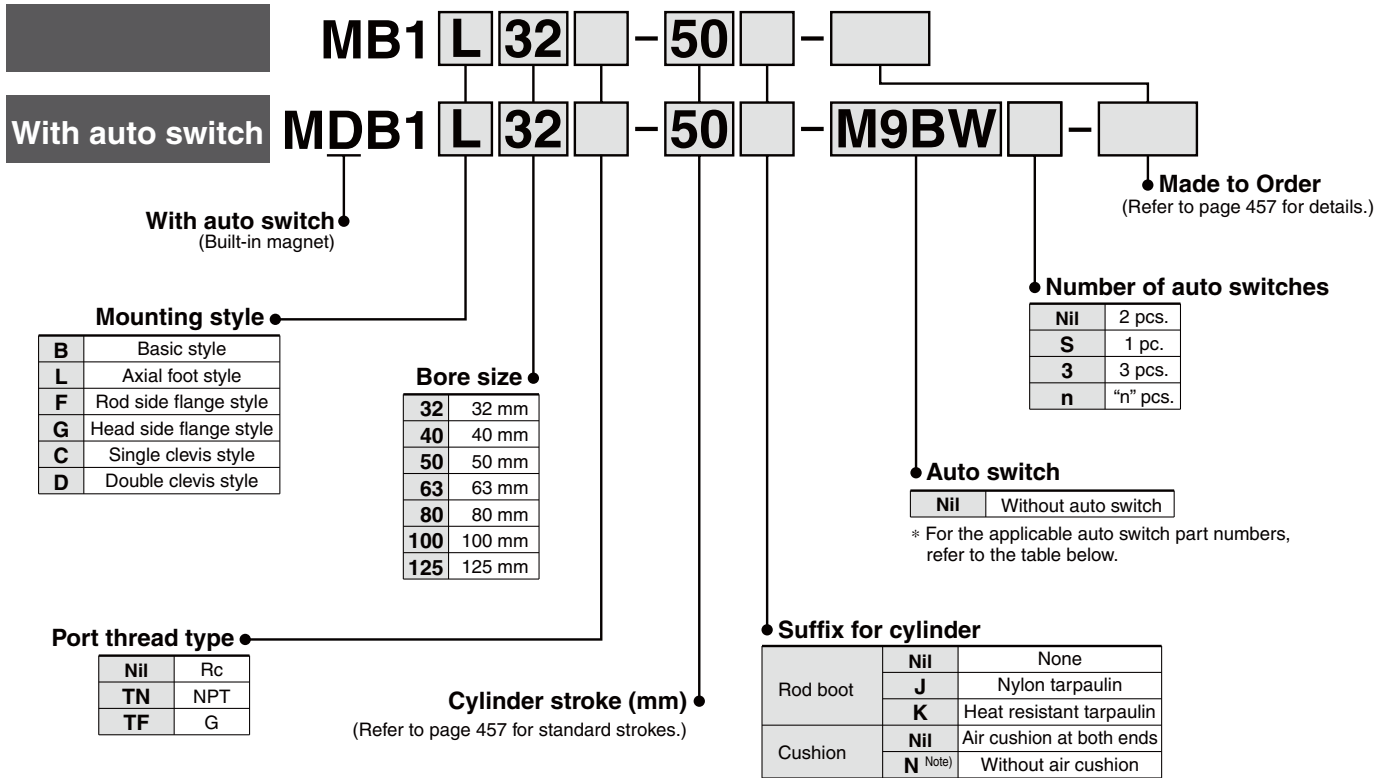


# Square Tube Type Air Cylinder: Standard Type Double Acting, Single Rod

## Series MB1

ø32, ø40, ø50, ø63, ø80, ø100, ø125

### How to Order



### 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

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.

