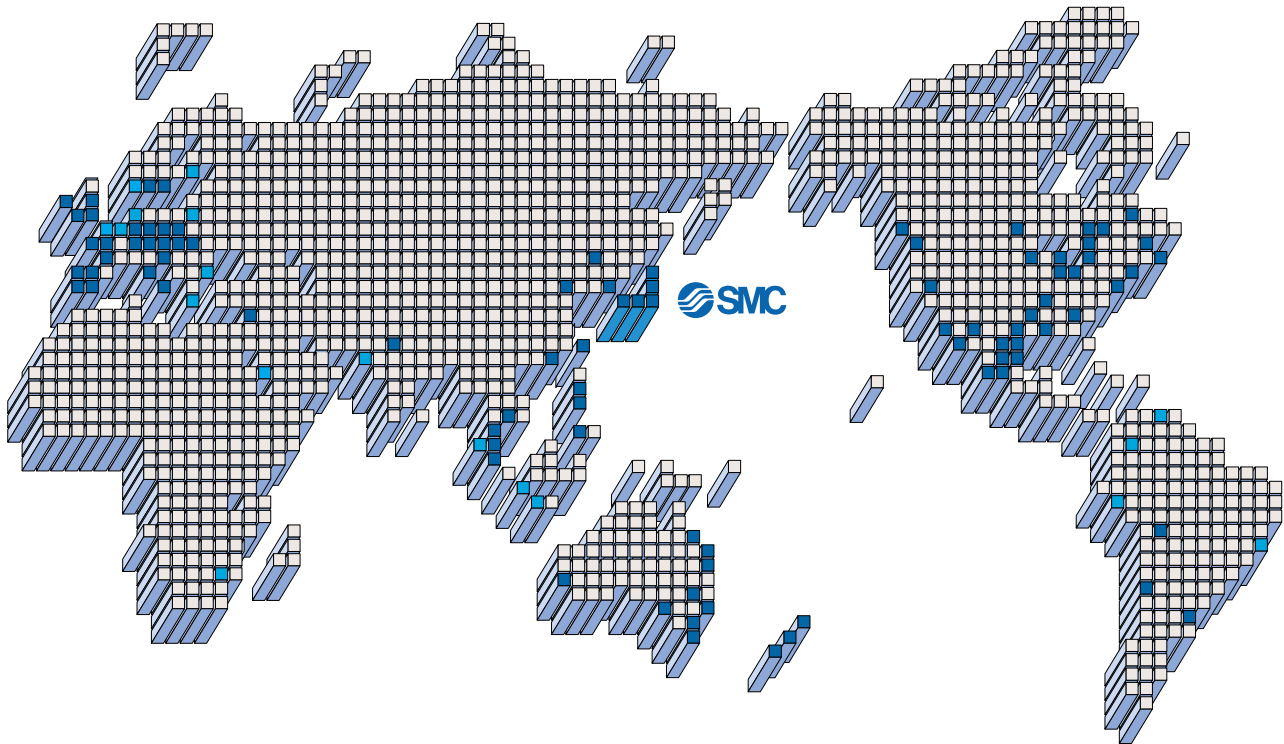


Selection Graphs





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