Rotary Clamp Cylinder

Series MK (Standard type)
ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63

Series MK2 (Heavy duty type)
ø20, ø25, ø32, ø40, ø50, ø63

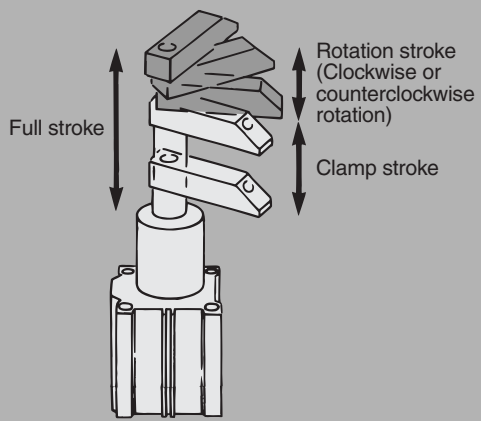
Series MK

Series MK2

Maximum operating pressure: 1 MPa

Ideal for machine designs with small space requirements

Suited for electronic parts inspection clamps. Ideal for use in small mounting space.



Possible to install auto switches

A built-in magnet is standard, an auto switch can be directly mounted.

- A solid state magnetic field resistant auto switch is available. (ø40, ø50, ø63)

Made to Order Specifications

Heat resistant: Max. 150°C (-XB6)

⚠ Precautions 1

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 10-24-3 to 10-24-6.

Operating Environment

⚠ Warning

Do not use the cylinder under following environments:

1. An area in which fluids such as cutting oil splash on the piston rod.
2. An area in which foreign matter such as particles, cutting chips, dust, or spatter is present.
3. An area in which the ambient temperature exceeds the operating range.
4. An area exposed to direct sunlight.
5. An environment that poses the risk of corrosion.

Removing and Reinstalling the Clamp Arm

⚠ Warning

To remove and reinstall the arm on the piston rod, instead of securing the cylinder body, use a wrench to secure the arm to loosen or to tighten the bolt (Fig. (1)).
An excessive amount of rotational force will be applied to the piston rod if the bolt is tightened by securing the cylinder body, which could damage the internal parts.
To fabricate an arm, make sure to machine a detect portion that corresponds to the parallel section at the rod end.

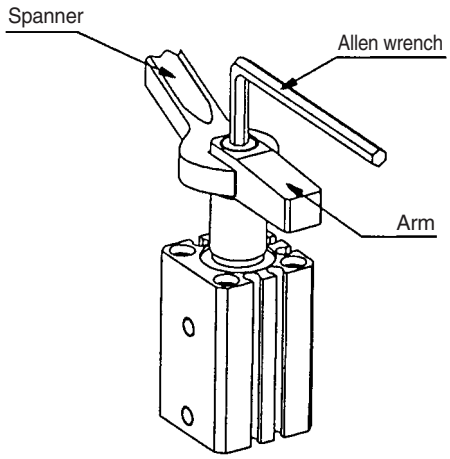


Fig. (1)

Speed Adjustment

⚠ Warning

Make sure to connect a speed controller to the cylinder and adjust it so that the cylinder speed will be within a range of 50 to 200 mm/s.
If a clamp arm other than the available option is used, make sure to select an appropriate arm after calculating the inertial moment of the arm.
To operate a speed controller, make sure that the valve is fully closed, and gradually open the valve to adjust the speed.

⚠ Precautions 2

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 10-24-3 to 10-24-6.

How to Operate

⚠ Warning

The MK cylinder could malfunction or the non-rotating accuracy could be affected if a rotational force is applied to the piston rod. Therefore, observe the particulars given below before operating the cylinder.

1. Make sure to mount the cylinder vertically (Fig. (2)).
2. Do not absolutely perform any work (such as clamping or acting as a stopper, etc.) in the rotary direction (Fig. (3)).
3. To clamp, make sure to do so within the clamp stroke (straight-line stroke) range (Fig. (4)).
4. Make sure that the clamping surface of the workpiece is perpendicular to the cylinder's axial line (Fig. (5)).
5. Do not operate the cylinder in such a way that an external force causes the workpiece to move while being clamped (Fig. (6)).
6. Furthermore, do not operate the cylinder in an application in which a rotational force will be applied to the piston rod.