### 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		Auto switch model		Lead wire length (m)				Pre-wired connector	Applicable load		
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)				
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	<b>M9NV</b>	<b>M9N</b>	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				<b>M9PV</b>	<b>M9P</b>	●	●	●	○	○		
				2-wire				<b>M9BV</b>	<b>M9B</b>	●	●	●	○	○		
				3-wire (NPN)				<b>M9NVW</b>	<b>M9NW</b>	●	●	●	○	○		
	Diagnostic indication (2-color indication)			3-wire (PNP)	<b>M9PWV</b>	<b>M9PW</b>	●	●	●	○	○	IC circuit				
				2-wire	<b>M9BWV</b>	<b>M9BW</b>	●	●	●	○	○					
				3-wire (NPN)	<b>M9NAV**</b>	<b>M9NA**</b>	○	○	●	○	○					
				3-wire (PNP)	<b>M9PAV**</b>	<b>M9PA**</b>	○	○	●	○	○					
Water resistant (2-color indication)	2-wire	<b>M9BAV**</b>	<b>M9BA**</b>	○	○	●	○	○	—							
	3-wire (NPN equivalent)	<b>A96V</b>	<b>A96</b>	●	—	●	—	—		IC circuit						
	2-wire	24 V	12 V	100 V	<b>A93V</b>	<b>A93</b>	●	—			●	●	—	—		
		100 V or less	<b>A90V</b>	<b>A90</b>	●	—	●	—			—	—	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.

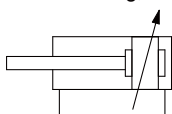
\* Auto switches are shipped together (not assembled).

# Square Tube Type Air Cylinder: Standard Type *Series MB1*



## Symbol

Double acting, 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
-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
<b>Action</b>	Double acting, Single rod						
<b>Fluid</b>	Air						
<b>Proof pressure</b>	1.5 MPa						
<b>Maximum operating pressure</b>	1.0 MPa						
<b>Minimum operating pressure</b>	0.05 MPa						
<b>Ambient and fluid temperature</b>	Without auto switch -10 to 70°C (No freezing)						
	With auto switch -10 to 60°C (No freezing)						
<b>Lubrication</b>	Not required (Non-lube)						
<b>Piston speed</b>	50 to 1000 mm/s						
<b>Stroke length tolerance</b>	Up to 250: $^{+1.0}_0$ ; 251 to 1000: $^{+1.4}_0$ ; 1001 to 1500: $^{+1.8}_0$						
<b>Cushion</b>	Both ends (Air cushion) <sup>Note)</sup>						
<b>Port size (Rc, NPT, G)</b>	1/8	1/4	3/8	1/2			
<b>Mounting</b>	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
<b>32</b>	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	700
<b>40</b>	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500	800
<b>50</b>	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
<b>63</b>	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600	1000
<b>80</b>	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
<b>100</b>	25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800	1000
<b>125</b>	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 <sup>(1)</sup>	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
<b>J</b>	Nylon tarpaulin	70°C
<b>K</b>	Heat resistant tarpaulin	110°C*

\* Maximum ambient temperature for the rod boot itself.

CJ1

CJP

CJ2

-Z

CJ2

CM2

-Z

CM2

CM3

CG1

-Z

CG1

CG3

MB

-Z

MB

**MB1**

CA2

-Z

CA2

CS1

CS2

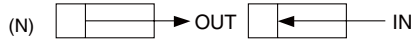
D-□

-X□

Technical data

# Series MB1

## Theoretical Output



Bore size (mm)	Rod size (mm)	Operating direction	Piston area (mm <sup>2</sup> )	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<sup>2</sup>)

## 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

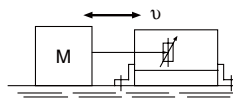
For details about the kinetic energy absorbable by the cushion mechanism and w/ air cushion, refer to page 1823.

