

Rotary Clamp Cylinder: Standard

Series MK

ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63

How to Order

Rotary clamp cylinder • **MK B 20** - **10 R N Z** - **M9BW** - **□** - **□**

Mounting bracket •

Symbol	Mounting
B	Through-hole/Both ends tapped common (Basic)
G	Head flange

* Head flanges are shipped together, (but not assembled).

Bore size •

Symbol	Bore size
12	12 mm
16	16 mm
20	20 mm
25	25 mm
32	32 mm
40	40 mm
50	50 mm
63	63 mm

Port thread type •

Symbol	Thread	Applicable bore size
Nil	M thread	ø12 to ø25
	Rc	ø32 to ø63
TN	NPT	
TF	G	

Auto switch type •

Symbol	Quantity
Nil	2 pcs.
S	1 pc.

Auto switch multiple side mounting •

Symbol	Mounting
Nil	Without auto switch (Built-in magnet)

* For applicable auto switch models, refer to the below table.
* Auto switches are shipped together, (but not assembled).

Body option •

Symbol	Option
Nil	Standard (Female thread)
N	With arm

* Arms are shipped together, (but not assembled).

Rotary direction (Unclamp → Clamp) •

Symbol	Direction
R	Clockwise
L	Counterclockwise

Applicable Auto Switches/Refer to Best Pneumatics No. 3 for further information on auto switches. For details, refer to the catalog ES20-201.

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)	None (N)		IC circuit	Relay, PLC		
Solid state 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			M9BV				M9B	●	●	●	○	—	○	IC circuit			
	3-wire (NPN)			M9NVV				M9NV	●	●	●	○	—	○				
	3-wire (PNP)			M9PVV				M9PV	●	●	●	○	—	○	IC circuit			
	2-wire			M9BVV				M9BV	●	●	●	○	—	○				
	3-wire (NPN)			M9NAV				M9NA	○	○	●	○	—	○	IC circuit			
	3-wire (PNP)			M9PAV				M9PA	○	○	●	○	—	○				
	2-wire			M9BAV				M9BA	○	○	●	○	—	○	—			
	2-wire (Non-polar)			—				P3DW*	●	—	●	●	—	●				
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	5 V	—	A96V	A96	●	—	●	—	—	—	IC circuit	Relay, PLC	
				2-wire				12 V	100 V	A93V	A93	●	—	●	—	—		—
								5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—		—

* Lead wire length symbols: 0.5 m Nil (Example) M9NV
1 m M (Example) M9NVM
3 m L (Example) M9NVL
5 m Z (Example) M9NVZ

* Solid state auto switches marked with "○" are produced upon receipt of order.
* For D-P3DW□, ø32 to ø63 are available.

* Since there are other applicable auto switches than listed, refer to page 15 for details.
* For details about auto switches with pre-wired connector, refer to Best Pneumatics No. 3.
For D-P3DW□, refer to the catalog ES20-201.
* Auto switches are shipped together, (but not assembled).

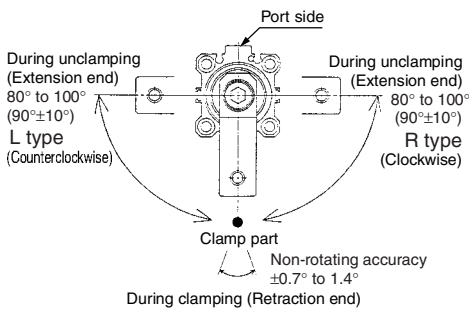
Series MK



Specifications

Bore size (mm)	12	16	20	25	32	40	50	63
Action	Double acting							
Rotary angle ^{Note 1)}	90° ±10°							
Rotary direction ^{Note 2)}	Clockwise, Counterclockwise							
Rotary stroke (mm)	7.5		9.5		15		19	
Clamp stroke (mm)	10, 20, 30				10, 20, 30, 50			
Theoretical clamp force (N) ^{Note 3)}	40	75	100	185	300	525	825	1400
Fluid	Air							
Proof pressure	1.5 MPa							
Operating pressure range	0.1 to 1 MPa							^{Note 4)} 0.1 to 0.6 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							
Piping port size	M5 x 0.8			Rc1/8, NPT1/8 G1/8		Rc1/4, NPT1/4 G1/4		
Mounting	Through-hole/Both ends tapped common, Head flange							
Cushion	Rubber bumper							
Stroke length tolerance	+0.6 -0.4							
Piston speed ^{Note 5)}	50 to 200 mm/s							
Non-rotating accuracy (Clamp part) ^{Note 1)}	±1.4°	±1.2°		±0.9°		±0.7°		

Rotary Angle



Made to Order
(For details, refer to page 17.)

Symbol	Description
-X2071	Max. operating pressure 1.0 MPa
-X2094	Overall length is the same as the MK2 series

Option/Arm

Bore size (mm)	Part no.	Accessories
12	MK-A012Z	Clamp bolt, Hexagon socket head cap screw, Hexagon nut, Spring washer
16	MK-A016Z	
20	MK-A020Z	
25		
32	MK-A032Z	
40		
50	MK-A050Z	
63		

Mounting Bracket/Flange

Bore size (mm)	Part no.	Accessories
12	CQS-F012	Hexagon socket head cap screw
16	CQS-F016	
20	MKZ-F020	
25	MKZ-F025	
32	MK2T-F032	
40	MK2T-F040	
50	MK2T-F050	
63	MK2T-F063	

Theoretical Output

Unit: N

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (cm ²)	Operating pressure (MPa)			
				0.3	0.5	0.7	1.0
12	6	IN	0.8	25	42	59	85
		OUT	1.1	34	57	79	113
16	8	IN	1.5	45	75	106	151
		OUT	2.0	60	101	141	201
20	12	IN	2.0	60	101	141	201
		OUT	3.1	94	157	220	314
25	12	IN	3.8	113	189	264	378
		OUT	4.9	147	245	344	491
32	16	IN	6.0	181	302	422	603
		OUT	8.0	241	402	563	804
40	16	IN	10.6	317	528	739	1056
		OUT	12.6	377	628	880	1257
50	20	IN	16.5	495	825	1155	1649
		OUT	19.6	589	982	1374	1963
63	20	IN	28.0	841	1402	—	—
		OUT	31.2	935	1559	—	—

Note) Theoretical output (N) = Pressure (MPa) x Piston area (cm²) x 100
Operating direction IN: Clamp OUT: Unclamp

Weight

Unit: g

Clamp stroke (mm)	Bore size (mm)							
	12	16	20	25	32	40	50	63
10	69	94	222	282	445	517	921	1256
20	84	113	250	319	494	570	1001	1364
30	99	132	279	355	542	623	1081	1472
50	—	—	—	—	639	728	1241	1687

Additional Weight

Unit: g

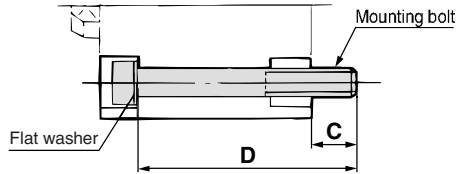
Bore size (mm)	12	16	20	25	32	40	50	63
With arm	13	32	100	100	200	200	350	350
Head flange (including mounting bolt)	58	69	130	150	175	209	371	578

Calculation: (Example) MKG20-10RNZ • Standard calculation: MKB20-10RZ222 g
• Extra weight calculation: Head flange130 g
With arm100 g
452 g

Mounting Bolt for MKB-Z

Mounting: Mounting bolt for through-hole type is available.
Ordering: Add the word "Bolt" to the mounting bolt size.

Example) Bolt M5 x 75 L (4 pcs.)



Note) Be sure to use a flat washer to mount cylinders via through-holes.

