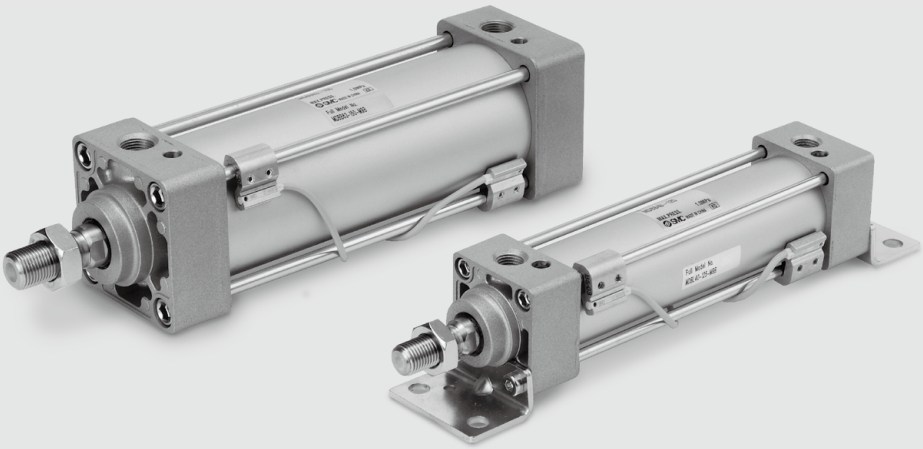
Air Cylinder

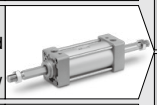
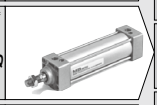
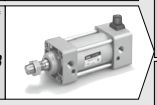
Series MB

ø32, ø40, ø50, ø63, ø80, ø100, ø125



Variations

Standard/Double acting

		Built-in-magnet	Rod boot	Mounting	Accessory	
Single rod *Series MB*		●	●	Basic Axial foot Rod side flange Head side flange Single clevis Double clevis Center trunnion	**Standard** Rod end nut **Option** Knuckle joint pin Clevis pin Single knuckle joint Double knuckle joint Trunnion pivot bracket Double clevis pivot bracket	Page 408
Double rod *Series MBW*		●	●	Basic Foot Flange Center trunnion	**Standard** Rod end nut **Option** Kuckle joint pin Single knuckle joint Double knuckle joint Trunnion pivot bracket	Page 417
*Non-rotating rod Single rod *Series MBK*		●	●	Basic Axial foot Rod side flange Head side flange Single clevis Double clevis Center trunnion	**Standard** Rod end nut **Option** Knuckle joint pin Clevis pin Single knuckle joint Double knuckle joint Trunnion pivot bracket Double clevis pivot bracket	Page 423
Non-rotating rod Double rod *Series MBKW*		●	●	Basic Axial foot Rod side flange Head side flange Center trunnion	**Standard** Rod end nut **Option** Kuckle joint pin Single knuckle joint Double knuckle joint Trunnion pivot bracket	Page 427
*Low friction *Series MB□Q*		●		Basic Axial foot Rod side flange Head side flange Single clevis Double clevis Center trunnion	**Standard** Rod end nut **Option** Knuckle joint pin Clevis pin Single knuckle joint Double knuckle joint Trunnion pivot bracket Double clevis pivot bracket	Page 431
*End lock *Series MBB*		●	●	Basic Axial foot Rod side flange Head side flange Single clevis Double clevis Center trunnion	**Standard** Rod end nut Locking release bolt (N only) **Option** Knuckle joint pin Clevis pin Single knuckle joint Double knuckle joint Trunnion pivot bracket Double clevis pivot bracket	Page 437

Standard stroke (mm)

Bore	25	50	75	100	125	150	175	200	250	300	350	400	450	500	600	700	800	900	1000
32	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
40	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
50	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
63	●	●	●	●	●	●	●	●	●	●	●	●	●	●					
80	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	● (1)		
100	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	● (1)		
125	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

∗ ø125 is not included in MBK, MB□Q and MBB.
Note 1) Standard stroke for MBK series is below 700.

Combinations of Standard Products and Made

Series MB

●: Standard
◎: Made to Order specifications
○: Special product (Contact SMC for details.)
—: Not available

Symbol	Specification	Applicable bore size	MB (Standard) Double acting Single rod Air ø32 to ø100	MB (Standard) Double acting Single rod Air ø125	MB (Standard) Double acting Single rod Rubber ø32 to ø100	MB (Standard) Double acting Single rod Rubber ø125	MB (Standard) Double acting Double rod Air ø32 to ø100	MB (Standard) Double acting Double rod Air ø125
Standard	**Standard**	ø32 to ø125	●	●	●	●	●	●
Long st	**Long stroke**		●	●	●	●	●	○
D	**Built-in magnet**		●	●	●	●	●	●
MB□-□JK	**With rod boot**		●	●	●	●	●	●
10-	**Clean series**		●	○	●	○	●	○
25-	**Copper (Cu) -free** Note 4)	ø32 to ø100	●	○	○	○	○	○
25A	**Copper (Cu) and zinc (Zn) -free** Note 4)		●	○	○	○	○	○
20-	**Copper** Note 3) **and Fluorine-free**	ø32 to ø125	●	○	●	○	●	○
MB□RV	**Water resistant**		●	○	●	○	●	○
XA□	**Change of rod end shape**	ø32 to ø125	◎	◎	◎	◎	◎	◎
XB5	**Oversized rod cylinder**		◎	○	○	○	○	○
XB6	**Heat-resistant cylinder (–10 to 150°C)**		◎	○	○	○	◎	○
XB13	**Low-speed cylinder (5 to 50 mm/s)**		◎	○	◎	○	○	○
XC3	**Special port position**		◎	○	◎	○	◎	○
XC4	**With heavy duty scraper**		◎	○	◎	○	◎	○
XC5	**Heat-resistant cylinder (–10 to 110°C)**		◎	○	○	○	◎	○
XC6	**Made of stainless steel**		◎	◎	◎	◎	◎	○
XC7	**Tie-rod, cushion valve, tie-rod nut, etc. made of stainless steel**		◎	○	◎	○	◎	○
XC8	**Adjustable stroke cylinder/Adjustable extension type**		◎	○	◎	○	—	—
XC9	**Adjustable stroke cylinder/Adjustable retraction type**		◎	○	◎	○	—	—
XC10	**Dual stroke cylinder/Double rod type**		◎	○	◎	○	—	—
XC11	**Dual stroke cylinder/Single rod type**		◎	○	◎	○	—	—
XC12	**Tandem cylinder**		◎	○	◎	○	○	○
XC14	**Change of trunnion bracket mounting position**		◎	◎	◎	◎	◎	◎
XC22	**Fluororubber seal**		◎	○	◎	○	◎	○
XC27	**Double clevis pins made of stainless steel (Stainless steel 304)**		◎	◎	◎	◎	—	—
XC29	**Double knuckle joint with spring pin**		◎	○	◎	○	○	○
XC30	**Rod side trunnion**		◎	○	◎	○	◎	○
XC35	**With coil scraper**		◎	○	◎	○	◎	○
XC59	**Fluororubber seal, Built-in hard plastic magnet**		◎	○	◎	○	○	○
XC65	**XC6 + XC7 specifications**		◎	○	◎	○	○	○
X1184	**Cylinder with reed, heat-resistant auto switch**		◎	○	○	○	○	○

Note 1) Simple specials except XC14A and XC14B.
Note 2) XC10 specification for Series MBK is the non-rotating type on both sides. When the non-rotating type is applicable on one side, submit a special order request form.

MB (Standard)		MBK (Non-rotating)				MB□Q (Low friction)	MBB (End lock)
Double acting							
Double rod		Single rod		Double rod		Single rod	Single rod
Rubber		Air	Rubber	Air	Rubber	—	Air
ø32 to ø100	ø125	ø32 to ø100					
●	●	●	●	●	●	●	●
●	○	●	●	●	●	○	○
●	●	●	●	●	●	●	●
●	●	●	●	●	●	○	●
●	○	○	○	○	○	○	○
○	○	—	—	—	—	—	○
○	○	—	—	—	—	—	○
●	○	—	—	—	—	—	○
●	○	—	—	—	—	○	○
◎	◎	◎	◎	○	○	◎	◎
○	○	○	○	○	○	○	○
○	○	○	○	○	○	—	○
○	○	○	○	○	○	—	○
◎	○	◎	◎	◎	◎	◎	○
◎	○	—	—	—	—	—	○
○	○	○	○	○	○	—	○
◎	○	◎	◎	◎	◎	◎	○
◎	○	◎	◎	◎	◎	◎	◎
—	—	◎	◎	—	—	○	○
—	—	◎	◎	—	—	○	○
—	—	◎ Note 2)	◎ Note 2)	—	—	○	◎
—	—	○	○	—	—	○	○
○	○	○	○	○	○	○	○
◎	◎	◎	◎	○	○	◎	◎ Note 1)
◎	○	○	○	○	○	—	○
—	—	◎	◎	○	○	◎	◎
○	○	○	○	○	○	◎	◎
◎	○	◎	◎	◎	◎	◎	◎
◎	○	—	—	—	—	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	—	—	—	—	—	○

Note 3) Copper-free for the externally exposed part.
Note 4) For details, refer to the SMC website.

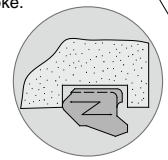
Series MB, MBW, MBK, MBKW, MB

Increased kinetic energy absorption

Elevated cushion volume and the adoption of a new cushion seal design permit about 30% more allowable kinetic energy over the CA1 series. In addition, service life of cushion seal is about 5 times greater.

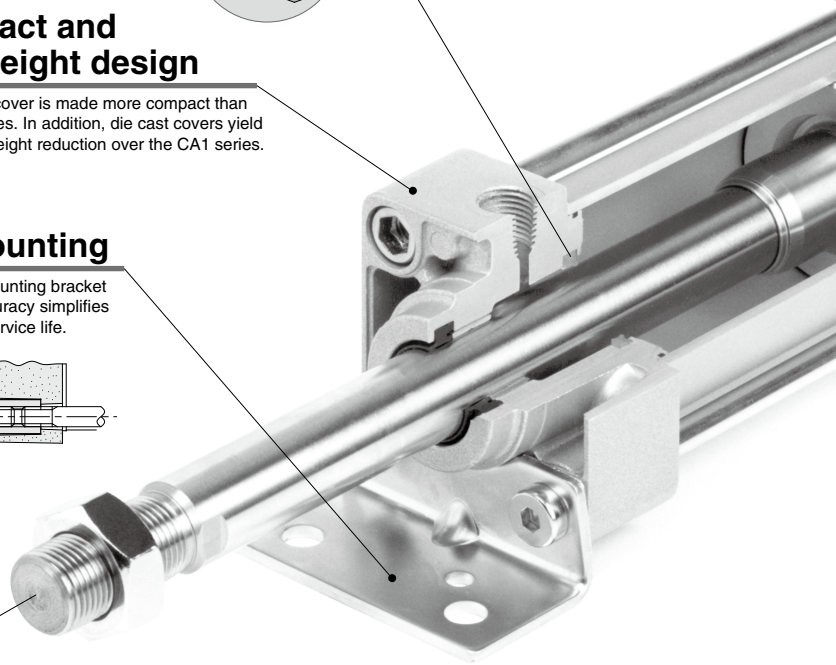
Improved cushion capacity

"Floating" cushion seal design eliminates piston rod "bouncing" due to cracking pressure at beginning of stroke.



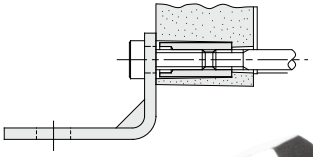
Compact and lightweight design

The square cover is made more compact than the CA1 series. In addition, die cast covers yield 10 to 25% weight reduction over the CA1 series.



Accurate mounting

The cylinder cover and mounting bracket with high dimensional accuracy simplifies installation and extends service life.



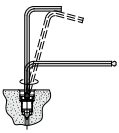
Minimal rod deflection

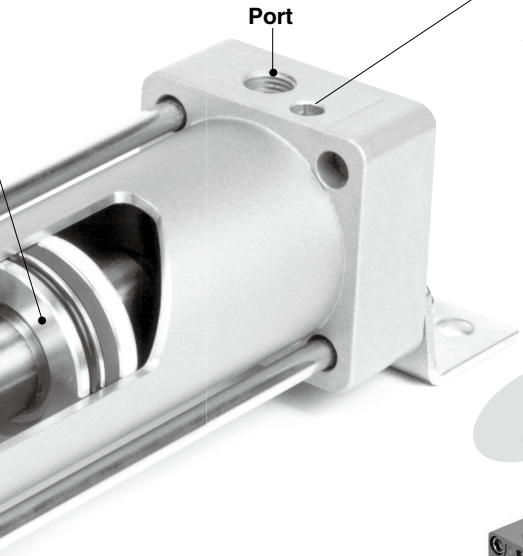
Improved bushing and piston rod dimensional accuracy achieves tighter clearances and reduced piston rod deflection.

□Q, MBB ø32, ø40, ø50, ø63, ø80, ø100, ø125

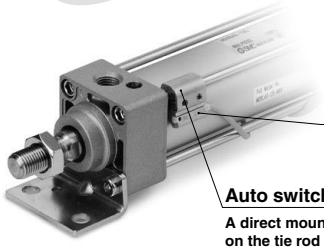
Easy adjustment of cushion valve

Adjustment of the cushion valve is made with a hex. wrench allowing for easy fine adjustment.
The cushion valve is recessed in the cover.





Compact type auto switches can be fitted.

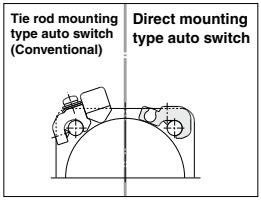


Compact type auto switch
Reed auto switch: D-A9□
Solid state auto switch: D-M9□
D-M9□W

Auto switch mounting bracket
A direct mounting type auto switch is secured on the tie rod with a dedicated switch bracket.

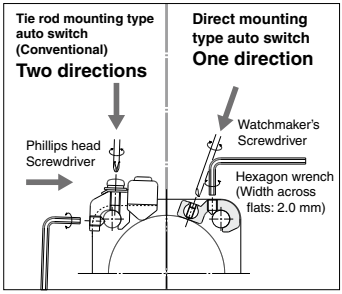
Miniaturization

Reduces the amount the auto switch protrudes from the cylinder.



Improved operability

Auto switch mounting and adjustment of the mounting position can be made via the same direction.



Auto switch inventory control can be simplified.

Auto switch inventory control in the field can be simplified because direct mounting type auto switches are applicable to a wide variety of cylinders.

Air Cylinder: Standard Type
Double Acting, Single Rod
Series MB
ø32, ø40, ø50, ø63, ø80, ø100, ø125

Series MB standard type double acting, single rod
ø32 to ø100 products have been remodeled for a lightweight design. For details, refer to page 383.

How to Order

MB L 32 □ – 50 □ – □

With auto switch **MDB L 32 □ – 50 □ – M9BW □ – □**

With auto switch
(Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm
125	125 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 409 for standard strokes.

Auto switch

Nil	Without auto switch

* For applicable auto switches, refer to the table below.

Rod boot/Cushion

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	Nil	Both ends
	N*	None

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows.
ø32, ø40: +6 mm, ø50, ø63: +8 mm,
ø80, ø100: +10 mm, ø125: +12 mm

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 409.

Built-in Magnet Cylinder Model
If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBB40-100

Applicable Auto Switches
/Refer to pages 1559 to 1673 for further information on auto switches.

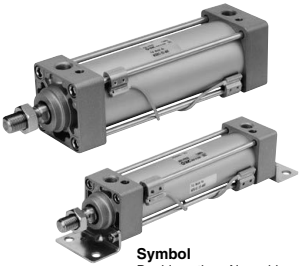
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Tie-rod mounting	Auto switch model Band mounting	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9P	—	●	●	●	○	○		
				2-wire		12 V		M9B	—	●	●	●	○	○		
					—	—	100 V, 200 V	J51	—	●	—	●	○	—	—	
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	G39	—	—	—	—	—	—	
				2-wire		12 V		K39	—	—	—	—	—	—	
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		M9NW	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
				2-wire		12V		M9BW	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PA**	—	○	○	●	○	○		
				2-wire		12 V		M9BA**	—	○	○	●	○	○	—	
	Diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		P3DW	—	●	—	●	●	○	—	
								P4DW	—	—	—	●	●	○		
Reed auto switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93	—	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	A54	—	●	—	●	●	—	—	
			No				200 V or less	A64	—	●	—	●	—	—	—	
		Terminal conduit	Yes				—	—	A33	—	—	—	—	—	—	
							100 V, 200 V	—	A34	—	—	—	—	—		PLC
		DIN terminal						—	A44	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	—	A59W	—	●	—	●	—	—		

** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. A water resistant type cylinder is recommended for use in an environment which requires water resistance. Consult with SMC regarding water resistant types for ø125.

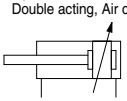
* Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

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

* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 449.
* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1626 and 1627 for details. Refer to pages 1614 and 1615 for D-P3DW□.
* D-A9□/M9□□□/P3DW□ auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled for D-A9□/M9□□□ when being shipped.)



Symbol
Double acting, Air cushion



Specifications

Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Single rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Max. operating pressure	1.0 MPa						
Min. operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Operating piston speed	50 to 1000 mm/s						50 to 700 mm/s
Allowable stroke tolerance	up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$						
Cushion Note 1)	Both ends (Air cushion)						
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2	
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion						

Note 1) When requesting a cylinder without air cushion, cylinder utilizes rubber bumpers which increases cylinders overall length.

Standard Stroke

Bore (mm)	Standard stroke (mm)	Max. stroke
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	700
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800,1000	1400

Intermediate strokes are available. (No spacer is used.)

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Max. ambient temperature for rod boot itself.

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100	125
Foot Note 1)	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10	MB-C12
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10	MB-D12

Note 1) Two foot brackets required for one cylinder.
Note 2) Accessories for each mounting bracket are as follows:
Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 416 for details.

Made to Order

Made to Order: Individual Specifications
(For details, refer to page 450.)

Symbol	Specifications
-X1184	Cylinder with reed, heat-resistant auto switch

Made to Order Specifications
(For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB5	Oversized rod cylinder
-XB6	Heat resistant cylinder (150°C)
-XB13	Low speed cylinder (5 to 50 mm/s)
-XC3	Special port position
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extend stroke
-XC9	Adjustable stroke cylinder/Adjustable retract stroke
-XC10	Dual stroke cylinder/Double rod
-XC11	Dual stroke cylinder/Single rod
-XC12	Tandem cylinder
-XC14	Change of trunnion bracket mounting position
-XC22	Fluororubber seals
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion
-XC35	With coil scraper
-XC59	Fluororubber seal, Built-in hard plastic magnet
-XC65	XC6 + XC7 specifications

Refer to pages 444 and 449 for cylinders with auto switches.

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

Theoretical Force

(Unit: N) OUT IN

Bore size (mm)	Rod diameter (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	OUT	804	161	241	322	402	482	563	643	724	804
		IN	691	138	207	276	346	415	484	553	622	691
40	16	OUT	1257	251	377	503	629	754	880	1006	1131	1257
		IN	1056	211	317	422	528	634	739	845	950	1056
50	20	OUT	1963	393	589	785	982	1178	1374	1570	1767	1963
		IN	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	OUT	3117	623	935	1247	1559	1870	2182	2494	2805	3117
		IN	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	OUT	5027	1005	1508	2011	2514	3016	3519	4022	4524	5027
		IN	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	30	OUT	7854	1571	2356	3142	3927	4712	5498	6283	7069	7854
		IN	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
125	32	OUT	12272	2454	3682	4909	6136	7363	8590	9818	11045	12272
		IN	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468

Note) Theoretical force (N) = Pressure (MPa) x Piston area (mm^2)

Weight/Aluminum Tube

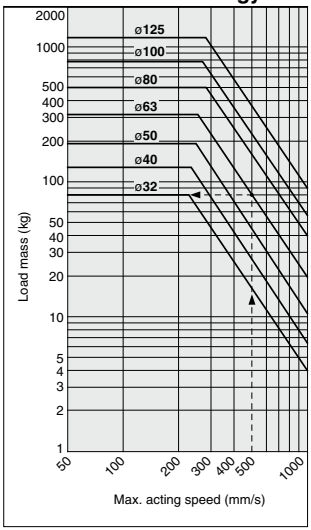
(kg)

Bore size (mm)		**32**	**40**	**50**	**63**	**80**	**100**	**125**
Basic weight	Basic	0.50	0.69	1.19	1.47	2.73	3.70	5.48
	Foot	0.62	0.83	1.41	1.75	3.23	4.36	7.56
	Flange	0.79	1.06	1.64	2.26	4.18	7.01	9.64
	Single clevis	0.75	0.92	1.53	2.10	3.84	6.87	8.05
	Double clevis	0.76	0.96	1.62	2.26	4.13	7.39	8.25
	Trunnion	0.79	1.05	1.67	2.27	4.28	7.37	8.46
Additional weight per each 50 mm stroke	All mounting bracket	0.11	0.16	0.26	0.27	0.42	0.56	0.71
Accessory	Single knuckle joint	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle joint (with pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation example: **MBB32-100** (Basic, ø32, 100 st)
- Basic weight ····· 0.50 (Basic, ø32)
- Additional weight ····· 0.11/50 stroke
- Cylinder stroke ····· 100 stroke

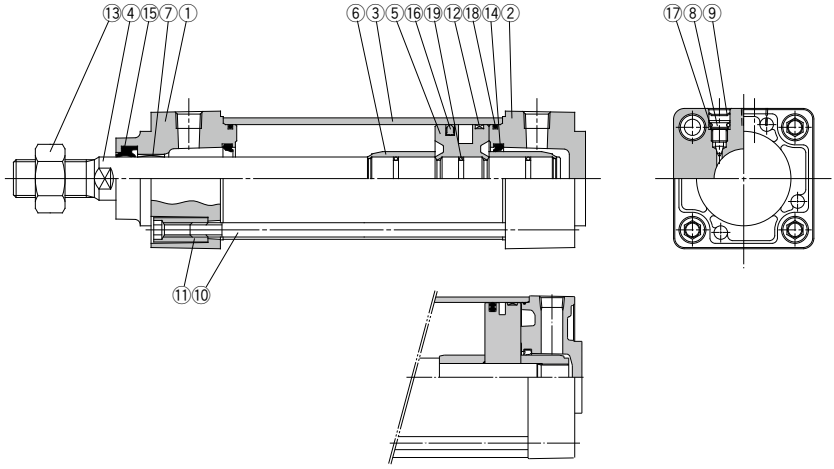
0.50 + 0.11 x 100/50 = 0.72 kg

Allowable Kinetic Energy



Example: Load limit at rod end when air cylinder ø63 is actuated with max. actuating speed 500 mm/s. See the intersection of lateral axis 500 mm/s and ø63 line, and extend the intersection to left. Thus the allowable load is 80 kg.

Construction



MB125

Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-cast	Metallic painted
2	Head cover	Aluminum die-cast	Metallic painted
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Carbon steel	Hard chrome plated
5	Piston	Aluminum alloy	Chromated
6	Cushion ring	Aluminum alloy	Anodized
7	Bushing	Bearing alloy	
8	Cushion ring	Steel wire	Nickel plated
9	Retaining ring	Steel for spring	ø40 to ø100
10	Tie rod	Carbon steel	Zinc chromated
11	Tie rod nut	Carbon steel	Nickel plated
12	Wear ring	Resin	
13	Rod end nut	Carbon steel	Nickel plated

No.	Description	Material	Note
14∗	Cushion seal	Urethane	
15∗	Rod seal	NBR	
16∗	Piston seal	NBR	
17	Cushion valve seal	NBR	
18∗	Cylinder tube gasket	NBR	
19	Piston gasket	NBR	

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MB32-PS	Set of the No. ⑭, ⑮, ⑯ and ⑱
40	MB40-PS	
50	MB50-PS	
63	MB63-PS	
80	MB80-PS	
100	MB100-PS	
125	MB125-PS	

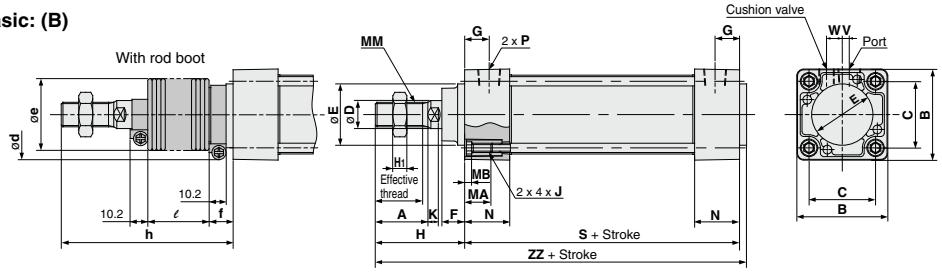
∗ Seal kits consist of items ⑭, ⑮, ⑯ and ⑱, and can be ordered by using the seal kit number corresponding to each bore size.
∗ Trunnion type should not be disassembled. (Refer to page 451.)
∗ Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).
Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Water Resistant Air Cylinder

Water resistant air cylinders are also available in Series MB, which are suitable for use on machine tools, where exposure to coolant is possible and applicable for food machinery and automobile washing equipment in an environment where water splashes. Please refer to page 1121 for more information.

Without Mounting Bracket

Basic: (B)



Bore size (mm)	Stroke range (mm)	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H1	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*
32	to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	6.5	135
40	to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	27	1/4	84	4	9	139
50	to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	10.5	156
63	to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	12	156
80	to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	14	190
100	to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	15	190
125	to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2	38	1/2	120	17	15	223

With Rod Boot

(mm)

Bore size (mm)	d	e	f	ℓ											
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200

(mm)

Bore size (mm)	h											
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	73	86	98	111	136	161	186	—	—	—	—	—
40	81	94	106	119	144	169	194	—	—	—	—	—
50	89	102	114	127	152	177	202	227	—	—	—	—
63	89	102	114	127	152	177	202	227	—	—	—	—
80	101	114	126	139	164	189	214	239	264	289		
100	101	114	126	139	164	189	214	239	264	289	—	—
125	120	130	140	150	170	190	210	230	250	270	290	310

Without Air Cushion

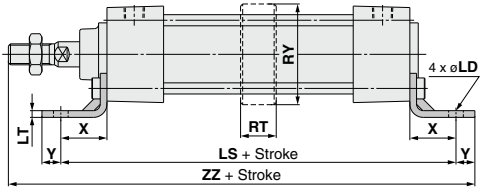
Bore size (mm)	S	ZZ
32	90	141
40	90	145
50	102	164
63	102	164
80	124	200
100	124	200
125	132	235

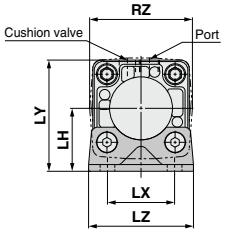
* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

With Mounting Bracket

∗ Refer to Basic (B) for other dimensions and with rod boot.

Foot: (L)





Foot (mm)

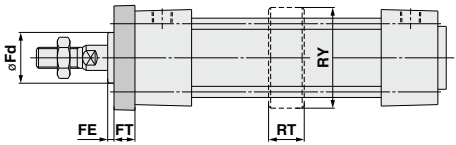
Bore size (mm)	Stroke range	X	Y	LD	LH	LS∗	LT	LX	LY	LZ	RT	RY	RZ	ZZ∗
32	to 700	22	9	7	30	128	3.2	32	53	50	—	—	—	162
40	to 800	24	11	9	33	132	3.2	38	59	55	—	—	—	170
50	to 1000	27	11	9	40	148	3.2	46	72.5	70	—	—	—	190
63	to 1000	27	14	12	45	148	3.6	56	82.5	80	—	—	—	193
80	to 1000	30	14	12	55	174	4.5	72	102.5	100	—	—	—	230
100	to 1000	32	16	14	65	178	4.5	89	122	120	—	—	—	234
125	to 1400	45	20	14	81	210	8	90	149	136	50	148	160	282

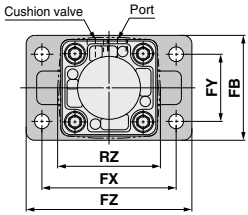
Without Air Cushion

Bore size (mm)	LS	ZZ
32	134	168
40	138	176
50	156	198
63	156	201
80	184	240
100	188	244
125	222	294

∗ Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

Rod side flange: (F)

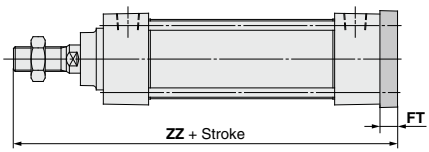


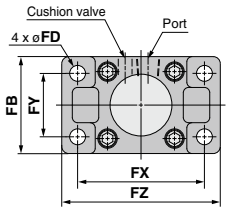


Rod Side Flange

Bore size (mm)	Stroke range	FB	FD	FE	FT	FX	FY	FZ	Fd	RT	RY	RZ
32	to 700	50	7	3	10	64	32	79	25	—	—	—
40	to 800	55	9	3	10	72	36	90	31	—	—	—
50	to 1000	70	9	2	12	90	45	110	38.5	—	—	—
63	to 1000	80	9	2	12	100	50	120	39.5	—	—	—
80	to 1000	100	12	4	16	126	63	153	45	—	—	—
100	to 1000	120	14	4	16	150	75	178	54	—	—	—
125	to 1400	138	14	7	20	180	102	216	57.5	50	148	160

Head side flange: (G)





Head Side Flange

Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	ZZ∗
32	to 500	50	7	10	64	32	79	141
40	to 500	55	9	10	72	36	90	145
50	to 600	70	9	12	90	45	110	164
63	to 600	80	9	12	100	50	120	164
80	to 800	100	12	16	126	63	153	202
100	to 800	120	14	16	150	75	178	202
125	to 1000	138	14	20	180	102	216	237

Without Air Cushion

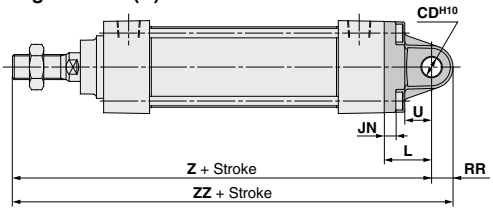
Bore size (mm)	ZZ
32	147
40	151
50, 63	172
80, 100	212
125	249

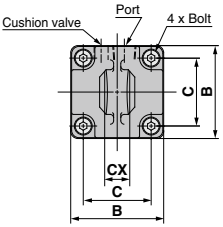
∗ **Rod/Head side flange**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

With Mounting Bracket

∗ Refer to Basic (B) for other dimensions and with rod boot.

Single clevis: (C)





Without Air Cushion

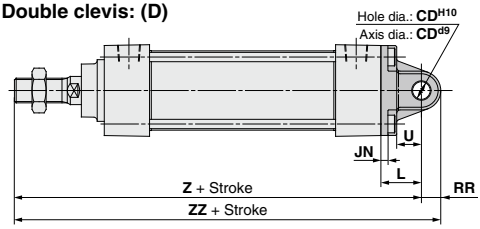
Bore size (mm)	Z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

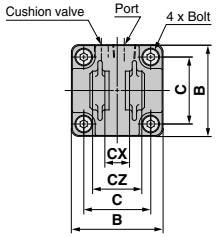
Single Clevis

Bore size (mm)	Stroke range	B	C	JN	L	RR	U	CD H10	CX −0.1 −0.3	Z∗	ZZ∗	Bolt
32	to 500	46	32.5	5	23	10.5	13	10	14	154	164.5	MB-32-48-C1247
40	to 500	52	38	5	23	11	13	10	14	158	169	(M6 x 1 x 16L, Low head)
50	to 600	65	46.5	6	30	15	17	14	20	182	197	MB-50-48-C1249
63	to 600	75	56.5	6	30	15	17	14	20	182	197	(M8 x 1.25 x 18L, Low head)
80	to 800	95	72	8	42	23	26	22	30	228	251	MB-80-48BC1251
100	to 800	114	89	8	42	23	26	22	30	228	251	(M10 x 1.5 x 22L, Low head)
125	to 1000	136	110	10	50	28	30	25	32	267	295	M12 x 1.75 x 28L, Low head

∗ **Single clevis**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

Double clevis: (D)





Without Air Cushion

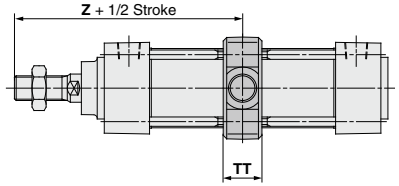
Bore size (mm)	Z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

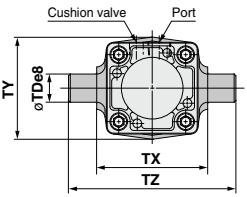
Double Clevis

Bore size (mm)	Stroke range	B	C	JN	L	RR	U	CD H10	CX +0.3 +0.1	CZ	Z∗	ZZ∗	Bolt
32	to 500	46	32.5	5	23	10.5	13	10	14	28	154	164.5	MB-32-48-C1247
40	to 500	52	38	5	23	11	13	10	14	28	158	169	(M6 x 1 x 16L, Low head)
50	to 600	65	46.5	6	30	15	17	14	20	40	182	197	MB-50-48-C1249
63	to 600	75	56.5	6	30	15	17	14	20	40	182	197	(M8 x 1.25 x 18L, Low head)
80	to 800	95	72	8	42	23	26	22	30	60	228	251	MB-80-48BC1251
100	to 800	114	89	8	42	23	26	22	30	60	228	251	(M10 x 1.5 x 22L, Low head)
125	to 1000	136	110	10	50	28	30	25	32	64	267	295	M12 x 1.75 x 28L, Low head

∗ **Double clevis**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

Center trunnion: (T)





Center Trunnion

Bore size (mm)	Stroke range	TDe8	TT	TX	TY	TZ	Z∗∗
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 800	20	34	110	110	150	129
100	to 800	25	40	132	136	182	129
125	to 1000	25	50	160	160	210	157

Without Air Cushion

Bore size (mm)	Z
32	92
40	96
50, 63	109
80, 100	134
125	163

∗∗ **Center trunnion**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +3 mm, ø50, ø63: +4 mm,
ø80, ø100: +5 mm, ø125: +6 mm

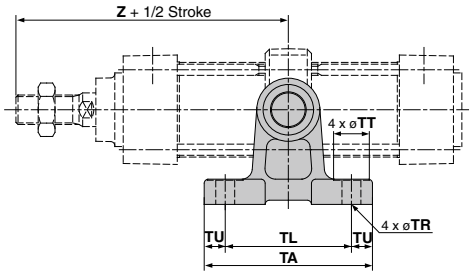
Trunnion/Double Clevis Pivot Bracket

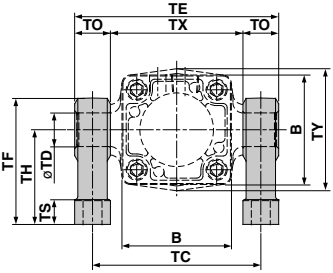
Part No.