## 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.



$$E_k = \frac{M}{2} v^2$$

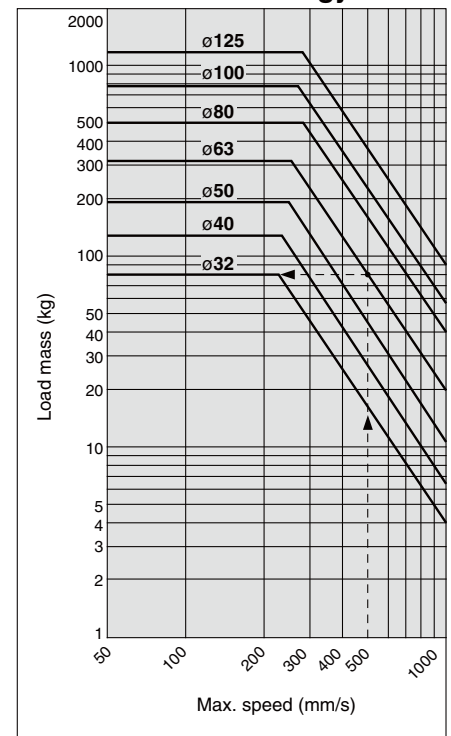
$E_k$  : Kinetic energy (J)

$M$  : Mass of load (kg)

$v$  : 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.

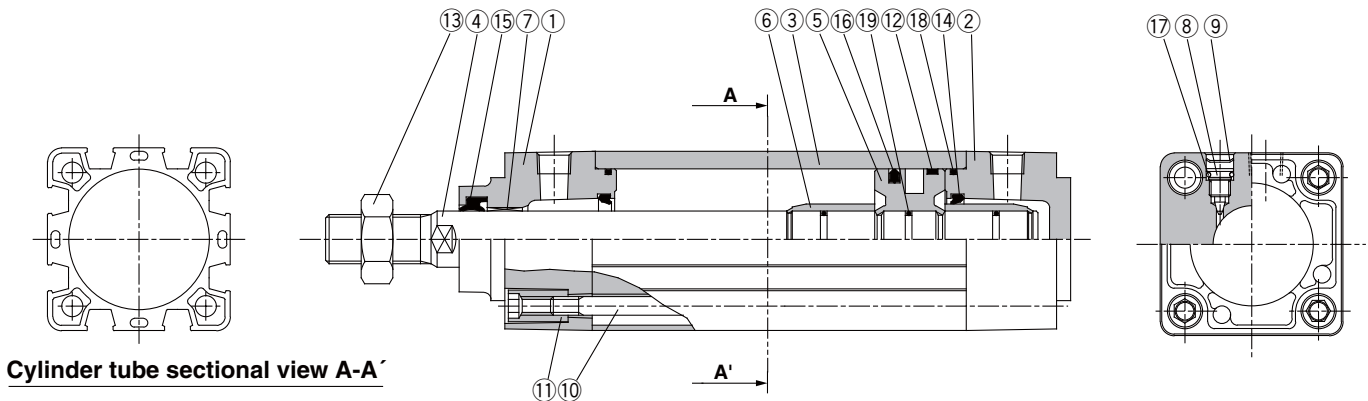
## Allowable Kinetic Energy



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, ⑰
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.

CJ1

CJP

CJ2  
-Z

CJ2

CM2  
-Z

CM2

CM3

CG1  
-Z

CG1

CG3

MB  
-Z

MB

**MB1**

CA2  
-Z

CA2

CS1

CS2

D-□

-X□

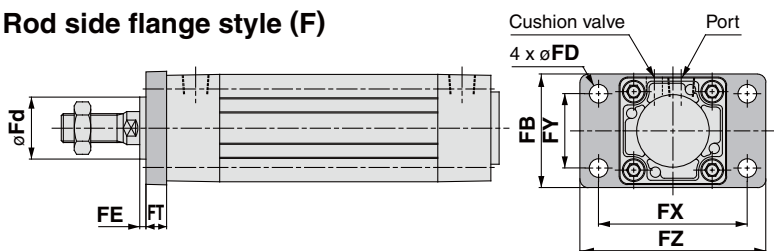
Technical  
data



# Square Tube Type Air Cylinder: Standard Type Double Acting, Single Rod **Series MB1**

## Standard Type: With Mounting Bracket

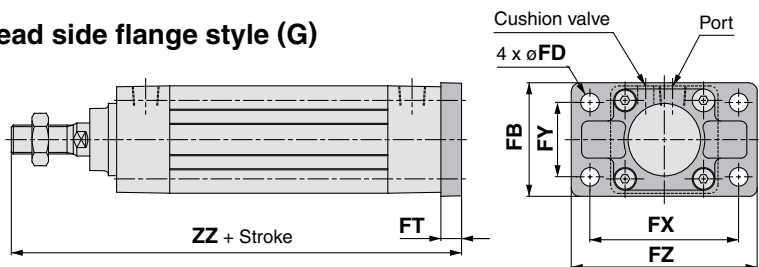
### Rod side flange style (F)