1. Do not operate the cylinder horizontally.

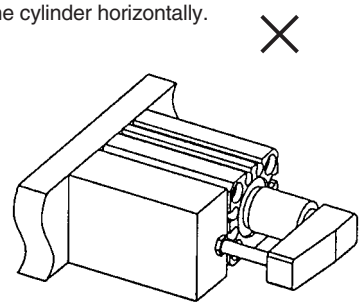


Fig. (2)

2. Do not perform any work in the rotary direction.

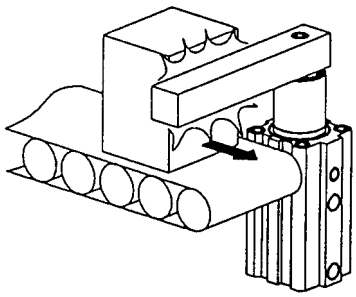


Fig. (3)

3. Do not clamp during the rotary stroke.

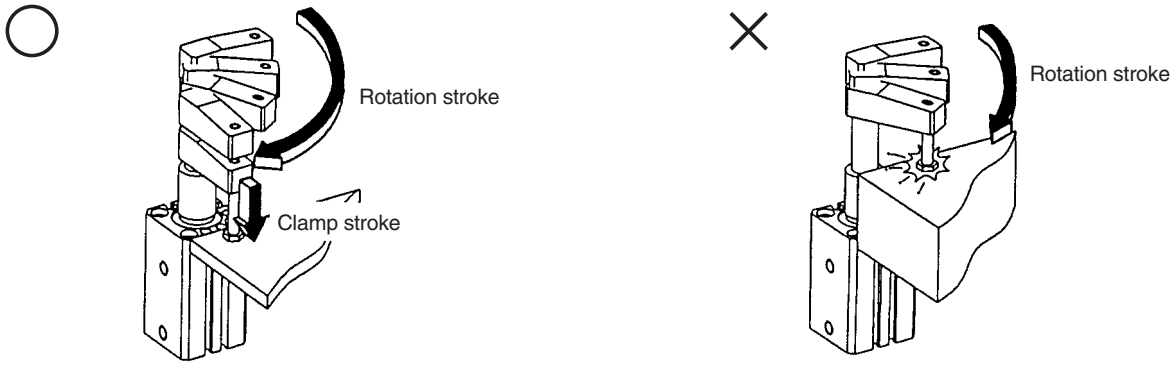


Fig. (4)

4. Do not clamp on a slanted surface.

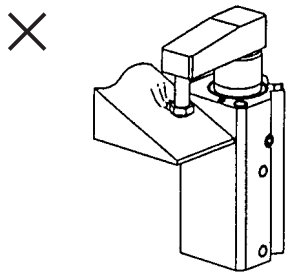


Fig. (5)

5. Make sure that the workpiece does not move during clamping.

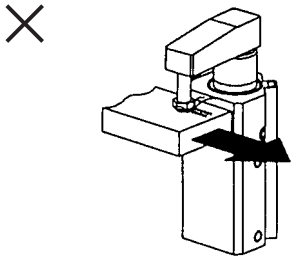


Fig. (6)

Rotary Clamp Cylinder: Standard Type

Series MK

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

How to Order

MK **A** **20** – **10** **R** **F** – **F9BW** **S**

Mounting style

Symbol	Mounting	Applicable bore (mm)
B	Through-hole/Both ends tapped common (Standard)	12, 16
A	Both ends tapped style	20 to 63
B	Through-hole	
G	Head side flange style	

∗The head side flange is equipped with a boss mounting, so be sure to specify body option "F".