Description \ Cylinder model	MB□32	MB□40	MB□50	MB□63	MB□80	MB□100	MB□125
Trunnion pivot bracket Note 1)	MB-S03	MB-S04		MB-S06		MB-S10	MB-S12
Double clevis pivot bracket	MB-B03		MB-B05		MB-B08		MB-B12

Note 1) When ordering a trunnion pivot bracket, order 2 pcs. for 1 cylinder.

Trunnion pivot bracket





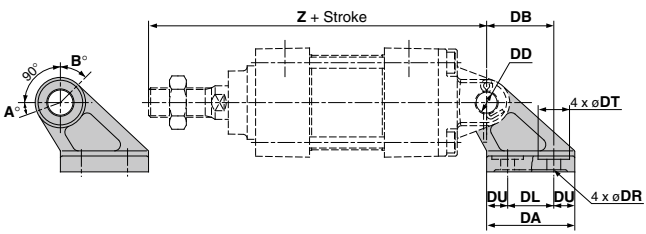
(mm)

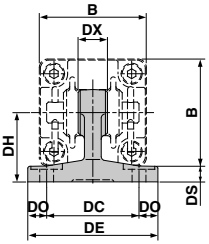
Part no.	Bore size (mm)	B	TA	TL	TU	TC	TX	TE	TO	TR	TT	TS	TH	TF	Z**	TD H10
MB-S03	32	46	62	45	8.5	62	50	74	12	7	13	10	35	47	89	12 +0.070 0
MB-S04	40	52	80	60	10	80	63	97	17	9	17	12	45	60	93	16 +0.070 0
	50	65	80	60	10	92	75	109	17	9	17	12	45	60	105	16 +0.070 0
MB-S06	63	75	100	70	15	110	90	130	20	11	22	14	60	80	105	20 +0.084 0
	80	95	100	70	15	130	110	150	20	11	22	14	60	80	129	20 +0.084 0
MB-S10	100	114	120	90	15	158	132	184	26	13.5	24	17	75	100	129	25 +0.084 0
MB-S12	125	136	142	105	18.5	186	160	212	26	13.5	24	25	85	115	157	25 +0.084 0

Without Air Cushion

Bore size (mm)	Z
32	92
40	96
50	109
63	109
80	134
100	134
125	163

Double clevis pivot bracket





(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z*	DD H10
MB-B03	32	46	42	32	22	10	44	14	62	9	6.6	15	7	33	154	10 +0.058 0
	40	52	42	32	22	10	44	14	62	9	6.6	15	7	33	158	10 +0.058 0
MB-B05	50	65	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	14 +0.070 0
	63	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	14 +0.070 0
MB-B08	80	95	73	64	45	14	86	30	111	12.5	11	22	10	65	228	22 +0.084 0
	100	114	73	64	45	14	86	30	111	12.5	11	22	10	65	228	22 +0.084 0
MB-B12	125	136	90	78	60	15	110	32	136	13	13.5	24	14	75	267	25 +0.084 0

Without Air Cushion

Bore size (mm)	Z
32	160
40	164
50	190
63	190
80	238
100	238
125	279

Rotating Angle

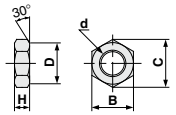
Bore size (mm)	A°	B°	A° + B° + 90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°
125	30°	50°	170°

** **Trunnion pivot bracket**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston; ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm

* **Mounting plate**
Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston; ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

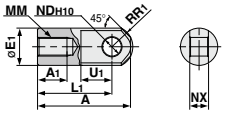
Dimensions for Accessories

Rod end nut
(Standard)



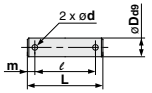
Part no.	Bore size (mm)	d	H	B	C	D
NT-03	**32**	M10 x 1.25	6	17	19.6	16.5
NT-04	**40**	M14 x 1.5	8	22	25.4	21
NT-05	**50, 63**	M18 x 1.5	11	27	31.2	26
NT-08	**80**	M22 x 1.5	13	32	37.0	31
NT-10	**100**	M26 x 1.5	16	41	47.3	39
NT-12M	**125**	M27 x 2	16	41	47.3	39

I type
Single knuckle joint



Part no.	Bore size (mm)	A	A_1	E_1	L_1	MM	R_1	U_1	ND_{H10}	NX
I-03M	**32**	40	14	20	30	M10 x 1.25	12	16	$10^{+0.058}_{0}$	$14^{+0.10}_{-0.30}$
I-04M	**40**	50	19	22	40	M14 x 1.5	12.5	19	$10^{+0.058}_{0}$	$14^{+0.10}_{-0.30}$
I-05M	**50, 63**	64	24	28	50	M18 x 1.5	16.5	24	$14^{+0.070}_{0}$	$20^{+0.10}_{-0.30}$
I-08M	**80**	80	26	40	60	M22 x 1.5	23.5	34	$22^{+0.084}_{0}$	$30^{+0.10}_{-0.30}$
I-10M	**100**	80	26	40	60	M26 x 1.5	23.5	34	$22^{+0.084}_{0}$	$30^{+0.10}_{-0.30}$
I-12M	**125**	119	36	46	92	M27 x 2.0	28.5	34	$25^{+0.084}_{0}$	$32^{+0.10}_{-0.30}$

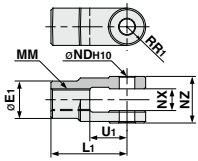
Knuckle joint pin
Clevis pin



Part no.	Bore size (mm) Clevis	Bore size (mm) Knuckle	D_{d9}	L	ℓ	m	d (Through hole diameter)	Applicable cotter pin
CD-M03 Note 1)	**32, 40**		$10^{-0.040}_{-0.076}$	44	36	4	3	ø3 x 18 ℓ
CD-M05 Note 1)	**50, 63**		$14^{-0.050}_{-0.093}$	60	51	4.5	4	ø4 x 25 ℓ
CD-M08 Note 1)	**80, 100**		$22^{-0.065}_{-0.117}$	82	72	5	4	ø4 x 35 ℓ
IY-12 Note 2)	**125**		$25^{-0.065}_{-0.117}$	79.5	69.5	5	4	ø4 x 40 ℓ

Note 1) A cotter pin and a flat washer are equipped as standard. Note 2) Only pins are included when shipped.

Y type
Double knuckle joint



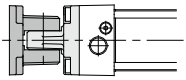
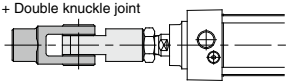
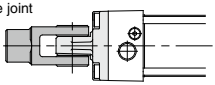
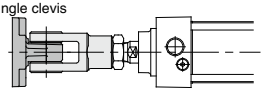
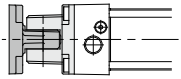
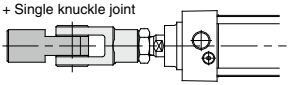
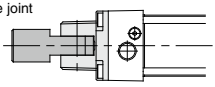
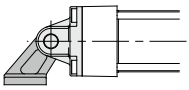
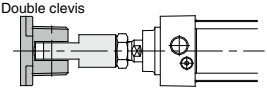
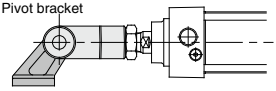
Part no.	Bore size (mm)	E_1	L_1	MM	R_1	U_1	ND_{H10}	NX	NZ
Y-03M Note 1)	**32**	20	30	M10 x 1.25	10	16	$10^{+0.058}_{0}$	$14^{+0.30}_{+0.10}$	$28^{-0.10}_{-0.30}$
Y-04M Note 1)	**40**	22	40	M14 x 1.5	11	19	$10^{+0.058}_{0}$	$14^{+0.30}_{+0.10}$	$28^{-0.10}_{-0.30}$
Y-05M Note 1)	**50, 63**	28	50	M18 x 1.5	14	24	$14^{+0.070}_{0}$	$20^{+0.30}_{+0.10}$	$40^{-0.10}_{-0.30}$
Y-08M Note 1)	**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 Note 1)	**100**	40	65	M26 x 1.5	20	34	$22^{+0.084}_{0}$	$30^{+0.30}_{+0.10}$	$60^{-0.10}_{-0.30}$
Y-12M Note 2)	**125**	46	100	M27 x 2	27	42	$25^{+0.084}_{0}$	$32^{+0.30}_{+0.10}$	$64^{-0.10}_{-0.30}$

Note 1) A pin, cotter pin and a flat washer are equipped as standard. Note 2) A pin and a cotter pin are equipped as standard.

Combinations of Support Brackets

Available Combination ▶ Refer to below picture together.

Bracket for cylinder \ Bracket for work	Single clevis	Double clevis	Single knuckle joint	Double knuckle joint	Pivot bracket
Single clevis	—	①	—	②	—
Double clevis	③	—	④	—	⑨
Single knuckle joint	—	⑤	—	⑥	—
Double knuckle joint	⑦	—	⑧	—	⑩

No.	Appearance	No.	Appearance
①	Single clevis + Double clevis 	⑥	Single knuckle joint + Double knuckle joint 
②	Single clevis + Double knuckle joint 	⑦	Double knuckle joint + Single clevis 
③	Double clevis + Single clevis 	⑧	Double knuckle joint + Single knuckle joint 
④	Double clevis + Single knuckle joint 	⑨	Double clevis + Pivot bracket 
⑤	Single knuckle joint + Double clevis 	⑩	Double knuckle joint + Pivot bracket 

Air Cylinder: Standard Type
Double Acting, Double Rod
Series MBW
ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order

MBW **L** **32** **□** – **150** **□** – **□**

With auto switch **MDBW** **L** **32** **□** – **150** **□** – **M9BW** **□** – **□**

With auto switch (Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Flange
T	Center trunnion

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm
125	125 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 418 for standard strokes.

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 418.

Rod boot/Cushion

Rod boot	**Nil**	None
	J	Nylon tarpaulin (one end)
	JJ	Nylon tarpaulin (both ends)
	K	Heat resistant tarpaulin (one end)
	KK	Heat resistant tarpaulin (both ends)
Cushion	**—**	Both ends
	N∗	None

∗ Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows.
ø32, ø40: +6 mm, ø50, ø63: +8 mm,
ø80, ø100: +10 mm

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBWB40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet		3-wire (NPN)	24 V	5 V, 12 V	—	**M9N**	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9P**	—	●	●	●	○	○		
				2-wire		12 V		**M9B**	—	●	●	●	○	○		
					—	—	100 V, 200 V	**J51**	—	●	—	●	○	—		—
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	**G39**	—	—	—	—	—	—		
				2-wire		12 V		**K39**	—	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)		5 V, 12 V	—	**M9NW**	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9PW**	—	●	●	●	○	○		
				2-wire		12V		**M9BW**	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		**M9NA**∗∗	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PA**∗∗	—	○	○	●	○	○		
				2-wire		12 V		**M9BA**∗∗	—	○	○	●	○	○	—	
	Diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**F59F**	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		**P3DW**	—	●	—	●	●	○	—	
								P4DW	—	—	—	●	●	○		
Reed auto switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	—	5 V	—	**A96**	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93**	—	●	—	●	●	—	—	Relay, PLC
							100 V or less	**A90**	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	**A54**	—	●	—	●	●	—		
			No				200 V or less	**A64**	—	●	—	●	—	—		—
		Terminal conduit	Yes				—	—	**A33**	—	—	—	—	—		
							100 V, 200 V	—	**A34**	—	—	—	—	—		PLC
		DIN terminal						—	**A44**	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	—	**A59W**	—	●	—	●	—	—		

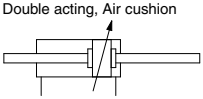
∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

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

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

∗ Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 449.
∗ Solid state auto switches are also available with a pre-wired connector. Refer to pages 1626 and 1627 for details. Refer to pages 1614 and 1615 for D-P3DW□.
∗ D-A9□/M9□□□/P3DW□ auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled for D-A9□/M9□□□ when being shipped.)

Symbol
Double acting, Air cushion



Specifications

Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Single rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Max. operating pressure	1.0 MPa						
Min. operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Operating piston speed	50 to 1000 mm/s						50 to 700 mm/s
Allowable stroke tolerance	up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$						
Cushion Note)	Both ends (Air cushion)						
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2	
Mounting	Basic, Foot, Flange, Center trunnion						

Note) Absorbable kinetic energy by cushion mechanism is identical to double acting single rod.
In case of types with no air cushion, a rubber bumper is used.

Made to Order Specifications

(For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat resistant cylinder (150°C)
-XC3	Special port position
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC22	Fluororubber seals
-XC30	Rod side trunnion
-XC35	With coil scraper

Refer to pages 444 and 449 for cylinders with auto switches.

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

Water Resistant Air Cylinder

Water resistant air cylinders are also available in Series MB, which are suitable for use on machine tools in an atmosphere with coolant and applicable to food machinery and automobile washing equipment in an environment with water splashes. Please refer to page 1121 for more information.

Standard Stroke

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
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800,1000

Intermediate strokes are available.
(No spacer is used)

Accessory

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

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Max. ambient temperature for rod boot itself.

Mounting Bracket Part No.

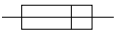
Bore size (mm)	32	40	50	63	80	100	125
Foot	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12

* Two foot brackets required for one cylinder.

Theoretical Force

(Unit: N)

OUT ←
IN →



Bore size (mm)	Rod diameter (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	IN, OUT	691	138	207	276	346	415	484	553	622	691
40	16	IN, OUT	1056	211	317	422	528	634	739	845	950	1056
50	20	IN, OUT	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	IN, OUT	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	IN, OUT	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	30	IN, OUT	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
125	32	IN, OUT	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468

Note) Theoretical force (N) = Pressure (MPa) x Piston area (mm^2)

Weight/Aluminum Tube

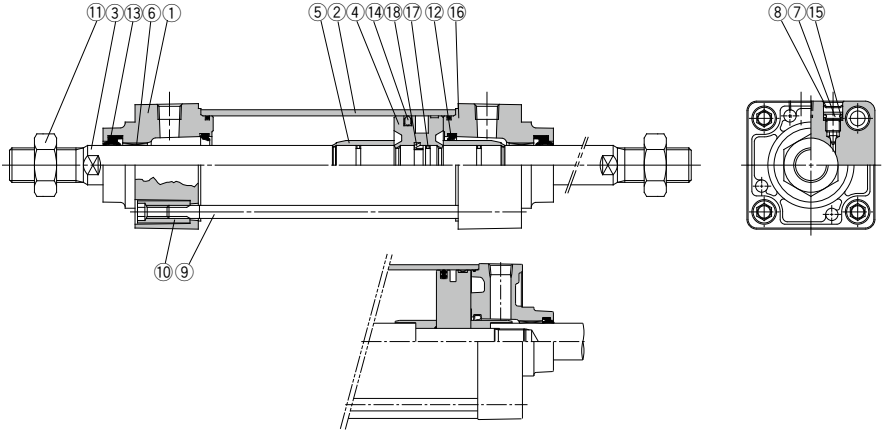
(kg)

Bore size (mm)		**32**	**40**	**50**	**63**	**80**	**100**	**125**
Basic weight	Basic	0.56	0.79	1.34	1.65	3.11	4.14	6.48
	Foot	0.6	0.93	1.56	1.93	3.61	4.8	8.56
	Flange	0.85	1.16	1.79	2.44	4.56	7.45	10.64
	Trunnion	0.85	1.15	1.82	2.45	4.66	7.81	9.46
Additional weight per each 50 mm stroke	All mounting bracket	0.15	0.24	0.34	0.35	0.61	0.84	1.02
Accessory	Single knuckle joint	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle joint (with pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation example
MBWB32-100 (Basic, ø32, 100 st)
- Basic weight ····· 0.56 (Basic, ø32)
- Additional weight ··· 0.15/50 stroke
- Cylinder stroke ····· 100 stroke

0.56 + 0.15 x 100/50 = 0.86 kg

Construction



MBW125

Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-cast	Metallic painted
2	Cylinder tube	Aluminum alloy	Hard anodized
3	Piston rod	Carbon steel	Hard chrome plated
4	Piston	Aluminum alloy	Chromated
5	Cushion ring	Aluminum alloy	Anodized
6	Bushing	Bearing alloy	
7	Cushion valve	Steel wire	Nickel plated
8	Retaining ring	Steel for spring	ø40 to ø100
9	Tie rod	Carbon steel	Zinc-chromated
10	Tie rod nut	Carbon steel	Nickel plated
11	Rod end nut	Carbon steel	Nickel plated

No.	Description	Material	Note
12∗	Cushion seal	Urethane	
13∗	Rod seal	NBR	
14∗	Piston seal	NBR	
15	Cushion valve seal	NBR	
16∗	Cylinder tube gasket	NBR	
17	Piston gasket	NBR	
18	Piston retainer	Urethane	

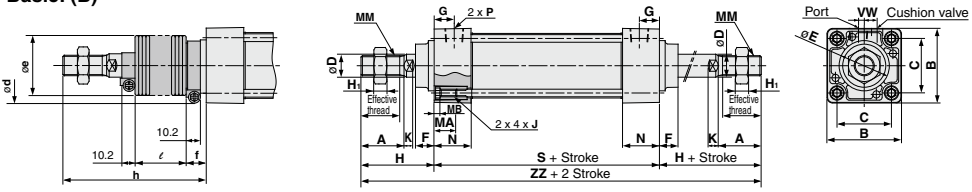
Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBW32–PS	Set of the No. ⑫, ⑬, ⑭ and ⑯.
40	MBW40–PS	
50	MBW50–PS	
63	MBW63–PS	
80	MBW80–PS	
100	MBW100–PS	
125	MBW125–PS	

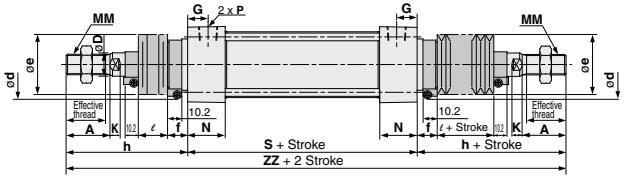
∗ Seal kits consist of items ⑫, ⑬, ⑭ and ⑯, and can be ordered by using the seal kit number corresponding to each bore size.
∗ Trunnion type should not be disassembled. (Refer to page 451.)
∗ Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).
Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

With Mounting Bracket

Basic: (B)



With rod boot



Bore (mm)	Stroke range	Eff. thread length	Width across flats	A	B	C	D	Ee11	F	G	H1	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*	Without Air Cushion S	Without Air Cushion ZZ
32	to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	6.5	178	90	184
40	to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	2	1/4	84	4	9	186	90	192
50	to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	10.5	210	102	218
63	to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	12	210	102	218
80	to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	14	258	124	268
100	to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	15	258	124	268
125	to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2.0	38	1/2	120	17	15	314	132	326

With Rod Boot

Bore (mm)	d	e	f	ℓ 1 to 50	ℓ 51 to 100	ℓ 101 to 150	ℓ 151 to 200	ℓ 201 to 300	ℓ 301 to 400	ℓ 401 to 500	ℓ 501 to 600	ℓ 601 to 700	ℓ 701 to 800	ℓ 801 to 900	ℓ 901 to 1000	h 1 to 50	h 51 to 100	h 101 to 150	h 151 to 200	h 201 to 300	h 301 to 400	h 401 to 500	h 501 to 600	h 601 to 700	h 701 to 800	h 801 to 900	h 901 to 1000
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	73	86	98	111	136	161	186	—	—	—	—	—
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	81	94	106	119	144	169	194	—	—	—	—	—
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	289	—	—
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	289	—	—
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	120	130	140	150	170	190	210	230	250	270	290	310

Note) Dimension ZZ is with rod boot. (mm)

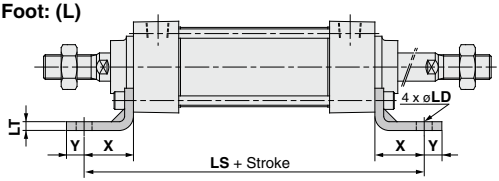
Bore (mm)	ZZ Note) 1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	230	256	280	306	356	406	456	—	—	—	—	—
40	246	272	296	322	372	422	472	—	—	—	—	—
50	272	298	322	348	398	448	498	548	—	—	—	—
63	272	298	322	348	398	448	498	548	—	—	—	—
80	316	342	366	392	442	492	542	592	642	692	—	—
100	316	342	366	392	442	492	542	592	642	692	—	—
125	340	360	380	400	440	480	520	560	600	640	680	720

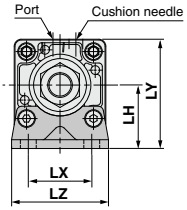
∗ Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

With Mounting Bracket

∗ Refer to basic mounting (B) for other dimensions and with rod boot.

Foot: (L)

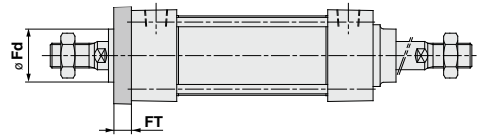


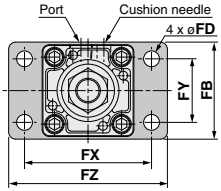


Foot

Bore (mm)	Stroke range	X	Y	LD	LH	LS∗	LT	LX	LY	LZ
32	to 500	22	9	7	30	128	3.2	32	53	50
40	to 500	24	11	9	33	132	3.2	38	59	55
50	to 600	27	11	9	40	148	3.2	46	72.5	70
63	to 600	27	14	12	45	148	3.6	56	82.5	80
80	to 800	30	14	12	55	174	4.5	72	102.5	100
100	to 800	32	16	14	65	178	4.5	89	122	120
125	to 1000	45	20	14	81	210	8	90	149	136

Front flange: (F)

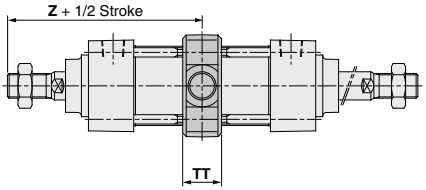


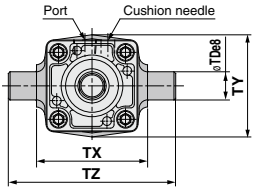


Front Flange

Bore (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	Fd
32	to 500	50	7	10	64	32	79	25
40	to 500	55	9	10	72	36	90	31
50	to 600	70	9	12	90	45	110	38.5
63	to 600	80	9	12	100	50	120	39.5
80	to 800	100	12	16	126	63	153	45
100	to 800	120	14	16	150	75	178	54
125	to 1000	138	14	20	180	102	216	57.5

Center trunnion: (T)





Center Trunnion

Bore (mm)	Stroke range	TDe8	TT	TX	TY	TZ	Z∗∗
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 800	20	34	110	110	150	129
100	to 800	25	40	132	136	182	129
125	to 1000	25	50	160	160	210	157

∗ Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm

∗∗ Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm (For trunnion mounting)

Air Cylinder: Non-rotating Rod Type
Double Acting, Single Rod
Series MBK
ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MBK L 32 □ – 50 □ – □

With auto switch **MDBK L 32 □ – 50 □ – M9BW □ – □**

With auto switch
(Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

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

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 424 for standard strokes.

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Rod boot/Cushion

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	Nil	Both ends
	N∗	None

∗ Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows.
ø32, ø40: +6 mm, ø50, ø63: +8 mm,
ø80, ø100: +10 mm

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 424.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBKB40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9P	—	●	●	●	○	○		
				2-wire		12 V		M9B	—	●	●	●	○	○		
					—	—	100 V, 200 V	J51	—	●	—	●	○	—	—	
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	G39	—	—	—	—	—	—		
				2-wire		12 V		K39	—	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V	—	M9NW	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
				2-wire		12V		M9BW	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PA**	—	○	○	●	○	○		
				2-wire		12 V		M9BA**	—	○	○	●	○	○	—	
	Diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		P3DW	—	●	—	●	●	○	—	
								P4DW	—	—	—	●	●	○		
Reed auto switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93	—	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	A54	—	●	—	●	●	—	—	
			No				200 V or less	A64	—	●	—	●	—	—		
		Terminal conduit	Yes				—	—	A33	—	—	—	—	—	—	
							100 V, 200 V	—	A34	—	—	—	—	—		PLC
		DIN terminal						—	A44	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	—	A59W	—	●	—	●	—	—		

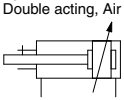
** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

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

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

∗ Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 449.
∗ Solid state auto switches are also available with a pre-wired connector. Refer to pages 1626 and 1627 for details. Refer to pages 1614 and 1615 for D-P3DW□.
∗ D-A9□/M9□□□/P3DW□ auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled for D-A9□/M9□□□ when being shipped.)

Symbol
Double acting, Air cushion



Made to Order

Made to Order Specifications (For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC3	Special port position
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extend stroke
-XC9	Adjustable stroke cylinder/Adjustable retract stroke
-XC10	Dual stroke cylinder/Double rod
-XC14	Change of trunnion bracket mounting position
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC30	Rod side trunnion

Standard Stroke

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

Intermediate strokes are available.
(No spacer is used)

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.05 MPa					
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Operating piston speed	50 to 1000 mm/s					
Allowable stroke tolerance	up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$					
Cushion Note 1)	Both ends (Air cushion)					
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion					
Non-rotating accuracy	±0.5°		±0.5°		±0.3°	
Allowable rotating torque N·m max.	0.25	0.45	0.64		0.79	0.93

Note 1) Absorbable kinetic energy by cushion mechanism is identical to double acting single rod. When requesting a cylinder without air cushion, cylinder utilizes rubber bumpers which increases cylinders overall length.

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Weight/Aluminum Tube

(kg)

Bore size (mm)		32	40	50	63	80	100
Basic weight	Basic	0.50	0.66	1.21	1.51	2.58	3.73
	Foot	0.62	0.83	1.41	1.75	3.23	4.36
	Flange	0.79	1.03	1.64	2.30	4.03	7.04
	Single clevis	0.75	0.89	1.55	2.14	3.69	6.90
	Double clevis	0.76	0.93	1.64	2.30	3.98	7.42
	Trunnion	0.79	1.02	1.69	2.31	4.13	7.40
Add'l weight per each 50 mm stroke	All mounting bracket	0.11	0.15	0.26	0.27	0.40	0.52
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation example: **MBKB32-100** (Basic, ø32, 100 st)
- Basic weight ····· 0.50 (Basic ø32)
- Additional weight ····· 0.11/50 stroke
- Cylinder stroke ····· 100 stroke

0.50 + 0.11 x 100/50 = 0.72 kg

Refer to pages 444 to 449 for cylinders with auto switches.

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

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C *

* Max. ambient temperature for rod boot itself.

Theoretical Force

OUT side is identical to double acting single rod.
Refer to table below for IN side.

Bore size (mm)	Rod diameter (mm^2)	Bore size (mm)	Rod diameter (mm^2)
32	675	**63**	2804
40	1082	**80**	4568
50	1651	**100**	7223

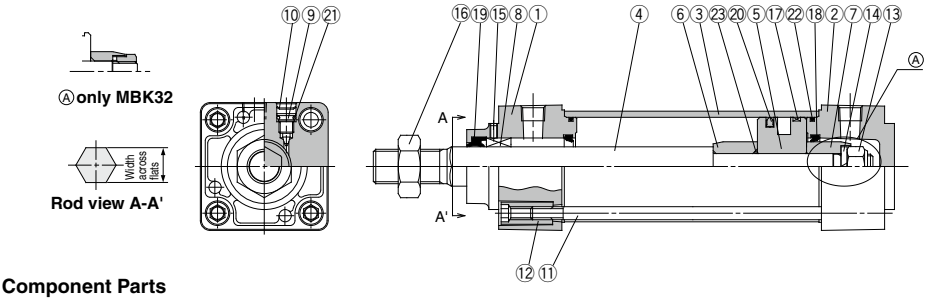
Theoretical force (N) =
Pressure (MPa) x Piston area (mm^2)

Mounting Bracket Part No.

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

Note 1) Two foot brackets required for one cylinder.
Note 2) Accessories for each mounting bracket are as follows:
Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 416 for details.

Construction



Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum die-cast	Metallic painted
2	Head cover	Aluminum die-cast	Metallic painted
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Stainless steel	
5	Piston	Aluminum alloy	Chromated
6	Cushion ring A	Rolled steel	
7	Cushion ring B	Rolled steel	
8	Non-rotating guide bearing	Oil-impregnated sintered alloy	
9	Cushion valve	Steel wire	Nickel plated
10	Retaining ring	Steel for spring	ø40 to ø100
11	Tie rod	Carbon steel	Zinc-chromated
12	Tie rod nut	Carbon steel	Nickel plated

No.	Description	Material	Note
13	Piston nut	Rolled steel	
14	Washer	Steel wire	
15	Lock nut	Steel wire	
16	Rod end nut	Carbon steel	Nickel plated
17	Wear ring	Resin	
18*	Cushion seal	Urethane	
19*	Rod seal	NBR	
20*	Piston seal	NBR	
21	Cushion valve seal	NBR	
22*	Cylinder tube gasket	NBR	
23	Piston gasket	NBR	

Replacement Parts/Seal Kit

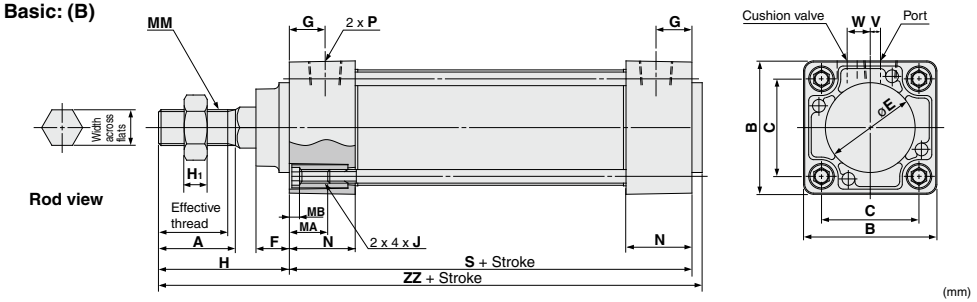
Bore size (mm)	Kit no.	Contents
32	MBK32-PS	Set of the No. 18, 19, 20 and 22.
40	MBK40-PS	
50	MBK50-PS	
63	MBK63-PS	
80	MBK80-PS	
100	MBK100-PS	

* Seal kits consist of items 18, 19, 20 and 22, and can be ordered by using the seal kit number corresponding to each bore size.
* Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).
Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;
ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm

Without Mounting Bracket

Basic: (B)



(mm)

Bore (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	E	F	G	H_1	H	MA	MB	J	MM	N	P	S*	V	W	ZZ*
32	up to 500	19.5	12.2	22	46	32.5	30	13	13	6	47	16	4	M6 x 1	M10 x 1.25	27	1/8	84	4	6.5	135
40	up to 500	27	14.2	30	52	38	35	13	14	8	51	16	4	M6 x 1	M14 x 1.5	27	1/4	84	4	9	139
50	up to 600	32	19	35	65	46.5	40	14	15.5	11	58	16	5	M8 x 1.25	M18 x 1.5	31.5	1/4	94	5	10.5	156
63	up to 600	32	19	35	75	56.5	45	14	16.5	11	58	16	5	M8 x 1.25	M18 x 1.5	31.5	3/8	94	9	12	156
80	up to 800	37	23	40	95	72	45	20	19	13	72	16	5	M10 x 1.5	M22 x 1.5	38	3/8	114	11.5	14	190
100	up to 800	37	27	40	114	89	55	20	19	16	72	16	5	M10 x 1.5	M26 x 1.5	38	1/2	114	17	15	190

Dimensions with mounting support is same as the basic style (Double acting single rod). Also dimensions with boot is same as the basic style (Double acting, Single rod).

Air Cylinder: Non-rotating Rod Type
Double Acting, Double Rod
Series MBKW
ø32, ø40, ø50, ø63, ø80, ø100

How to Order

Non-rotating Rod Type MBKW L 32 □ – 50 □ – □

With auto switch MDBKW L 32 □ – 50 □ – M9BW □ – □

- **With auto switch** (Built-in magnet)
- **Non-rotating Rod Type**
- **Double rod**
- **Mounting**

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
T	Center trunnion

- **Bore size**

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

- **Port thread type**

Nil	Rc
TN	NPT
TF	G

- **Cylinder stroke (mm)** Refer to page 428 for standard strokes.
- **Rod boot/Cushion**

Rod boot	Nil	None
	J	Nylon tarpaulin (head or rod end)
	JJ	Nylon tarpaulin (both ends)
	K	Heat resistant tarpaulin (head or rod end)
	KK	Heat resistant tarpaulin (both ends)
Cushion	Nil	Both ends
	N*	None

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushions because the bumpers are attached to the both sides of the piston as follows. ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm

- **Auto switch**

Nil	Without auto switch

* For applicable auto switches, refer to the table below.