### 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)



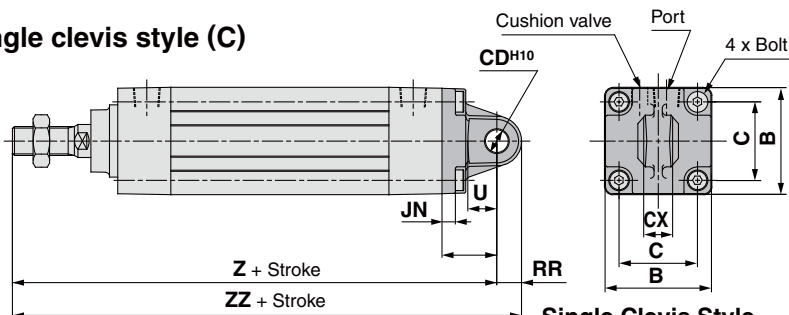
### Without Air Cushion

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)



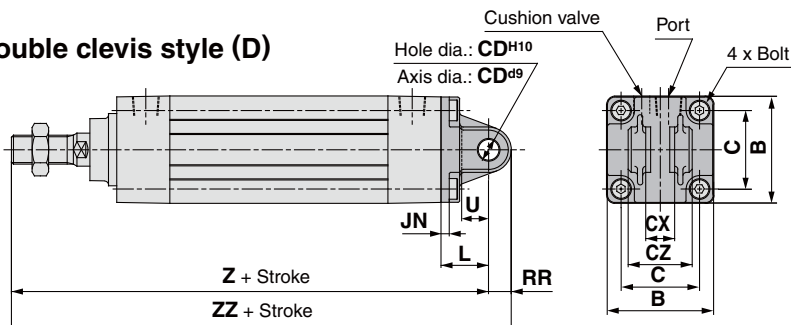
### Without Air Cushion

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 <sup>H10</sup>	CX <sup>+0.3/-0.1</sup>	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 <sup>H10</sup>	CX <sup>+0.3/-0.1</sup>	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

CJ1

CJP

CJ2-Z

CJ2

CM2-Z

CM2

CM3

CG1-Z

CG1

CG3

MB-Z

MB

MB1

CA2-Z

CA2

CS1

CS2

D-□

-X□

Technical data



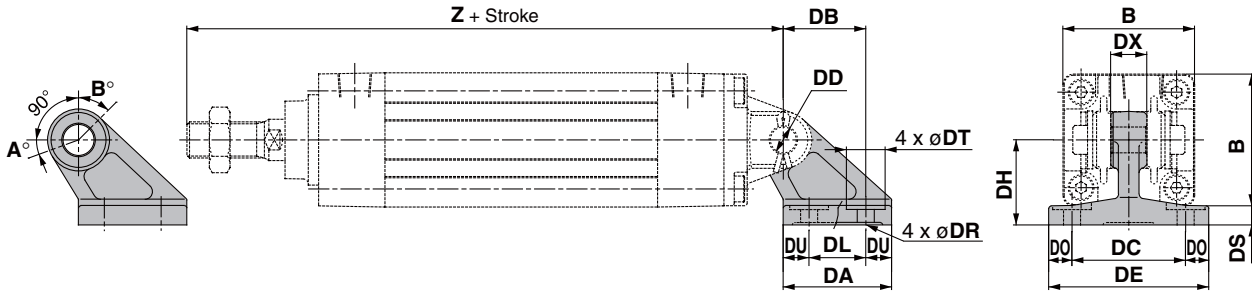
# Series MB1

## Pivot Bracket/Double Clevis Pivot Bracket

### Type

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

### Double clevis pivot bracket



### Without Air Cushion

(mm)

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

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°

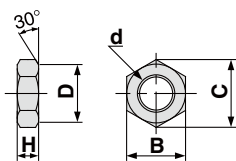
#### Method for longitudinal mounting of clevis pivot bracket

\* 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.