Bore size

12	12 mm	**32**	32 mm
16	16 mm	**40**	40 mm
20	20 mm	**50**	50 mm
25	25 mm	**63**	63 mm

Clamp stroke

Symbol	Clamp stroke	Applicable bore (mm)
10	10 mm	12 to 40
20	20 mm	12 to 63
50	50 mm	50 to 63

Rotary direction (Release → Clamp)

R	Clockwise
L	Counterclockwise

Body option

Symbol	Standard (Female thread)
M	Rod end width across flats∗
F	With boss on head end∗
N	With arm

∗ Regarding manufacturable range of body option, refer to the table.

Manufacturable Range of Body Options

Bore size (mm)	Nil	M	F	N	MF	FN
12, 16	●	—	—	●	—	—
20 to 63	●	●	●	●	●	●

Auto switch

Nil	Without auto switch (Built-in magnet)

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

Number of auto switches

Nil	2 pcs.
S	1 pc.

Applicable Auto Switch/Refer to page 10-20-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Rail mounting ø20 to ø63 Perpendicular	Rail mounting ø20 to ø63 In-line	Direct mounting ø12, ø16, ø32 to ø63 Perpendicular	Direct mounting ø12, ø16, ø32 to ø63 In-line	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	–	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	—	**A76H**	**A96V**	**A96**	●	●	—	—	—	IC circuit	—
				2-wire	—	—	200 V	**A72**	**A72H**	—	—	●	●	—	—	—	—	Relay, PLC
					24 V	12 V	100 V	**A73**	**A73H**	—	—	●	●	●	—	—		
								—	—	**A93V**	**A93**	●	●	—	—	—		
		Connector				12 V	—	**A73C**	—	—	—	●	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet				—	—	**A79W**	—	—	—	●	●	—	—	—		
Solid state switch	–	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**F7NV**	**F79**	—	—	●	●	○	—	○	IC circuit	Relay, PLC
								—	—	**M9NV**	**M9N**	●	●	○	—	○		
				3-wire (PNP)				**F7PV**	**F7P**	—	—	●	●	○	—	○		
								—	—	**M9PV**	**M9P**	●	●	○	—	○		
				2-wire		12 V		**F7BV**	**J79**	—	—	●	●	○	—	○	—	
								—	—	**M9BV**	**M9B**	●	●	○	—	○		
		Connector						**J79C**	—	—	—	●	●	●	●	—		
	Diagnostic output (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**F7NWV**	**F79W**	—	—	●	●	○	—	○	IC circuit	
								—	—	**F9NWV**	**F9NW**	●	●	○	—	○		
				3-wire (PNP)				—	**F7PW**	—	—	●	●	○	—	○		
								—	—	**F9PWV**	**F9PW**	●	●	○	—	○		
				2-wire		12 V		**F7BWV**	**J79W**	**F9BWV**	**F9BW**	●	●	○	—	○	—	
	Water resistant (2-color indication)							—	**F7BA**	—	**F9BA**	—	●	○	—	○		
								F7BAV	—	—	—	—	●	○	—	—		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		—	**F79F**	—	—	●	●	○	—	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire		—		—	**P5DW**	—	—	—	●	●	—	○	—	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) A73C
3 m ····· L (Example) A73CL
5 m ····· Z (Example) A73CZ
None ····· N (Example) A73CN

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

∗ D-P5DWL type can only be mounted for bore sizes ø40, ø50, ø63.
∗ Only D-P5DWL type is assembled at the time of shipment.

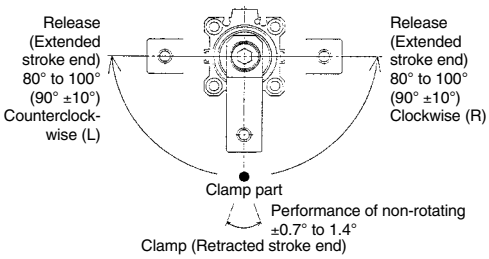
• Since there are other applicable auto switches than listed, refer to page 10-7-14 for details.
• For details about auto switches with pre-wire connector, refer to page 10-20-66.