- **Number of auto switches**

Nil	2
S	1
3	3
n	n

- **Made to Order** For details, refer to page 428.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBKB40-100

Applicable Auto Switches /Refer to pages 1559 to 1673 for further information on auto switches.

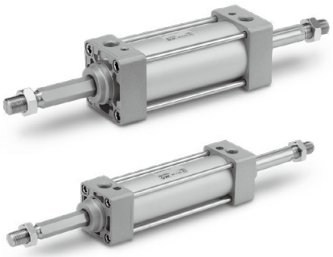
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model Tie-rod mounting	Auto switch model Band mounting	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire(NPN)	5V,12V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire(PNP)			M9P	—	●	●	●	○	○		
				2-wire	12V		M9B	—	●	●	●	○	○		
					—	100V,200V	J51	—	●	—	●	○	—	—	
		Terminal conduit		3-wire(NPN)	5V,12V		—	G39	—	—	—	—	—		
				2-wire	12V		—	K39	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire(NPN)	5V,12V		M9NW	—	●	●	●	○	○	IC circuit	
				3-wire(PNP)			M9PW	—	●	●	●	○	○		
				2-wire	12V		M9BW	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire(NPN)	5V,12V		M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire(PNP)			M9PA**	—	○	○	●	○	○		
				2-wire	12V		M9BA**	—	○	○	●	○	○	—	
	Diagnostic output (2-color indication)			4-wire(NPN)	5V,12V		F59F	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)	—		P3DW	—	●	—	●	●	○	—	
							P4DW	—	—	—	●	●	○		
Reed auto switch	——	Grommet	Yes	3-wire (Equiv. to NPN)	—	5V	—	A96	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24V	12V	100V	A93	—	●	—	●	●	—	—
			Yes				100V or less	A90	—	●	—	●	—	—	IC circuit
			No				100V,200V	A54	—	●	—	●	●	—	Relay, PLC
							200V or less	A64	—	●	—	●	—	—	
		Terminal conduit	Yes				—	A33	—	—	—	—	—	—	
							100V,200V	A34	—	—	—	—	—		PLC
		DIN terminal					—	A44	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet			—	—	A59W	—	●	—	●	—	—		

** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

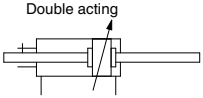
* Lead wire length symbols: 0.5 m……Nil (Example) M9NW
1 m……M (Example) M9NWM
3 m……L (Example) M9NWL
5 m……Z (Example) M9NWZ

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

* Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 449.
* Solid state auto switches are also available with a pre-wired connector. Refer to pages 1626 and 1627 for details. Refer to pages 1614 and 1615 for D-P3DW□.
* D-A9□/M9□□□/P3DW□ auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled for D-A9□/M9□□□ when being shipped.)



Symbol
Double acting



Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.05 MPa					
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing)					
	With auto switch: –10 to 60°C (No freezing)					
Lubrication	Non-lube					
Operating piston speed	50 to 1000 mm/s					
Allowable stroke tolerance	to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$					
Cushion Note)	Both ends (Air cushion)					
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2
Mounting	Basic, Foot, Rod side flange, Head side flange, Center trunnion					
Non-rotating accuracy	±0.5°		±0.5°		±0.3°	
Allowable rotating torque N·m or less	0.25	0.45	0.64		0.79	0.93

Note) Absorbable kinetic energy by cushion mechanism is identical to double acting single rod.
In case of types with no air cushion, a rubber bumper is used.

Accessory

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

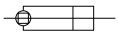
Made to Order

Made to Order Specifications
(For details, refer to pages 1699 to 1818.)

Symbol	Specifications
-XC3	Special port position
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC30	Rod side trunnion

Theoretical Force

(Unit: N) OUT ← IN →



Bore size (mm)	Rod dia. (mm) Width across flats (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa) 0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	OUT	691	138	207	276	346	415	484	553	622	691
	12.2	IN	675	135	203	270	338	405	473	540	608	675
40	16	OUT	1056	211	317	422	528	634	739	845	950	1056
	14.2	IN	1082	216	325	433	541	649	757	866	974	1082
50	20	OUT	1649	330	495	660	825	989	1154	1319	1484	1649
	19	IN	1651	330	495	660	826	991	1156	1321	1486	1651
63	20	OUT	2803	561	841	1121	1402	1682	1962	2242	2523	2803
	19	IN	2804	561	841	1122	1402	1682	1963	2243	2524	2804
80	25	OUT	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
	23	IN	4568	914	1370	1827	2284	2741	3198	3654	4111	4568
100	30	OUT	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
	27	IN	7223	1445	2167	2889	3612	4334	5056	5778	6501	7223

Note) Theoretical force (N) = Pressure (MPa) x Piston area (mm^2)

Refer to pages 444 to 449 for cylinders with auto switches.

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

Weight/Aluminum Tube

(kg)

Bore size (mm)		32	40	50	63	80	100	125
Basic weight	Basic	0.56	0.79	1.34	1.65	3.11	4.14	6.48
	Foot	0.6	0.93	1.56	1.93	3.61	4.8	8.56
	Flange	0.85	1.16	1.79	2.44	4.56	7.45	10.64
	Center trunnion	0.85	1.15	1.82	2.45	4.66	7.81	9.46
Add'l weight per each 50 mm stroke	All mounting bracket	0.15	0.24	0.34	0.35	0.61	0.84	1.02
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation example:
MBKWB32-100 (Basic, ø32,100 st)
- Basic weight ·····0.56 (Basic, ø32)
- Additional weight ·····0.15/50 stroke
- Cylinder stroke ·····100 stroke

0.56 + 0.15 x 100/50 = 0.86 kg

SMC

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100	125
Foot	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12

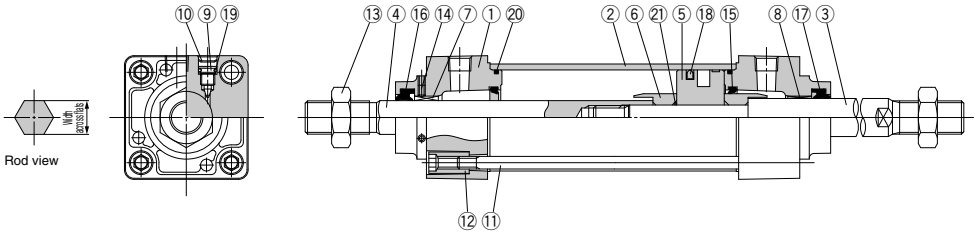
Note) Two foot brackets required for one cylinder.

Material of Rod Boot

Symbol	Material	Max. ambient temp.
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C∗

∗ Max. ambient temperature for rod boot itself.

Construction



Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum die-cast	Metallic painted
2	**Cylinder tube**	Aluminum alloy	Hard anodized
3	**Piston rod A**	Carbon steel	Hard chrome plated
4	**Piston rod B**	Stainless steel	
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring**	Aluminum alloy	Anodized
7	**Non-rotating guide bearing**	Oil-impregnated sintered alloy	
8	**Bushing**	Bearing alloy	
9	**Cushion valve**	Steel wire	Nickel plated
10	**Retaining ring**	Steel for spring	ø40 to ø100
11	**Tie rod**	Carbon steel	Zinc-chromated
12	**Tie rod nut**	Carbon steel	Nickel plated
13	**Rod end nut**	Carbon steel	Nickel plated
14	**Lock nut**	Steel wire	
15∗	**Cushion seal**	Urethane	
16∗	**Rod seal A**	NBR	
17∗	**Rod seal B**	NBR	
18∗	**Piston seal**	NBR	
19	**Cushion valve seal**	NBR	
20∗	**Cylinder tube gasket**	NBR	
21	**Piston gasket**	NBR	

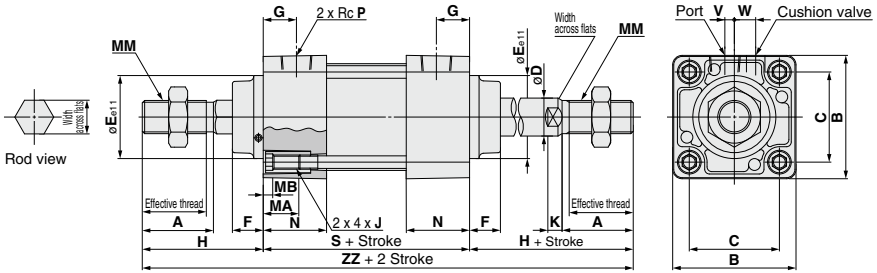
Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBKW32–PS	Set of the No. ⑮, ⑯, ⑰, ⑱ and ⑳
40	MBKW40–PS	
50	MBKW50–PS	
63	MBKW63–PS	
80	MBKW80–PS	
100	MBKW100–PS	

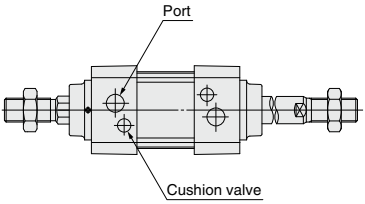
∗ Seal kits consist of items ⑮, ⑯, ⑰, ⑱ and ⑳, and can be ordered by using the seal kit number corresponding to each bore size.
∗ Trunnion type should not be disassembled. (Refer to page 451.)
∗ Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100, 125: 30 g).
Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g)**, GR-S-020** (20 g)

Without Mounting Bracket

Basic: (B)



Positional relationship between port and cushion valve



Bore size (mm)	Stroke range	Effective thread length	Width across flats	Width across flats	A	B	C	D	E	F	G	H_1	H	MA	MB	J
32	to 500	19.5	12.2	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1
40	to 500	27	14.2	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1
50	to 600	32	19	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25
63	to 600	32	19	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25
80	to 800	37	23	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5
100	to 800	37	27	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5

(mm)

Bore size (mm)	K	MM	N	P	S*	V	W	ZZ*
32	6	M10 x 1.25	27	1/8	84	4	6.5	178
40	6	M14 x 1.5	27	1/4	84	4	9	186
50	7	M18 x 1.5	31.5	1/4	94	5	10.5	210
63	7	M18 x 1.5	31.5	3/8	94	9	12	210
80	10	M22 x 1.5	38	3/8	114	11.5	14	258
100	10	M26 x 1.5	38	1/2	114	17	15	258

* Model without air cushion is designed to include rubber bumpers. The overall length is longer than the cylinder with air cushion as follows because the bumpers are attached to the both sides of the piston;ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm

The dimensions for each mounting type are the same as those for the standard double acting double rod model. Refer to pages 421 and 422.

Air Cylinder: Low Friction Type

Series MB□Q

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MB L Q 32 □ – 50 F – □

With auto switch: MDB L Q 32 □ – 50 F – M9BW □ – □

With auto switch (Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

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

Cylinder stroke (mm)
Refer to page 432 for standard strokes.

Port thread type

Nil	Rc
TN	NPT
TF	G

Direction of low friction

F	With pressure at head side
B	With pressure at rod side

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
3	3
n	n

Made to Order
For details, refer to page 432.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBBQ40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage: DC		Load voltage: AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet		3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9P	—	●	●	●	○	○		
				2-wire		12 V		M9B	—	●	●	●	○	○	—	
					—	—	100 V, 200 V	J51	—	●	—	●	○	—		
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	—	G39	—	—	—	—	—	—	
				2-wire		12 V		—	K39	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)		5 V, 12 V	—	M9NW	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
				2-wire		12V		M9BW	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PA**	—	○	○	●	○	○		
				2-wire		12 V		M9BA**	—	○	○	●	○	○	—	
	Diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		P3DW	—	●	—	●	●	○	—	
								P4DW	—	—	—	●	●	○		
Reed auto switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93	—	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	A54	—	●	—	●	●	—	—	
			No				200 V or less	A64	—	●	—	●	—	—		
		Terminal conduit	Yes				—	—	A33	—	—	—	—	—	—	PLC
		DIN terminal					100 V, 200 V	—	A34	—	—	—	—	—		
								—	A44	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	—	A59W	—	●	—	●	—	—		

∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

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

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

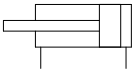
∗ Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 449.
∗ Solid state auto switches are also available with a pre-wired connector. Refer to pages 1626 and 1627 for details. Refer to pages 1614 and 1615 for D-P3DW□.
∗ D-A9□/M9□□□/P3DW□ auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled for D-A9□/M9□□□ when being shipped.)

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting single rod					
Direction of low friction	One direction Note 1)					
Fluid	Air					
Proof pressure	1.05 MPa					
Max. operating pressure	0.7 MPa					
Min. operating pressure	0.025 MPa (ø32)	0.01 MPa (ø40 to ø100)				
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Cushion	None					
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion					
Allowable leakage	0.5 L/min (ANR) or less					

Note 1) Please refer to Selection Guide for the Low Friction Side.

Symbol
Double acting, Without cushion



Made to Order Specifications (For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC3	Special port position
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion

Refer to pages 444 to 449 for cylinders with auto switches.

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

Standard Stroke

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

Intermediate strokes are available. (No spacer is used.)

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (With pin)	●	●	●	●	●	●	●

Mounting Bracket Part No.

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

Note 1) Two foot brackets required for one cylinder.
Note 2) Accessories for each mounting bracket are as follows:
Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 416 for details.

Weight/Aluminum Tube

(kg)

Bore size (mm)		32	40	50	63	80	100
Basic weight	Basic	0.50	0.69	1.19	1.47	2.73	3.7
	Foot	0.68	0.93	1.56	1.93	3.61	4.8
	Flange	0.79	1.06	1.64	2.26	4.18	7.01
	Single clevis	0.75	0.92	1.53	2.1	3.84	6.87
	Double clevis	0.76	0.96	1.62	2.26	4.13	7.39
	Trunnion	0.79	1.05	1.67	2.27	4.28	7.37
Additional weight per each 50 mm stroke	All mounting bracket	0.11	0.16	0.26	0.27	0.42	0.56
Accessory	Single rod clevis	0.15	0.23	0.26	0.26	0.60	0.83
	Double rod clevis (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

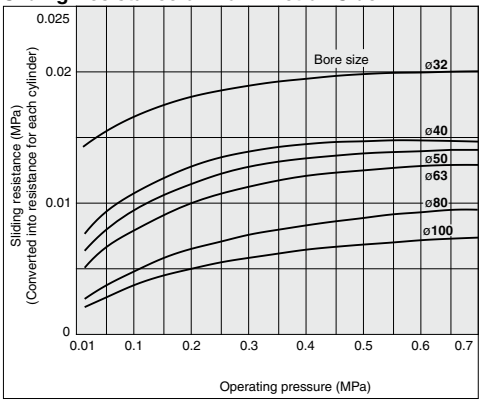
Calculation example: **MBBQ32-100** (Basic, ø32, 100 st)
- Basic weight ····· 0.50 (Basic, ø32)
- Additional weight ··· 0.11/50 stroke
- Cylinder stroke ····· 100 stroke

0.50 + 0.11 x 100/50 = 0.72 kg

Selection Guide for the Low Friction Side

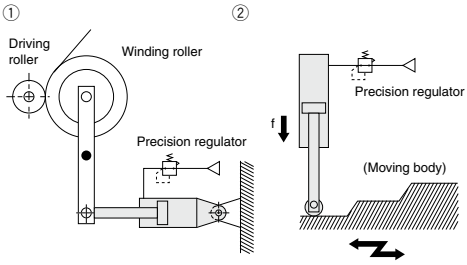
1. When used as a balancer etc., follow the example of the application mentioned earlier applying pressure at one port while leaving the other port open to atmosphere.
   With pressure at rod cover port
   ····· Low friction side B (Example of application ①)
   With pressure at head cover port
   ····· Low friction side F (Example of application ②)
   In both cases, as long as the outside pressure moves the piston rod, low friction can result in the direction of extension and retraction.

Sliding Resistance on Low Friction Side



Application Example

Low friction cylinder used in combination with precision regulator (Series IR)



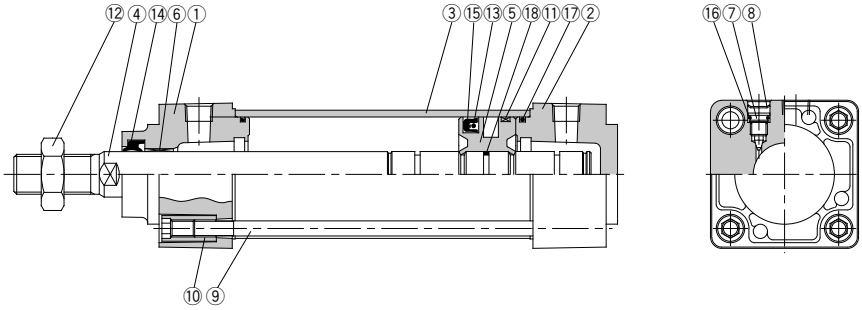
Caution on Use

⚠ Warning

1. In the direction of low friction operation, speed control must be effected by the meter-in system.

With meter-out control, the exhaust pressure will increase and create a greater sliding resistance.

Construction



Component Parts

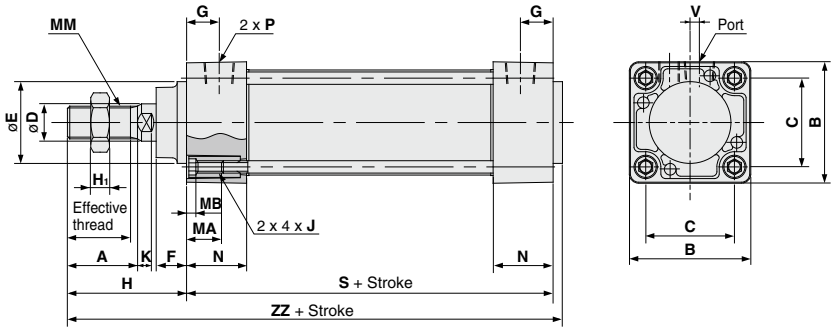
No.	Description	Material	Note
1	Rod cover	Aluminum die-cast	Metallic painted
2	Head cover	Aluminum die-cast	Metallic painted
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Carbon steel	Hard chrome plated
5	Piston	Aluminum alloy	Chromated
6	Bushing	Bearing alloy	
7	Cushion valve	Steel wire	Nickel plated
8	Retaining ring	Steel for spring	ø40 to ø100
9	Tie rod	Carbon steel	Zinc chromated
10	Tie rod nut	Carbon steel	Nickel plated
11	Wear ring	Resin	
12	Rod end nut	Carbon steel	Nickel plated
13 *	Back up O ring	NBR	
14 *	Rod seal	NBR	
15 *	Piston seal	NBR	
16	Cushion valve seal	NBR	
17 *	Cylinder tube gasket	NBR	
18	Piston gasket	NBR	

Replacement Parts/Seal Kit

Bore (mm)	Kit no.	Contents
32	MBQ32-PS	Set of the No. ⑬, ⑭, ⑮ and ⑰
40	MBQ40-PS	
50	MBQ50-PS	
63	MBQ63-PS	
80	MBQ80-PS	
100	MBQ100-PS	

* Seal kits consist of items ⑬, ⑭, ⑮ and ⑰, and can be ordered by using the seal kit number corresponding to each bore size.
* Trunnion type should not be disassembled. (Refer to page 451.)
* Since the seal kit does not include a grease pack, order it separately.
Grease pack part number: GR-L-005 (5 g), **GR-L-010** (10 g), **GR-L-150** (150 g),

Basic: (B)



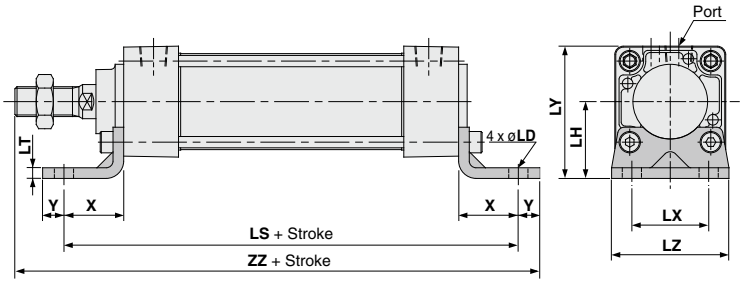
(mm)

Bore (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H1	H	MA	MB	J	K	MM	N	P	S	V	ZZ
32	up to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	135
40	up to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	27	1/4	84	4	139
50	up to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	156
63	up to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	156
80	up to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	190
100	up to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	190

With Mounting Bracket

* Refer to basic mounting (B) for other dimensions and with rod boot.

Foot: (L)

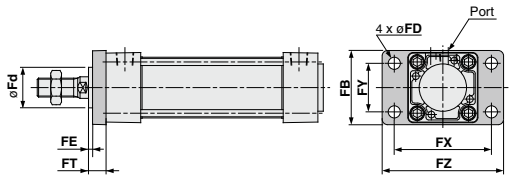


Foot (mm)

Bore size (mm)	Stroke range	X	Y	LD	LH	LS	LT	LX	LY	LZ	ZZ
32	to 700	22	9	7	30	128	3.2	32	53	50	162
40	to 800	24	11	9	33	132	3.2	38	59	55	170
50	to 1000	27	11	9	40	148	3.2	46	72.5	70	190
63	to 1000	27	14	12	45	148	3.6	56	82.5	80	193
80	to 1000	30	14	12	55	174	4.5	72	102.5	100	230
100	to 1000	32	16	14	65	178	4.5	89	122	120	234

With Mounting Bracket

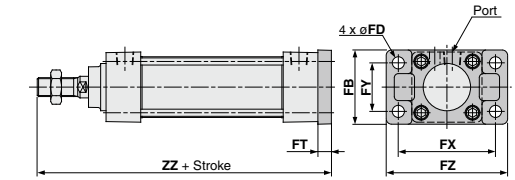
Front flange: (F)



Front Flange (mm)

Bore size (mm)	Stroke range	B	FD	FE	FT	FX	FY	FZ	Fd
32	to 700	50	7	3	10	64	32	79	25
40	to 800	55	9	3	10	72	36	90	31
50	to 1000	70	9	2	12	90	45	110	38.5
63	to 1000	80	9	2	12	100	50	120	39.5
80	to 1000	100	12	4	16	126	63	153	45
100	to 1000	120	14	4	16	150	75	178	54

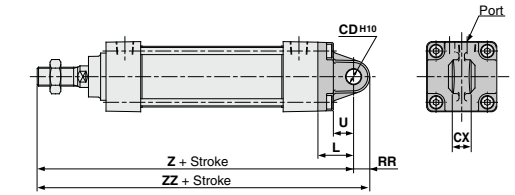
Rear flange: (G)



Rear Flange (mm)

Bore size (mm)	Stroke range	B	FD	FT	FX	FY	FZ	ZZ
32	to 500	50	7	10	64	32	79	141
40	to 500	55	9	10	72	36	90	145
50	to 600	70	9	12	90	45	110	164
63	to 600	80	9	12	100	50	120	164
80	to 750	100	12	16	126	63	153	202
100	to 750	120	14	16	150	75	178	202

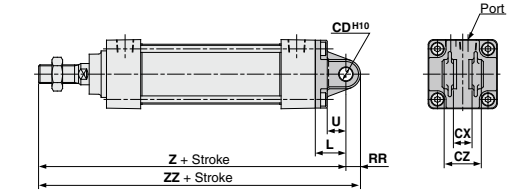
Single clevis: (C)



Single Clevis (mm)

Bore size (mm)	Stroke range	L	RR	U	CD^{H10}	$CX^{-0.1}_{-0.3}$	Z	ZZ
32	to 500	23	10.5	13	10	14	154	164.5
40	to 500	23	11	13	10	14	158	169
50	to 600	30	15	17	14	20	182	197
63	to 600	30	15	17	14	20	182	197
80	to 750	42	23	26	22	30	228	251
100	to 750	42	23	26	22	30	228	251

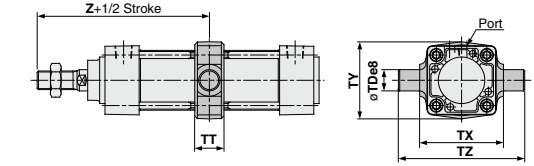
Double clevis: (D)



Double Clevis (mm)

Bore size (mm)	Stroke range	L	RR	U	CD^{H10}	$CX^{-0.1}_{-0.3}$	CZ	Z	ZZ
32	to 500	23	10.5	13	10	14	28	154	164.5
40	to 500	23	11	13	10	14	28	158	169
50	to 600	30	15	17	14	20	40	182	197
63	to 600	30	15	17	14	20	40	182	197
80	to 750	42	23	26	22	30	60	228	251
100	to 750	42	23	26	22	30	60	228	251

Center trunnion: (T)



Center Trunnion (mm)

Bore size (mm)	Stroke range	TDe8	TT	TX	TY	TZ	Z
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 750	20	34	110	110	150	129
100	to 750	25	40	132	136	182	129

Air Cylinder: With End Lock

Series MBB

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MBB [L] [32] [ ] – [50] [ ] – [H] [N] – [ ]

With auto switch **MDBB** [L] [32] [ ] – [50] [ ] – [H] [N] – [M9BW] [ ] – [ ]

With auto switch (Built-in magnet)

Mounting

B	Basic/Without bracket
L	Axial foot
F	Rod side flange
G	Head side flange
C	Single clevis
D	Double clevis
T	Center trunnion

Bore size

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

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to "Standard Stroke" on page 438.

Manual release

N	Non-locking
L	Locking

Locking position

H	Locking at head end
R	Locking at rod end
W	Locking at both ends

Rod boot

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

Number of auto switches

Nil	2
S	1
3	3
n	n

Auto switch

Nil	Without auto switch

∗ For applicable auto switches, refer to the table below.

Made to Order
For details, refer to page 438.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDBBB40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

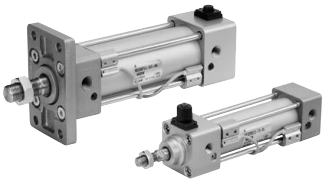
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet		3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9P	—	●	●	●	○	○	
				2-wire		12 V		M9B	—	●	●	●	○	○	
					—	—	100 V, 200 V	J51	—	●	—	●	○	—	—
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	—	G39	—	—	—	—	—	
				2-wire		12 V		—	K39	—	—	—	—	—	
	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)		5 V, 12 V	—	M9NW	—	●	●	●	○	○	IC circuit
				3-wire (PNP)				M9PW	—	●	●	●	○	○	
				2-wire		12V		M9BW	—	●	●	●	○	○	—
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NA**	—	○	○	●	○	○	IC circuit
				3-wire (PNP)				M9PA**	—	○	○	●	○	○	
				2-wire		12 V		M9BA**	—	○	○	●	○	○	—
	Diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	—	●	—	●	○	○	IC circuit
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		P3DW	—	●	—	●	●	○	—
								P4DW	—	—	—	●	●	○	
Reed auto switch	—	Grommet	Yes	3-wire (Equiv. to NPN)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93	—	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	A54	—	●	—	●	●	—	—	—
			No				200 V or less	A64	—	●	—	●	—	—	—	
		Terminal conduit	Yes				—	—	A33	—	—	—	—	—	—	PLC
							100 V, 200 V	—	A34	—	—	—	—	—		
		DIN terminal						—	A44	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	—	A59W	—	●	—	●	—	—		

∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

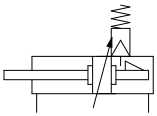
∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

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

∗ Besides the above models, there are some other auto switches that are applicable. For detailed information, please refer to page 449.
∗ Solid state auto switches are also available with a pre-wired connector. Refer to pages 1626 and 1627 for details. Refer to pages 1614 and 1615 for D-P3DW□.
∗ D-A9□/M9□□□/P3DW□ auto switches are shipped together (not assembled). (However, auto switch mounting brackets are assembled for D-A9□/M9□□□ when being shipped.)



Symbol
Air cushion



Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.15 MPa *					
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Operating piston speed	50 to 1000 mm/s					
Allowable stroke tolerance	up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$					
Cushion	Both ends (Air cushion)					
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2
Mounting	Basic, Foot, Rod side flange, Head side flange, Single clevis, Double clevis, Center trunnion					

* 0.05 MPa except locking parts.

Made to Order Specifications (For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC7	Tie rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC10	Dual stroke cylinder/Double rod
-XC14	Change of trunnion bracket mounting position
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion

Refer to pages 444 to 449 for cylinders with an auto switch.

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

Locking Specifications

Locking position	Head end, rod end, both ends					
Holding force (Max.) N	ø32	ø40	ø50	ø63	ø80	ø100
	550	860	1340	2140	3450	5390
Back lash	1.5 mm or less					
Manual release	Non-locking type, locking type					

Accessory

Mounting		Basic	Foot	Rod side flange	Head side flange	Single clevis	Double clevis	Center trunnion
Standard	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	—	—	—	—	—	●	—
	Locking release bolt (N type only)	●	●	●	●	●	●	●
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint (with pin)	●	●	●	●	●	●	●
	Rod boot	●	●	●	●	●	●	●

Standard Stroke

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

Intermediate strokes are available. (No spacer is used.)

Weight/Aluminum Tube

(kg)

Bore size (mm)		32	40	50	63	80	100
Basic weight	Basic	0.50	0.69	1.19	1.47	2.73	3.7
	Foot	0.68	0.93	1.56	1.93	3.61	4.8
	Flange	0.79	1.06	1.64	2.26	4.18	7.01
	Single clevis	0.75	0.92	1.53	2.1	3.84	6.87
	Double clevis	0.76	0.96	1.62	2.26	4.13	7.39
	Trunnion	0.79	1.05	1.67	2.27	4.28	7.37
Additional weight per each 50 mm stroke	All mounting bracket	0.11	0.16	0.26	0.27	0.42	0.56
Accessory	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.22	0.37	0.43	0.43	0.87	1.27

Additional Weight of Locking Part

(kg)

Bore size (mm)		32	40	50	63	80	100
Manual release non-locking (N)	Locking at head end (H)	0.08	0.13	0.21	0.30	0.75	1.1
	Locking at rod end (R)	0.08	0.13	0.20	0.29	0.71	1.03
	Locking at both ends (W)	0.16	0.26	0.41	0.59	1.46	2.13
Manual release locking (L)	Locking at head end (H)	0.09	0.15	0.23	0.32	0.78	1.13
	Locking at rod end (R)	0.09	0.15	0.22	0.31	0.74	1.06
	Locking at both ends (W)	0.18	0.30	0.45	0.63	1.52	2.19

Calculation example: **MBBL32-100-HN**
- Basic weight 0.68
- Additional weight ..... 0.11/50 stroke
- Cylinder stroke ..... 100 stroke
- Locking weight ..... 0.08 (Locking at head end, manual release non-locking type)

0.68 + 0.11 x 100/50 + 0.08 = 0.98 kg

Mounting Bracket Part No.

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

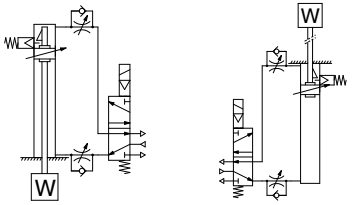
Note 1) Two foot brackets required for one cylinder.
Note 2) Accessories for each mounting bracket are as follows:
Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, flat washer and cotter pins. → Refer to page 416 for details.

Cautions for Using

1. Use recommended pneumatic circuit

⚠Caution

For correct operation of the locking and release mechanism, please use the following pneumatic circuit.



With locking at head side　　With locking at rod side

① Do not use a 3 position solenoid valve.

Avoid using circuit with 3 position solenoid valve (especially closed center). When pressure is trapped in the port with locking mechanism, end lock is free. When utilizing a 3 position closed center valve, even if the lock is engaged, it may become unlocked due to pressure leakage either across the piston or the valve spool.

② Back pressure is required to release end lock.

Be sure air is supplied to side of cylinder without the locking mechanism, as above, prior to supplying air pressure to the side with end lock or lock may not be released. (Refer to "Release of lock".)

③ Release lock when mounting or adjusting the cylinder.

If mounting is done with lock engaged, lock mechanism may be damaged.

④ Use with load 50% or less of rated capacity.

If cylinder is used at 50% load capacity or more, lock may be damaged.

⑤ Do not use two cylinders in parallel at same time.

Avoid to using 2 or more end lock cylinders at same time to perform a single task because binding may occur and one of the cylinders end lock may not release.

⑥ Use a speed controller as meter-out.

Meter-in control may not allow lock to release.

⑦ Use complete stroke or cylinder at side with end lock.

If cylinder piston does not reached end of stroke, end lock may not lock or release.

2. Operating pressure

⚠Caution

Use pressures over 0.15 MPa at port with locking mechanism.

3. Exhaust speed

⚠Caution

When pressures at port with locking mechanism is decrease to 0.05 MPa or less, it is automatically locked. When exhaust pipe at port with locking mechanism is thin and long or speed controller is separated from cylinder port, exhaust speed is slow and will require additional time for lock engagement. Clogging the silencer mounted on exhaust port of solenoid valve leads to same result.

4. Relationship with cushion

⚠Caution

When cushion valve at side with locking mechanism is fully opened or closed, piston rod may reached at stroke end. Thus lock is not established. And when locking is done at cushion valve fully closed, adjust cushion valve since lock may not be released.

5. Release of lock

⚠Warning

When lock is to be released, supply air pressure to the port without the locking mechanism, this relieves the load from the lock mechanism. Then supply pressure to the port with lock, releasing the lock and changing cylinder direction.
(Refer to recommended pneumatic circuit.) When port without lock mechanism is exhausted and locking mechanism is loaded, the lock may be damaged due to excessive force on lock during release. Piston rod will operate immediately.

6. Manual release

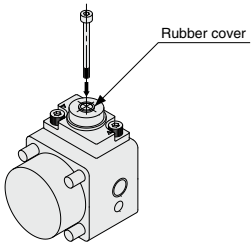
⚠Caution

Non-locking type

Insert attached bolt from upper side of rubber cover (no need to remove rubber cover), tighten locking piston and pull bolt, locking will be released. When bolt is released, locking begins to take place. Thread size, required pulling force and stroke are listed below.