Cylinder model	C	D	Mounting bolt size
MKB12-10□Z	8	50	M3 x 50L
-20□Z		60	M3 x 60L
-30□Z		70	M3 x 70L
MKB16-10□Z	8	50	M3 x 50L
-20□Z		60	M3 x 60L
-30□Z		70	M3 x 70L
MKB20-10□Z	9	75	M5 x 75L
-20□Z		85	M5 x 85L
-30□Z		95	M5 x 95L
MKB25-10□Z	8	75	M5 x 75L
-20□Z		85	M5 x 85L
-30□Z		95	M5 x 95L
MKB32-10□Z	9.5	85	M5 x 85L
-20□Z		95	M5 x 95L
-30□Z		105	M5 x 105L
-50□Z		125	M5 x 125L
MKB40-10□Z	11	80	M5 x 80L
-20□Z		90	M5 x 90L
-30□Z		100	M5 x 100L
-50□Z		120	M5 x 120L
MKB50-10□Z	10.5	90	M6 x 90L
-20□Z		100	M6 x 100L
-30□Z		110	M6 x 110L
-50□Z		130	M6 x 130L
MKB63-10□Z	14.1	95	M8 x 95L
-20□Z		105	M8 x 105L
-30□Z		115	M8 x 115L
-50□Z		135	M8 x 135L

Clamp Arm Mounting

⚠ Caution

Use a clamp arm that is available as an option.

To fabricate a clamp arm, make sure that the allowable bending moment and the inertial moment will be within the specified range. Refer to Graph 1 and 2 on page 1.

Ensuring Safety

⚠ Caution

If one side of the piston is pressurized by supplying air with the clamp arm attached, the piston will move vertically while the clamp arm rotates.

This operation could be hazardous to personnel, as their hands or feet could get caught by the clamp arm, or could lead to equipment damage. Therefore, it is important to secure as a danger zone a cylindrical area with the length of the clamp arm as its radius, and the stroke plus 20 mm as its height.

Clamp Arm Mounting and Removal

⚠ Caution

When the arm is mounted onto or removed from the piston rod, do not fix the cylinder body, but hold the arm with a spanner when tightening or loosening the bolt (Fig. 1).

If the bolt is tightened with the cylinder body fixed, excessive rotation force will be applied to the piston rod, which may damage the internal components.

Note that when making an arm, machine it so that it engages with the width across flats on the rod end to prevent it from rotating.

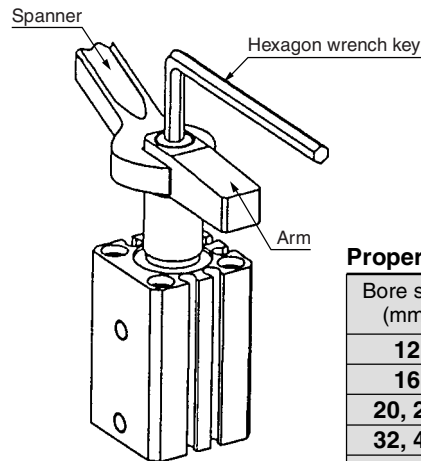


Fig. 1

Proper Tightening Torque

Bore size (mm)	Proper tightening torque (N·m)
12	0.5 to 0.7
16	2.8 to 3.5
20, 25	11.5 to 14.0
32, 40	24 to 30
50, 63	75 to 90

Head Flange Mounting

⚠ Caution

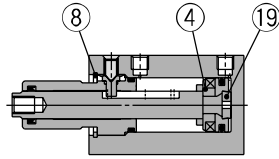
The mounting bolt for the head flange should be tightened to the torque shown in the below table.

Bore size	Thread size	Tightening torque
ø12, 16	M4 x 0.7	1.4 to 2.6 N·m
ø20 to 40	M6 x 1.0	9.0 to 12.0 N·m
ø50	M8 x 1.25	11.4 to 22.4 N·m
ø63	M10 x 1.5	25.0 to 44.9 N·m

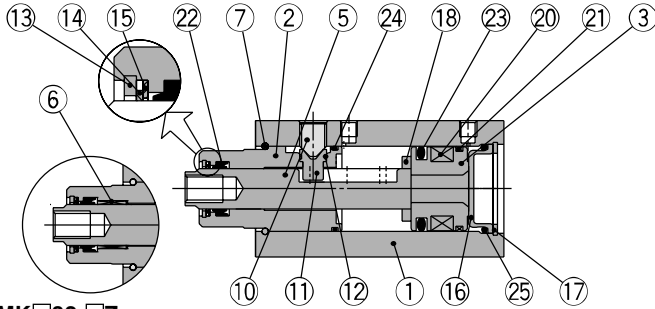
Series MK

Construction

New MK12, 16

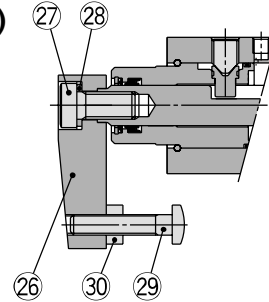


New MK20 to 32

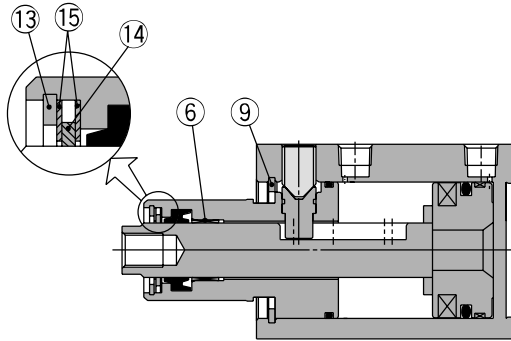


MK□32-□Z

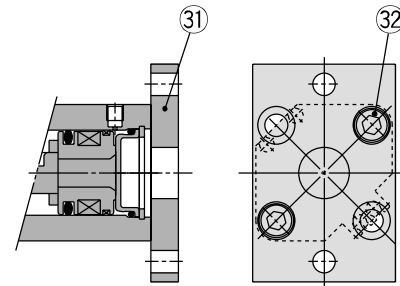
With arm (N)



New MK40 to 63



Head flange (G)



Component Parts

No.	Description	Material	Note
1	Cylinder tube	Aluminum alloy	Hard anodized
2	Rod cover	Aluminum alloy	Hard anodized
3	Piston	Aluminum alloy	Chromated
4	Magnet holder	Aluminum alloy	Chromated
5	Piston rod	Stainless steel	ø12 to ø25 Nitriding
		Carbon steel	ø32 to ø63 Heated, Nickel plated
6	Bushing	Copper bearing material	ø32 to ø63 only
7	Stop ring	Stainless steel	ø20 to ø32 only
8	Round R-type retaining ring	Carbon tool steel	ø12, ø16 only
9	C-type retaining ring	Carbon tool steel	ø40 to ø63 only
10	Hexagon socket head set screw	Chromium molybdenum steel	Sharp end section: 90°
11	Guide pin	Stainless steel	Nitriding
12	O-ring	NBR	
13	Round R-type retaining ring	Carbon tool steel	Except ø12, ø16
14	Coil scraper	Phosphor bronze	Except ø12, ø16
15	Scraper pressure	Stainless steel	Except ø12, ø16
16	Head cover	Rolled steel	Electroless nickel plated
17	C-type retaining ring	Carbon tool steel	ø20 to ø32 only

Component Parts

No.	Description	Material	Note
18	Bumper	Urethane	
19	Bumper B	Urethane	ø12, ø16 only
20	Magnet	—	
21	Wear ring	Resin	Except ø12, ø16
22	Rod seal	NBR	
23	Piston seal	NBR	
24	Gasket	NBR	
25	O-ring	NBR	ø20 to ø32 only
26	Arm	Rolled steel	
27	Hexagon socket head cap screw	Chromium molybdenum steel	
28	Spring washer	Hard steel	
29	Clamp bolt	Chromium molybdenum steel	
30	Hexagon nut	Rolled steel	
31	Flange	Rolled steel	
32	Hexagon socket head cap screw	Chromium molybdenum steel	Qty. ø12, ø16, ø32 to ø40: 4 pcs.
			ø20, ø25: 2 pcs.