Specifications

Bore size (mm)	12	16	20	25	32	40	50	63
Action	Double acting							
Rotary angle (1)	90° ±10°							
Rotary direction (2)	R: Clockwise, L: Counterclockwise							
Rotary stroke (mm)	7.5		9.5		15		19	
Clamp stroke (mm)	10, 20						20, 50	
Allowable moment (N·m) (3)	1	3.8	7	13	27	47	107	182
Theoretical clamp force (N) (4)	40	75	100	185	300	525	825	1400
Fluid	Air							
Proof pressure	1.5 MPa							
Operating pressure range	0.1 to 10 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				Rc 1/8		Rc 1/4	
Mounting	Through-hole/Both ends tapped common	Both ends tapped, Through-hole, Head side flange						
Cushion	Rubber bumper							
Stroke length tolerance	+0.6 –0.4							
Piston speed	50 to 200 mm/s							
Non-rotating accuracy (1)	±1.4°	±1.2°			±0.9°		±0.7°	

Note 1) Refer to "Rotary angle" figure.
Note 2) Direction of rotation viewed from the rod side when the piston rod retracting.
Note 3) Max. bending moment applied to the piston rod side.
Note 4) At 0.5 MPa.

Rotary Angle



Made to Order Specifications (For details, refer to page 10-21-1.)

Symbol	Specifications
-XB6	Head resistant cylinder (150°C)

Theoretical Output

(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	R	0.8	24	40	56	80
		H	1.1	33	55	77	110
16	8	R	1.5	45	75	105	150
		H	2	60	100	140	200
20	12	R	2	60.8	100	139	200
		H	3	90.2	149	208	298
25	12	R	3.7	112	185	258	370
		H	4.9	149	245	341	490
32	16	R	6	182	300	418	600
		H	8	243	400	557	800
40	16	R	10.5	319	525	731	1050
		H	12.5	380	625	870	1250
50	20	R	16.5	502	825	1149	1648
		H	19.6	596	980	1365	1961
63	20	R	28	851	1400	1950	2801
		H	31.2	948	1560	2172	3121

Note) Theoretical output (N) = Pressure (MPa) x Piston area (cm^2) x 100 Operating direction R: Rod side (Clamp)
H: Head side (Release)

Option Part No./Arm

Bore size (mm)	Part no.	Accessory
12	**MK-A012**	Clamp bolt Hexagon socket head cap screw Hexagon nut Spring washer
16	**MK-A016**	
20	**MK-A020**	
25		
32	**MK-A032**	
40		
50	**MK-A050**	
63		

Mounting Bracket Part No./Flange

Bore size (mm)	Part no.	Accessory
20	**MK-F020**	Centering location ring Set pin Bolt for cylinder body
25	**MK-F025**	
32	**MK-F032**	
40	**MK-F040**	
50	**MK-F050**	
63	**MK-F063**	

Weight/Through-hole Mounting

(g)

Clamp stroke (mm)	Bore size (mm) 12	16	20	25	32	40	50	63
10	70	100	250	280	500	595	—	—
20	87	123	290	320	525	640	1100	1520
50	—	—	—	—	—	—	1350	1805

Additional Weight

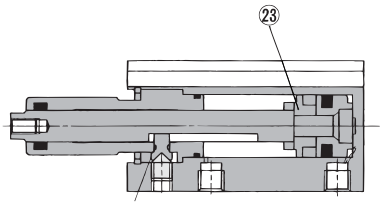
(g)

Bore size (mm)	12	16	20	25	32	40	50	63
Both ends tapped style	—	—	6	7	7	6	7	17
Rod end width across flats	—	—	10	10	21	21	46	46
With boss in head side	—	—	2	3	5	7	13	25
With arm	13	32	100	100	200	200	350	350
Rear flange type (including mounting bolt)	—	—	133	153	166	198	345	531