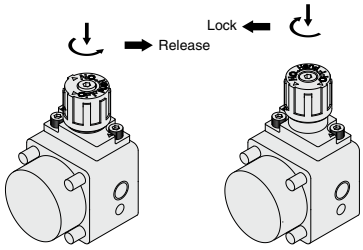
Bore size (mm)	Thread size	Pulling force	Stroke (mm)
32	≥ M2.5 x 0.45 x 25 L	4.9 N	2
40, 50, 63	≥ M3 x 0.5 x 30 L	10 N	3
80, 100	≥ M5 x 0.8 x 40 L	24.5 N	3

∗ Remove bolt under normal operations.
It may cause malfunction of locking and release.



Locking style

Turn 90° to counterclockwise pushing M/O button. Lock is released when ▲ on cap and ▼ OFF mark on M/O button correspond. (Lock remains released.)
When locking is desired, turn M/O button clockwise 90° while pushing fully, correspond ▲ on cap and ▼ ON mark on M/O button. The correct position is confirmed by click sound "click".
If not confirmed, locking is not done.

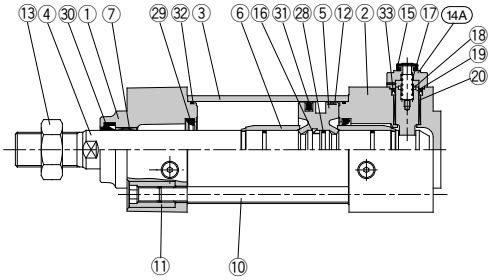


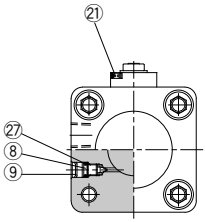
Locked　　**Released**

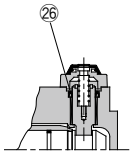
Construction

Locking at head end

Manual release non-locking type: N

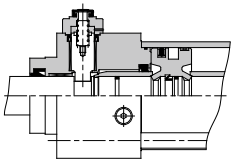


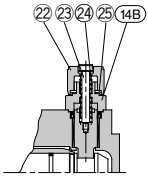




ø80, ø100

Locking at rod end





Manual release non-locking type: L

Component Parts

No.	Description	Material	Note
1	Rod cover	Aluminum alloy	Metallic painted
2	Head cover	Aluminum alloy	Metallic painted
3	Cylinder tube	Aluminum alloy	Hard anodized
4	Piston rod	Carbon steel	Hard chrome plated
5	Piston	Aluminum alloy	Chromated
6	Cushion ring	Aluminum alloy	Anodized
7	Bushing	Bearing alloy	
8	Cushion valve	Steel wire	Nickel plated
9	Retaining ring	Steel for spring	ø40 to ø100
10	Tie rod	Carbon steel	Chromated
11	Tie rod nut	Carbon steel	Nickel plated
12	Wear ring	Resin	
13	Rod end nut	Carbon steel	Nickel plated
14A	Cover A	Aluminum alloy	Painted black
14B	Cover B	Carbon steel	Tufftride
15	Rubber cover	Synthetic rubber	
16	Piston holder	Urethane	

Component Parts

No.	Description	Material	Note
17	Lock spring	Steel wire	
18	Bumper	Urethane	
19	Lock piston	Carbon steel	Hardened, Hard chrome plated
20	Lock bushing	Copper allow	
21	Bolt with hex. hole	Alloyed steel	Black zinc chromated
22	M/O knob	Zinc alloy	Painted black
23	M/O bolt	Alloyed steel	Black zinc chromated, Painted red
24	M/O spring	Steel wire	Zinc chromated
25	Stopper ring	Carbon steel	Zinc chromated
26	Seal retainer	Rolled steel	ø80, ø100 only
27	Cushion valve seal	NBR	
28	Piston gasket	NBR	
29*	Cushion seal	Urethane	
30*	Rod seal	NBR	
31*	Piston seal	NBR	
32*	Cylinder tube gasket	NBR	
33*	Lock piston seal	NBR	

Replacement Parts/Seal Kit (Locking at head or rod end)

Bore size (mm)	Kit no.	Contents
32	MBB32-PS	Set of the No. 29, 30, 31, 32 and 33.
40	MBB40-PS	
50	MBB50-PS	
63	MBB63-PS	
80	MBB80-PS	
100	MBB100-PS	

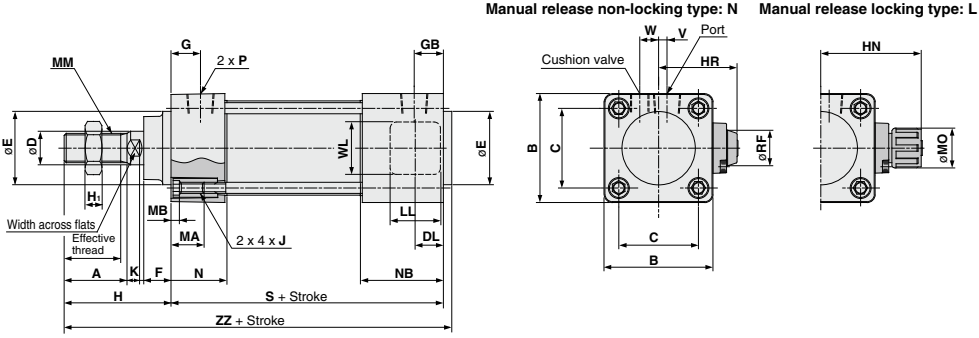
Replacement Parts/Seal Kit (Locking at both ends)

Bore size (mm)	Kit no.	Contents
32	MBB32-PS-W	Set of the No. 29, 30, 31, 32 and 33.
40	MBB40-PS-W	
50	MBB50-PS-W	
63	MBB63-PS-W	
80	MBB80-PS-W	
100	MBB100-PS-W	

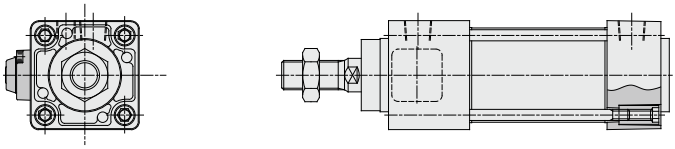
* Seal kits consist of items 29 to 33, and can be ordered by using the seal kit number corresponding to each bore size.
* Trunnion type should not be disassembled. (Refer to page 451.)
* Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100: 30 g).
  Order with the following part number when only the grease pack is needed.
  Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Basic: (B)

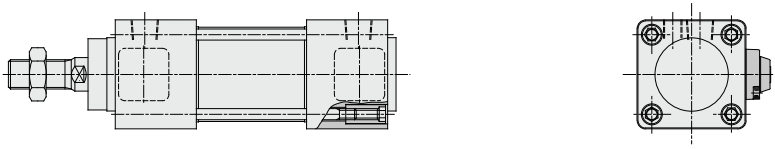
Locking at head end: MBBB Bore size | Port thread type — Stroke — **H□**



Locking at rod end: MBBB Bore size | Port thread type — Stroke — **R□**



Locking at both ends: MBBB Bore size | Port thread type — Stroke — **W□**



-H□/-R□ (mm)

Bore size (mm)	Stroke range (mm)	Effective thread length	Width across flats	A	B	C	D	DL	E	F	G	GB	H_1	H	HR	HN	J	K	LL	MA	MB
32	to 500	19.5	10	22	46	32.5	12	9	30	13	13	21	6	47	33.5	45	M6 x 1	6	15	16	4
40	to 500	27	14	30	52	38	16	12	35	13	14	27	8	51	38.5	52.5	M6 x 1	6	21	16	4
50	to 600	32	18	35	65	46.5	20	13	40	14	15.5	27.5	11	58	45	59	M8 x 1.25	7	21	16	5
63	to 600	32	18	35	75	56.5	20	13	45	14	16.5	28.5	11	58	50	64	M8 x 1.25	7	21	16	5
80	to 800	37	22	40	95	72	25	16	45	20	19	37	13	72	62	76.5	M10 x 1.5	10	30	16	5
100	to 800	37	26	40	114	89	30	16	55	20	19	37	16	72	71.5	86	M10 x 1.5	10	30	16	5

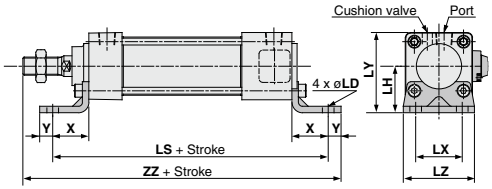
Bore size (mm)	Stroke range (mm)	MM	MO	N	NB	P	RF	S	V	W	WL	ZZ
32	to 500	M10 x 1.25	15	27	35	1/8	11	92	4	6.5	24	143
40	to 500	M14 x 1.5	19	27	40	1/4	11	97	4	9	24	152
50	to 600	M18 x 1.5	19	31.5	43.5	1/4	11	106	5	10.5	24	168
63	to 600	M18 x 1.5	19	31.5	43.5	3/8	11	106	9	12	24	168
80	to 800	M22 x 1.5	23	38	56	3/8	21	132	11.5	14	40	208
100	to 800	M26 x 1.5	23	38	56	1/2	21	132	17	15	40	208

-W□

S	ZZ
100	151
110	165
118	180
118	180
150	226
150	226

With Mounting Bracket

Foot(L)/Locking at head end (-H□)



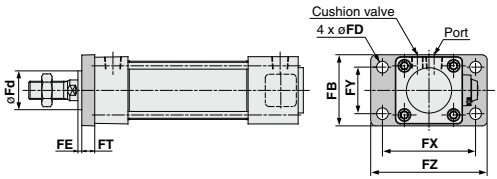
-H□/ -R□ (mm)

Bore size (mm)	Stroke range	X	Y	LD	LH	LS	LT	LX	LY	LZ	ZZ
32	to 700	22	9	7	30	136	3.2	32	53	50	170
40	to 800	24	11	9	33	145	3.2	38	59	55	183
50	to 1000	27	11	9	40	160	3.2	46	72.5	70	202
63	to 1000	27	14	12	45	160	3.6	56	82.5	80	205
80	to 1000	30	14	12	55	192	4.5	72	102.5	100	248
100	to 1000	32	16	14	65	196	4.5	89	122	120	252

-W□

LS	ZZ
144	178
158	196
172	214
172	217
210	266
214	270

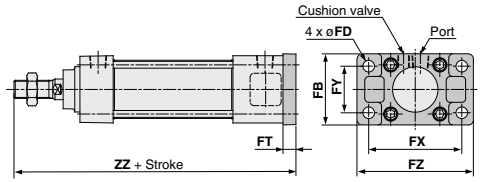
Front flange(F)/Locking at head end (-H□)



-H□/ -R□/ -W□ (mm)

Bore size (mm)	Stroke range	FB	FD	FE	FT	FX	FY	FZ	Fd
32	to 700	50	7	3	10	64	32	79	25
40	to 800	55	9	3	10	72	36	90	31
50	to 1000	70	9	2	12	90	45	110	38.5
63	to 1000	80	9	2	12	100	50	120	39.5
80	to 1000	100	12	4	16	126	63	153	45
100	to 1000	120	14	4	16	150	75	178	54

Rear flange(G)/Locking at head end (-H□)



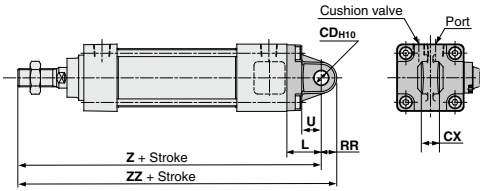
-H□/ -R□ (mm)

Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	ZZ
32	to 500	50	7	10	64	32	79	149
40	to 500	55	9	10	72	36	90	158
50	to 600	70	9	12	90	45	110	176
63	to 600	80	9	12	100	50	120	176
80	to 800	100	12	16	126	63	153	220
100	to 800	120	14	16	150	75	178	220

-W□

ZZ
157
171
188
188
238
238

Single clevis(C)/Locking at head end (-H□)



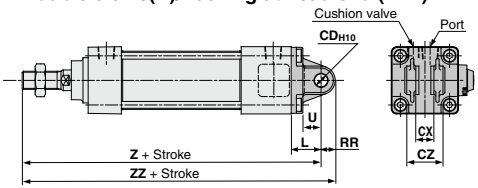
-H□/ -R□ (mm)

Bore size (mm)	Stroke range	L	RR	U	CD_{H10}	$CX^{0.1}_{0.3}$	Z	ZZ
32	to 500	23	10.5	13	10	14	162	172.5
40	to 500	23	11	13	10	14	171	182
50	to 600	30	15	17	14	20	194	209
63	to 600	30	15	17	14	20	194	209
80	to 800	42	23	26	22	30	246	269
100	to 800	42	23	26	22	30	246	269

-W□

Z	ZZ
170	180.5
184	195
206	221
206	221
264	287
264	287

Double clevis(D)/Locking at head end (-H□)



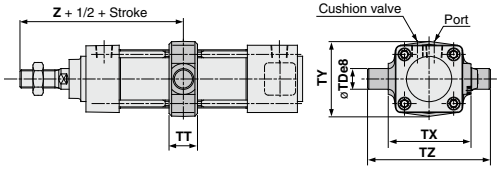
-H□/ -R□ (mm)

Bore size (mm)	Stroke range	L	RR	U	CD_{H10}	$CX^{+0.3}_{+0.1}$	CZ	Z	ZZ
32	to 500	23	10.5	13	10	14	28	162	172.5
40	to 500	23	11	13	10	14	28	171	182
50	to 600	30	15	17	14	20	40	194	209
63	to 600	30	15	17	14	20	40	194	209
80	to 800	42	23	26	22	30	60	246	269
100	to 800	42	23	26	22	30	60	246	269

-W□

Z	ZZ
170	180.5
184	195
206	221
206	221
264	287
264	287

Center trunnion(T)/Locking at head end (-H□)



-H□ (mm)

Bore size (mm)	Stroke range	TD_{e8}	TT	TX	TY	TZ	Z
32	to 500	12	17	50	49	74	89
40	to 500	16	22	63	58	95	93
50	to 600	16	22	75	71	107	105
63	to 600	20	28	90	87	130	105
80	to 800	20	34	110	110	150	129
100	to 800	25	40	132	136	182	129

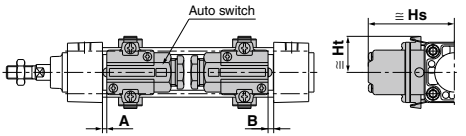
-R□/ -W□

Z
97
106
117
117
147
147

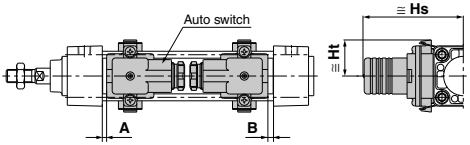
Auto Switch Mounting 1

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

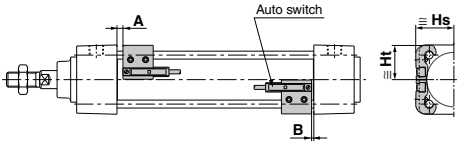
Band mounting
D-A3□/G39/K39



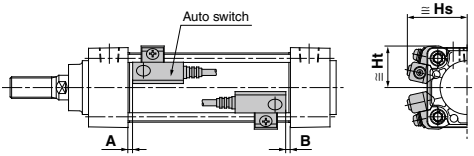
D-A44



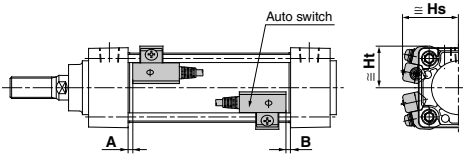
Tie-rod mounting
D-A9□/A9□V
D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-Z7□/Z80
D-Y59□/Y69□/Y7P/Y7PV
D-Y7□W/Y7□WV/Y7BA



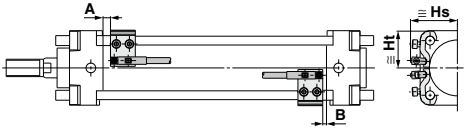
D-A5□/A6□
D-A59W



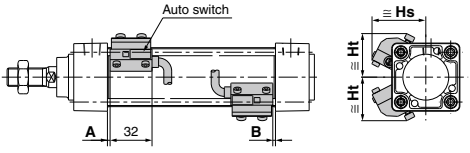
D-F5□/J5□
D-F5□W/J59W/F5BA
D-F59F/F5NT



D-P3DW



D-P4DW



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

Proper Auto Switch Mounting Position

(mm)

Auto switch model / Bore size	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A5□ D-A6□		D-A59W		D-F5□W D-J59W D-F5□ D-J5□ D-F5BA D-F59F		D-F5NT		D-A3□ D-A44 D-G39 D-K39		D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-P3DW		D-P4DW	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
32	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	6	3	3.5	1
40	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	6	3	3.5	1
50	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	6	4	4	1.5
63	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	6	4	4	1.5
80	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	4	2.5	7	5.5
100	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	4	2.5	7	5.5
125	12	12	16	16	6	6	10	10	12.5	12.5	17.5	17.5	6	6	9.5	9.5	6.5	6.5	9	9

∗ Cylinders without an air cushion have different dimensions for proper auto switch mounting positions (A and B). Add the following values to both A and B: 3 mm (ø 32 and 40), 4 mm (ø50 and 63), 5 mm (ø80 and 100), 6 mm (ø125).
Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Proper Auto Switch Mounting Height

(mm)

Auto switch model / Bore size	D-A9□ D-M9□ D-M9□W D-M9□A		D-A9□V		D-M9□V D-M9□WV D-M9□AV		D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F59F D-F5□W D-J59W D-F5BA D-F5NT		D-A3□ D-G39 D-K39		D-A44		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W D-Y7BA		D-Y69□ D-Y7PV D-Y7□WV		D-P3DW		D-P4DW	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	24.5	23	27.5	23	30.5	23	35	24.5	32.5	25	67	27.5	77	27.5	25.5	23	26.5	23	34	23	38	31
40	28.5	25.5	31.5	25.5	34	25.5	38.5	27.5	36.5	27.5	71.5	27.5	81.5	27.5	29.5	26	30	26	38	26	42	33
50	33.5	31	36	31	38.5	31	43.5	34.5	41	34	77	—	87	—	33.5	31	34.5	31	42	31	46.5	39
63	38.5	36	40.5	36	43	36	48.5	39.5	46	39	83.5	—	93.5	—	39	36	40	36	50	36	51.5	44
80	46.5	45	49	45	52	45	55	46.5	52.5	46.5	92.5	—	103	—	47.5	45	48.5	45	56	45	58	51.5
100	54	53.5	57	53.5	59.5	53.5	62	55	59.5	55	103	—	113.5	—	55.5	53.5	56.5	53.5	63.5	53.5	65.5	60.5
125	65.5	64.5	68.5	64.5	71	64.5	71.5	66.5	70.5	66.5	115	—	125	—	67.5	65	68.5	65	74.5	64.5	76.5	72

Operating Range

(mm)

Auto switch model	Bore size						
	32	40	50	63	80	100	125
D-A9□/A9□V	7	7.5	8.5	9.5	9.5	10.5	12
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	4	4.5	5	6	6	6	7
D-Z7□/Z80	7.5	8.5	7.5	9.5	9.5	10.5	13
D-A5□/A6□	9	9	10	11	11	11	10
D-A59W	13	13	13	14	14	15	17
D-A3□/A44	9	9	10	11	11	11	10
D-Y59□/Y69□ D-Y7P/Y7□V D-Y7□W/Y7□WV D-Y7BA	5.5	5.5	7	7.5	6.5	5.5	7
D-F5□/J5□ D-F5□W/J59W D-F5BA/F5NT D-F59F	3.5	4	4	4.5	4.5	4.5	5
D-G39/K39	9	9	9	10	10	11	11
D-P3DW	4.5	5	5	5.5	4	6.5	8.5
D-P4DW	4	4	4	4.5	4	4.5	4.5

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

Auto Switch Mounting 2

Minimum Auto Switch Mounting Stroke: Mounting Brackets Except Center Trunnion Type

n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Mounting brackets except center trunnion type		
		ø32, ø40, ø50, ø63	ø80, ø100	ø125
D-A9□	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		
D-A9□V	2 (Different surfaces, same surface) 1	10		
	n	$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		
D-M9□ **D-M9□W**	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		
D-M9□V **D-M9□WV**	2 (Different surfaces, same surface) 1	10		
	n	$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		
D-M9□A	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		
D-M9□AV	2 (Different surfaces, same surface) 1	15		
	n	$15 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		
D-A3□ **D-G39** **D-K39**	2 (Different surfaces)	35		
	2 (Same surface)	100		
	n (Different surfaces)	35 + 30 (n – 2) (n = 2, 3, 4···)		
	n (Same surface)	100 + 100 (n – 2) (n = 2, 3, 4···)		
	1	10		
D-A44	2 (Different surfaces)	35		
	2 (Same surface)	55		
	n (Different surfaces)	35 + 30 (n – 2) (n = 2, 3, 4···)		
	n (Same surface)	55 + 50 (n – 2) (n = 2, 3, 4···)		
	1	10		
D-A5□ **D-A6□**	2 (Different surfaces, same surface) 1	15	20	20
	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
D-A59W	2 (Different surfaces, same surface)	20	25	25
	n (Same surface)	$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
	1	15	25	25
D-F5□ **D-J5□** **D-F5□W** **D-J59W** **D-F5BA** **D-F59F**	2 (Different surfaces, same surface)	15	25	25
	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
	1	10	25	25
D-F5NT	2 (Different surfaces, same surface)	15	25	30
	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)	$30 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)
	1	10	25	30
D-Z7□ **D-Z80** **D-Y59□** **D-Y7P** **D-Y7□W**	2 (Different surfaces, same surface) 1	15		
	n	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···) Note 1)		

Note 1) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

Minimum Auto Switch Mounting Stroke: Mounting Brackets Except Center Trunnion Type

n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Mounting brackets except center trunnion type			
		ø32, ø40	ø50, ø63	ø80, ø100	ø125
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, same surface) 1	10			
	n	$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)			
D-Y7BA	2 (Different surfaces, same surface) 1	20			
	n	$20 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)			
D-P3DW	2 (Different surfaces) 1	15	15		
	2 (Same surface)	40	15		
	n (Different surfaces)	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)		
	n (Same surface)	$40 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)		
D-P4DW	2 (Different surfaces, same surface) 1	15			20
	n	$15 + 65\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)			$20 + 65\frac{(n-2)}{2}$ (n = 2, 4, 6, 8…) Note 1)

Note 1) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

Auto Switch Mounting 3

Minimum Auto Switch Mounting Stroke: Center Trunnion Type

n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Center trunnion						
		ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-A9□	2 (Different surfaces, same surface) 1	70	75		80	85	95	100
	n	$70 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-A9□V	2 (Different surfaces, same surface) 1	45	50		55	60	70	75
	n	$45 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$50 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$70 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-M9□ D-M9□W	2 (Different surfaces, same surface) 1	75	80		85	90	95	105
	n	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-M9□V D-M9□WV	2 (Different surfaces, same surface) 1	50	55		60	65	70	80
	n	$50 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$70 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-M9□A	2 (Different surfaces, same surface) 1	80	85		90	95	100	110
	n	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$110 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-M9□AV	2 (Different surfaces, same surface) 1	55	60		65	70	75	85
	n	$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$70 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-A3□ D-G39 D-K39	2 (Different surfaces)	60	65		75	80	85	90
	2 (Same surface)	90	95		100	105	110	125
	n (Different surfaces)	60 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)	65 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)		75 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)	80 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)	85 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)	90 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)
	n (Same surface)	90 + 100 (n − 2) (n = 2, 4, 6, 8···) Note 2)	95 + 100 (n − 2) (n = 2, 4, 6, 8···) Note 2)		100 + 100 (n − 2) (n = 2, 4, 6, 8···) Note 2)	105 + 100 (n − 2) (n = 2, 4, 6, 8···) Note 2)	110 + 100 (n − 2) (n = 2, 4, 6, 8···) Note 2)	125 + 100 (n − 2) (n = 2, 4, 6, 8···) Note 2)
	1	60	65		75	80	85	90
D-A44	2 (Different surfaces)	70	75		80		85	90
	2 (Same surface)							
	n (Different surfaces)	70 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)	75 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)		80 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)		85 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)	90 + 30 (n − 2) (n = 2, 4, 6, 8···) Note 2)
	n (Same surface)	70 + 50 (n − 2) (n = 2, 4, 6, 8···) Note 2)	75 + 50 (n − 2) (n = 2, 4, 6, 8···) Note 2)		80 + 50 (n − 2) (n = 2, 4, 6, 8···) Note 2)		85 + 50 (n − 2) (n = 2, 4, 6, 8···) Note 2)	90 + 50 (n − 2) (n = 2, 4, 6, 8···) Note 2)
	1	70	75		80		85	90
D-A5□ D-A6□	2 (Different surfaces, same surface) 1	60		80	105	110	115	
	n (Same surface)	$60 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$80 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$105 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$115 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	
D-A59W	2 (Different surfaces, same surface)	60	70	85	110	115	120	
	n (Same surface)	$60 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$70 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$115 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	
	1	60	70	85	110	115	120	
D-F5□/J5□ D-F5□W D-J59W D-F5BA D-F59F	2 (Different surfaces, same surface)	90	95		110	115	120	130
	n (Same surface)	$90 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$95 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$115 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
	1	90	95		110	115	120	130
D-F5NT	2 (Different surfaces, same surface)	100	105		120	125	130	140
	n (Same surface)	$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$105 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$125 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$140 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
	1	100	105		120	125	130	140
D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W	2 (Different surfaces, same surface) 1	80	85	90		95	100	105
	n	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-Y69□ D-Y7PV D-Y7□WV	2 (Different surfaces, same surface) 1	60	65		70	75	85	85
	n	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$70 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)

Note 1) When "n" is an odd number, a multiple of 4 that is larger than this odd number is used for the calculation. Note 2) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

Minimum Auto Switch Mounting Stroke: Center Trunnion Type

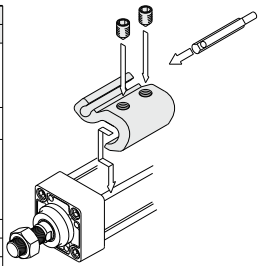
n: No. of auto switches (mm)

Auto switch model	No. of auto switches	Center trunnion						
		ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-Y7BA	2 (Different surfaces, same surface) 1	85	90		100	105	110	115
	n	$85 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$90 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$100 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$105 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$110 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$115 + 45\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-P3DW	2 (Different surfaces, same surface) 1	80	85		90		95	100
	n	$80 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$85 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$95 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)	$100 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)
D-P4DW	2 (Different surfaces, same surface) 1	120		130		140		150
	n	$120 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$130 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$140 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)		$150 + 65\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···) Note 1)

Note 1) When "n" is an odd number, a multiple of 4 that is larger than this odd number is used for the calculation.

Auto Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)						
	ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	BMB5-032	BMB5-032	BA7-040	BA7-040	BA7-063	BA7-063	BA7-080
D-A3□/A44 D-G39/K39	BMB2-032	BMB2-040	BMB1-050	BMB1-063	BMB1-080	BMB1-100	BS1-125
D-A5□/A6□/A59W D-F5□/J5□ D-F5□W/J59W D-F59F/F5BA D-F5NT	BT-03	BT-03	BT-05	BT-05	BT-06	BT-06	BT-08
D-P3DW	BMB9-032S	BMB9-032S	BMB9-050S	BMB9-050S	BA9T-063S	BA9T-063S	BA9T-080S
D-P4DW	BMB3T-040	BMB3T-040	BMB3T-050	BMB3T-050	BMB3T-080	BMB3T-080	BAP2T-080
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA	BMB4-032	BMB4-032	BMB4-050	BMB4-050	BA4-063	BA4-063	BA4-080



· The figure shows the mounting example for D-A9□(V)/M9□(V)/M9□W(V)/M9□A(V).

[Stainless Steel Mounting Screw Kit]

The following set of stainless steel mounting screws (including set screws) is available. Use them in accordance with the operating environment. (Since auto switch brackets are not included, order them separately.)

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

Note 1) Refer to page 1663 for the details of BBA1.
The above stainless steel screws are used when a cylinder is shipped with D-F5BA type auto switches.
When only a switch is shipped independently, BBA1 is attached.

Note 2) When using D-M9□A(V)/Y7BA, do not use the steel set screws which is included with the auto switch mounting brackets above (BMB5-032, BA7-□□□, BMB4-□□□, BA4-□□□). Order a stainless steel screw set (BBA1) separately, and select and use the M4 x 6L stainless steel set screws included in the BBA1.

In addition to the auto switches listed above, the following auto switches are also available. Refer to pages 1559 to 1673 for the detailed specifications.

Auto switch type	Part no.	Electrical entry (Entry direction)	Features
Reed auto switch	D-A93V, A96V	Grommet (perpendicular)	—
	D-A90V		Without indicator light
	D-A53, A56, Z73, Z76	Grommet (in-line)	—
	D-A67, Z80		Without indicator light
Solid state auto switch	D-M9NV, M9PV, M9BV	Grommet (perpendicular)	—
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color)
	D-Y7NWV, Y7PWV, Y7BWV		
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-color indication)
	D-F59, F5P, J59	Grommet (in-line)	—
	D-Y59A, Y59B, Y7P		
	D-F59W, F5PW, J59W		Diagnostic indication (2-color)
	D-Y7NW, Y7PW, Y7BW		
	D-F5BA, Y7BA		Water resistant (2-color indication)
	D-F5NT		With timer
	D-P5DW		Magnetic field resistant (2-color indication)

∗ For solid state switches, auto switches with a pre-wired connector are also available. Refer to pages 1626 and 1627 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H/Y7G/Y7H types) are also available. Refer to page 1577 and 1579 for details.

Made to Order: Individual Specifications

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

Symbol
-X1184

1 Cylinder with Heat Resistant Reed Auto Switch (–10°C to 120°C)

MDB [Standard model no.] – [Heat resistant reed auto switch] [ ] – **X1184**

Switch model

Symbol	Description
Nil	Without switch
B30	D-B30
B30J	D-B30J
B31	D-B31
B31J	D-B31J
B35	D-B35
B35J	D-B35J

No. of switches

Symbol	Description
S	1 pc.
Nil	2 pcs.
n	n pcs.

For heat resistant auto switches (D-B3□) (with built-in magnet)

∗ Refer to page 1559 for details of auto switches.

Specifications

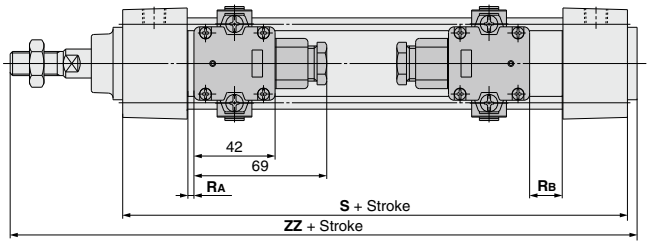
Ambient temperature range	–10–to 120°C–
Bore size (mm)	40, 50, 63, 80, 100
Seal material	Fluororubber
Grease	Heat resistant grease

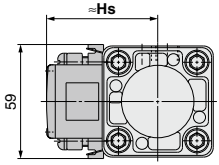
⚠ Warning

Precautions

Be aware that smoking cigarettes, etc. after your hands have come into contact with the grease used in this cylinder can create a gas that is hazardous to humans.

Dimensions (Dimensions other than those below are the same as the standard type.)





mm

Bore size	S	ZZ	Hs	RA	RB	Minimum mounting stroke		Auto switch mounting bracket : part no.
						Other than center trunnion	Center trunnion	
40	99	154	57.5	2.5	14.5		200 st or more	BMB2-040
50	109	171	62.5	3.5	14.5	1 pc.: 50 st or more	200 st or more	BMB1-050
63	109	171	69	0.5	14.5	2 pcs.: Different surfaces 50 st or more	200 st or more	BMB1-063
80	129	205	78	2.5	22.5	2 pcs.: Same surface 220 st or more	210 st or more	BMB1-080
100	129	205	88.5	1	22		210 st or more	BMB1-100

Specific Product Precautions

Be sure to read before handling.
Refer to front matter 57 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Adjustment

⚠ Warning

1. Do not open the cushion valve beyond the stopper.

Crimping (ø32) or a snap ring (ø40 to ø100) is provided to prevent the accidental removal of the cushion valve. Do not open the valve beyond the mechanism. If air is supplied, the cushion valve may shoot out from the cover.

Bore (mm)	Cushion valve width across flats	Socket wrench
32, 40	2.5	JIS 4648 Hexagonal spanner wrench 2.5
50, 63	3	JIS 4648 Hexagonal spanner wrench 3
80, 100	4	JIS 4648 Hexagonal spanner wrench 4
125	4	JIS 4648 Hexagonal spanner wrench 4

2. Use the air cushion at the end of cylinder stroke.

Select the cylinder with bumper "N" if cushion valve is to be fully opened.

Tie rods or piston assembly may be damaged if neither air cushion nor bumper is utilized.

3. When replacing mounting bracket, use a socket wrench.

Bore (mm)		Bolt no.	Width across flats	Tightening torque (N·m)
32, 40		MB-32-48-C1247	4	5.1
50, 63		MB-50-48-C1249	5	11
80, 100	Foot	MB-80-48AC1251	6	25
	Other	MB-80-48BC1251		
125	Foot Other	CE00008	8	30.1
		(M12 x 1.75 x 25, Hexagon thin socket head bolt)		
		CE00032		
		(M12 x 1.75 x 28, Hexagon thin socket head bolt)		

4. When replacing a bracket, tie-rod nuts on the cylinder body become loosened.

After retightening the tie-rod nuts with the proper tightening torque (Refer to Adjustment 3.), mount a mounting bracket.