Replacement Parts/Seal Kit

Bore size (mm)	ø12	ø16	ø20	ø25	ø32	ø40	ø50	ø63
Kit no.	CQSB12-PS	CQSB16-PS	MK20Z-PS	MK25Z-PS	MK32Z-PS	MK2T40-PS	MK2T50-PS	MK63Z-PS
Contents	Set of nos. above 22 23 24			Set of nos. above 14 22 23 24				

* Seal kit includes numbers in the table. Order the seal kit, based on each bore size.

* Since the seal kit does not include a grease pack, order it separately. Grease pack part no.: GR-S-010 (10 g)

Replacement Parts/Guide Pin Kit

Bore size (mm)	ø12	ø16	ø20	ø25	ø32	ø40	ø50	ø63
Kit no.	MK12Z-GS	MK16Z-GS	MK20Z-GS	MK25Z-GS	MK32Z-GS	MK40Z-GS	MK50Z-GS	MK63Z-GS
Contents	Set of nos. above 10 11 12							

* Guide pin kit includes numbers in the table. Order the guide pin kit, based on each bore size.

* For the replacement procedure of the replacement parts/seal and guide pin kits, refer to the Operation Manual.

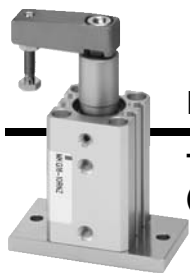
GENTLE AUTOMATIC SOLUTION SDN BHD

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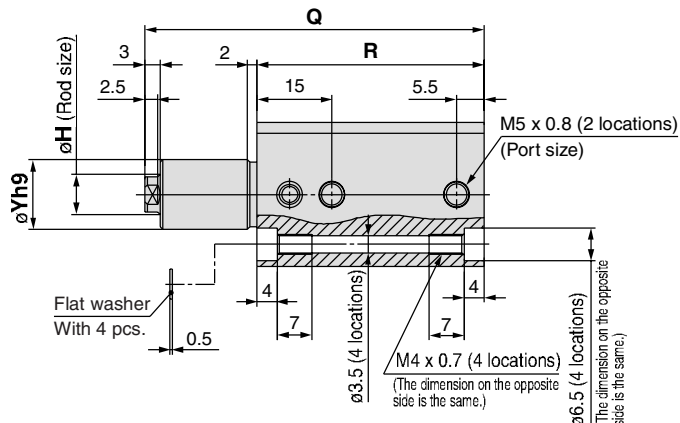
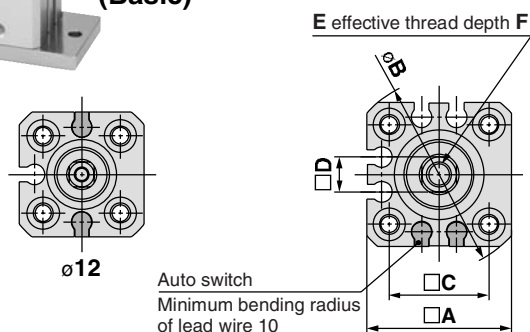
email:sales@gentle.com.my / gpauto@tm.net.my



Dimensions: **Ø12, Ø16**

The outline dimensions shown are when the rod is retracted.

Through-hole/Both ends tapped common (Basic)



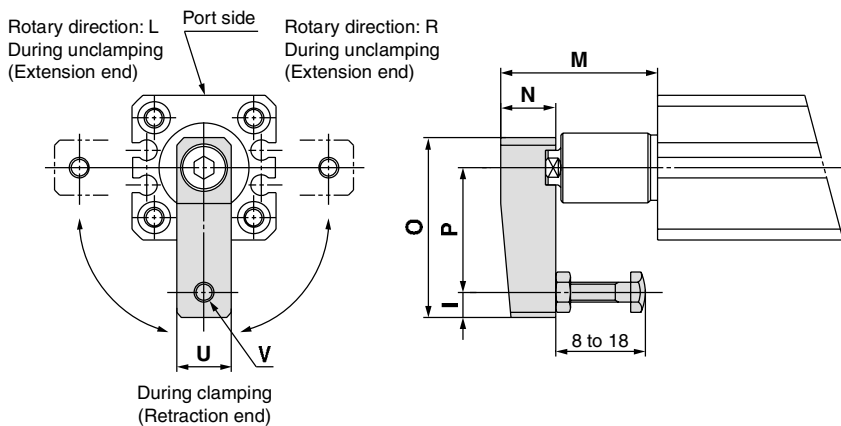
Basic

Model	A	B	C	D	E	F	H	ØYh9
MKB12-Z	25	32	15.5	5	M3 x 0.5	5.5	6	11 ⁰ _{-0.043}
MKB16-Z	29	38	20	7	M5 x 0.8	6.5	8	14 ⁰ _{-0.043}

Model	Rod state	Clamp stroke					
		10 mm		20 mm		30 mm	
		Q	R	Q	R	Q	R
MKB12-Z	Retracted	68	45.5	88	55.5	108	65.5
	Extended	85.5	45.5	115.5	55.5	145.5	65.5
MKB16-Z	Retracted	68	45.5	88	55.5	108	65.5
	Extended	85.5	45.5	115.5	55.5	145.5	65.5

Note) The above figure is with the auto switch (D-M9□) mounted.

With arm

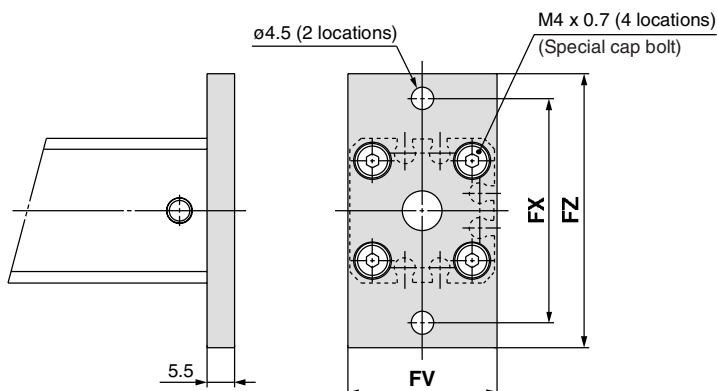


With Arm

Model	I	N	O	P	U	V
MKB12-Z	4	8	29	20	8	M3 x 0.5
MKB16-Z	5	11	36	25	11	M4 x 0.7

Model	Rod state	M		
		Clamp stroke		
		10 mm	20 mm	30 mm
MKB12-Z	Retracted	28.5	38.5	48.5
	Extended	46	66	86
MKB16-Z	Retracted	31.5	41.5	51.5
	Extended	49	69	89