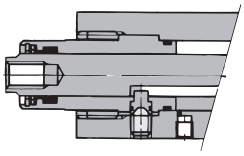
Calculation: (Example) MKG20-10RFN
- Standard calculation: MKB20-10R 250 g
- Extra weight calculation: Both ends tapped style 6 g
  Rear flange 133 g
  With boss in head side 2 g
  With arm 100 g
  491 g

Construction

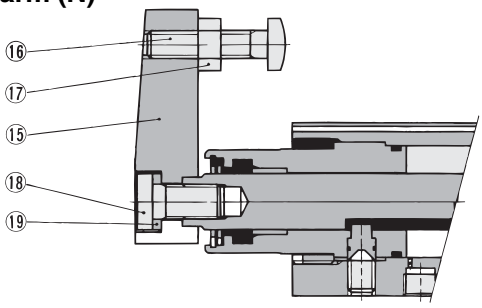
MK□12, 16



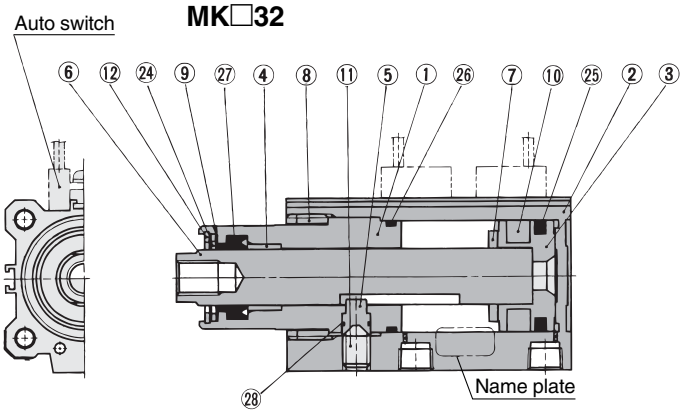
MK□20, 25



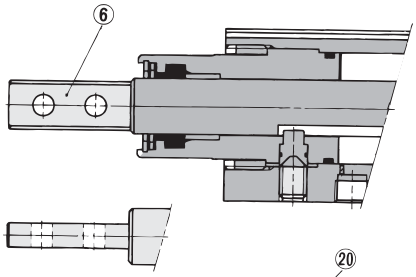
With arm (N)



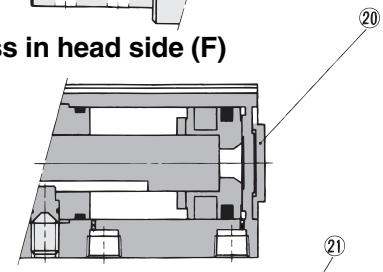
MK□32



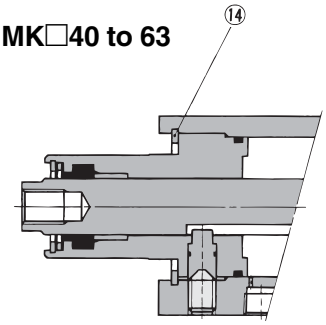
Rod end width across flats (M)



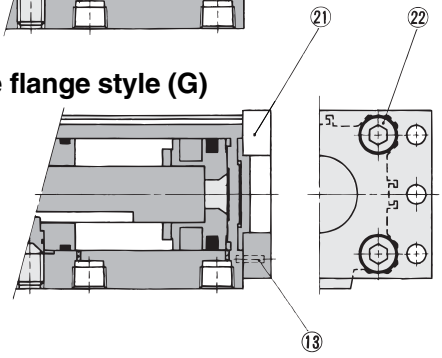
With boss in head side (F)



MK□40 to 63



Head side flange style (G)



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	Hard anodized
②	Cylinder tube	Aluminum alloy	Hard anodized
③	Piston	Aluminum alloy	
④	Bushing	Copper bearing material	Only ø32 to ø63
⑤	Guide pin	Stainless steel	Nitrided
⑥	Piston rod	Stainless steel	ø12 to 25 Nitrided
		Carbon steel	ø32 to ø63 Heated, Nickel plated
⑦	Bumper	Urethane	
⑧	Ring nut	Copper alloy	Only ø20 to ø32
⑨	Scraper pressure	Stainless steel	Except ø12, ø16
⑩	Rubber magnet	Synthetic rubber	
⑪	Hexagon socket head set screw	Chromium molybdenum steel	Sharp end section: 90°
⑫	Round type R retainer	Spring steel	
⑬	Parallel pin	Stainless steel	