5. Mounting precision is required for the trunnion type cylinder.

It is difficult to align the axial center of the trunnion with the axial center of the cylinder. Thus, if this type of cylinder is disassembled and reassembled, the required dimensional accuracy cannot be attained, which may lead to malfunctions.

Non-rotating rod (Double acting, Single rod)

Handling

⚠ Caution

1. Avoid using the air cylinder in such a way that more than allowable rotational torque would be applied to the piston rod.

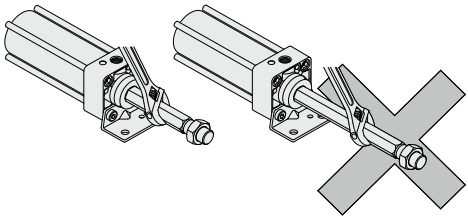
If rotational torque is applied, the non-rotating guide will deform, thus affecting the non-rotating accuracy. valve may shoot out from the cover.

Mounting and Piping

⚠ Caution

1. Mounting a workpiece on the rod end

To screw a bracket or a nut onto the threaded portion at the tip of the piston rod, make sure to retract the piston rod entirely, and place a wrench over the flat portion of the rod that protrudes. To tighten, take precautions to prevent the tightening torque from being applied to the non-rotating guide.



With rod boot

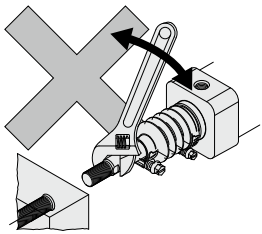
Handling

⚠ Caution

1. Do not turn the piston rod with the rod boot kept locked.

When turning the piston rod, loosen the band once and do not twist the rod boot.

2. Set the breathing hole in the rod boot downward or in the direction that prevents entry of dust or water content.



Square Tube Type Air Cylinder

Series MB1

ø32, ø40, ø50, ø63, ø80, ø100, ø125

Increased kinetic energy absorption

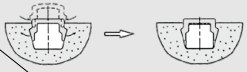
The absorption of kinetic energy has been increased by nearly 30% compared to the CA1 series, through increased cushion volume and the use of a new cushion seal. In addition, the life of the cushion seal is approximately 5 times longer.

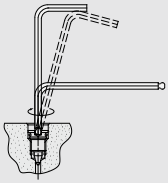
Improved cushion capacity

Piston rod lurching, due to cracking pressure at start up, has been eliminated by means of a floating seal mechanism.

Space-saving auto switch mounting

Space is saved by setting switches into grooves provided on 4 surfaces. This is also effective to prevent loosening and damage, etc.





Port aperture

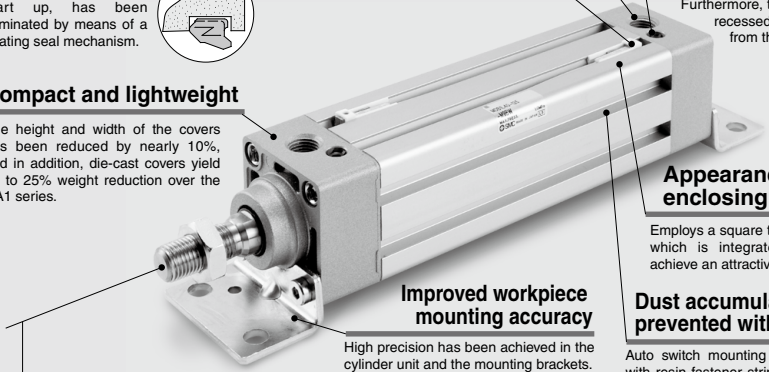
Easy cushion valve adjustment

Adjustment of the cushion valve is made with a hexagon wrench key allowing for easy fine adjustment.

Furthermore, the cushion valve has been recessed so that it does not protrud from the cover.

Compact and lightweight

The height and width of the covers has been reduced by nearly 10%, and in addition, die-cast covers yield 10 to 25% weight reduction over the CA1 series.

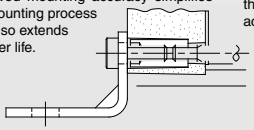


Appearance improved by enclosing the tie-rods

Employs a square tube with enclosed tie-rods which is integrated with both covers to achieve an attractive, unified appearance.

Improved workpiece mounting accuracy

High precision has been achieved in the cylinder unit and the mounting brackets. Improved mounting accuracy simplifies the mounting process and also extends cylinder life.



Dust accumulation can be prevented with fastener strips

Auto switch mounting grooves can be covered with resin fastener strips, which adhere tightly to the tube (option) to prevent the entry and accumulation of dirt.

Piston rod sagging reduced

Sagging of the piston rod has been reduced by increasing the precision of the bushing and piston rod, and reducing their clearances.

Series Variations

Standard type: Double acting

Bore size (mm)	Standard stroke (mm) 25	50	75	100	125	150	175	200	250	300	350	400	450	500	600	700	800	Built-in magnet	Rod boot	Mounting bracket	Accessory	
Single Rod *Series MB1*																						
32	●	●	●	●	●	●	●	●	●	●	●	●	●	●				●	●	Basic style Axial foot style Rod side flange style Head side flange style Single clevis style Double clevis style Center trunnion style	(Standard) Rod end nut (Option) Knuckle joint pin Clevis pin Single knuckle joint Double knuckle joint Trunnion pivot bracket Double clevis pivot bracket	Page 456
40	●	●	●	●	●	●	●	●	●	●	●	●	●	●								
Double Rod *Series MB1W*																						
50	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●	Basic style Foot style Flange style Center trunnion style	(Standard) Rod end nut (Option) Knuckle joint pin Single knuckle joint Double knuckle joint Trunnion pivot bracket	Page 464
63	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
Non-rotating Rod *Series MB1K*																						
80	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	Basic style Axial foot style Rod side flange style Head side flange style Single clevis style Double clevis style Center trunnion style	(Standard) Rod end nut (Option) Knuckle joint pin Clevis pin Single knuckle joint Double knuckle joint Trunnion pivot bracket Double clevis pivot bracket	Page 469
100	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						
125	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					

* ø125 is not available for MB1K.

Series MB1

● : Standard
◎ : Made to Order specifications
○ : Special product (Contact SMC for details.)
— : Not available

Symbol	Specification	Applicable bore size	MB1 (Standard) Double acting Single rod Air ø32 to ø100	MB1 (Standard) Double acting Single rod Air ø125	MB1 (Standard) Double acting Single rod Rubber ø32 to ø100	MB1 (Standard) Double acting Single rod Rubber ø125
Standard	Standard	ø32 to ø125	●	●	●	●
Long st	Long stroke	ø32 to ø125	○	○	○	○
D	Built-in magnet	ø32 to ø125	●	●	●	●
MB1□-□ J/K	With rod boot	ø32 to ø125	●	●	●	●
10-	Clean series	ø32 to ø125	●	○	●	○
20-	Copper[Note 3] and Fluorine-free	ø32 to ø125	●	○	●	○
MB1□ S/V	Water resistant	ø32 to ø125	●	○	●	○
XA□	Change of rod end shape	ø32 to ø125	◎	◎	◎	◎
XB5	Oversized rod cylinder	ø32 to ø125	◎	○	○	○
XB6	Heat-resistant cylinder (–10 to 150℃)	ø32 to ø125	◎	○	○	○
XB13	Low-speed cylinder (5 to 50 mm/s)	ø32 to ø125	○	○	○	○
XC3	Special port position	ø32 to ø125	◎	○	◎	○
XC4	With heavy duty scraper	ø32 to ø125	◎	○	◎	○
XC5	Heat-resistant cylinder (–10 to 110℃)	ø32 to ø125	◎	○	○	○
XC6	Made of stainless steel	ø32 to ø125	◎	◎	◎	◎
XC7	Tie-rod, cushion valve, tie-rod nut, etc. made of stainless steel	ø32 to ø125	◎	○	◎	○
XC8	Adjustable stroke cylinder/Adjustable extension type	ø32 to ø125	◎	○	◎	○
XC9	Adjustable stroke cylinder/Adjustable retraction type	ø32 to ø125	◎	○	◎	○
XC10	Dual stroke cylinder/Double rod type	ø32 to ø125	◎	○	◎	○
XC11	Dual stroke cylinder/Single rod type	ø32 to ø125	◎	○	◎	○
XC12	Tandem cylinder	ø32 to ø125	◎	○	◎	○
XC22	Fluororubber seal	ø32 to ø125	◎	○	◎	○
XC27	Double clevis pins made of Stainless steel (Stainless steel 304)	ø32 to ø125	◎	◎	◎	◎
XC29	Double knuckle joint with spring pin	ø32 to ø125	◎	○	◎	○
XC30	Rod side trunnion	ø32 to ø125	◎ Note 1)	○	◎ Note 1)	○
XC35	With coil scraper	ø32 to ø125	◎	○	◎	○
XC59	Fluororubber seal, Built-in hard plastic magnet	ø32 to ø125	◎	○	◎	○
XC65	XC6 + XC7 specifications	ø32 to ø125	◎	○	◎	○
X846	Fastener strips mounted on switch mounting grooves	ø32 to ø125	◎	◎	◎	◎

Note 1) For Series MB1, a T bracket can be used only when selecting XC30.
Note 2) XC10 specification for Series MBK is the non-rotating type on both sides.For only one side, submit a special order request form.
Note 3) Copper is not allowed to use for the externally exposed part.

MB1 (Standard)				MB1K (Non-rotating)			
Double acting							
Double rod				Single rod		Double rod	
Air		Rubber		Air	Rubber	Air	Rubber
ø32 to ø100	ø125	ø32 to ø100	ø125	ø32 to ø100			
●	●	●	●	●	●	●	●
○	○	○	○	○	○	○	○
●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●
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●	○	●	○	—	—	—	—
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—	—	—	—	◎ Note 2)	◎ Note 2)	—	—
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◎ Note 1)	○	◎ Note 1)	○	◎ Note 1)	◎ Note 1)	◎ Note 1)	◎ Note 1)
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○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
◎	◎	◎	◎	◎	◎	◎	◎

Square Tube Type Air Cylinder: Standard Type
Double Acting, Single Rod

Series MB1

ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order

MB1 [L] [32] [ ] – [50] [ ] – [ ]

With auto switch **MDB1** [L] [32] [ ] – [50] [ ] – [M9BW] [ ] – [ ]

With auto switch
(Built-in magnet)

Mounting style

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

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm
125	125 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
(Refer to page 457 for standard strokes.)

Suffix for cylinder

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	Nil	Air cushion at both ends
	N Note)	Without air cushion

Note) In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Auto switch

Nil	Without auto switch

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

Number of auto switches

Nil	2 pcs.
S	1 pc.
3	3 pcs.
n	"n" pcs.

Made to Order
(Refer to page 457 for details.)

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDB1F40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
				2-wire		12V		M9BV	M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NAV**	M9NA**	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PAV**	M9PA**	○	○	●	○	○		
				2-wire		12 V		M9BAV**	M9BA**	○	○	●	○	○	—	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V	A93	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90V	A90	●	—	●	—	—	IC circuit	

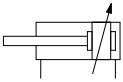
** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. A water resistant type cylinder is recommended for use in an environment which requires water resistance. Consult with SMC regarding water resistant types for ø125.

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

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

∗ Since there are other applicable auto switches than listed above, refer to page 474 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1626 and 1627.
∗ Auto switches are shipped together (not assembled).

Symbol
Double acting, Air cushion



Made to Order **Made to Order: Individual Specifications**
(For details, refer to page 475.)

Symbol	Specifications
-X846	Fastener strips mounted on switch mounting grooves

Made to Order Specifications
(For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XB5	Oversized rod cylinder
-XB6	Heat resistant cylinder (150°C)
-XC3	Special port location
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie-rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extension type
-XC9	Adjustable stroke cylinder/Adjustable retraction type
-XC10	Dual stroke cylinder/Double rod type
-XC11	Dual stroke cylinder/Single rod type
-XC12	Tandem type cylinder
-XC22	Fluororubber seals
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC29	Double knuckle joint with spring pin
-XC30	Rod side trunnion
-XC35	With coil scraper
-XC59	Fluororubber seals Built-in hard plastic magnet
-XC65	XC6 + XC7 specifications

Refer to pages 473 and 474 for cylinders with auto switches.

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

Specifications

Bore size (mm)	32	40	50	63	80	100	125
Action	Double acting, Single rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Maximum operating pressure	1.0 MPa						
Minimum operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch –10 to 70°C (No freezing)						
	With auto switch –10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Piston speed	50 to 1000 mm/s						50 to 700 mm/s
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$						
Cushion	Both ends (Air cushion) Note)						
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2	
Mounting	Basic style, Foot style, Rod side flange style, Head side flange style Single clevis style, Double clevis style						

Note) In the case of w/o air cushion, it comes with rubber bumper.

Standard Stroke

Bore size (mm)	Standard stroke (mm)	Maximum manufacturable stroke
32	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	700
40	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
50	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
63	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
80	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
100	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000	1400

Note) Intermediate strokes are available, too. (Spacer is not used.)

Accessory

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

Mounting Bracket Part No.

Bore size (mm)	32	40	50	63	80	100	125
Foot (1)	MB-L03	MB-L04	MB-L05	MB-L06	MB-L08	MB-L10	MB-L12
Flange	MB-F03	MB-F04	MB-F05	MB-F06	MB-F08	MB-F10	MB-F12
Single clevis	MB-C03	MB-C04	MB-C05	MB-C06	MB-C08	MB-C10	MB-C12
Double clevis	MB-D03	MB-D04	MB-D05	MB-D06	MB-D08	MB-D10	MB-D12

Note 1) Order two foot brackets per cylinder.
Note 2) Accessories for each mounting bracket are as follows. Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins,cotter pins and flat washer. Refer to page 463 for details.

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Theoretical Output

(N) → OUT ← IN

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	OUT	804	161	241	322	402	482	563	643	724	804
		IN	691	138	207	276	346	415	484	553	622	691
40	16	OUT	1257	251	377	503	629	754	880	1006	1131	1257
		IN	1056	211	317	422	528	634	739	845	950	1056
50	20	OUT	1963	393	589	785	982	1178	1374	1570	1767	1963
		IN	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	OUT	3117	623	935	1247	1559	1870	2182	2494	2805	3117
		IN	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	OUT	5027	1005	1508	2011	2514	3016	3519	4022	4524	5027
		IN	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	30	OUT	7854	1571	2356	3142	3927	4712	5498	6283	7069	7854
		IN	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
125	32	OUT	12272	2454	3682	4909	6136	7363	8590	9818	11045	12272
		IN	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

(kg)

Bore size (mm)		**32**	**40**	**50**	**63**	**80**	**100**	**125**
Basic weight	Basic style	0.53	0.72	1.24	1.54	2.84	3.83	5.68
	Foot style	0.65	0.86	1.46	1.82	3.34	4.49	7.76
	Flange style	0.82	1.09	1.69	2.33	4.29	7.14	9.84
	Single clevis style	0.78	0.95	1.58	2.17	3.95	7.0	8.25
	Double clevis style	0.79	0.99	1.67	2.33	4.24	7.52	8.45
Additional weight per each 50 mm of stroke	All mounting brackets	0.16	0.21	0.33	0.37	0.56	0.72	0.94
Accessory bracket	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation:
(Example) **MB1B32-100** (Basic style/ø32, 100 st)
- Basic weight·····0.53 (Basic style, ø32)
- Additional weight·····0.16/50 mm stroke
- Cylinder stroke·····100 mm stroke

0.53 + 0.16 x 100/50 = 0.85 kg

Consideration of the Cushion

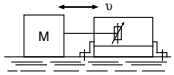
For details about the kinetic energy absorbable by the cushion mechanism and w/ air cushion, refer to page 1823.

Kinetic Energy Absorbable by the Cushion Mechanism

Bore size (mm)	Effective cushion length (mm)	Kinetic energy absorbable (J)
32	18.8	2.2
40	18.8	3.4
50	21.3	5.9
63	21.3	11
80	30.3	20
100	29.3	29
125	Rod side 31.4 Head side 29.4	43

With Air Cushion

At the stroke end, when stopping a large amount of kinetic energy generated by a large load and high speed operation, compression of air is used to absorb the impact without transmitting vibration to the surroundings. The purpose of an air cushion is not to reduce the speed of a piston as it nears the stroke end. The kinetic energy of load can be found using the following formula.

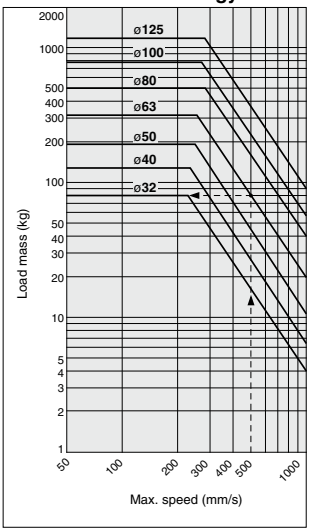


$$Ek = \frac{M}{2}\upsilon^2$$

Ek : Kinetic energy (J)
M : Mass of load (kg)
υ : Piston speed (m/s)

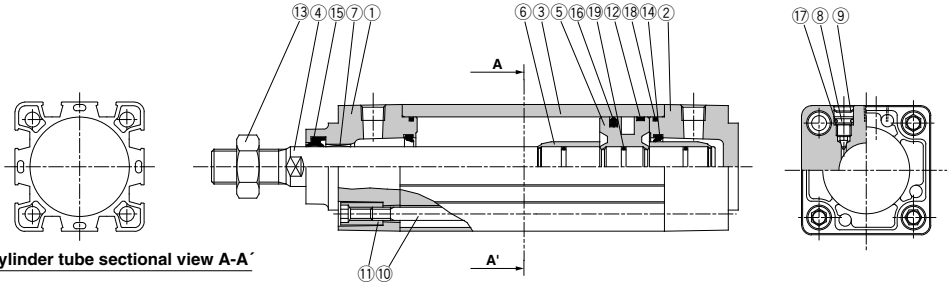
If the kinetic energy obtained is no greater than the absorbable kinetic energy shown in the table above, the life of the cushion seal will be 10 million cycles or more.

Allowable Kinetic Energy



Example) Load limit at rod end when the air cylinder ø63 is actuated with max. speed of 500 mm/s.
Extend upward from 500 mm/s on the horizontal axis of the graph to the intersection point with the line for a tube bore of 63 mm, and then extend leftward from this point to find the load of 80 kg.

Construction



Cylinder tube sectional view A-A´

Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum die-casted	Metallic painted
2	**Head cover**	Aluminum die-casted	Metallic painted
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Carbon steel	Hard chrome plated
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring**	Aluminum alloy	Anodized
7	**Bushing**	Lead-bronze casted	
8	**Cushion valve**	Steel wire	Nickel plated
9	**Retaining ring**	Spring steel	ø40 to ø100
10	**Tie-rod**	Carbon steel	Zinc chromated
11	**Tie-rod nut**	Carbon steel	Nickel plated
12	**Wear ring**	Resin	
13	**Rod end nut**	Carbon steel	Nickel plated

No.	Description	Material	Note
14*	**Cushion seal**	Urethane	
15*	**Rod seal**	NBR	
16*	**Piston seal**	NBR	
17	**Cushion valve seal**	NBR	
18*	**Cylinder tube gasket**	NBR	
19	**Piston gasket**	NBR	

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MB32-PS	Set of the above nos. ⑭, ⑮, ⑯, ⑱
40	MB40-PS	
50	MB50-PS	
63	MB63-PS	
80	MB80-PS	
100	MB100-PS	

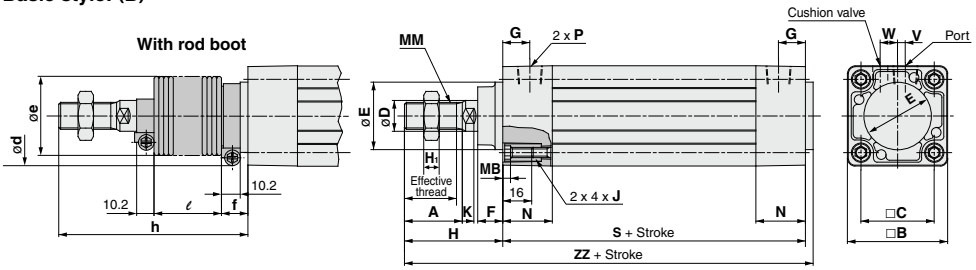
* Seal kit includes 14 to 16, 18. Order the seal kit, based on each bore size.
* Seal kit includes a grease pack (ø32 to 50 : 10 g, ø63, 80 : 20 g, ø100 : 30g). Order with the following part number when only the grease pack is needed.
Grease pack part number : GR-S-010 (10g), **GR-S-020** (20g)

Water Resistant Air Cylinders

As compared to the standard cylinder, anti-coolant performance has been improved, and suitable for using under the atmosphere having coolant in the machine tools. Improved water resistant air cylinder, Series MB is also available, which is compliant for the environment having water splashed on the food machinery, or car washing machine, etc. Refer to page 1121 for details.

Standard Type

Basic style: (B)



Without Air Cushion

Bore size (mm)	S	ZZ	Bore size (mm)	S	ZZ
32	90	141	**63**	102	164
40	90	145	**80**	124	200
50	102	164	**100**	124	200
			125	132	235

∗ In the case of w/o air cushion, it comes with rubber bumper. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Bore size (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H_1	H	MA	MB	J	K	MM	N	P	S∗	V	W	ZZ∗
32	Up to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	27	1/8	84	4	6.5	135
40	Up to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	27	1/4	84	4	9	139
50	Up to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	1/4	94	5	10.5	156
63	Up to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31.5	3/8	94	9	12	156
80	Up to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	38	3/8	114	11.5	14	190
100	Up to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	38	1/2	114	17	15	190
125	Up to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2	38	1/2	120	17	15	223

With Rod Boot

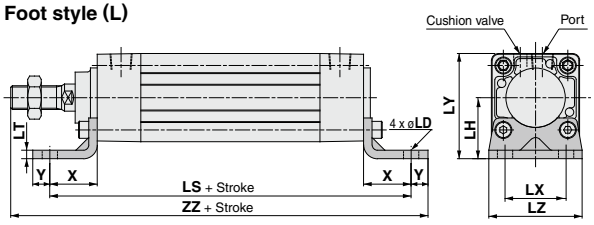
(mm)

Bore size (mm)	d	e	f	ℓ												h											
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	73	86	98	111	136	161	186	—	—	—	—	—
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	81	94	106	119	144	169	194	—	—	—	—	—
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	289	—	—
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	289	—	—
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	120	130	140	150	170	190	210	230	250	270	290	310

Standard Type: With Mounting Bracket

∗ Dimensions not shown are the same as basic style. (drawing above)

Foot style (L)



Without Air Cushion

Bore size (mm)	LS	ZZ
32	134	168
40	138	176
50	156	198
63	156	201
80	184	240
100	188	244
125	222	294

∗ In the case of w/o air cushion, it comes with rubber bumper. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

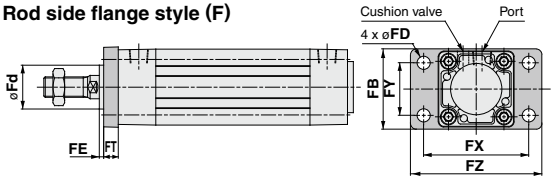
Foot Style

(mm)

Bore size (mm)	Stroke range	X	Y	LD	LH	LS∗	LT	LX	LY	LZ	ZZ∗
32	Up to 700	22	9	7	30	128	3.2	32	53	50	162
40	Up to 800	24	11	9	33	132	3.2	38	59	55	170
50	Up to 1000	27	11	9	40	148	3.2	46	72.5	70	190
63	Up to 1000	27	14	12	45	148	3.6	56	82.5	80	193
80	Up to 1000	30	14	12	55	174	4.5	72	102.5	100	230
100	Up to 1000	32	16	14	65	178	4.5	89	122	120	234
125	Up to 1400	45	20	14	81	210	8	90	149	136	282

Standard Type: With Mounting Bracket

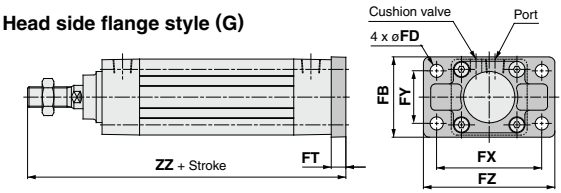
Rod side flange style (F)



Rod Side Flange Style

Bore size (mm)	Stroke range	FB	FD	FE	FT	FX	FY	FZ	Fd
32	to 700	50	7	3	10	64	32	79	25
40	to 800	55	9	3	10	72	36	90	31
50	to 1000	70	9	2	12	90	45	110	38.5
63	to 1000	80	9	2	12	100	50	120	39.5
80	to 1000	100	12	4	16	126	63	153	45.5
100	to 1000	120	14	4	16	150	75	178	54
125	to 1400	138	14	7	20	180	102	216	57.5

Head side flange style (G)



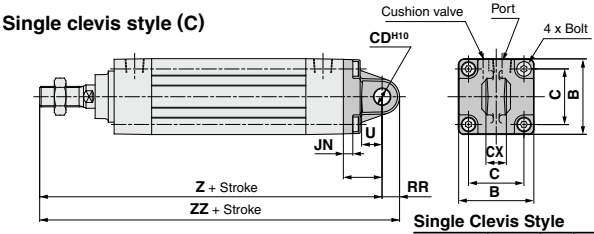
Without Air Cushion

Bore size (mm)	ZZ
32	147
40	151
50, 63	172
80, 100	212
125	249

Head Side Flange Style

Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	ZZ*
32	to 500	50	7	10	64	32	79	141
40	to 500	55	9	10	72	36	90	145
50	to 600	70	9	12	90	45	110	164
63	to 600	80	9	12	100	50	120	164
80	to 800	100	12	16	126	63	153	202
100	to 800	120	14	16	150	75	178	202
125	to 1000	138	14	20	180	102	216	237

Single clevis style (C)



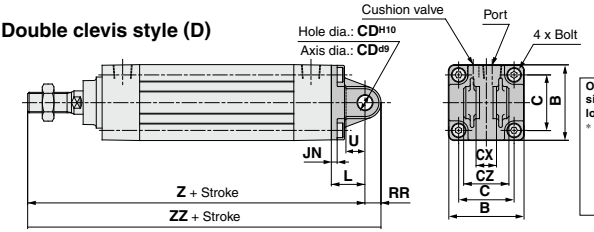
Without Air Cushion

Bore size (mm)	Z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

Single Clevis Style

Bore size (mm)	Stroke range	B	C	JN	L	RR	U	CD H10	CX +0.3 +0.1	Z*	ZZ*	Bolt
32	to 500	46	32.5	5	23	10.5	13	10	14	154	164.5	MB-32-48-C1247
40	to 500	52	38	5	23	11	13	10	14	158	169	(M6 x 1 x 16L, Low head)
50	to 600	65	46.5	6	30	15	17	14	20	182	197	MB-50-48-C1249
63	to 600	75	56.5	6	30	15	17	14	20	182	197	(M8 x 1.25 x 18L, Low head)
80	to 800	95	72	8	42	23	26	22	30	228	251	MB-80-48BC1251
100	to 800	114	89	8	42	23	26	22	30	228	251	(M10 x 1.5 x 22L, Low head)
125	to 1000	136	110	10	50	28	30	25	32	267	295	M12 x 1.75 x 28L, Low head

Double clevis style (D)



Overall length of rod/head side flange, single/double clevis, and method for longitudinal mounting

* When there is no air cushion, the unit is equipped with rubber bumpers. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Without Air Cushion

Bore size (mm)	Z	ZZ
32	160	170.5
40	164	175
50, 63	190	205
80, 100	238	261
125	279	307

Double Clevis Style

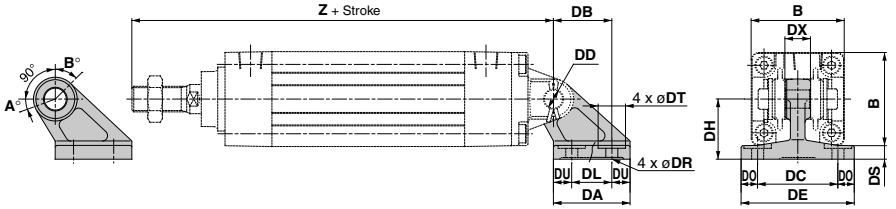
Bore size (mm)	Stroke range	B	C	JN	L	RR	U	CD H10	CX +0.3 +0.1	CZ	Z*	ZZ*	Bolt
32	to 500	46	32.5	5	23	10.5	13	10	14	28	154	164.5	MB-32-48-C1247
40	to 500	52	38	5	23	11	13	10	14	28	158	169	(M6 x 1 x 16L, Low head)
50	to 600	65	46.5	6	30	15	17	14	20	40	182	197	MB-50-48-C1249
63	to 600	75	56.5	6	30	15	17	14	20	40	182	197	(M8 x 1.25 x 18L, Low head)
80	to 800	95	72	8	42	23	26	22	30	60	228	251	MB-80-48BC1251
100	to 800	114	89	8	42	23	26	22	30	60	228	251	(M10 x 1.5 x 22L, Low head)
125	to 1000	136	110	10	50	28	30	25	32	64	267	295	M12 x 1.75 x 28L, Low head

Pivot Bracket/Double Clevis Pivot Bracket

Type

Description \ Bore size	MB□32	MB□40	MB□50	MB□63	MB□80	MB□100	MB□125
Double clevis pivot bracket	MB-B03		MB-B05		MB-B08		MB-B12

Double clevis pivot bracket



(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z*	DD_{H10}
MB-B03	32	46	42	32	22	10	44	14	62	9	6.6	15	7	33	154	$10^{+0.058}_{0}$
	40	52	42	32	22	10	44	14	62	9	6.6	15	7	33	158	$10^{+0.058}_{0}$
MB-B05	50	65	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	$14^{+0.070}_{0}$
	63	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	182	$14^{+0.070}_{0}$
MB-B08	80	95	73	64	45	14	86	30	111	12.5	11	22	10	65	228	$22^{+0.084}_{0}$
	100	114	73	64	45	14	86	30	111	12.5	11	22	10	65	228	$22^{+0.084}_{0}$
MB-B12	125	136	90	78	60	15	110	32	136	13	13.5	24	14	75	267	$25^{+0.084}_{0}$

Without Air Cushion

Bore size (mm)	Z
32	160
40	164
50	190
63	190
80	238
100	238
125	279

Rotating Angle

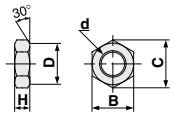
Bore size (mm)	A°	B°	A° + B° + 90°
32, 40	25°	45°	160°
50, 63	40°	60°	190°
80, 100	30°	55°	175°
125	30°	50°	170°

Method for longitudinal mounting of clevis pivot bracket

∗ In the case of w/o air cushion, it comes with rubber bumper. Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

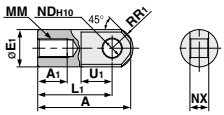
Accessory Bracket Dimensions

Rod end nut (Standard equipment)



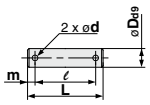
Part no.	Bore size (mm)	d	H	B	C	D
NT-03	32	M10 x 1.25	6	17	19.6	16.5
NT-04	40	M14 x 1.5	8	22	25.4	21
NT-05	50, 63	M18 x 1.5	11	27	31.2	26
NT-08	80	M22 x 1.5	13	32	37.0	31
NT-10	100	M26 x 1.5	16	41	47.3	39
NT-12M	125	M27 x 2	16	41	47.3	39

I type single Knuckle joint



Part no.	Bore size (mm)	A	A_1	E_1	L_1	MM	R_1	U_1	ND_{H10}	NX
I-03M	32	40	14	20	30	M10 x 1.25	12	16	$10^{+0.058}_{0.0}$	$14^{-0.10}_{-0.30}$
I-04M	40	50	19	22	40	M14 x 1.5	12.5	19	$10^{+0.058}_{0.0}$	$14^{-0.10}_{-0.30}$
I-05M	50, 63	64	24	28	50	M18 x 1.5	16.5	24	$14^{+0.070}_{0.0}$	$20^{-0.10}_{-0.30}$
I-08M	80	80	26	40	60	M22 x 1.5	23.5	34	$22^{+0.084}_{0.0}$	$30^{-0.10}_{-0.30}$
I-10M	100	80	26	40	60	M26 x 1.5	23.5	34	$22^{+0.084}_{0.0}$	$30^{-0.10}_{-0.30}$
I-12M	125	119	36	46	92	M27 x 2	28.5	34	$25^{+0.084}_{0.0}$	$32^{-0.10}_{-0.30}$

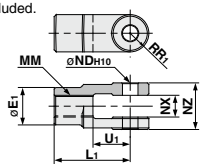
Knuckle joint pin Clevis pin



Part no.	Bore size (mm) Clevis	Bore size (mm) Knuckle	D_{d9}	L	ℓ	m	d (Drill through)	Cotter pin
CD-M03(1)	32, 40		$10^{-0.040}_{-0.076}$	44	36	4	3	ø3 x 18ℓ
CD-M05(1)	50, 63		$14^{-0.050}_{-0.093}$	60	51	4.5	4	ø4 x 25ℓ
CD-M08(1)	80, 100		$22^{-0.065}_{-0.117}$	82	72	5	4	ø4 x 35ℓ
IY-12(2)	125		$25^{-0.065}_{-0.117}$	79.5	69.5	5	4	ø4 x 40ℓ

Note 1) Cotter pins and flat washers are included.
Note 2) Only pins are included.