Head flange



Head Flange

Model	FV	FX	FZ
MKG12-Z	25	45	55
MKG16-Z	30	45	55

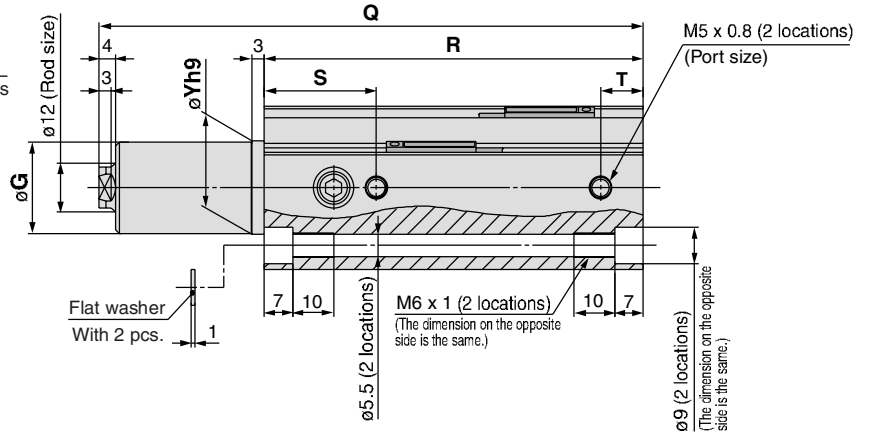
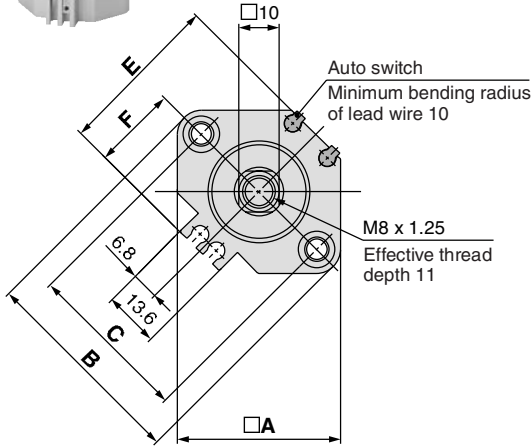
Series MK



Dimensions: $\varnothing 20$, $\varnothing 25$

The outline dimensions shown are when the rod is retracted.

Through-hole/Both ends tapped common (Basic)

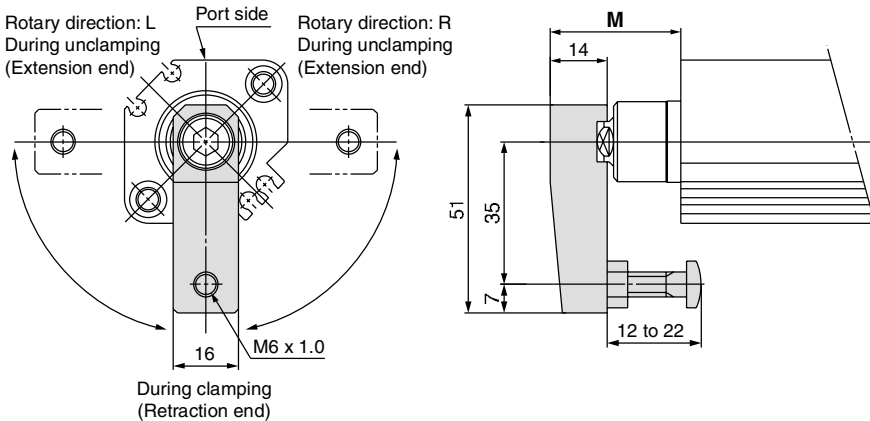


Model	A	B	C	E	F	G	$\varnothing Yh9$	S	T
MKB20-Z	36	47	36	35.5	18	17.9	18 ^{+0.043}	28	9
MKB25-Z	40	52	40	40.5	21	22.5	23 ^{+0.052}	27.5	10.5

Model	Rod state	Clamp stroke (mm)					
		10 mm		20 mm		30 mm	
		Q	R	Q	R	Q	R
MKB20-Z	Retracted	92.5	72	112.5	82	132.5	92
	Extended	112		142		172	
MKB25-Z	Retracted	93.5	73	113.5	83	133.5	93
	Extended	113		143		173	

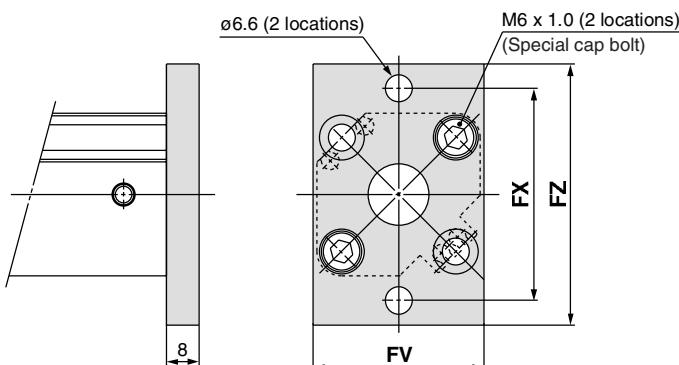
Note) The above figure is with the auto switch (D-M9□) mounted.

With arm



Model	Rod state	M (mm)		
		10 mm	20 mm	30 mm
MKB20-Z	Retracted	32	42	52
	Extended	51.5	71.5	91.5
MKB25-Z	Retracted	32	42	52
	Extended	51.5	71.5	91.5

Head flange



Model	FV	FX	FZ
MKG20-Z	39	48	60
MKG25-Z	42	52	64

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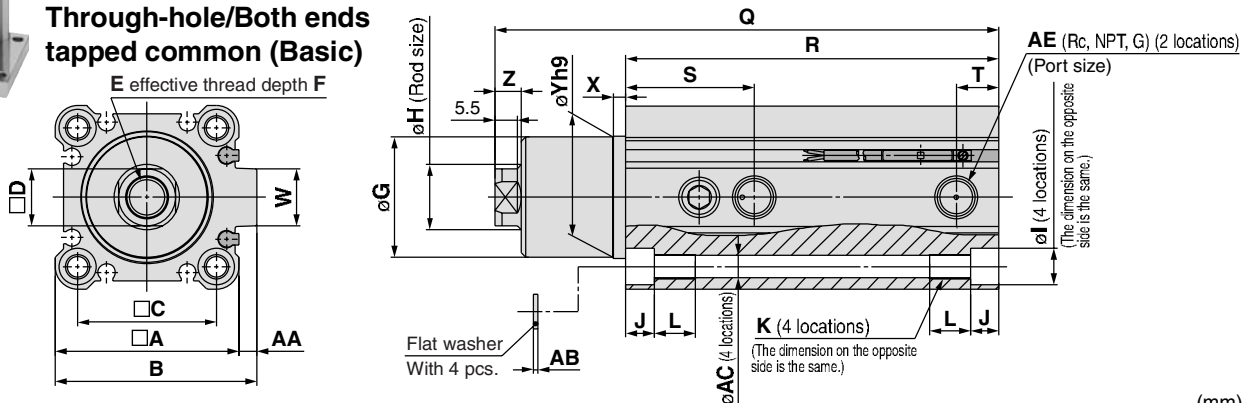
Rotary Clamp Cylinder: Standard *Series MK*



Dimensions: $\varnothing 32, \varnothing 40, \varnothing 50, \varnothing 63$

The outline dimensions shown are when the rod is retracted.