# Square Tube Type Air Cylinder: Standard Type Double Acting, Single Rod **Series MB1**

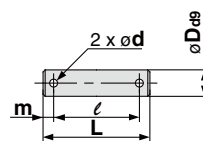
## Accessory Bracket Dimensions

**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

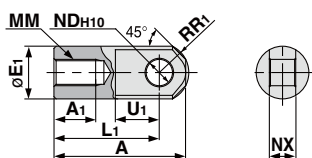
**Knuckle joint pin**  
Clevis pin



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

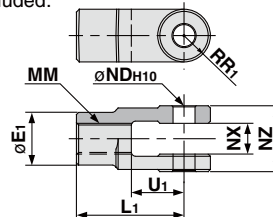
Note 1) Cotter pins and flat washers are included.  
Note 2) Only pins are included.

**I type single**  
Knuckle joint



Part no.	Bore size (mm)	A	A <sub>1</sub>	E <sub>1</sub>	L <sub>1</sub>	MM	R <sub>1</sub>	U <sub>1</sub>	NDH <sub>10</sub>	NX
I-03M	32	40	14	20	30	M10 x 1.25	12	16	10 <sup>+0.058/0.0</sup>	14 <sup>-0.10/0.30</sup>
I-04M	40	50	19	22	40	M14 x 1.5	12.5	19	10 <sup>+0.058/0.0</sup>	14 <sup>-0.10/0.30</sup>
I-05M	50, 63	64	24	28	50	M18 x 1.5	16.5	24	14 <sup>+0.070/0.0</sup>	20 <sup>-0.10/0.30</sup>
I-08M	80	80	26	40	60	M22 x 1.5	23.5	34	22 <sup>+0.084/0.0</sup>	30 <sup>-0.10/0.30</sup>
I-10M	100	80	26	40	60	M26 x 1.5	23.5	34	22 <sup>+0.084/0.0</sup>	30 <sup>-0.10/0.30</sup>
I-12M	125	119	36	46	92	M27 x 2	28.5	34	25 <sup>+0.084/0.0</sup>	32 <sup>-0.10/0.30</sup>

**Y type double**  
Knuckle joint



Part no.	Bore size (mm)	E <sub>1</sub>	L <sub>1</sub>	MM	R <sub>1</sub>	U <sub>1</sub>	NDH <sub>10</sub>	NX	NZ
Y-03M <sup>(1)</sup>	32	20	30	M10 x 1.25	10	16	10 <sup>+0.058/0.0</sup>	14 <sup>-0.30/0.10</sup>	28 <sup>-0.10/0.30</sup>
Y-04M <sup>(1)</sup>	40	22	40	M14 x 1.5	11	19	10 <sup>+0.058/0.0</sup>	14 <sup>-0.30/0.10</sup>	28 <sup>-0.10/0.30</sup>
Y-05M <sup>(1)</sup>	50, 63	28	50	M18 x 1.5	14	24	14 <sup>+0.070/0.0</sup>	20 <sup>-0.30/0.10</sup>	40 <sup>-0.10/0.30</sup>
Y-08M <sup>(1)</sup>	80	40	65	M22 x 1.5	20	34	22 <sup>-0.084/0.0</sup>	30 <sup>-0.30/0.10</sup>	60 <sup>-0.10/0.30</sup>
Y-10M <sup>(1)</sup>	100	40	65	M26 x 1.5	20	34	22 <sup>-0.084/0.0</sup>	30 <sup>-0.30/0.10</sup>	60 <sup>-0.10/0.30</sup>
Y-12M <sup>(1)</sup>	125	46	100	M27 x 2	27	42	25 <sup>+0.084/0.0</sup>	32 <sup>-0.30/0.10</sup>	64 <sup>-0.10/0.30</sup>