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(1)	32	20	30	M10 x 1.25	10	16	$10^{+0.058}_{0.0}$	$14^{+0.30}_{+0.10}$	$28^{-0.10}_{-0.30}$
Y-04M(1)	40	22	40	M14 x 1.5	11	19	$10^{+0.058}_{0.0}$	$14^{+0.30}_{+0.10}$	$28^{-0.10}_{-0.30}$
Y-05M(1)	50, 63	28	50	M18 x 1.5	14	24	$14^{+0.070}_{0.0}$	$20^{+0.30}_{+0.10}$	$40^{-0.10}_{-0.30}$
Y-08M(1)	80	40	65	M22 x 1.5	20	34	$22^{+0.084}_{0.0}$	$30^{+0.30}_{+0.10}$	$60^{-0.10}_{-0.30}$
Y-10M(1)	100	40	65	M26 x 1.5	20	34	$22^{+0.084}_{0.0}$	$30^{+0.30}_{+0.10}$	$60^{-0.10}_{-0.30}$
Y-12M(1)	125	46	100	M27 x 2	27	42	$25^{+0.084}_{0.0}$	$32^{+0.30}_{+0.10}$	$64^{-0.10}_{-0.30}$

Note 1) Pins, cotter pins, and flat washers are included.
Note 2) Pins and cotter pins are included.

Bracket Combinations

Bracket Combinations Available ▶ Refer to table together with combination drawings.

Cylinder mounting bracket \ Support bracket for work mounting side	Single clevis	Double clevis	Single knuckle joint	Double knuckle joint	Clevis pivot bracket
Single clevis	—	①	—	②	—
Double clevis	③	—	④	—	⑨
Single knuckle joint	—	⑤	—	⑥	—
Double knuckle joint	⑦	—	⑧	—	⑩

No.	Appearance	No.	Appearance
①	Single clevis + Double clevis	⑥	Single knuckle joint + Double knuckle joint
②	Single clevis + Double knuckle joint	⑦	Double knuckle joint + Single clevis
③	Double clevis + Single clevis	⑧	Double knuckle joint + Single knuckle joint
④	Double clevis + Single knuckle joint	⑨	Double clevis + Clevis pivot bracket
⑤	Single knuckle joint + Double clevis	⑩	Double knuckle joint + Clevis pivot bracket

Square Tube Type Air Cylinder: Standard Type
Double Acting, Double Rod
Series MB1W
ø32, ø40, ø50, ø63, ø80, ø100, ø125

How to Order

MB1W **L** **32** **□** – **150** **□** – **□**

With auto switch **MDB1W** **L** **32** **□** – **150** **□** – **M9BW** **□** – **□**

With auto switch
(Built-in magnet)

Mounting style

B	Basic style
L	Foot style
F	Flange style

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm
125	125 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
(Refer to page 465 for standard strokes.)

Suffix for cylinder

Rod boot	**Nil**	None
	J	Nylon tarpaulin (One end)
	JJ	Nylon tarpaulin (Both ends)
	K	Heat resistant tarpaulin (One end)
	KK	Heat resistant tarpaulin (Both ends)
Cushion	**Nil**	Air cushion at both ends
	N Note)	Without air cushion

Note) In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

Auto switch

Nil	Without auto switch

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

Number of auto switches

Nil	2 pcs.
S	1 pc.
3	3 pcs.
n	"n" pcs.

Made to Order
(Refer to page 466 for details.)

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDB1WB40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NAV**	M9NA**	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PAV**	M9PA**	○	○	●	○	○		
				2-wire		12 V		M9BAV**	M9BA**	○	○	●	○	○	—	
Reed auto switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V	A93	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90V	A90	●	—	●	—	—	IC circuit	

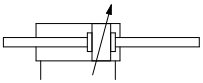
** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

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

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

∗ Since there are other applicable auto switches than listed above, refer to page 474 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1626 and 1627.
∗ Auto switches are shipped together (not assembled).

Symbol
Double acting, Air cushion



Standard Stroke

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
125	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000

Intermediate strokes are available, too.
(Spacer is not used.)

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Mounting Bracket Part No.

Bore size (mm)	**32**	**40**	**50**
Foot	MB-L03	MB-L04	MB-L05
Flange	MB-F03	MB-F04	MB-F05

Bore size (mm)	**63**	**80**	**100**
Foot	MB-L06	MB-L08	MB-L10
Flange	MB-F06	MB-F08	MB-F10

Bore size (mm)	**125**
Foot	MB-L12
Flange	MB-F12

Note) Order two foot brackets per cylinder.

Refer to pages 473 and 474 for cylinders with auto switches.

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

Specifications

Bore size (mm)	**32**	**40**	**50**	**63**	**80**	**100**	**125**
Action	Double acting, Double rod						
Fluid	Air						
Proof pressure	1.5 MPa						
Maximum operating pressure	1.0 MPa						
Minimum operating pressure	0.05 MPa						
Ambient and fluid temperature	Without auto switch –10 to 70°C (No freezing)						
	With auto switch –10 to 60°C (No freezing)						
Lubrication	Not required (Non-lube)						
Piston speed	50 to 1000 mm/s						50 to 700 mm/s
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 800: $^{+1.4}_{0}$						
Cushion Note)	Both ends (Air cushion) Note)						
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2	
Mounting	Basic style, Foot style, Flange style						

Note) In the case of w/o air cushion, it comes with rubber bumper.
Kinetic energy absorbable by the cushion mechanism is identical to double acting, single rod.

Accessory

Mounting		Basic style	Foot style	Flange style
Standard equipment	Rod end nut	●	●	●
Option	Single knuckle joint	●	●	●
	Double knuckle (With pin)	●	●	●
	Rod boot	●	●	●

Theoretical Output

OUT ←
IN →

(N)

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm^2)	Operating pressure (MPa)								
				0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
32	12	IN/OUT	691	138	207	276	346	415	484	553	622	691
40	16	IN/OUT	1056	211	317	422	528	634	739	845	950	1056
50	20	IN/OUT	1649	330	495	660	825	989	1154	1319	1484	1649
63	20	IN/OUT	2803	561	841	1121	1402	1682	1962	2242	2523	2803
80	25	IN/OUT	4536	907	1361	1814	2268	2722	3175	3629	4082	4536
100	30	IN/OUT	7147	1429	2144	2859	3574	4288	5003	5718	6432	7147
125	32	IN/OUT	11468	2294	3440	4588	5734	6881	8028	9174	10321	11468

Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

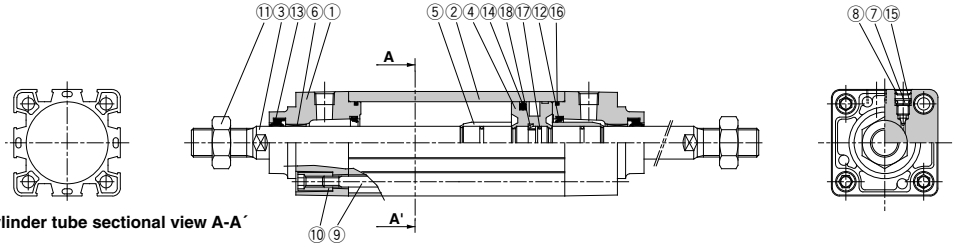
(kg)

Bore size (mm)		**32**	**40**	**50**	**63**	**80**	**100**	**125**
Basic weight	Basic style	0.59	0.82	1.39	1.72	3.22	4.27	6.68
	Foot style	0.71	0.96	1.61	2.0	3.72	4.93	8.76
	Flange style	0.88	1.19	1.84	2.51	4.67	7.58	10.86
Additional weight per each 50 mm of stroke	All mounting brackets	0.20	0.29	0.41	0.45	0.75	1.0	1.25
Accessory bracket	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83	1.10
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27	0.91

Calculation:
(Example) **MB1WB32-100** (Basic style/ø32, 100 st)
- Basic weight·····0.59 kg
- Additional weight·····0.20/50 stroke
- Cylinder stroke·····100 stroke

0.59 + 0.20 x 100/50 = 0.99 kg

Construction



Cylinder tube sectional view A-A´

Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum die-casted	Metallic painted
2	**Cylinder tube**	Aluminum alloy	Hard anodized
3	**Piston rod**	Carbon steel	Hard chrome plated
4	**Piston**	Aluminum alloy	Chromated
5	**Cushion ring**	Aluminum alloy	Anodized
6	**Bushing**	Lead-bronze casted	
7	**Cushion valve**	Steel wire	Nickel plated
8	**Retaining ring**	Spring steel	ø40 to ø100
9	**Tie-rod**	Carbon steel	Zinc chromated
10	**Tie-rod nut**	Carbon steel	Nickel plated
11	**Rod end nut**	Carbon steel	Nickel plated

No.	Description	Material	Note
12*	**Cushion seal**	Urethane	
13*	**Rod seal**	NBR	
14*	**Piston seal**	NBR	
15	**Cushion valve seal**	NBR	
16*	**Cylinder tube gasket**	NBR	
17	**Piston gasket**	NBR	
18	**Piston holder**	Urethane	

Replacement Parts/Seal Kit

Bore size (mm)	Kit no.	Contents
32	MBW32-PS	Set of the above nos. ⑫, ⑬, ⑭, ⑯
40	MBW40-PS	
50	MBW50-PS	
63	MBW63-PS	
80	MBW80-PS	
100	MBW100-PS	

∗ Seal kit includes ⑫ to ⑭, ⑯. Order the seal kit, based on each bore size.
∗ Seal kit includes a grease pack (ø32 to 50: 10 g, ø63, 80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Made to Order: Individual Specifications (For details, refer to page 475.)

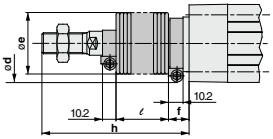
Symbol	Specifications
-X846	Fastener strips mounted on switch mounting grooves

Made to Order Specifications (For details, refer to pages 1675 to 1818.)

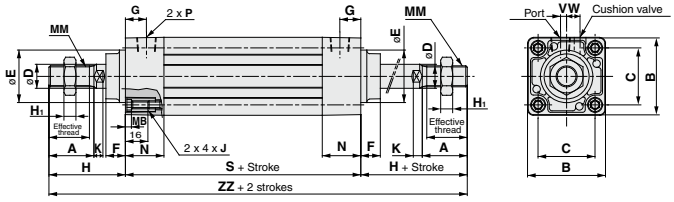
Symbol	Specifications
-XA□	Change of rod end shape
-XB6	Heat resistant cylinder (150°C)
-XC3	Special port location
-XC4	With heavy duty scraper
-XC5	Heat resistant cylinder (110°C)
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie-rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC22	Fluororubber seals
-XC30	Rod side trunnion
-XC35	With coil scraper

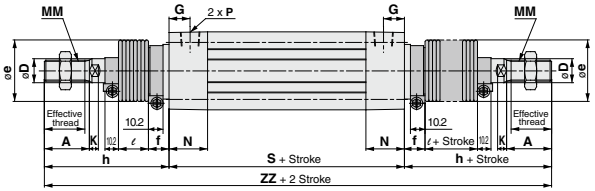
Standard Type

Basic style: (B)



With rod boot





* In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm, ø125: +12 mm.

** In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +3 mm, ø50, ø63: +4 mm, ø80, ø100: +5 mm, ø125: +6 mm (In the case of trunnion style and trunnion pivot bracket).

Without Air Cushion

Bore size (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	D	Ee11	F	G	H1	H	MA	MB	J	K	MM	N	P	S*	V	W	ZZ*	S	ZZ
32	Up to 500	19.5	10	22	46	32.5	12	30	13	13	6	47	16	4	M6 x 1	6	M10 x 1.25	26.5	1/8	84	4	6.5	178	90	184
40	Up to 500	27	14	30	52	38	16	35	13	14	8	51	16	4	M6 x 1	6	M14 x 1.5	26.5	1/4	84	4	9	186	90	192
50	Up to 600	32	18	35	65	46.5	20	40	14	15.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31	1/4	94	5	10.5	210	102	218
63	Up to 600	32	18	35	75	56.5	20	45	14	16.5	11	58	16	5	M8 x 1.25	7	M18 x 1.5	31	3/8	94	9	12	210	102	218
80	Up to 800	37	22	40	95	72	25	45	20	19	13	72	16	5	M10 x 1.5	10	M22 x 1.5	37.5	3/8	114	11.5	14	258	124	268
100	Up to 800	37	26	40	114	89	30	55	20	19	16	72	16	5	M10 x 1.5	10	M26 x 1.5	37.5	1/2	114	17	15	258	124	268
125	Up to 1000	50	27	54	136	110	32	60	27	19	16	97	20	6	M12 x 1.75	13	M27 x 2.0	38	1/2	120	17	15	314	132	316

With Rod Boot

Bore size (mm)	d	e	f	ℓ											h										
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	54	36	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	73	86	98	111	136	161	186	—	—	—	—	—
40	56	41	23	12.5	25	37.5	50	75	100	125	—	—	—	—	—	81	94	106	119	144	169	194	—	—	—	—	—
50	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—
63	64	51	25	12.5	25	37.5	50	75	100	125	150	—	—	—	—	89	102	114	127	152	177	202	227	—	—	—	—
80	68	56	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	276	—	—
100	76	61	29	12.5	25	37.5	50	75	100	125	150	175	200	—	—	101	114	126	139	164	189	214	239	264	276	—	—
125	82	75	27	10	20	30	40	60	80	100	120	140	160	180	200	120	130	140	150	170	190	210	230	250	270	290	310

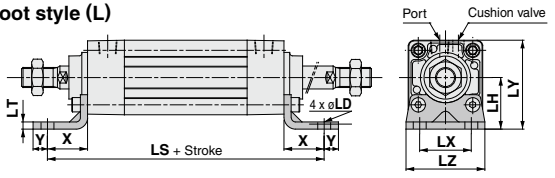
Note) ZZ indicates dimensions for double side rod boot.

Bore size (mm)	ZZ Note)										
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	701 to 800	801 to 900	901 to 1000
32	230	256	280	306	356	406	456	—	—	—	—	—
40	246	272	296	322	372	422	472	—	—	—	—	—
50	272	298	322	348	398	448	498	548	—	—	—	—
63	272	298	322	348	398	448	498	548	—	—	—	—
80	316	342	366	392	442	492	542	592	642	692	—	—
100	316	342	366	392	442	492	542	592	642	692	—	—
125	340	360	380	400	440	480	520	560	600	640	680	720

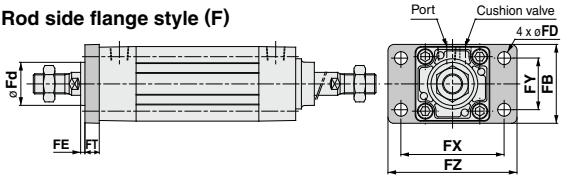
Standard Type: With Mounting Bracket

* Dimensions not indicated are the same as the standard type (page 467).

Foot style (L)



Rod side flange style (F)



Foot Style

Bore size (mm)	Stroke range	X	Y	LD	LH	LS*	LT	LX	LY	LZ
32	Up to 500	22	9	7	30	128	3.2	32	53	50
40	Up to 500	24	11	9	33	132	3.2	38	59	55
50	Up to 600	27	11	9	40	148	3.2	46	72.5	70
63	Up to 600	27	14	12	45	148	3.6	56	82.5	80
80	Up to 800	30	14	12	55	174	4.5	72	102.5	100
100	Up to 800	32	16	14	65	178	4.5	89	122	120
125	Up to 1000	45	20	14	81	210	8	90	149	136

Rod Side Flange Style

Bore size (mm)	Stroke range	FB	FD	FT	FX	FY	FZ	Fd
32	Up to 500	50	7	10	64	32	79	25
40	Up to 500	55	9	10	72	36	90	31
50	Up to 600	70	9	12	90	45	110	38.5
63	Up to 600	80	9	12	100	50	120	39.5
80	Up to 800	100	12	16	126	63	153	45.5
100	Up to 800	120	14	16	150	75	178	54
125	Up to 1000	138	14	20	180	102	216	57.5

Square Tube Type Air Cylinder: Non-rotating Rod Type
Double Acting, Single Rod
Series MB1K
ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MB1K L 32 – 50 –

With auto switch MDB1K L 32 – 50 – M9BW –

With auto switch
(Built-in magnet)

Mounting style

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

Bore size

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

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
(Refer to page 470 for standard strokes.)

Suffix for cylinder

Rod boot	**Nil**	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	**Nil**	Air cushion at both ends
	N Note)	Without air cushion

Note) In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm.

Auto switch

Nil	Without auto switch

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

Number of auto switches

Nil	2 pcs.
S	1 pc.
3	3 pcs.
n	"n" pcs.

Made to Order
(Refer to page 470 for details.)

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) MDB1KB40-100

Applicable Auto Switches/Refer to pages 1559 to 1673 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Perpendicular	Auto switch model: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○		
				2-wire		12 V		M9BV	M9B	●	●	●	○	○	—	
	Diagnostic indication (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NWV	M9NW	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	○		
				2-wire		12 V		M9BWV	M9BW	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NAV**	M9NA**	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PAV**	M9PA**	○	○	●	○	○		
				2-wire		12 V		M9BAV**	M9BA**	○	○	●	○	○	—	
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93V	A93	●	—	●	●	—	—	Relay, PLC
							100 V or less	A90V	A90	●	—	●	—	—	IC circuit	

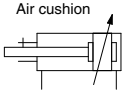
∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

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

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

∗ Since there are other applicable auto switches than listed above, refer to page 474 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1626 and 1627.
∗ Auto switches are shipped together (not assembled).

Symbol
Air cushion



Made to Order: Individual Specifications
(For details, refer to page 475.)

Symbol	Specifications
-X846	Fastener strips mounted on switch mounting grooves

Made to Order Specifications
(For details, refer to pages 1675 to 1818.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC3	Special port location
-XC6	Piston rod and rod end nut made of stainless steel
-XC7	Tie-rod, cushion valve, tie rod nut, etc. made of stainless steel
-XC8	Adjustable stroke cylinder/Adjustable extension type
-XC9	Adjustable stroke cylinder/Adjustable retraction type
-XC10	Dual stroke cylinder/Double rod type
-XC27	Double clevis pin and double knuckle pin made of stainless steel
-XC30	Rod side trunnion

Mounting Bracket Part No.

Bore size (mm)	32	40	50
Foot (1)	MB-L03	MB-L04	MB-L05
Flange	MB-F03	MB-F04	MB-F05
Single clevis	MB-C03	MB-C04	MB-C05
Double clevis	MB-D03	MB-D04	MB-D05

Bore size (mm)	63	80	100
Foot (1)	MB-L06	MB-L08	MB-L10
Flange	MB-F06	MB-F08	MB-F10
Single clevis	MB-C06	MB-C08	MB-C10
Double clevis	MB-D06	MB-D08	MB-D10

Note 1) Order two foot brackets per cylinder.
Note 2) Accessories for each mounting bracket are as follows: Foot, flange, single clevis/body mounting bolt, double clevis/body mounting bolt, clevis pins, cotter pins and flat washer. Refer to page 463 for details.

Refer to pages 473 and 474 for cylinders with auto switches.

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

Specifications

Bore size (mm)	32	40	50	63	80	100
Action	Double acting, Single rod					
Fluid	Air					
Proof pressure	1.5 MPa					
Maximum operating pressure	1.0 MPa					
Minimum operating pressure	0.05 MPa					
Ambient and fluid temperature	Without auto switch –10 to 70°C (No freezing)					
	With auto switch –10 to 60°C (No freezing)					
Lubrication	Not required (Non-lube)					
Piston speed	50 to 1000 mm/s					
Stroke length tolerance Note)	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$, 1001 to 1500: $^{+1.8}_{0}$					
Cushion	Both ends (Air cushion) Note)					
Port size (Rc, NPT, G)	1/8	1/4		3/8		1/2
Mounting	Basic style, Foot style, Rod side flange style, Head side flange style Single clevis style, Double clevis style					

Rod non-rotating accuracy	ø32, ø40	±0.5°
	ø50, ø63	±0.5°
	ø80, ø100	±0.3°

Allowable rotational torque (N·m or less)	ø32	0.25	ø80	0.79
	ø40	0.45	ø100	0.93
	ø50, ø63	0.64	—	—

Note) In the case of w/o air cushion, it comes with rubber bumper.
Kinetic energy absorbable by the cushion mechanism is identical to double acting, single rod.

Accessory

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

Standard Stroke

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

Intermediate strokes are available, too.
(Spacer is not used.)

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Theoretical Output

OUT side is the same value as double acting, single rod. But, IN side is different. For IN side, refer to the table below.

Bore size (mm)	Piston area (mm^2)	Bore size (mm)	Piston area (mm^2)
32	675	**63**	2804
40	1082	**80**	4568
50	1651	**100**	7223

Theoretical output (N) = Pressure (MPa) x Piston area (mm^2)

Weight

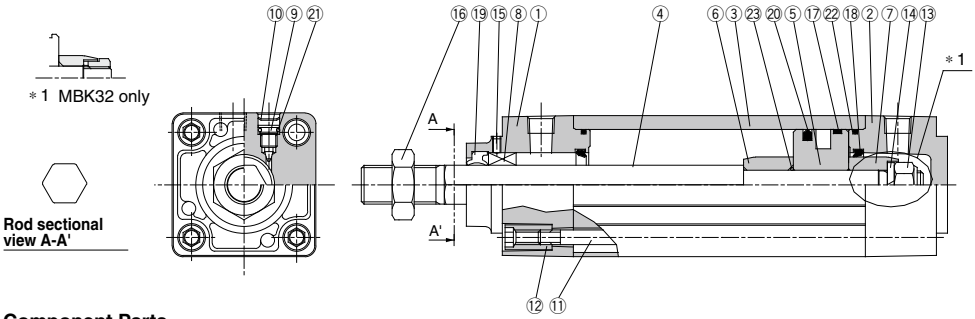
(kg)

Bore size (mm)		32	40	50	63	80	100
Basic weight	Basic style	0.53	0.69	1.26	1.58	2.69	3.86
	Foot style	0.65	0.83	1.48	1.86	3.19	4.52
	Flange style	0.82	1.06	1.69	2.37	4.14	7.17
	Single clevis style	0.78	0.92	1.60	2.21	3.8	7.03
	Double clevis style	0.79	0.96	1.69	2.37	4.09	7.55
Additional weight per each 50 mm of stroke	All mounting brackets	0.16	0.21	0.33	0.37	0.56	0.72
Accessory bracket	Single knuckle	0.15	0.23	0.26	0.26	0.60	0.83
	Double knuckle (With pin)	0.22	0.37	0.43	0.43	0.87	1.27

Calculation:
(Example) **MB1K32-100** (Basic style/ø32, 100 st)
- Basic weight·····0.53 kg
- Additional weight·····0.16/50 stroke
- Cylinder stroke·····100 stroke

0.53 + 0.16 x 100/50 = 0.85 kg

Construction



Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum die-casted	Metallic painted
2	**Head cover**	Aluminum die-casted	Metallic painted
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Stainless steel	
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring A**	Rolled steel	
7	**Cushion ring B**	Rolled steel	
8	**Non-rotating guide**	Oil-impregnated sintered alloy	
9	**Cushion valve**	Steel wire	Nickel plated
10	**Retaining ring**	Spring steel	ø40 to ø100
11	**Tie-rod**	Carbon steel	Zinc chromated
12	**Tie-rod nut**	Carbon steel	Nickel plated

No.	Description	Material	Note
13	**Piston nut**	Rolled steel	
14	**Spring washer**	Steel wire	
15	**Set screw**	Steel wire	
16	**Rod end nut**	Carbon steel	Nickel plated
17	**Wear ring**	Resin	
18∗	**Cushion seal**	Urethane	
19∗	**Rod seal**	NBR	
20∗	**Piston seal**	NBR	
21	**Cushion valve seal**	NBR	
22∗	**Cylinder tube gasket**	NBR	
23	**Piston gasket**	NBR	

Replacement Parts/Seal Kit

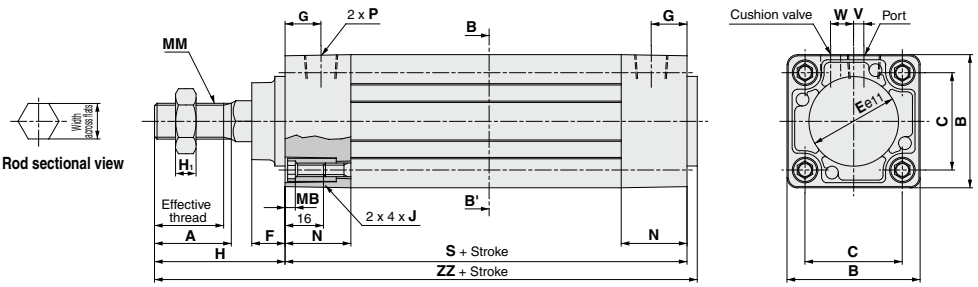
Bore size (mm)	Kit no.	Contents
32	MBK32-PS	Set of the above nos. ⑱, ⑲, ⑳, ㉒
40	MBK40-PS	
50	MBK50-PS	
63	MBK63-PS	
80	MBK80-PS	
100	MBK100-PS	

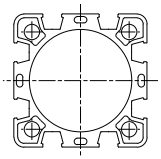
∗ Seal kit includes 18 to 20, 22. Order the seal kit, based on each bore size.
∗ Seal kit includes a grease pack (ø32 to 50 : 10 g, ø63, 80 : 20 g, ø100 : 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number : GR-S-010 (10 g)**, GR-S-020** (20 g)

∗ In the case of w/o air cushion, it comes with rubber bumper.
Besides, the overall length is longer than the cylinder with air cushion as follows, because the bumpers are attached to the both sides of the piston: ø32, ø40: +6 mm, ø50, ø63: +8 mm, ø80, ø100: +10 mm.

Standard Type

Basic style: (B)





Cylinder tube sectional view B-B´

Bore size (mm)	Stroke range	Effective thread length	Width across flats	A	B	C	E	F	G	H_1	MB	J	MM	N	P	S	V	W	H	ZZ
32	Up to 500	19.5	12.2	22	46	32.5	30	13	13	6	4	M6 x 1	M10 x 1.25	26.5	1/8	84	4	6.5	47	135
40	Up to 500	27	14.2	30	52	38	35	13	14	8	4	M6 x 1	M14 x 1.5	26.5	1/4	84	4	9	51	139
50	Up to 600	32	19	35	65	46.5	40	14	15.5	11	5	M8 x 1.25	M18 x 1.5	31	1/4	94	5	10.5	58	156
63	Up to 600	32	19	35	75	56.5	45	14	16.5	11	5	M8 x 1.25	M18 x 1.5	31	3/8	94	9	12	58	156
80	Up to 800	37	23	40	95	72	45	20	19	13	5	M10 x 1.5	M22 x 1.5	37.5	3/8	114	11.5	14	72	190
100	Up to 800	37	27	40	114	89	55	20	19	16	5	M10 x 1.5	M26 x 1.5	37.5	1/2	114	17	15	72	190

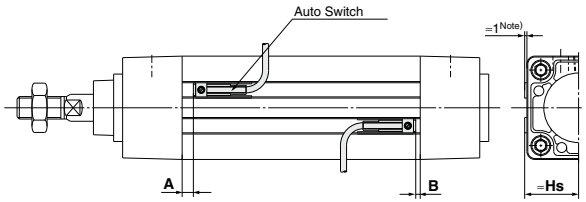
Minimum Auto Switch Mounting Stroke

(mm)

Auto switch model	No. of auto switch mounted	ø32	ø40	ø50	ø63	ø80	ø100	ø125
D-A9□ D-A9□V	2 (Different surfaces, Same surface)	15						
	1	15				10		
	n	15 + 10 (n−2)		15 + 15 (n−2)				15 + 20 (n−2)
D-M9□ D-M9□V	2 (Different surfaces, Same surface)	15				10		
	1	15				10		
	n	15 + 5 (n−2)				10 + 10 (n−2)		
D-M9□W D-M9□WV D-M9□A D-M9□AV	2 (Different surfaces, Same surface)	15				10		
	1	15				10		
	n	15 + 10 (n−2)				10 + 10 (n−2)		10 + 15 (n−2)
D-Z7□ D-Z80	2 (Different surfaces, Same surface)	25				15		
	1	25				15		
	n	25 + 15 (n−2)				15 + 15 (n−2)	15 + 20 (n−2)	
D-Y59□/Y69□ D-Y7P/Y7PV	2 (Different surfaces, Same surface)	25				15		
	1	25				15		
	n	25 + 10 (n−2)				15 + 10 (n−2)	15 + 15 (n−2)	
D-Y7□W D-Y7□WV	2 (Different surfaces, Same surface)	25				20		
	1	25				20		
	n	25 + 10 (n−2)				20 + 10 (n−2)	20 + 15 (n−2)	
D-Y7BA	2 (Different surfaces, Same surface)	30				20		
	1	30				20		
	n	30 + 10 (n−2)				20 + 10 (n−2)	20 + 15 (n−2)	

Note 1) n = 3, 4, 5 ···
Note 2) Center trunnion type is not included.

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



Proper Auto Switch Mounting Position

(mm)

Auto switch model / Bore size	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A9□ D-A9□V		D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV D-Y7BA	
	A	B	A	B	A	B
32	9	6	5	2	4	1
40	9	6	5	2	4	1
50	9	7	5	3	4	2
63	9	7	5	3	4	2
80	12.5	10.5	8.5	6.5	7.5	5.5
100	12.5	10.5	8.5	6.5	7.5	5.5
125	14.5	14.5	10.5	10.5	9.5	9.5

Note) Adjust the auto switch after confirming the operation to set actually.

Auto Switch Mounting Height

(mm)

Auto switch model / Bore size	D-A9□V D-Y69□ D-Y7PV D-Y7□WV	D-M9□V D-M9□WV D-M9□AV
	Hs	Hs
32	27	30
40	30	33
50	36	39
63	41	44
80	51	54
100	60.5	63.5
125	71.5	74.5

Note) The above figures are for when the electrical entry perpendicular types D-A9□V/M9□V/M9□WV/M9□AV/Y69□/Y7PV/Y7□WV are mounted.

Auto Switch Mounting 2

Operating Range

(mm)

Auto switch model	Bore size						
	32	40	50	63	80	100	125
D-A9□/A9□V	7	7.5	8	9	9.5	10.5	12.5
D-M9□/M9□V **D-M9□W/M9□WV** **D-M9□A/M9□AV**	4	4.5	5	6	6	6	7
D-Z7□Z80	10	10	10	11	11	12	14
D-Y59□/Y69□ **D-Y7P/Y7PV** **D-Y7□W/Y7□WV** **D-Y7BA**	6.5	6.5	6	7	7	8	7

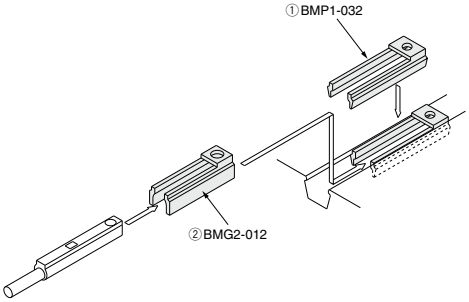
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)
	ø32 to ø125
D-A9□/A9□V **D-M9□/M9□V** **D-M9□W/M9□WV** **D-M9□A/M9□AV**	Note) ① BMP1-032 ② BMG2-012
D-Z7□/Z80 **D-Y5□/Y7P** **D-Y7□W** **D-Y6□/Y7PV** **D-Y7□WV** **D-Y7BA**	① BMP1-032

Note) Two kinds of auto switch brackets are used as a set.

D-A9□ (V)/M9□ (V)/M9□W (V)/M9□A (V)



Besides the models listed in How to Order, the following auto switches areapplicable.
Refer to pages 1559 to 1673 for the detailed specifications.

Auto switch type	Part no.	Electrical entry (Entry direction)	Features
Reed	D-Z73, Z76	Grommet (in-line)	–
	D-Z80		With indicator light
Sold state	D-Y69A, Y69B, Y7PV	Grommet (perpendicular)	–
	D-Y7NWV, Y7PWV, Y7BWV		Diagnosis indication (2 colors)
	D-Y59A, Y59B, Y7P	Grommet (in-line)	–
	D-Y7NW, Y7PW, Y7BW		Diagnosis indication (2 colors)
	D-Y7BA		Water resistant (2-color indication)

∗ For solid state switches, auto switches with a pre-wired connector are alsoavailable. Refer to pages 1626 and 1627 for details.
∗ Normally closed (NC = b contact) solid state auto switches(D-F9G/F9H/Y7G/Y7H types) are also available. Refer to pages 1577 and 1579 for details.

Made to Order : Individual Specifications

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

Symbol

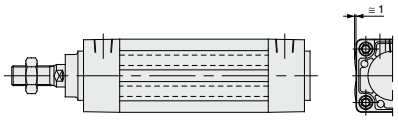
1 Fastener Strips Mounted on Switch Mounting Grooves — -X846

It prevents splashing water or windblown dust to the cylinder body from making an ingress into the auto switch mounting groove and accumulating.

MB1
MDB1 [Standard model no.] — X846

● With fasteners

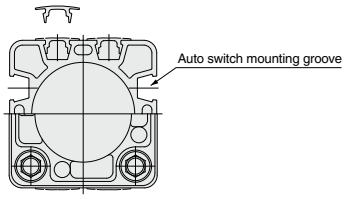
Dimensions



Fastener Specifications

Quantity	8 pcs. (6 pcs. when auto switches are mounted) Note)
Material	Vinyl chloride
Color	Urban white

Note) These cannot be installed on switch mounting grooves where auto switches have been mounted.



Sectional view

Specific Product Precautions

Be sure to read before handling.
Refer to front matter 57 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Adjustment

⚠Warning

1. Do not open the cushion valve beyond the stopper.
Crimping (ø32) or a snap ring (ø40 to ø100) is provided to prevent the accidental removal of the cushion valve. Do not open the valve beyond the mechanism.
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	2.5	JIS 4648 Hexagon wrench key 2.5
50, 63	3	JIS 4648 Hexagon wrench key 3
80, 100	4	JIS 4648 Hexagon wrench key 4
125	4	JIS 4648 Hexagon wrench key 4

2. Use the air cushion at the end of cylinder stroke.
When it is intended to use the cushion valve in the fully open position, select the type with damper. If this is not done, the tie-rods or piston rod assembly will be damaged.