Through-hole/Both ends tapped common (Basic)



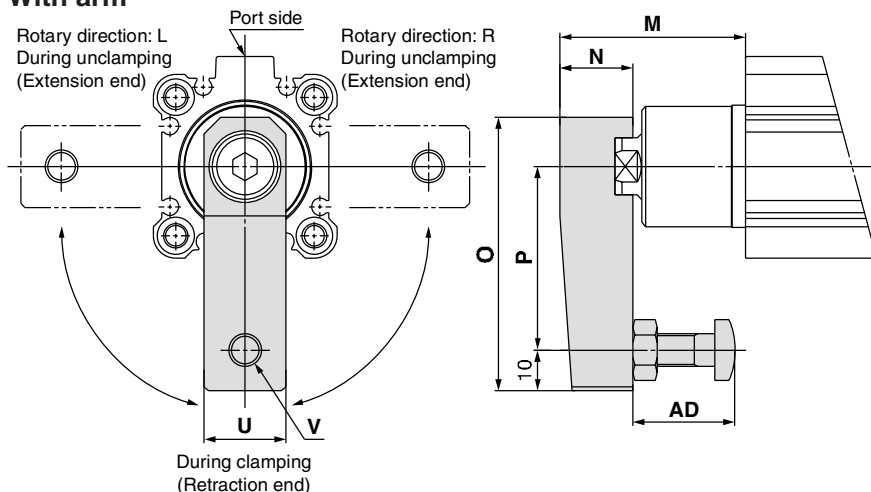
Basic

Model	A	B	C	D	E	F	G	H	I	J	K	L	S	T	W	X	$\varnothing Yh9$	Z	AA	AB	$\varnothing AC$	AE
MKB32-Z	45	49.5	34	14	M10 x 1.5	12	29.5	16	9	7	M6 x 1.0	10	31.5	10.5	14	3	$30_{-0.062}^0$	6.5	4.5	1	5.5	1/8
MKB40-Z	52	57	40	14	M10 x 1.5	12	29.5	16	9	7	M6 x 1.0	10	29	9	15	3	$30_{-0.062}^0$	6.5	5	1	5.5	1/8
MKB50-Z	64	71	50	17	M12 x 1.75	15	36.5	20	11	8	M8 x 1.25	14	34	11.5	19	3.5	$37_{-0.062}^0$	7.5	7	1	6.6	1/4
MKB63-Z	77	84	60	17	M12 x 1.75	15	47.5	20	14	10.5	M10 x 1.5	18	34.5	10.5	19	3.5	$48_{-0.062}^0$	7.5	7	1.4	9	1/4

Model	Rod state	Clamp stroke							
		10 mm		20 mm		30 mm		50 mm	
		Q	R	Q	R	Q	R	Q	R
MKB32-Z	Retracted	113.5	81.5	133.5	91.5	153.5	101.5	193.5	121.5
	Extended	138.5	81.5	168.5	91.5	198.5	101.5	258.5	121.5
MKB40-Z	Retracted	114.5	75	134.5	85	154.5	95	194.5	115
	Extended	139.5	75	169.5	85	199.5	95	259.5	115
MKB50-Z	Retracted	132	86.5	172	96.5	221	106.5	212	126.5
	Extended	161	86.5	191	96.5	221	106.5	281	126.5
MKB63-Z	Retracted	135	90	155	100	175	110	215	130
	Extended	164	90	194	100	224	110	284	130

Note) The above figure is with the auto switch (D-M9□) mounted.

With arm

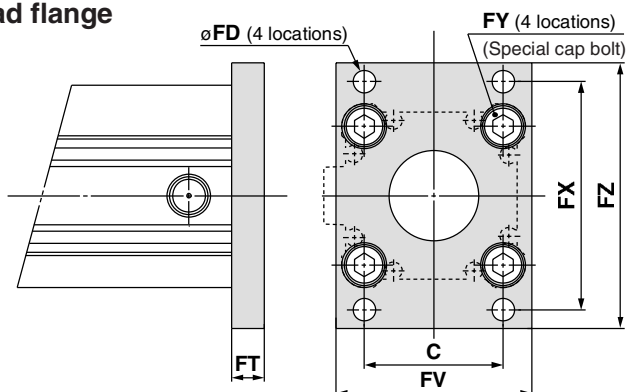


With Arm

Model	N	O	P	U	V	AD
MKB32-Z	18	67	45	20	M8 x 1.25	15 to 25
MKB40-Z	18	67	45	20	M8 x 1.25	15 to 25
MKB50-Z	22	88	65	22	M10 x 1.5	30 to 40
MKB63-Z	22	88	65	22	M10 x 1.5	30 to 40

Model	Rod state	M			
		Clamp stroke			
		10 mm	20 mm	30 mm	50 mm
MKB32-Z	Retracted	45.5	55.5	65.5	85.5
	Extended	70.5	90.5	110.5	150.5
MKB40-Z	Retracted	53	63	73	93
	Extended	78	98	118	158
MKB50-Z	Retracted	63	73	83	103
	Extended	92	112	132	172
MKB63-Z	Retracted	62.5	72.5	82.5	102.5
	Extended	91.5	111.5	131.5	171.5

Head flange



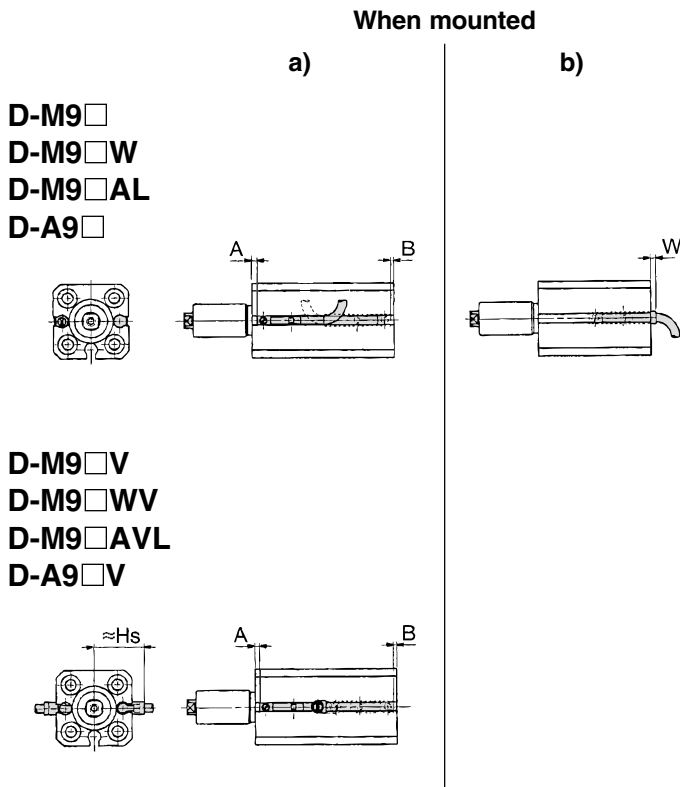
Head Flange

Model	C	$\varnothing FD$	FT	FV	FX	FY	FZ
MKB32-Z	34	5.5	8	48	56	M6 x 1.0	65
MKB40-Z	40	5.5	8	54	62	M6 x 1.0	72
MKB50-Z	50	6.6	9	67	76	M8 x 1.25	89
MKB63-Z	60	9	9	80	92	M10 x 1.5	108

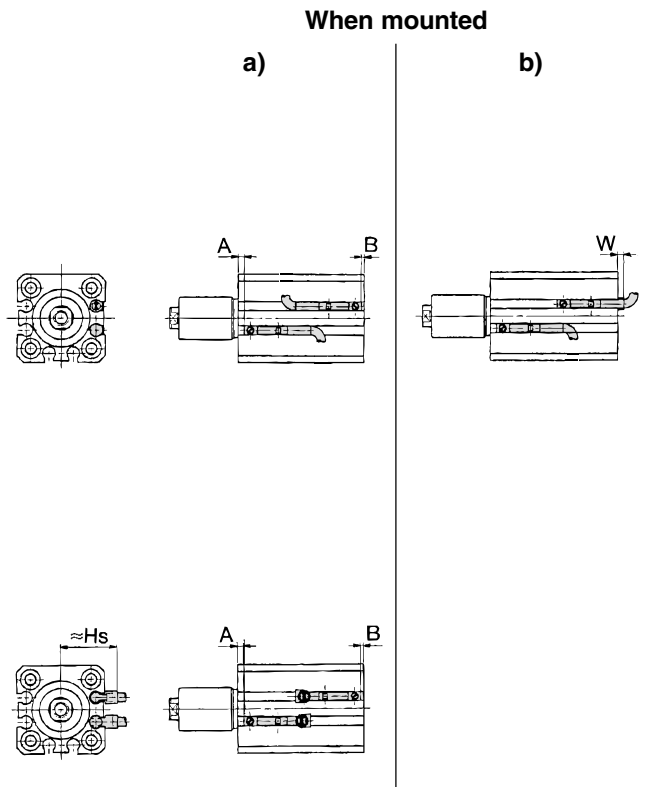
Series MK

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

ø12



ø16



Auto Switch Proper Mounting Position (mm)

Bore size (mm)	D-M9□ D-M9□W D-M9□AVL			D-M9□V D-M9□WV			D-M9□AL			D-A9□ D-A9□V		
	A	B	W	A	B	W	A	B	W	A	B	W
12	12	4	6	12	4	4	12	4	8	8	0	4.5 (2)
16	12	4	6	12	4	4	12	4	8	8	0	4.5 (2)

Note 1) (): D-A96, A9□V

Note 2) When setting an auto switch, confirm the operation and adjust its mounting position.