No.	Description	Material	Note	
⑭	Type C snap ring	Carbon tool steel	Only ø40 to ø63	
⑮	Arm	Rolled steel		
⑯	Clamp bolt	Chromium molybdenum steel		
⑰	Hexagon nut	Rolled steel		
⑱	Hexagon socket head cap screw	Chromium molybdenum steel		
⑲	Spring washer	Hard steel		
⑳	Centering location ring	Aluminum alloy	Except ø12, ø16	
㉑	Flange	Rolled steel	Except ø12, ø16	
㉒	Hexagon socket head cap screw	Chromium molybdenum steel	Qty.	ø25, 25: 2
				ø32 to 63: 4
㉓	Spacer for switch type	Aluminum alloy	Only ø12, ø16	
㉔	Coil scraper	Phosphor bronze		
㉕	Piston seal	NBR		
㉖	Gasket	NBR		
㉗	Rod seal	NBR		
㉘	O-ring	NBR		

Replacement Parts: Seal Kit

Bore size (mm)	12	16	20 to 32	40	50	63
Kit no.	MK-12-PS	MK-16-PS	Not able to disassemble	MK-40-PS	MK-50-PS	MK-63-PS
Content	Set of nos. above ㉔ ㉕ ㉖ ㉗ ㉘					

∗ Seal kit includes ㉔ to ㉘. (Except ø20 to ø32) Order the seal kit, based on each bore size.

⚠Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 10-24-3 to 10-24-6.

⚠ Caution

Mounting of Clamp Arm

1. 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.
If a clamp arm that exceeds the specified value is installed, the internal mechanism in the cylinder could become damaged.

Ensuring Safety

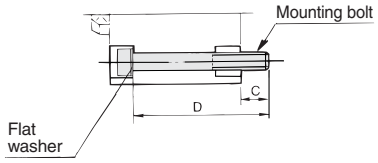
1. If one side of the piston is pressurized by supplying air with the clamp arm attached, the piston will move vertically while the clamp arm rotates. This operation could be hazardous to personnel, as their hands or feet could get caught by the clamp arm, or could lead to equipment damage. Therefore, 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.

Installation and Adjustment/Regarding Clamp Arm Removal and Reinstallation

1. During the removal or reinstallation of the clamp arm, make sure to use a wrench or a vise to secure the clamp arm before removing or tightening the bolt.
This is to prevent the bolt tightening torque from being applied to the piston rod, which could damage the cylinder's internal mechanism.

Mounting bolt for MKB

Mounting method: Mounting bolt for through-hole type is available as an option.
Ordering: Add the word "MKB" in front of the bolts to be used.
Example) M5 x 75ℓ (**MKB**)



Note) Be sure to use a flat washer to mount ø12 and ø16 cylinders via through-holes.

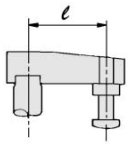
Model	C	D	Mounting bolt
MKB12-10	8	50	M3 x 50ℓ
MKB12-20	8	60	M3 x 60ℓ
MKB16-10	8	50	M3 x 50ℓ
MKB16-20	8	60	M3 x 60ℓ
MKB20-10	10	75	M5 x 75ℓ
MKB20-20		85	M5 x 85ℓ
MKB25-10	9	75	M5 x 75ℓ
MKB25-20		85	M5 x 85ℓ
MKB32-10	10.5	85	M5 x 85ℓ
MKB32-20		95	M5 x 95ℓ
MKB40-10	7	75	M5 x 75ℓ
MKB40-20		85	M5 x 85ℓ
MKB50-20	6.5	95	M6 x 95ℓ
MKB50-50	11.5	130	M6 x 130ℓ
MKB63-20	10.5	100	M8 x 100ℓ
MKB63-50		130	M8 x 130ℓ