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 

- CJ1
- CJP
- CJ2-Z
- CJ2
- CM2-Z
- CM2
- CM3
- CG1-Z
- CG1
- CG3
- MB-Z
- MB
- MB1
- CA2-Z
- CA2
- CS1
- CS2

D-□  
-X□  
Technical data



# Series MB1 Auto Switch Mounting 1

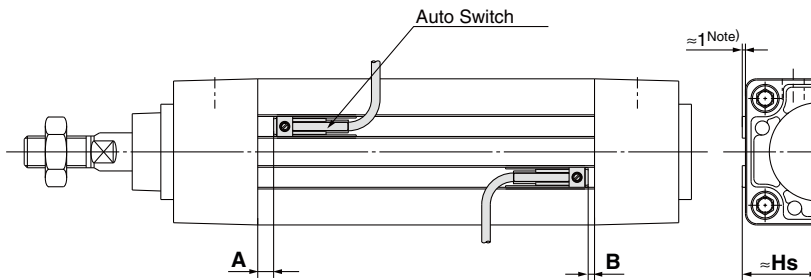
## Minimum Auto Switch Mounting Stroke

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

Auto switch model	Auto switch mounting position (mm)					
	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	
Bore size	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

Auto switch model	Auto switch mounting height (mm)	
	D-A9□V D-Y69□ D-Y7PV D-Y7□WV	D-M9□V D-M9□WV D-M9□AV
Bore size	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.

# Series MB1 Auto Switch Mounting 2

## Operating Range

Auto switch model	Bore size (mm)						
	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

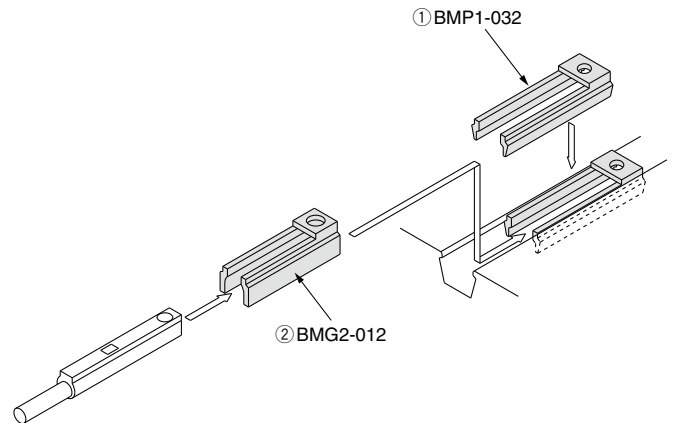
\* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

## 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 are applicable. 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
Solid 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 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 pages 1577 and 1579 for details.

# Series MB1

## Made to Order : Individual Specifications

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

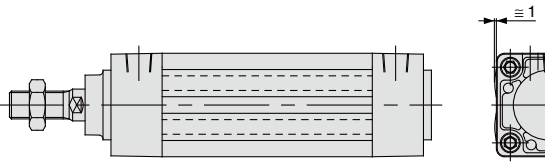


### 1 Fastener Strips Mounted on Switch Mounting Grooves Symbol -X846

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

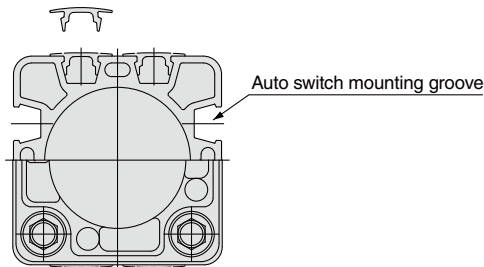
### Dimensions



#### Fastener Specifications

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

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



Sectional view

CJ1

CJP

CJ2  
-Z

CJ2

CM2  
-Z

CM2

CM3

CG1  
-Z

CG1

CG3

MB  
-Z

MB

**MB1**

CA2  
-Z

CA2

CS1

CS2

D-□

-X□

Technical data