Auto Switch Mounting Height (mm)

Auto switch model	D-M9□V D-M9□WV D-M9□AVL		D-A9□V
	Hs		Hs
Bore size 12	19		17
16	21		19

Operating Range

Auto switch model	Bore size (mm)							
	12	16	20	25	32	40	50	63
D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL	3	4	5	5.5	5	5	5	6.5
D-A9□/A9□V	6	7.5	10	9	9	9.5	9.5	11
D-F7□/J79 D-F7□V/J79C D-F7□W/F7□WV D-J79W D-F79F/F7BAL D-F7BAVL/F7NTL	—	—	6	6	6	6.5	6.5	7.5
D-A7□/A80 D-A7□H/A80H D-A73C/A80C	—	—	12	11	10.5	11.5	11	13
D-A79W	—	—	15.5	14	14	15.5	14.5	17
D-P3DWL	—	—	—	—	6.5	7	7	8

* 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 the ambient environment.

* The D-M9□(V), M9□W(V), M9□A(V)L, and A9□(V) with ø12 or ø16 (MK), or ø32 or more (MK, MK2) indicate the operating range when using the existing auto switch mounting groove, without using auto switch mounting bracket BQ2-012.

GENTLE AUTOMATIC SOLUTION SDN BHD

No.36, Jalan Industri USJ 1/13, Taman Perindustrian USJ 1, 47600 Subang Jaya, Selangor.

TEL: 603-8023 7743 / 8743

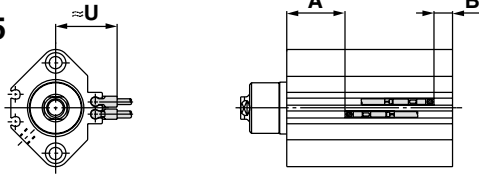
FAX: 603-8023 9743

email:sales@gentle.com.my / gpauto@tm.net.my

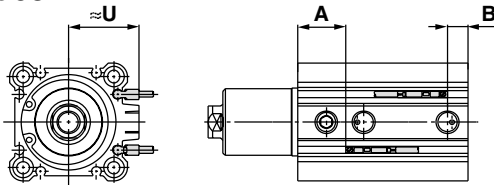
D-M9□
D-M9□V
D-M9□W
D-M9□WV

D-M9□AL
D-M9□AVL
D-A9□
D-A9□V

∅20, ∅25



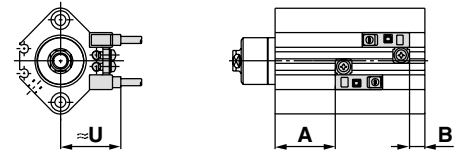
∅32 to ∅63



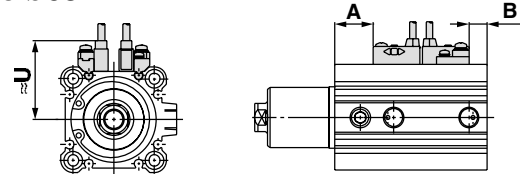
D-F7□/J79
D-F7□V
D-J79C
D-F7□W/J79W
D-F7□WV
D-F7BAL/F7BAVL

D-F79F/F7NTL
D-A7□/A80
D-A73C/A80C
D-A7□H/A80H
D-A79W

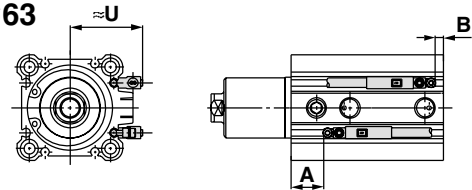
∅20, ∅25



∅32 to ∅63



D-P3DWL
∅32 to ∅63



Auto Switch Proper Mounting Position

Bore size (mm)	D-M9□ D-M9□V D-M9□W D-M9□WV D-M9□AL D-M9□AVL		D-F7□/J79 D-F7□V D-J79C/F7□W D-F7□WV D-F7BAL D-F7BAVL D-F79F/J79W D-A7□H/A80H D-A73C/A80C D-A72		D-F7NTL		D-A9□ D-A9□V		D-A73 D-A80		D-A79W		D-P3DWL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	30.5	10.0	28.0	7.5	33.0	12.5	26.5	6.0	27.5	7.0	25.0	4.5	—	—
25	29.5	12.0	27.0	9.5	32.0	14.5	25.5	8.0	26.5	9.0	24.0	6.5	—	—
32	31.5	13.0	29.0	10.5	34.0	15.5	27.5	9.0	28.5	10.0	26.0	7.5	22.5	3.5
40	25.0	13.0	22.5	10.5	27.5	15.5	21.0	9.0	22.0	10.0	19.5	7.5	16.0	4.0
50	29.0	16.5	26.5	14.0	31.5	19.0	25.0	12.5	26.0	13.5	23.5	11.0	20.0	7.5
63	29.5	19.5	27.0	17.0	32.0	22.0	25.5	15.5	26.5	16.5	24.0	14.0	20.5	10.5

Note) When setting an auto switch, confirm the operation and adjust its mounting position.

Auto Switch Mounting Height

Auto switch model	(mm)									
	D-M9□V	D-A9□V	D-F7□/J79 D-F7□W D-J79W D-F7BAL D-F79F D-F7NTL D-A7□H D-A80H	D-F7□V D-F7□WV	D-J79C	D-A7□ D-A80	D-A73C D-A80C	D-A79W	D-P3DW□	
Bore size	U	U	U	U	U	U	U	U	U	U
20	25	23	25.5	27.5	30	24.5	31	28	—	—
25	28	26	28	30.5	32.5	27.5	34	31	—	—
32	28.5	26.5	36	26.5	39.5	34	40.5	37.5	33	33
40	32	30	38	40	42.5	37.5	43.5	40.5	36.5	36.5
50	37.5	35	43.5	45	48	43	49	46	42	42
63	42.5	40.5	48.5	50.5	53.5	48	54.5	51.5	47	47