3. When replacing mounting bracket, use a hexagon wrench.

Bore size (mm)		Bolt no.	Width across flats	Tightening torque (N·m)
32, 40		MB-32-48-C1247	4	5.1
50, 63		MB-50-48-C1249	5	11
80, 100	Foot	MB-80-48AC1251	6	25
	Others	MB-80-48BC1251		
125	Foot Others	CE00008	8	30.1
		(M12 x 1.75 x 25, Hexagon thin socket head bolt)		
		CE00032		
		(M12 x 1.75 x 28, Hexagon thin socket head bolt)		

4. When replacing a bracket, tie-rod nuts on the cylinder body may become loosened.
After retightening the tie-rod nuts with the proper tightening torque (Refer to Adjustment 3.), mount a mounting bracket.

Non-rotating rod type (Double acting, Single rod)

Operating Precautions

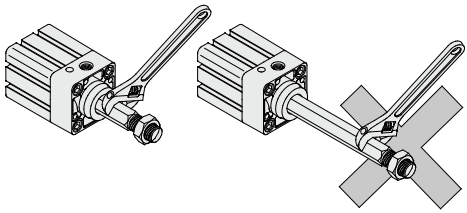
⚠Caution

1. Avoid using the air cylinder in such a way that more than allowable rotational torque would be applied to the piston rod.
If rotational torque is applied, the non-rotating guide will deform, thus affecting the non-rotating accuracy. This may cause damage to machinery.

Mounting/Piping

⚠Caution

1. Mounting a workpiece on rod end
To screw a bracket or a nut onto the threaded portion at the tip of the piston rod, make sure to retract the piston rod entirely, and place a wrench over the flat portion of the rod that protrudes.
Tighten it by giving consideration to prevent the tightening torque from being applied to the non-rotating guide.



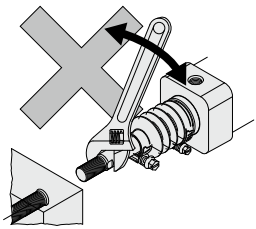
With rod boot

Handling

⚠Caution

1. Do not turn the piston rod with the rod boot kept locked.
When turning the piston rod, loosen the band once and do not twist the rod boot.

2. Set the breathing hole in the rod boot downward or in the direction that prevents entry of dust or water content.



Cylinder with Lock

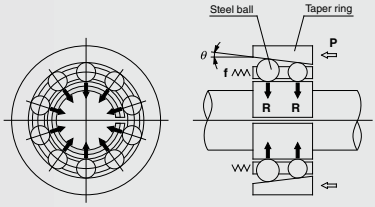
Series MNB

ø32, ø40, ø50, ø63, ø80, ø100

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

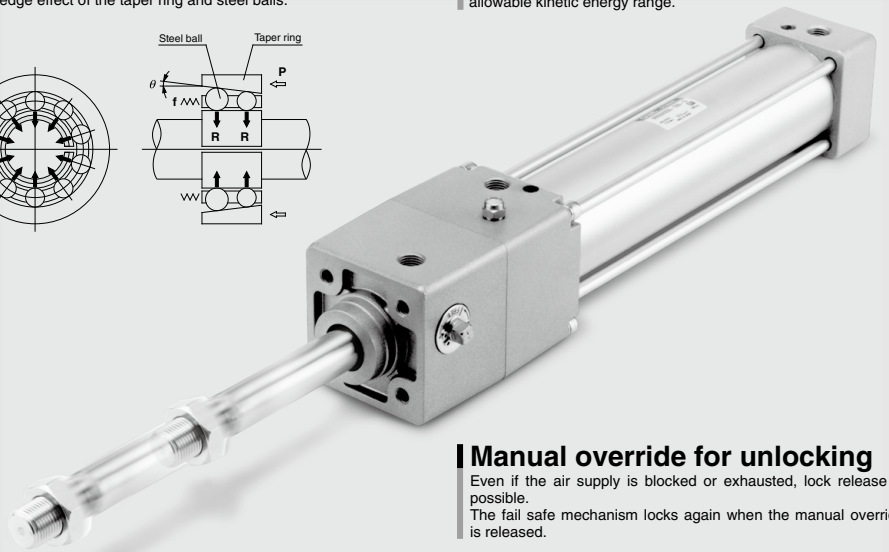
Simple construction

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



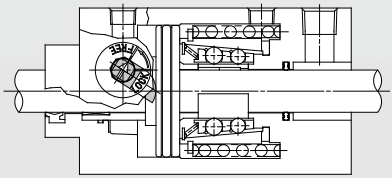
Maximum piston speed: 1000 mm/s

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



Manual override for unlocking

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



High locking efficiency

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

High reliability and stable holding force

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

Design minimizes the influences of unlocking air quality

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

Can be locked in both directions

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

■ Series Variations

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

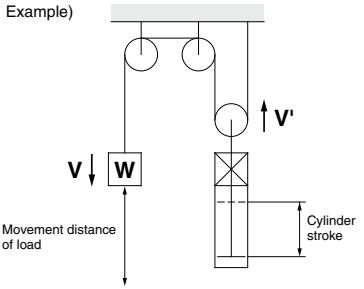
Model Selection

Precautions on Model Selection

⚠ Caution

1. In order that the originally selected maximum speed shall not be exceeded, be certain to use a speed controller to adjust the total movement distance of the load so that movement takes place in no less than the applicable movement time.
The movement time is the time that is necessary for the load to travel the total movement distance from the start without any intermediate stops.

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



3. The following selection example and procedures are based on use at the intermediate stop (including emergency stops during operation). However, when the cylinder is in a locked state, kinetic energy does not act upon it. Under these conditions, use the load mass at the maximum speed (V) of 100 mm/s shown in graphs (5) to (7) on page 805 depending on the operating pressure and select models.

Selection Example

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

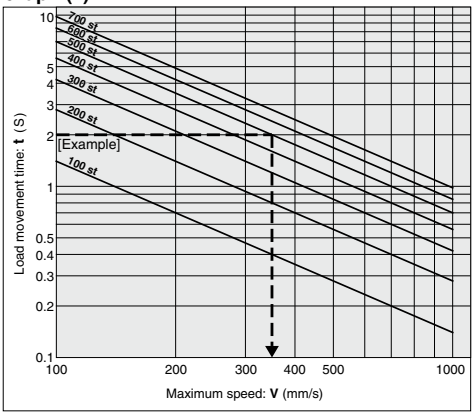
Step (1): From graph (1) find the maximum movement speed of the load
∴ Maximum speed **V**: ≅ 350 mm/s.

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

Step (1) Find the maximum load speed V.

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

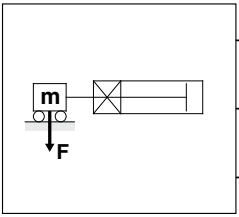
Graph (1)

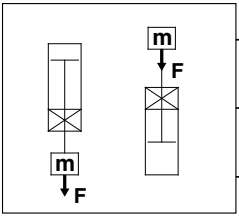


Step (2) Find the bore size.

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

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

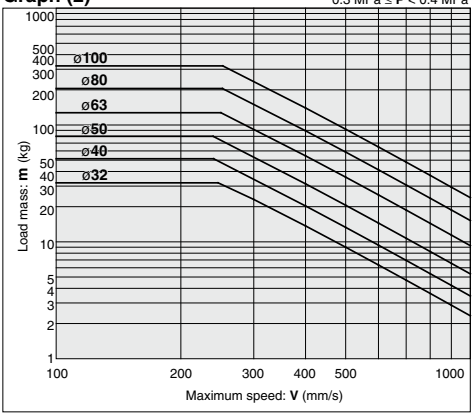




Selection Graph

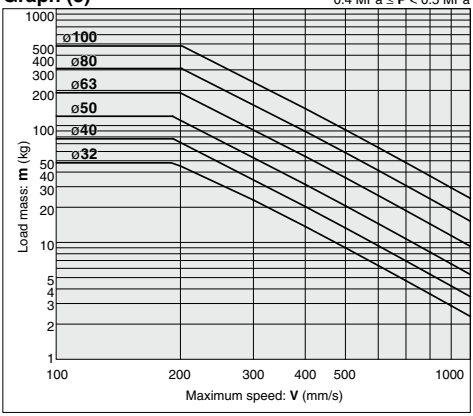
Graph (2)

0.3 MPa ≤ **P** < 0.4 MPa



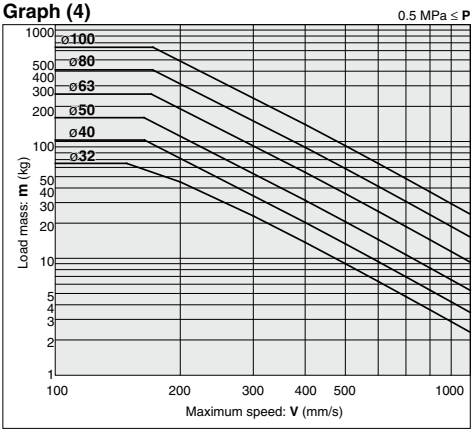
Graph (3)

0.4 MPa ≤ **P** < 0.5 MPa



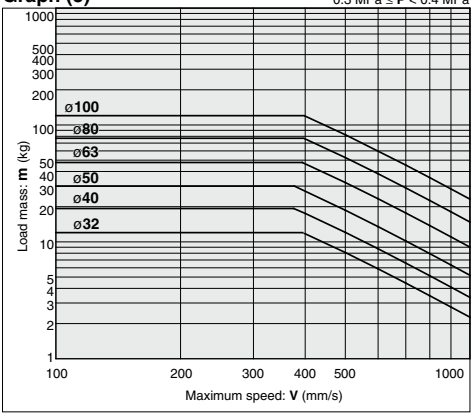
Graph (4)

0.5 MPa ≤ **P**



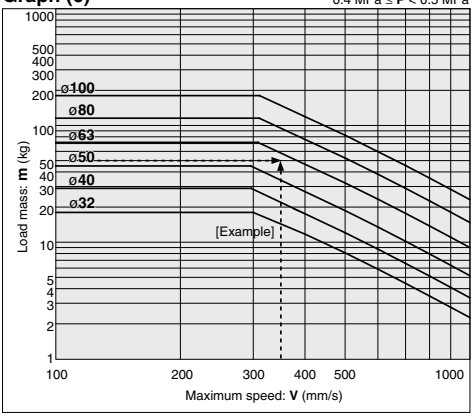
Graph (5)

0.3 MPa ≤ **P** < 0.4 MPa



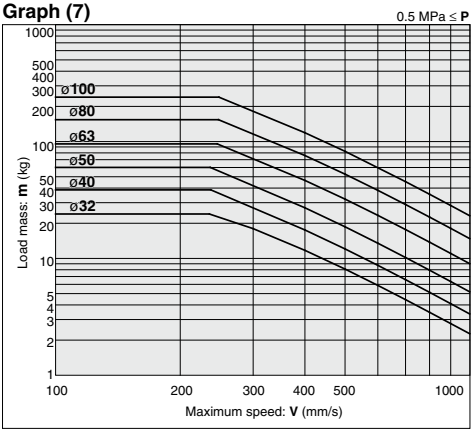
Graph (6)

0.4 MPa ≤ **P** < 0.5 MPa



Graph (7)

0.5 MPa ≤ **P**



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

How to Order

	MNB	L	50		–	100		–	D	–				
With auto switch	MDNB	L	50		–	100		–	D	–	M9BW		–	

With auto switch (Built-in magnet)

Mounting style

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

Bore size

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

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

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 807 for the standard stroke.

With rod boot

Rod boot	Nil	None
	J	Nylon tarpaulin
	K	Heat resistant tarpaulin

Locking direction

D	Both directions

Auto switch

Nil	Without auto switch

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

Number of auto switch

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

Made to Order
Refer to page 807 for details.

Applicable Auto Switches/Refer to pages 1893 to 2007 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				M9P	—	●	●	●	○	○		
				2-wire		12 V		M9B	—	●	●	●	○	○		
					—	—	100 V, 200 V	J51	—	●	—	●	○	—	—	
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	—	G39	—	—	—	—	—		
				2-wire		12 V		—	K39	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		M9NW	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
				2-wire		12 V		M9BW	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		M9NA**	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				M9PA**	—	○	○	●	○	○		
				2-wire		12 V		M9BA**	—	○	○	●	○	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		P3DW	—	●	—	●	●	○	—	
								P4DW	—	—	—	●	●	○		
Reed auto switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93	—	●	—	●	●	—	—	Relay, PLC
			No				100 V or less	A90	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	A54	—	●	—	●	●	—	—	
			No				200 V or less	A64	—	●	—	●	—	—		
		Terminal conduit	Yes				—	—	A33	—	—	—	—	—	—	PLC
		DIN terminal					100 V, 200V	—	A34	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	–	A59W	—	●	—	●	—	—		

** Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance. Consult with SMC regarding water resistant types with the above model numbers.

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

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

∗ Since there are other applicable auto switches than listed, refer to page 827 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1960 and 1961. For D-P3DW, refer to pages 1948 and 1949.
∗ D-A9□/M9□□□/P3DW auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment for D-A9□ and M9□□□.)

Cylinder Specifications

Bore size (mm)	32	40	50	63	80	100
Lubrication	Not required (Non-lube)					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.08 MPa					
Piston speed	50 to 1000 mm/s*					
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)					
Cushion	Air cushion on both ends					
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$					
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style					

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

Made to Order

Made to Order Specifications
(For details, refer to pages 2009 to 2152.)

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

Refer to pages 824 to 827 for cylinders with auto switches.

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

Lock Specifications

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

* The holding force (max. static load) shows the maximum capability and does not show the normal holding capability. So, select an appropriate cylinder while referring to page 804.

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for /mounting of auto switches (page 804).

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

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

Stopping Accuracy

(mm)

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

Condition: Lateral, Supply pressure P = 0.5 MPa
Load mass ····· Upper limit of allowed value
Solenoid valve for locking mounted on the unlocking port
Maximum value of stopping position dispersion from 100 measurements

Mounting Bracket Part No.

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

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

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Accessory

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

Single Rod Weight/Aluminum Tube

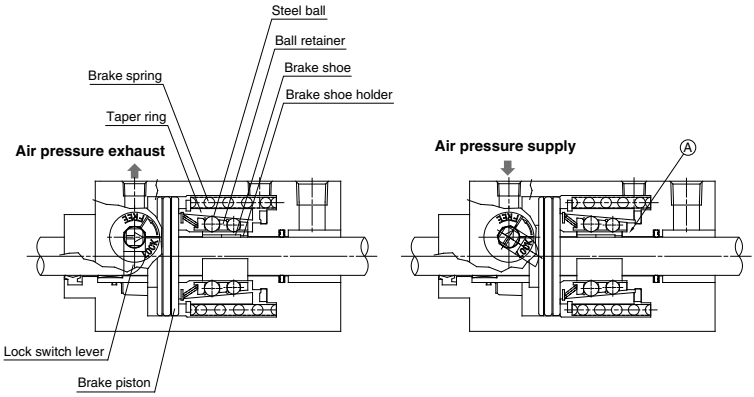
(kg)

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

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

1.20 + 0.11 x 100/50 = 1.42 kg

Construction Principle



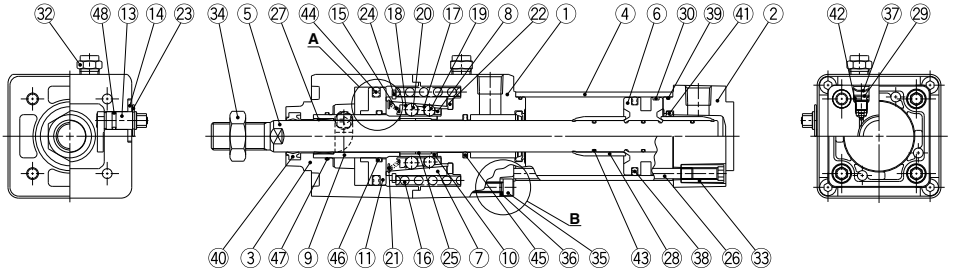
Locked state **Unlocked state**

Spring locking (Exhaust locking)

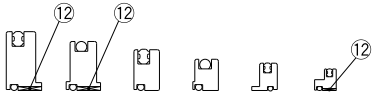
The spring force which acts upon the taper ring is magnified by a wedge effect, and is conveyed to all of the numerous steel balls which are arranged in two circles. These act on the brake shoe holder and brake, which locks the piston rod by tightening against it with a large force.

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

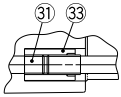
Construction



A section



B section



ø80, ø100

Component Parts

No.	Description		Material	Note
①	**Rod cover**		Aluminum alloy	Hard anodized and metallic painted
②	**Head cover**		Aluminum die-casted	Chromated and metallic painted
③	**Cover**		Aluminum alloy	Hard anodized and metallic painted
④	**Cylinder tube**		Aluminum alloy	Hard anodized
⑤	**Piston rod**		Carbon steel	Hard chrome plated
⑥	**Piston**		Aluminum alloy	Chromated
⑦	**Taper ring**		Carbon steel	Heat treated
⑧	**Ball retainer**		Special resin	
⑨	**Piston guide**		Carbon steel	Zinc chromated
⑩	**Brake shoe holder**		Special steel	Heat treated
⑪	**Release piston**	**ø32, ø80, ø100**	Aluminum alloy	Chromated
		ø40, ø50, ø63		Hard anodized
⑫	**Release piston bushing**		Steel + Special resin	ø32, ø80, ø100 only
⑬	**Unlocking cam**		Chromium molybdenum steel	Glossy chromated
⑭	**Washer**		Carbon steel	Colorless zinc chromated
⑮	**Retainer pre-load spring**	**ø32**	Steel wire	Zinc chromated
		ø40 to ø100	Stainless steel wire	
⑯	**Brake spring**		Steel wire	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	**Bumper**		Polyurethane rubber	
㉓	Type C retaining ring for unlocking cam shaft		Carbon steel	
㉔	Type C retaining ring for taper ring		Carbon steel	
㉕	**Brake shoe**		Babbitt	
㉖	**Tie-rod**		Carbon steel	Zinc chromated
㉗	**Bushing**		Bearing alloy	
㉘	**Cushion ring**		Aluminum alloy	Anodized

Component Parts

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

Replacement Parts: Seal Kit

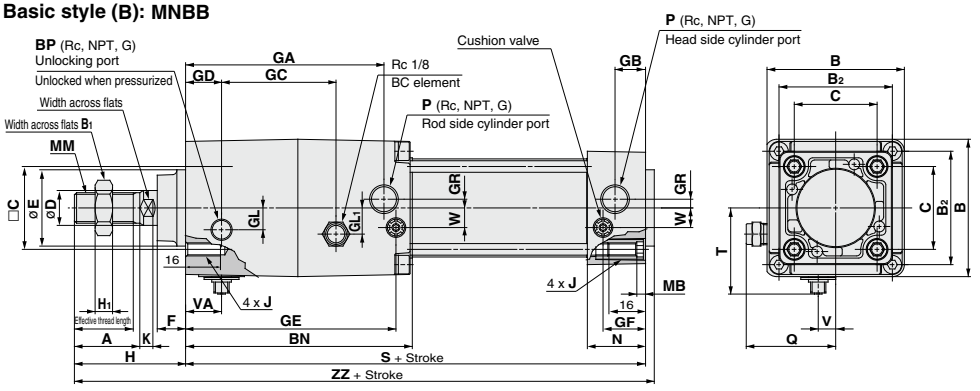
Bore size (mm)	Kit no.	Contents
32	MB32-PS	A set of ㊳, ㊴, ㊵ and ㊶ above
40	MB40-PS	
50	MB50-PS	
63	MB63-PS	
80	MB80-PS	
100	MB100-PS	

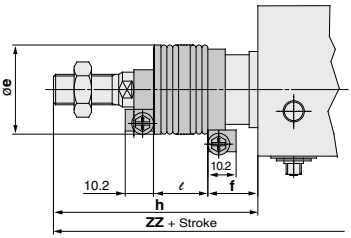
∗ Since the lock section for Series MNB is normally replaced as a unit, kits are for the cylinder section only. These can be ordered using the order number for each bore size.

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

Dimensions

Basic style (B): MNBB





With rod boot

(mm)

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

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

With Rod Boot

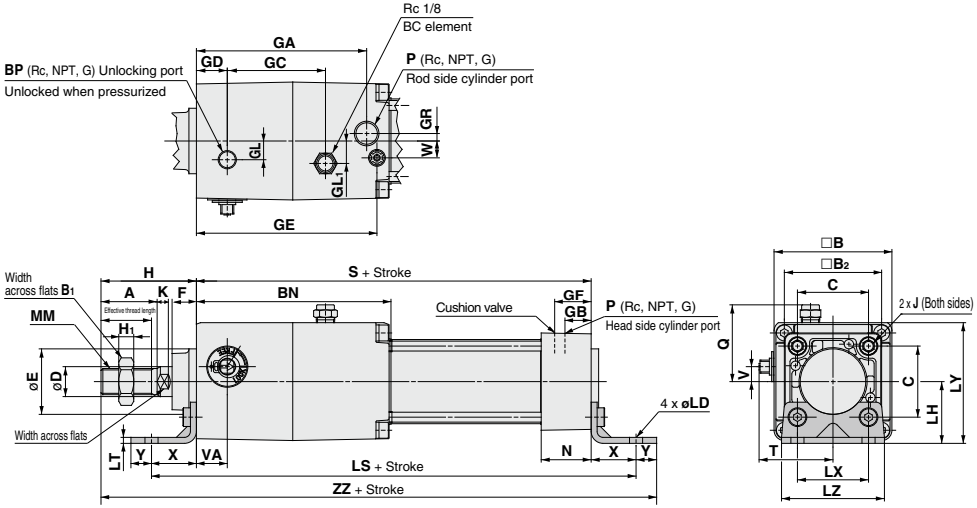
(mm)

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

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

Dimensions

Axial foot style (L): MNBL



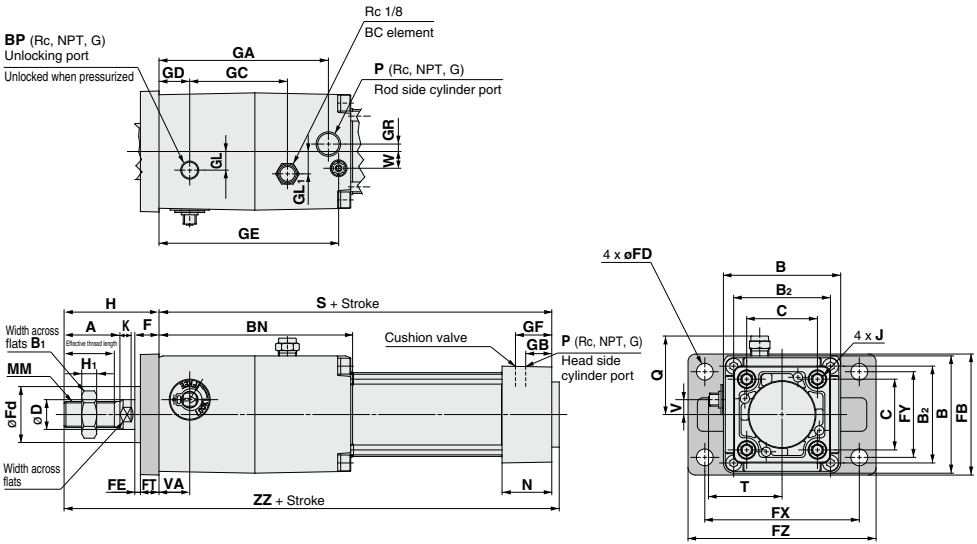
(mm)

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

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

∗ Refer to page 811 for cylinders with a rod boot.

Rod side flange style (F): MNBF



(mm)

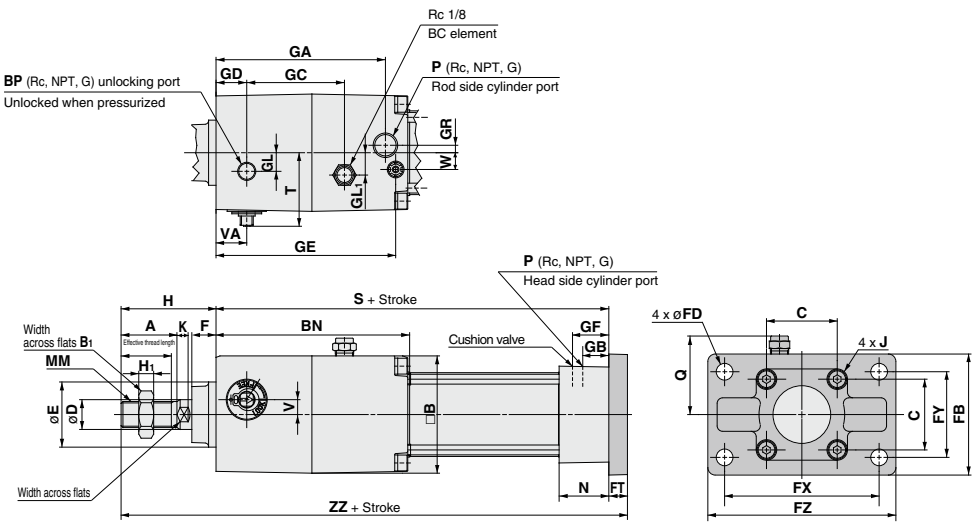
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	FB	B	B_1	H_1	B_2	BN	BP	C	D	F	Fd	FD	FE	FT	FX	FY	FZ	GA	GB
32	Up to 700	19.5	10	22	56	54	17	6	46	97	1/8	32.5	12	13	25	7	3	10	72	38	87	83	13
40	Up to 800	27	14	30	65	63	22	8	52	104	1/8	38	16	13	31	9	3	10	83	46	101	91	14
50	Up to 1000	32	18	35	77	75	27	11	65	120.5	1/4	46.5	20	14	38.5	9	2	12	100	52	120	104.5	15.5
63	Up to 1000	32	18	35	92	90	27	11	75	134.5	1/4	56.5	20	14	39.5	9	2	12	115	62	135	119.5	16.5
80	Up to 1000	37	22	40	100	102	32	13	95	169	1/4	72	25	20	45.5	12	4	16	126	63	153	150	19
100	Up to 1000	37	26	40	120	116	41	16	114	189	1/4	89	30	20	54	14	4	16	150	75	178	170	19

Bore size (mm)	GC	GD	GL	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

∗ Refer to page 811 for cylinders with a rod boot.

Dimensions

Head side flange style (G): MNBG



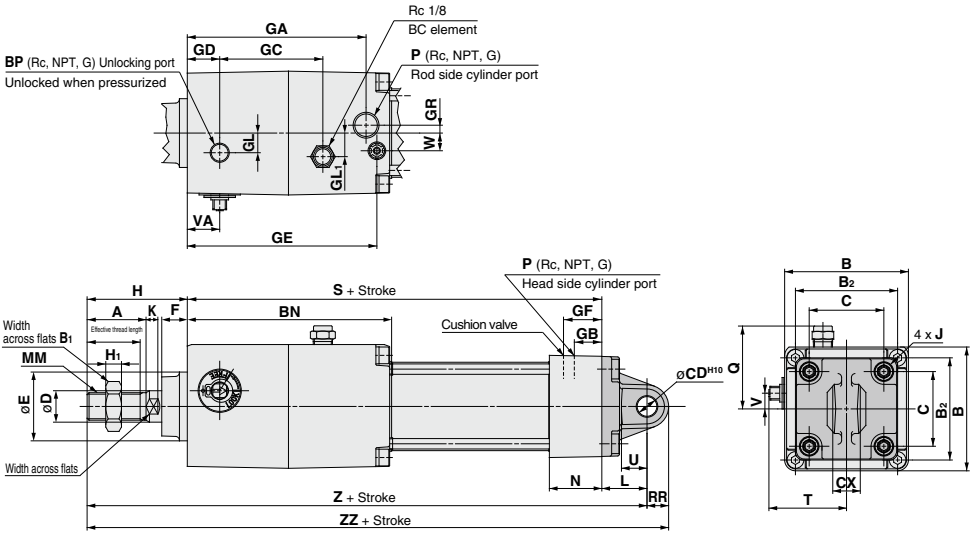
(mm)

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

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

∗ Refer to page 811 for cylinders with a rod boot.

Single clevis style (C): MNBC



(mm)

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

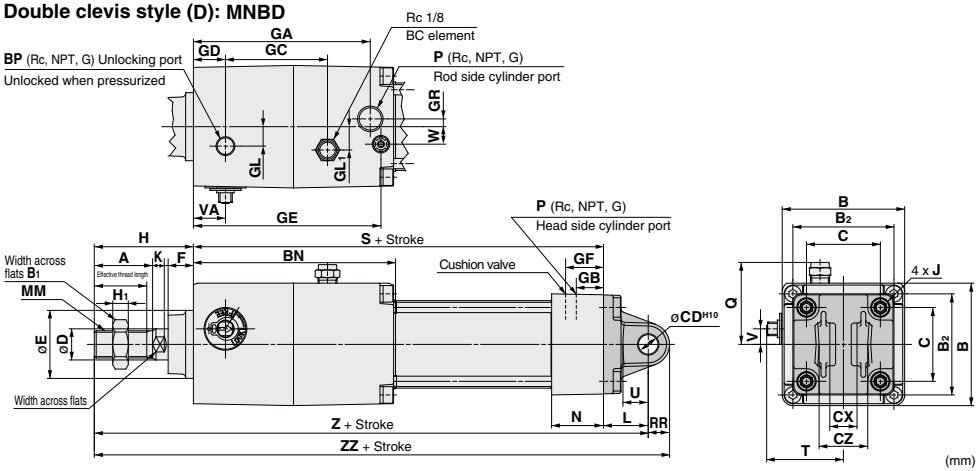
Bore size (mm)	GE	GF	J	K	L	MM	N	P	Q	RR	H	S	T	U	V	VA	W	Z	ZZ
32	88.5	18.3	M6 x 1.0	6	23	M10 x 1.25	27	1/8	37	10.5	47	154	34	13	6.5	13	6.5	224	234.5
40	96.5	19.5	M6 x 1.0	6	23	M14 x 1.5	27	1/4	41.5	11	51	161	39.5	13	8	16.5	9	235	246
50	111.2	22.4	M8 x 1.25	7	30	M18 x 1.5	31.5	1/4	47.5	15	58	183	47	17	9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

∗ Refer to page 811 for cylinders with a rod boot.

CLJ2
CLM2
CLG1
CL1
MLGC
CNG
MNB
CNA2
CNS
CLS
CLQ
RLQ
MLU
MLGP
ML1C
D-□
-X□

Dimensions

Double clevis style (D): MNBD



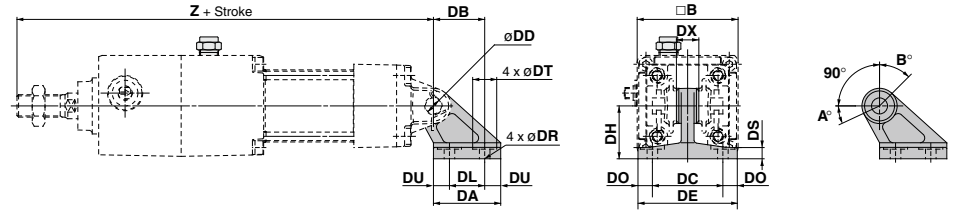
(mm)

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}	$CX^{+0.3}_{+0.1}$	CZ	D	Ee_{11}	F	GA	GB	GC	GD	GL	GL_1
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	10	14	28	12	30	13	83	13	45.5	13	8.5	12
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	10	14	28	16	35	13	91	14	52.5	16.5	10	12
50	Up to 600	32	18	35	75	27	11	65	120.5	1/4	46.5	14	20	40	20	40	14	104.5	15.5	58.5	19	12.5	15
63	Up to 600	32	18	35	90	27	11	75	134.5	1/4	56.5	14	20	40	20	45	14	119.5	16.5	68	23	17.5	12
80	Up to 800	37	22	40	102	32	13	95	169	1/4	72	22	30	60	25	45	20	150	19	81	33	22	18
100	Up to 800	37	26	40	116	41	16	114	189	1/4	89	22	30	60	30	55	20	170	19	96	37.5	25	20

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

∗ Refer to page 811 for cylinders with a rod boot.

Double Clevis Pivot Bracket



(mm)

Part no.	Bore size (mm)	B	DA	DB	DL	DU	DC	DX	DE	DO	DR	DT	DS	DH	Z	DD_{H10} (Hole)
MB-B03	**32**	54	42	32	22	10	44	14	62	9	6.6	15	7	33	224	$10^{+0.058}_{0}$
	40	63	42	32	22	10	44	14	62	9	6.6	15	7	33	235	$10^{+0.058}_{0}$
MB-B05	**50**	75	53	43	30	11.5	60	20	81	10.5	9	18	8	45	271	$14^{+0.070}_{0}$
	63	90	53	43	30	11.5	60	20	81	10.5	9	18	8	45	285	$14^{+0.070}_{0}$
MB-B08	**80**	102	73	64	45	14	86	30	111	12.5	11	22	10	65	359	$22^{+0.084}_{0}$
	100	116	73	64	45	14	86	30	111	12.5	11	22	10	65	379	$22^{+0.084}_{0}$

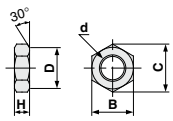
Rotating Angle

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

Accessory Bracket Dimensions

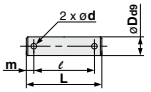
Accessory Bracket Dimensions

Rod End Nut
(Standard equipment)



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

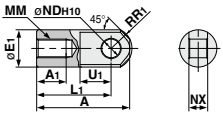
Knuckle Joint Pin,
Clevis Pin



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

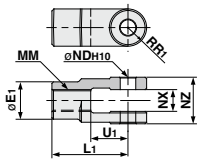
Note) Cotter pins and flat washers are included.