GENTLE AUTOMATIC SOLUTION SDN BHD

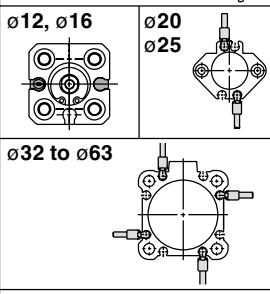
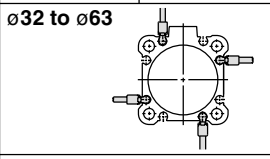
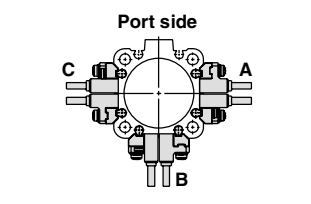
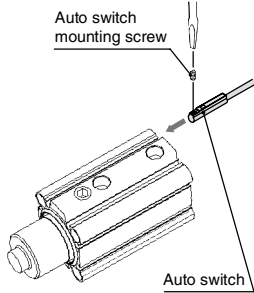
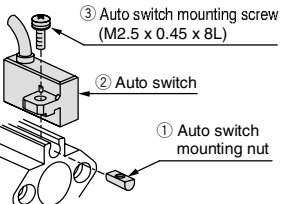
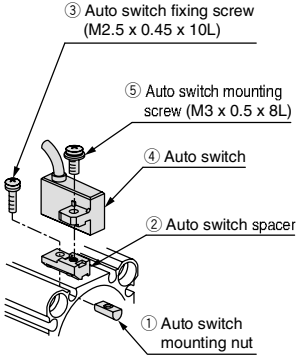
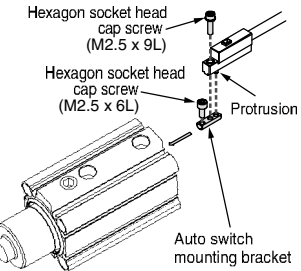
No.36, Jalan Industri USJ 1/13, Taman Perindustrian USJ 1, 47600 Subang Jaya, Selangor.

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Auto Switch Mounting Bracket/Parts No.

Applicable auto switch	D-M9□/M9□V D-M9□W/M9□WV D-M9□AL/M9□AVL D-A9□/A9□V	D-F7□/F7□V/J79/J79C/F7□W/J79W/F7□WV D-F7BAL/F7BAVL/F79F/F7NTL D-A7□/A80/A7□H/A80H/A73C/A80C/A79W	D-P3DW□									
Bore size (mm)	ø12 to ø63	ø20, ø25	ø32 to ø63									
Auto switch mounting bracket part no.	—	BQ4-012	BQ5-032									
Auto switch mounting bracket fitting parts lineup/weight	—	<ol style="list-style-type: none"> Auto switch mounting screw (M2.5 x 8L) Auto switch mounting nut Weight: 1.5 g	<ol style="list-style-type: none"> Auto switch fixing screw (M2.5 x 10L) Auto switch mounting screw (M3 x 8L) Auto switch spacer Auto switch mounting nut Weight: 3.5 g									
		When requesting the enclosure of the auto switch mounting bracket with the cylinder for shipment, add “-BQ” to the end of the cylinder part number. Standard model no. +BQ Example: MKB20-10LZ-BQ										
Auto switch mounting surface	Surfaces with auto switch mounting slot ø12, ø16 ø20 ø25  ø32 to ø63 	Auto switch mounting rail side only	A/B/C side except port side									
		—										
Mounting of auto switch	 <p>Auto switch mounting screw</p> <p>Auto switch</p> <ul style="list-style-type: none"> When tightening the auto switch mounting screw, use a watchmakers' screwdriver with a handle 5 to 6 mm in diameter. <p>Tightening torque of auto switch mounting screw (N·m)</p> <table border="1"> <thead> <tr> <th>Auto switch model</th> <th>Tightening torque</th> </tr> </thead> <tbody> <tr> <td>D-M9□(V)</td> <td rowspan="2">0.05 to 0.15</td> </tr> <tr> <td>D-M9□W(V)</td> </tr> <tr> <td>D-M9□A(V)L</td> <td rowspan="2">0.10 to 0.20</td> </tr> <tr> <td>D-A9□(V)</td> </tr> </tbody> </table>	Auto switch model	Tightening torque	D-M9□(V)	0.05 to 0.15	D-M9□W(V)	D-M9□A(V)L	0.10 to 0.20	D-A9□(V)	<ol style="list-style-type: none"> Insert the nut into the auto switch mounting slot on the cylinder tube, and place it in the roughly estimated setting position. Engage the ridge on the auto switch mounting arm with the recess in the cylinder tube rail, and slide it to the position of the nut. Gently screw the auto switch mounting screw into the thread of the auto switch mounting nut through the mounting hole on the auto switch mounting arm. Confirm where the mounting position is, and tighten the auto switch mounting screw to fix the auto switch. The tightening torque of the M2.5 screw must be 0.25 to 0.35 N·m. The detection position can be changed under the conditions in step ③.  <p>③ Auto switch mounting screw (M2.5 x 0.45 x 8L)</p> <p>② Auto switch</p> <p>① Auto switch mounting nut</p>	<ol style="list-style-type: none"> Insert the nut into the auto switch mounting slot on the cylinder tube, and place it in the roughly estimated setting position. With the lower tapered part of the auto switch spacer facing the outside of the cylinder tube, line up the M2.5 through hole with the M2.5 female of the auto switch mounting nut. Gently screw the auto switch mounting nut fixing screw (M2.5) into the thread of the auto switch mounting nut through the mounting hole. Engage the ridge on the auto switch mounting arm with the recess in the auto switch spacer. Tighten the auto switch mounting screw (M3) to fix the auto switch. The tightening torque of the M3 screw must be 0.35 to 0.45 N·m. Confirm where the mounting position is, and tighten the auto switch fixing screw (M2.5) to fix the auto switch mounting nut. The tightening torque of the M2.5 screw must be 0.25 to 0.35 N·m. The detection position can be changed under the conditions in step ⑤.  <p>③ Auto switch fixing screw (M2.5 x 0.45 x 10L)</p> <p>⑤ Auto switch mounting screw (M3 x 0.5 x 8L)</p> <p>④ Auto switch</p> <p>② Auto switch spacer</p> <p>① Auto switch mounting nut</p>	<ol style="list-style-type: none"> Insert the protrusion on the bottom of the auto switch into the mating part of the auto switch mounting bracket and fix the auto switch and the auto switch mounting bracket temporarily by tightening the hexagon socket head cap screw (M2.5 x 9L) 1 to 2 turns. Insert the temporarily tightened mounting bracket into the mating groove of the cylinder tube, and slide the auto switch onto the cylinder tube through the groove. Check the detecting position of the auto switch and fix the auto switch firmly with the hexagon socket head cap screw (M2.5 x 6L, M2.5 x 9L).* If the detecting position is changed, go back to step ②. <p>* The hexagon socket head cap screw (M2.5 x 6L) is used to fix the mounting bracket and cylinder tube. This enables the replacement of the auto switch without adjusting the auto switch position.</p> <p>Note 1) Ensure that the auto switch is covered with the mating groove to protect the auto switch.</p> <p>Note 2) The tightening torque of the hexagon socket head cap screw (M2.5 x 6L, M2.5 x 9L) is 0.2 to 0.3 N·m.</p> <p>Note 3) Tighten the hexagon socket head cap screws evenly.</p>  <p>Hexagon socket head cap screw (M2.5 x 9L)</p> <p>Hexagon socket head cap screw (M2.5 x 6L)</p> <p>Protrusion</p> <p>Auto switch mounting bracket</p>
Auto switch model	Tightening torque											
D-M9□(V)	0.05 to 0.15											
D-M9□W(V)												
D-M9□A(V)L	0.10 to 0.20											
D-A9□(V)												

Note) The auto switch mounting bracket and auto switch are enclosed with the cylinder for shipment.

Other than the models listed in "How to Order", the following auto switches are applicable.
For detailed specifications, refer to Best Pneumatics No. 3.

Auto switch type	Model	Electrical entry	Features	Applicable bore size
Reed	D-A72, A73	Grommet (Perpendicular)	—	ø20 to ø63
	D-A80		Without indicator light	
	D-A79W		Diagnostic indication (2-color indication)	
	D-A73C	Connector (Perpendicular)	—	
	D-A80C		Without indicator light	
	D-A72H, A73H, A76H	Grommet (In-line)	—	
	D-A80H		Without indicator light	
Solid state	D-F7NV, F7PV, F7BV	Grommet (Perpendicular)	—	ø20 to ø63
	D-F7NWW, F7BWV		Diagnostic indication (2-color indication)	
	D-F7BAVL		Water resistant (2-color indication)	
	D-J79C	Connector (Perpendicular)	—	
	D-F79, F7P, J79	Grommet (In-line)	—	
	D-F79W, F7PW, J79W		Diagnostic indication (2-color indication)	
	D-F7BAL		Water resistant (2-color indication)	
	D-F79F		With diagnostic output (2-color indication)	
	D-F7NTL		With timer	

* With pre-wired connector is also available for solid state auto switches. For details, refer to Best Pneumatics No. 3.

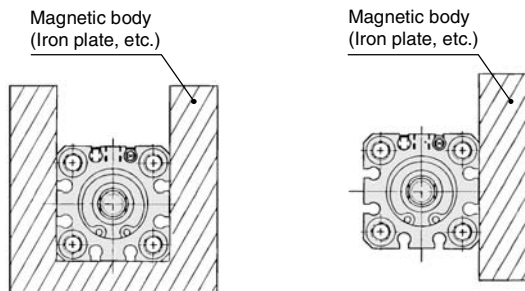
Mounting

⚠ Caution

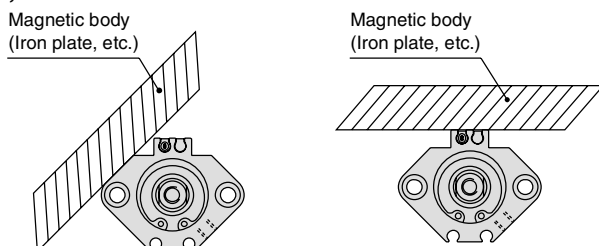
When a Magnetic Body Surrounds the Cylinder

- When a magnetic body surrounds the cylinder as shown in the figure below (including when the magnetic body is only on one side of the cylinder), the movement of the auto switch may become unstable, so please contact SMC.

ø12 to ø16
ø32 to ø63



ø20, ø25



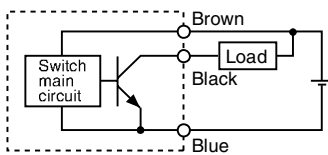
With Magnetic Field Resistant Auto Switch D-P3DWL

- If welding cables or welding gun electrodes are in the vicinity of the cylinder, the magnets in the cylinder could be affected by the external magnetic fields. (Please contact SMC if the welding amperage exceeds 16000 A.) If the source of strong magnetism comes in contact with the cylinder or an auto switch, make sure to install the cylinder away from the source of the magnetism.
If the cylinder is to be used in an environment in which spatter will come in direct contact with the lead wires, cover the lead wires with a protective tube. For the protective tube, use a tube I.D. ø7 or more, which excels in heat resistance and flexibility. Please contact SMC if an inverter welder or a DC welder will be used.

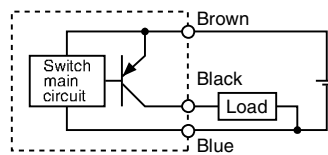
Auto Switch Connections and Examples

Basic Wiring

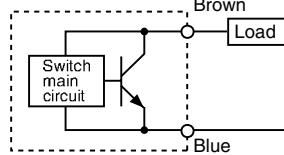
Solid state 3-wire, NPN



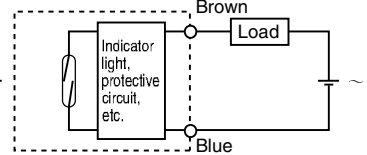
Solid state 3-wire, PNP



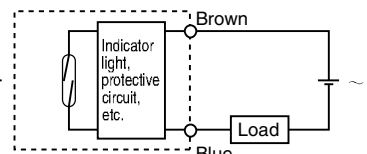
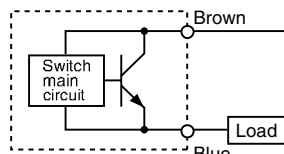
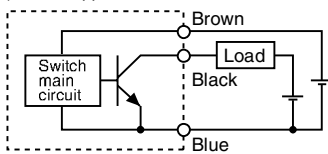
2-wire (Solid state)



2-wire (Reed)

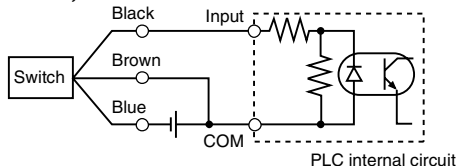


(Power supplies for switch and load are separate.)

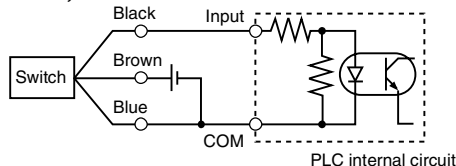


Example of Connection to PLC (Programmable Logic Controller)

• Sink input specification 3-wire, NPN

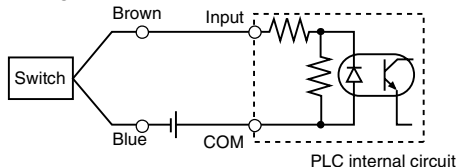


• Source input specification 3-wire, PNP

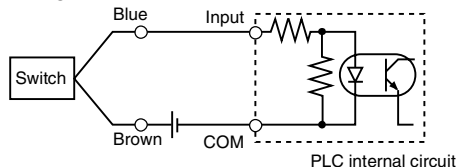


Connect according to the PLC input specifications, since the connection method will differ depending on the PLC input specifications.

2-wire



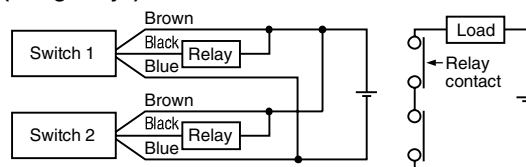
2-wire



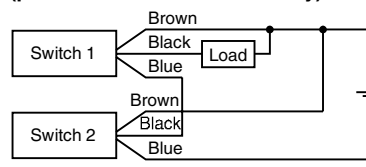
Example of AND (Serial) and OR (Parallel) Connection

• 3-wire

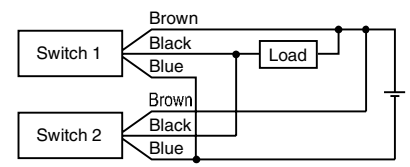
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)



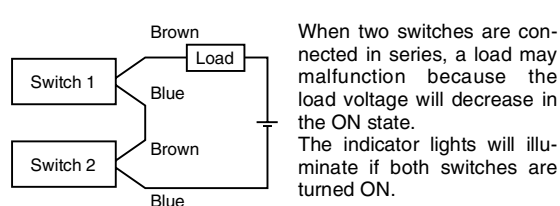
OR connection for NPN output



The indicator lights will illuminate when both switches are turned ON.

• 2-wire

2-switch AND connection

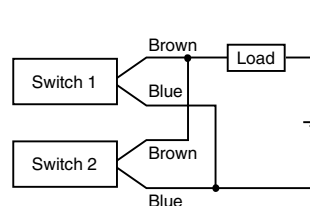


When two switches are connected in series, a load may malfunction because the load voltage will decrease in the ON state. The indicator lights will illuminate if both switches are turned ON.

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

Example) Power supply voltage: 24 VDC
Auto switch internal voltage drop: 4 V

2-switch OR connection



(Solid state)

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

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

Example) Load impedance: 3 kΩ
Auto switch leakage current: 1 mA

(Reed)

Because there is no leakage current, the load voltage will not increase in the OFF state. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light because of the dispersion and reduction of the current flowing to the switches.