I Type Single Knuckle Joint



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

Y Type Double Knuckle Join



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

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

Cylinder with Lock
Double Acting, Double Rod
Series MNBW

ø32, ø40, ø50, ø63, ø80, ø100

How to Order

MNBW L 50 □ − 100 □ −D

With auto switch

MDNBW L 50 □ − 100 □ −D− M9BW □

With auto switch (Built-in magnet)

Double rod type

Mounting style

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

Bore size

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

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 819 for the standard stroke.

With rod boot

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

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

Locking direction

D	Both directions

Auto switch

Nil	Without auto switch

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

Number of auto switches

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

Built-in Magnet Cylinder Model

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

Applicable Auto Switches/Refer to pages 1893 to 2007 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Tie-rod mounting	Auto switch model Band mounting	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9N**	—	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9P**	—	●	●	●	○	○		
				2-wire		12 V		**M9B**	—	●	●	●	○	○	—	
					—	—	100 V, 200 V	**J51**	—	●	—	●	○	—		
		Terminal conduit		3-wire (NPN)	24 V	5 V, 12 V	—	—	**G39**	—	—	—	—	—		
				2-wire		12 V		—	**K39**	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**M9NW**	—	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PW**	—	●	●	●	○	○		
				2-wire		12 V		**M9BW**	—	●	●	●	○	○	—	
	Water resistant (2-color indication)			3-wire (NPN)		5 V, 12 V		**M9NA****	—	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PA****	—	○	○	●	○	○		
				2-wire		12 V		**M9BA****	—	○	○	●	○	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		**F59F**	—	●	—	●	○	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (Non-polar)		—		**P3DW**	—	●	—	●	●	○	—	
								P4DW	—	—	—	●	●	○		
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96**	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93**	—	●	—	●	●	—	—	Relay, PLC
			No				100 V or less	**A90**	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	**A54**	—	●	—	●	●	—	—	
			No				200 V or less	**A64**	—	●	—	●	—	—		
		Terminal conduit	Yes				—	—	**A33**	—	—	—	—	—		
							100 V, 200 V	—	**A34**	—	—	—	—	—		PLC
		DIN terminal						—	**A44**	—	—	—	—	—		Relay, PLC
	Diagnostic indication (2-color indication)	Grommet				—	–	**A59W**	—	●	—	●	—	—		

∗∗ Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.
Consult with SMC regarding water resistant types with the above model numbers.

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

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

∗ Since there are other applicable auto switches than listed, refer to page 827 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1960 and 1961. For D-P3DW, refer to pages 1948 and 1949.
∗ D-A9□/M9□□□/P3DW auto switches are shipped together (not assembled). (Only auto switch brackets are assembled at the time of shipment for D-A9□ and M9□□□.)

Cylinder Specifications

Bore size (mm)	32	40	50	63	80	100
Lubrication	Not required (Non-lube)					
Fluid	Air					
Proof pressure	1.5 MPa					
Max. operating pressure	1.0 MPa					
Min. operating pressure	0.08 MPa					
Piston speed	50 to 1000 mm/s*					
Ambient and fluid temperature	Without auto switch: –10 to 70°C (No freezing) With auto switch: –10 to 60°C (No freezing)					
Cushion	Air cushion on both ends					
Stroke length tolerance	Up to 250: $^{+1.0}_{0}$, 251 to 1000: $^{+1.4}_{0}$					
Mounting	Basic style, Axial foot style, Rod side flange style					

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

Lock Specifications

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

* The holding force (max. static load) shows the maximum capability and does not show the normal holding capability. So, select an appropriate cylinder while referring to page 804.

Refer to pages 824 to 827 for cylinders with auto switches.

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

Standard Stroke

For cases with auto switches, refer to the table of minimum strokes for /mounting of auto switches (page 826).

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

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

Stopping Accuracy

(mm)

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

Condition: Lateral, Supply pressure P = 0.5 MPa
Load mass ····· Upper limit of allowed value
Solenoid valve for locking mounted on the unlocking port
Maximum value of stopping position dispersion from 100 measurements

Mounting Bracket Part No.

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

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

Rod Boot Material

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

* Maximum ambient temperature for the rod boot itself.

Accessory

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

Double Rod Weight/Aluminum Tube

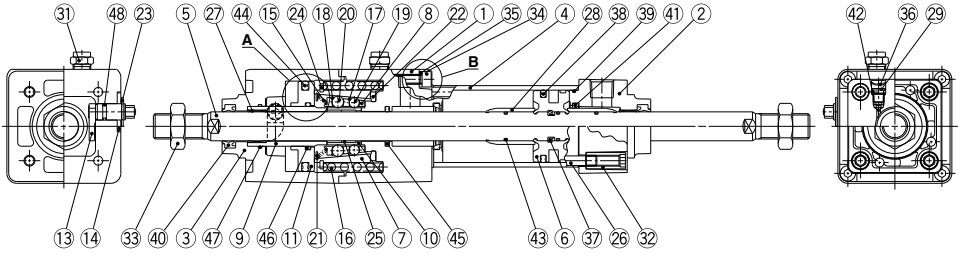
(kg)

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

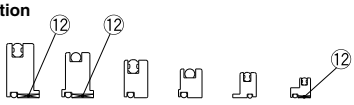
Calculation:
(Example) **MNBWB32-100-D** (Basic type, ø32, 100 st)
- Basic weight·····1.26 (Basic style, ø32)
- Additional weight ·····0.11/50 stroke
- Cylinder stroke ····· 100 stroke

1.26 + 0.11 x 100/50 = 1.48 kg

Construction

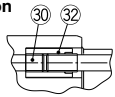


A section



ø100 ø80 ø63 ø50 ø40 ø32

B section



ø80, ø100

Component Parts

No.	Description		Material	Note
1	Rod cover A		Aluminum alloy	Hard anodized and metallic painted
2	Rod cover B		Aluminum die-casted	Chromated and metallic painted
3	Cover		Aluminum alloy	Hard anodized and metallic painted
4	Cylinder tube		Aluminum alloy	Hard anodized
5	Piston rod		Carbon steel	Hard chrome plated
6	Piston		Aluminum alloy	Chromated
7	Taper ring		Carbon steel	Heat treated
8	Ball retainer		Special resin	
9	Piston guide		Carbon steel	Zinc chromated
10	Brake shoe holder		Special steel	Heat treated
11	Release piston	ø32, ø80, ø100	Aluminum alloy	Chromated
		ø40, ø50, ø63		Hard anodized
12	Release piston bushing		Steel + Special resin	ø32, ø80, ø100 only
13	Unlocking cam		Chromium molybdenum steel	Glossy chromated
14	Washer		Carbon steel	Colorless zinc chromated
15	Retainer pre-load spring	ø32	Steel wire	Zinc chromated
		ø40 to ø100	Stainless steel wire	
16	Brake spring		Steel wire	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	Bumper		Polyurethane rubber	
23	Type C retaining ring for unlocking cam shaft		Carbon steel	
24	Type C retaining ring for taper ring		Carbon steel	
25	Brake shoe		Babbitt	
26	Tie-rod		Carbon steel	Zinc chromated
27	Bushing		Bearing alloy	
28	Cushion ring		Aluminum alloy	Anodized

Component Parts

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

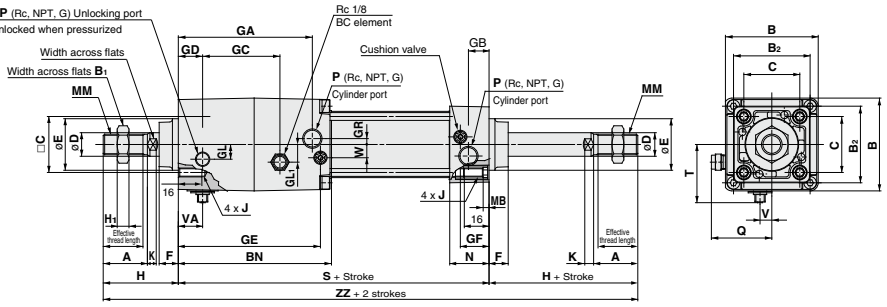
Replacement Parts: Seal Kit

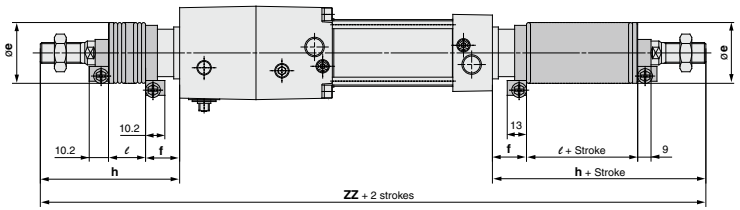
Bore size (mm)	Kit no.	Contents
32	MBW32-PS	A set of 38, 39, 40 and 41 above
40	MBW40-PS	
50	MBW50-PS	
63	MBW63-PS	
80	MBW80-PS	
100	MBW100-PS	

* As a general rule, the lock section of Series MNBW is replaced as a unit, and therefore, the replacement seal kits are for the cylinder section only. These can be ordered using the order number for each bore size.
* Seal kit includes a grease pack (ø32 to ø50: 10 g, ø63 and ø80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part number: GR-S-010 (10 g), **GR-S-020** (20 g)

Dimensions

Basic style (B): MNBWB





With rod boot

(mm)

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

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

With Rod Boot

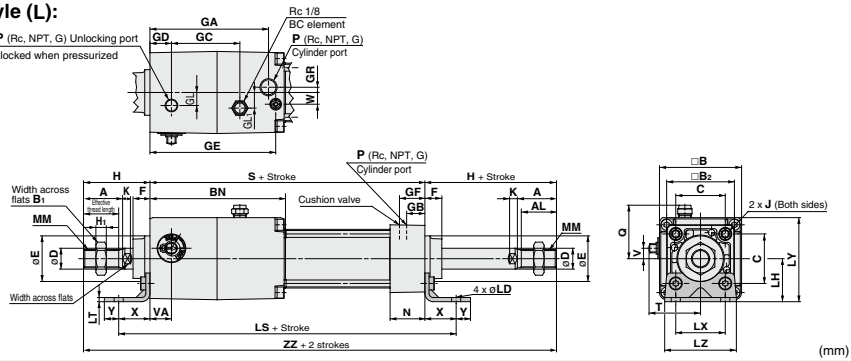
Note) ZZ: Dimensions for cylinders with a rod boot on both sides.

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

Dimensions

Axial foot style (L):

MNBWL



(mm)

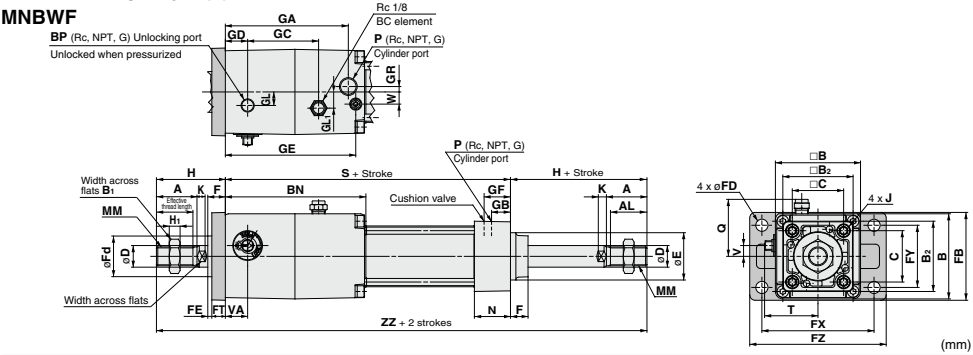
Bore size (mm)	Stroke range (mm)	Effective thread length (mm)	Width across flats	A	B	B1	H1	B2	BN	BP	C	D	Ee11	F	GA	GB	GC	GD	GL	GL1	GR	GE	GF
32	Up to 500	19.5	10	22	54	17	6	46	97	1/8	32.5	12	30	13	83	13	45.5	13	8.5	12	4	88.5	18.3
40	Up to 500	27	14	30	63	22	8	52	104	1/8	38	16	35	13	91	14	52.5	16.5	10	12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

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

∗ Refer to page 822 for cylinders with a rod boot.

Rod side flange style (F):

MNBWF



(mm)

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

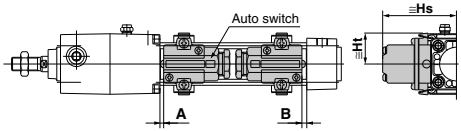
Bore size (mm)	GA	GB	GC	GD	GL	GL1	GR	GE	GF	J	K	MM	N	P	Q	H	S	T	V	VA	W	ZZ
32	83	13	45.5	13	8.5	12	4	88.5	18.3	M6 x 1.0	6	M10 x 1.25	27	1/8	37	47	154	34	6.5	13	6.5	248
40	91	14	52.5	16.5	10	12	4	96.5	19.5	M6 x 1.0	6	M14 x 1.5	27	1/4	41.5	51	161	39.5	8	16.5	9	263
50	104.5	15.5	58.5	19	12.5	15	5	111.2	22.4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

∗ Refer to page 822 for cylinders with a rod boot.

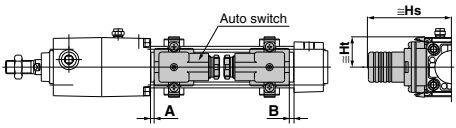
Auto Switch Mounting 1

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

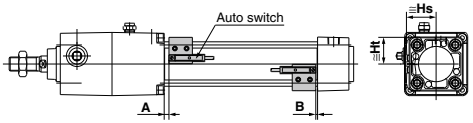
<Band mounting style>
D-A3□/G39/K39



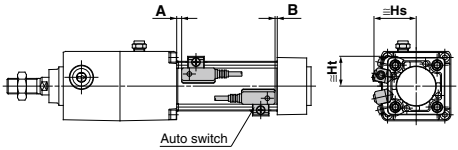
D-A44



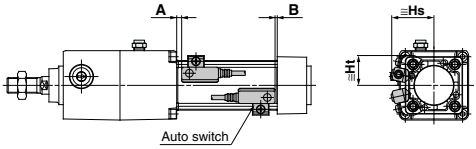
<Tie-rod mounting style>
D-A9□/A9□V
D-M9□/M9□V
D-M9□W/M9□WV
D-M9□A/M9□AV
D-Z7□/Z80
D-Y59/Y69/Y7P/Y7PV
D-Y7□W/Y7□WV/Y7BA



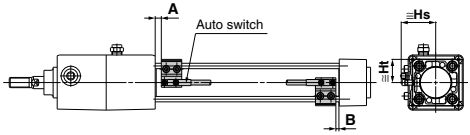
D-A5□/A6□
D-A59W



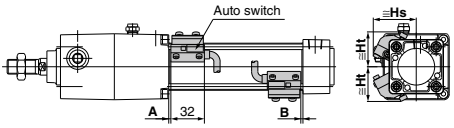
D-F5□/J5□
D-F5□W/J59W/F5BA
D-F59F/F5NT



D-P3DW



D-P4DW



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

Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□A D-M9□AV		D-A5□ D-A6□		D-A59W		D-F5□W D-J59W D-F5□ D-J5□ D-F5BA D-F59F		D-F5NT		D-A3□ D-A44 D-G39 D-K39		D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV D-Y7BA		D-P3DW		D-P4DW	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
32	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	6	3	3.5	1
40	6.5	4	10.5	8	0.5	0	4.5	2	7	4.5	12	9.5	0.5	0	4	1.5	6	3	3.5	1
50	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	6	4	4	1.5
63	7	4.5	11	8.5	1	0	5	2.5	7.5	5	12.5	10	1	0	4.5	2	6	4	4	1.5
80	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	4	2.5	7	5.5
100	10	8.5	14	12.5	4	2.5	8	6.5	10.5	9	15.5	14	4	2.5	7.5	6	4	2.5	7	5.5

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

Auto Switch Mounting Height

(mm)

Auto switch model / Bore size (mm)	D-A9□ D-M9□ D-M9□W D-M9□A		D-A9□V		D-M9□V D-M9□WV D-M9□AV		D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F59F D-F5□W D-J59W D-F5BA D-F5NT		D-A3□ D-G39 D-K39		D-A44		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W D-Y7BA		D-Y69□ D-Y7PV D-Y7□WV		D-P3DW		D-P4DW	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Ht
32	24.5	23	27.5	23	30.5	23	35	24.5	32.5	25	67	27.5	77	27.5	25.5	23	26.5	23	34	23	38	31
40	28.5	25.5	31.5	25.5	34	25.5	38.5	27.5	36.5	27.5	71.5	27.5	81.5	27.5	29.5	26	30	26	38	26	42	33
50	33.5	31	36	31	38.5	31	43.5	34.5	41	34	77	—	87	—	33.5	31	34.5	31	42	31	46.5	39
63	38.5	36	40.5	36	43	36	48.5	39.5	46	39	83.5	—	93.5	—	39	36	40	36	50	36	51.5	44
80	46.5	45	49	45	52	45	55	46.5	52.5	46.5	92.5	—	103	—	47.5	45	48.5	45	56	45	58	51.5
100	54	53.5	57	53.5	59.5	53.5	62	55	59.5	55	103	—	113.5	—	55.5	53.5	56.5	53.5	63.5	53.5	65.5	60.5

Operating Range

(mm)

Auto switch model	Bore size (mm)					
	32	**40**	**50**	**63**	**80**	**100**
D-A9□/A9□V	7	7.5	8.5	9.5	9.5	10.5
D-M9□/M9□V D-M9□W/M9□WV D-M9□A/M9□AV	4	4.5	5	6	6	6
D-Z7□/Z80	7.5	8.5	7.5	9.5	9.5	10.5
D-A5□/A6□	9	9	10	11	11	11
D-A59W	13	13	13	14	14	15
D-A3□/A44	9	9	10	11	11	11
D-Y59□/Y69□ D-Y7P/Y7□V D-Y7□W/Y7□WV D-Y7BA	5.5	5.5	7	7.5	6.5	5.5
D-F5□/J5□ D-F5□W/J59W D-F5BA/F5NT D-F59F	3.5	4	4	4.5	4.5	4.5
D-G39/K39	9	9	10	11	11	11
D-P3DW	4.5	5	5	5.5	4	6.5
D-P4DW	4	4	4	4.5	4	4.5

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

Auto Switch Mounting 2

Minimum Stroke for Auto Switch Mounting

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

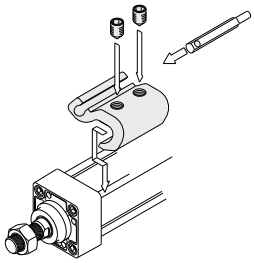
Note 1) When "n" is an odd number, an even number that is one larger than this odd number is used for the calculation.

n: No. of auto switches (mm)

Auto switch model	No. of auto switches mounted	ø32, ø40	ø50, ø63	ø80, ø100
D-A5□ **D-A6□**	2 (Different surfaces, same surface), 1	15		20
	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		$20 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)
D-A59W	2 (Different surfaces, same surface)	20		25
	n (Same surface)	$20 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		$25 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)
	1	15		25
D-F5□/J5□	2 (Different surfaces, same surface)	15		25
D-F5□W **D-J59W** **D-F5BA** **D-F59F** **D-F5NT**	n (Same surface)	$15 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		$25 + 55\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)
	1	10		25
D-Z7□ **D-Z80** **D-Y59□** **D-Y7P** **D-Y7□W**	2 (Different surfaces, same surface), 1	15		
	n	$15 + 40\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		
D-Y69□ **D-Y7PV** **D-Y7□WV**	2 (Different surfaces, same surface), 1	10		
	n	$10 + 30\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		
D-Y7BA	2 (Different surfaces, same surface), 1	20		
	n	$20 + 45\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		
D-P3DW	2 (Different surfaces), 1	15		15
	2 (Same surface)	40		15
	n (Different surfaces)	$15 + 50\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		$15 + 50\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)
	n (Same surface)	$40 + 50\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		$15 + 50\frac{(n-2)}{2}$ (n=2, 4, 6, 8…) Note 1)
D-P4DW	2 (Different surfaces, same surface), 1	15		
	n	$15 + 65\frac{(n-2)}{2}$ (n=2, 4, 6, 8···) Note 1)		

Auto Switch Mounting Bracket Part No.

Auto switch model	Bore size (mm)					
	ø32	ø40	ø50	ø63	ø80	ø100
D-A9□/A9□V **D-M9□/M9□V** **D-M9□W/M9□WV** **D-M9□A/M9□AV**	BMB5-032	BMB5-032	BA7-040	BA7-040	BA7-063	BA7-063
D-A3□/A44 **D-G39/K39**	BMB2-032	BMB2-040	BMB1-050	BMB1-063	BMB1-080	BMB1-100
D-A5□/A6□ **D-A59W** **D-F5□/J5□** **D-F5□W/J59W** **D-F5□F** **D-F5BA** **D-F5NT**	BT-03	BT-03	BT-05	BT-05	BT-06	BT-06
D-P3DW	BMB9-032S	BMB9-032S	BMB9-050S	BMB9-050S	BA9T-063S	BA9T-063S
D-P4DW	BMB3T-040	BMB3T-040	BMB3T-050	BMB3T-050	BMB3T-080	BMB3T-080
D-Z7□/Z80 **D-Y59□/Y69□** **D-Y7P/Y7PV** **D-Y7□W** **D-Y7□WV** **D-Y7BA**	BMB4-032	BMB4-032	BMB4-050	BMB4-050	BA4-063	BA4-063



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

[Mounting screws set made of stainless steel]

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

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

D-F5BA auto switch is set on the cylinder with the stainless steel screws above when shipped. When an auto switch is shipped independently, BBA1 is attached.

Note 1) Refer to page 1997 for the details of BBA1.

Note 2) When using D-M9□A(V)/Y7BA, do not use the steel set screws which is included with the auto switch mounting brackets above (BMB5-032, BA7-□□□, BMB4-□□□, BA4-□□□). Order a stainless steel screw set (BBA1) separately, and select and use the M4 x 6L stainless steel set screws included in the BBA1.

Besides the models listed in How to Order, the following auto switches are applicable.
For detailed specifications, refer to pages 1893 to 2007.

Auto switch type	Model	Electrical entry (Fetching direction)	Features
Reed	D-A93V, A96V	Grommet (Perpendicular)	—
	D-A90V		Without indicator light
	D-A53, A56, Z73, Z76	Grommet (In-line)	—
	D-A67, Z80		Without indicator light
Solid state	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	—
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color indication)
	D-Y7NWV, Y7PWV, Y7BWV		
	D-M9NAV, M9PAV, M9BAV		Water resistant (2-color indication)
	D-F59, F5P, J59	Grommet (In-line)	—
	D-Y59A, Y59B, Y7P		
	D-F59W, F5PW, J59W		Diagnostic indication (2-color indication)
	D-Y7NW, Y7PW, Y7BW		
	D-F5BA, Y7BA		Water resistant (2-color indication)
	D-F5NT		With timer
	D-P5DW		Magnetic field resistant (2-color indication)

∗ With pre-wired connector is available for solid state auto switches. For details, refer to pages 1960 and 1961.
∗ Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H/Y7G/Y7H type) are also available. For details, refer to pages 1911 and 1913.

Series MNB
Specific Product Precautions 1

Be sure to read before handling. Refer to front matter 39 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Design of Equipment and Machinery

⚠ Warning

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

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

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

In cases such as an intermediate stop, where a lock is operated at a desired position within the stroke and air pressure is applied from only one side of the cylinder, the piston will lurch at high speed when the lock is released. In such situations, there is a danger of causing human injury by having hands or feet, etc. caught, and also a danger for causing damage to the equipment. In order to prevent this lurching, a balance circuit such as the recommended pneumatic circuits (page 829) should be used.

Selection

⚠ Warning

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

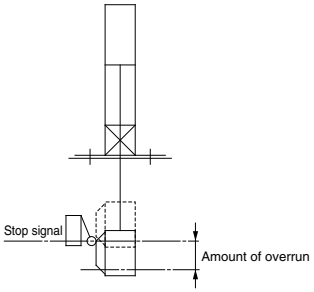
Use caution, because an external action such as an impacting load, strong vibration or turning force, may damage the locking mechanism or reduce its life.

2. Consider stopping accuracy and the amount of over-run when an intermediate stop is performed.

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

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

∗ For stopping accuracy, refer to page 807.



Selection

⚠ Warning

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

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

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

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

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

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

Select the most suitable bore sizes for the operating conditions in accordance with the selection procedures. The Model Selection (pages 804 and 805) is based on use at the intermediate stop (including emergency stops during operation). However, when the cylinder is in a locked state, kinetic energy does not act upon it. Under these conditions, use the load mass at the maximum speed (V) of 100 mm/s shown in graphs (5) to (7) on page 805 depending on the operating pressure and select models.

Mounting

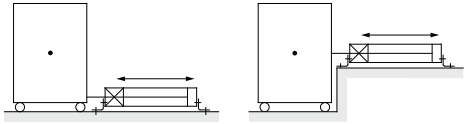
⚠ Warning

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

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

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

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



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

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

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

Specific Product Precautions 2

Be sure to read before handling. Refer to front matter 39 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Mounting

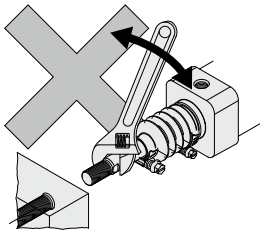
⚠Caution

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

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

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

3. Do not turn the piston rod with the rod boot kept locked.
When turning the piston rod, loosen the band once and do not twist the rod boot.
Set the breathing hole in the rod boot downward or in the direction that prevents entry of dust or water content.



Adjustment

⚠Warning

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

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

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

⚠Caution

1. Adjust the cylinder's air balance.
Balance the load by adjusting the air pressure in the rod and head sides of the cylinder with the load connected to the cylinder and the lock released. Lurching of the cylinder when unlocked can be prevented by carefully adjusting this air balance.

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

Series MNB
Specific Product Precautions 3

Be sure to read before handling. Refer to front matter 39 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Pneumatic Circuit

⚠ Warning

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

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

2. The effective area of the unlocking solenoid valve should be at least 50% of the effective area of the cylinder driving solenoid valve, and it should be installed as close to the cylinder as possible so that it is closer than the cylinder driving solenoid valve.

If the effective area of the unlocking solenoid valve is small or if it is installed at a distance from the cylinder, the time required for exhausting air for unlocking will be longer, which may cause a delay in the locking operation.

The delay in the locking operation may result in problems such as increase of overrunning when performing intermediate stop or emergency stop during operation, or if maintaining position from the operation stop state such as drop prevention, workpieces may be dropped depending on the timing of the load action to the operation delay of the lock.

3. Avoid backflow of the exhaust pressure when there is a possibility of interference of exhaust air, for example for a common exhaust type valve manifold.

The lock may not operate properly when the exhaust air pressure backflows due to interference of the exhaust air when exhausting air for lock release. It is recommended to use an individual exhaust type manifold or individual valves.

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

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

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

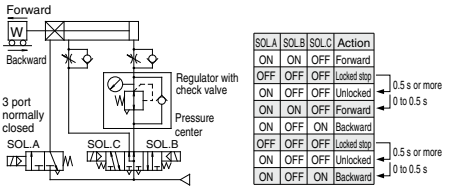
If the signal is delayed, the piston rod (and load) may lurch at a speed greater than the control speed of the speed controller.

6. Carefully check for dew condensation due to repeated air supply and exhaust of the locking solenoid valve.

The operating stroke of the lock part is very small. So, if the piping is long and the air supply and exhaust are repeated, the dew condensation caused by the adiabatic expansion accumulates in the lock part. This may corrode internal parts, causing air leak or lock release fault.

7. Basic circuit

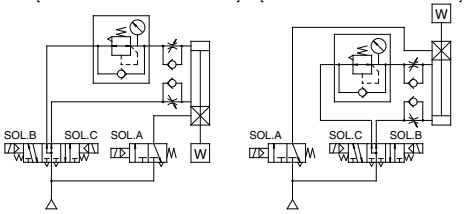
1) [Horizontal]



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

2) [Vertical]

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



∗ The symbol for the cylinder with lock in the basic circuit uses SMC original symbol.

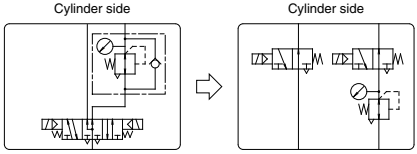
Specific Product Precautions 4

Be sure to read before handling. Refer to front matter 39 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

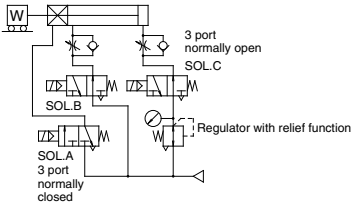
Pneumatic Circuit

⚠Caution

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

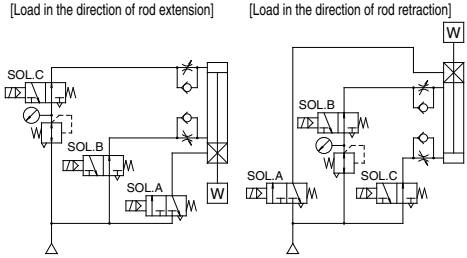


[Example]
1. [Horizontal]



2. [Vertical]

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



∗ The symbol for the cylinder with lock in the pneumatic circuit uses SMC original symbol.

Manually Unlocking

⚠Warning

1. Never operate the unlocking cam until safety has been confirmed. (Do not turn to the FREE side.)
- When unlocking is performed with air pressure applied to only one side of the cylinder, the moving parts of the cylinder will lurch at high speed causing a serious hazard.
- When unlocking is performed, be sure to confirm that personnel are not within the load movement range and that no other problems will occur if the load moves.

2. Before operating the unlocking cam, exhaust any residual pressure which is in the system.

3. Take measures to prevent the load from dropping when unlocking is performed.
- Perform work with the load in its lowest position.
- Take measures for drop prevention by strut, etc.

Manually Unlocking

⚠Caution

1. The unlocking cam is an emergency unlocking mechanism only.
During an emergency when the air supply is stopped or cut off, this is used to alleviate a problem by forcibly pushing back the release piston and brake spring to release the lock.

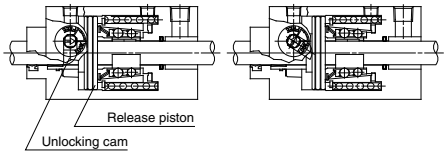
2. When installing the cylinder into equipment or performing adjustments, etc., be sure to apply air pressure of 0.25 MPa or more to the unlocking port, and do not perform work using the unlocking cam.

3. When releasing the lock with the unlocking cam, it must be noted that the internal resistance of the cylinder will be high, unlike normally unlocking with air pressure.

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

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

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



Locked state **Manually unlocked state**

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

Specific Product Precautions 5

Be sure to read before handling. Refer to front matter 39 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Maintenance

⚠ Caution

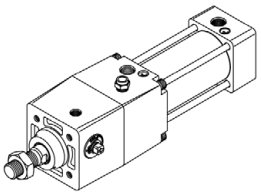
1.The lock units for Series MNB are replaceable.
To order replacement lock units for Series MNB, use the order numbers given in the table below.

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

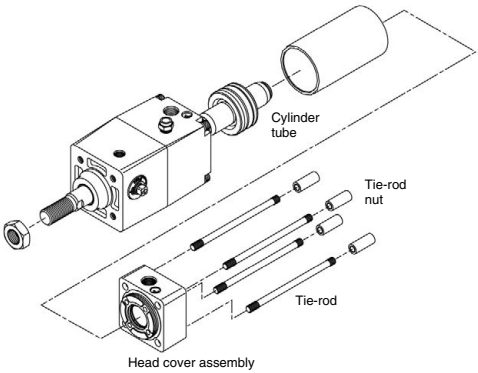
2. How to replace lock unit

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

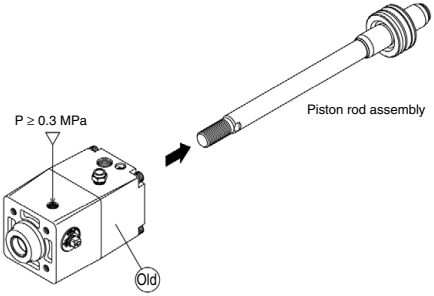
Bore size (mm)	Tie-rod nut socket width across flats (mm)
32, 40	6
50, 63	8
80, 100	10



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

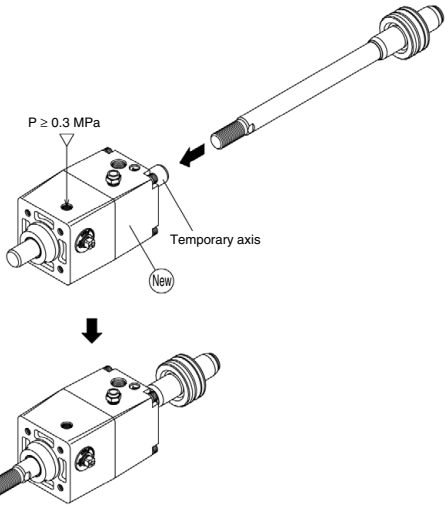


3) Apply 0.3 MPa or more of compressed air to the unlocking port, and pull out the piston rod assembly.



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

Note) Be sure to keep applying compressed air with a pressure of at least 0.3 MPa to the lock releasing port when replacing the temporary axis of a new lock unit and a piston rod assembly.
If the compressed air applied to the unlocking port is released (when it is in the lock condition) while the temporary axis and the piston rod assembly are removed from the lock unit, the brake shoe will be deformed and it will become impossible to insert the piston rod assembly, which will make the lock unit impossible to use.



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