Precautions for Designing and Mounting Arms

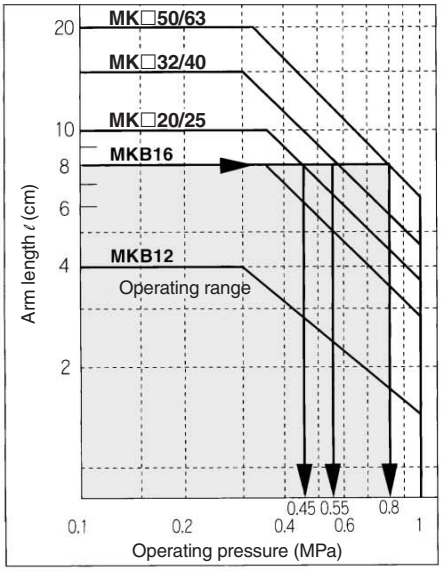
When arms are to be made separately, their length and weight should be within the following range.

1. Allowable bending moment

Use the arm length and operating pressure within graph (1) for allowable bending moment loaded piston rod.



Graph (1)

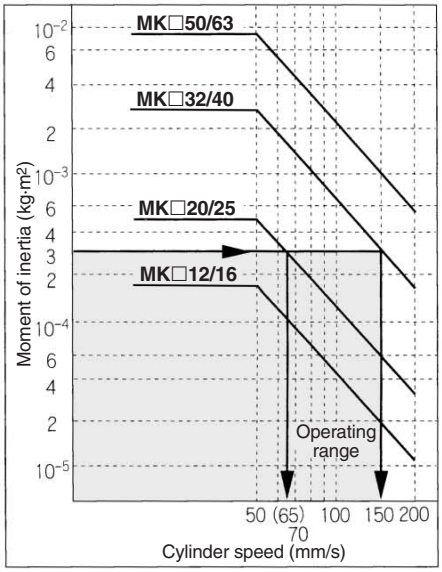


When arm length is 8 cm, pressure should be less than
MK□20/25: 0.45 MPa
MK□32/40: 0.55 MPa
MK□50/63: 0.8 MPa.

2. Moment of inertia

When the arm is long and heavy, damage of internal parts may be caused due to inertia. Use the inertia moment and cylinder speed within graph (2) based on arm requirements.

Graph (2)

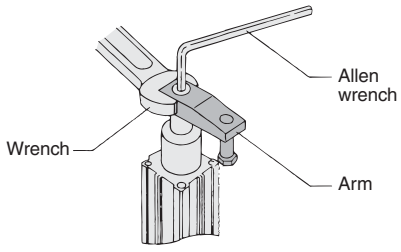


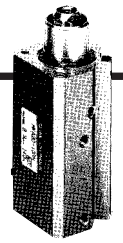
When arm's moment of inertia is 3 x 10^{-4} kg·m², cylinder speed should be less than
MK□20/25: 65 mm/s
MK□32/40: 150 mm/s.
For calculating moment of inertia, refer to page 10-7-21.

● To attach and detach the arm to and from the piston rod, fix the arm with a wrench or vise and then tighten the bolt.
(If an excessive force is applied in the rotary direction, it may bring about the damage to the internal mechanism.)
Refer to the following table for the tightening torque for mounting.

(N·m)

Bore size (mm)	Proper tightening torque
12	0.4 to 0.6
16	2 to 2.4
20, 25	4 to 6
32, 40	8 to 10
50, 63	14 to 16

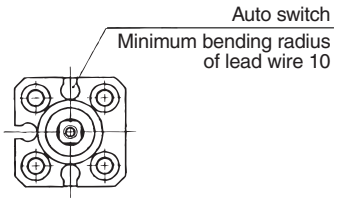




ø12, ø16, ø20, ø25

Through-hole (Basic style): MKB

ø12



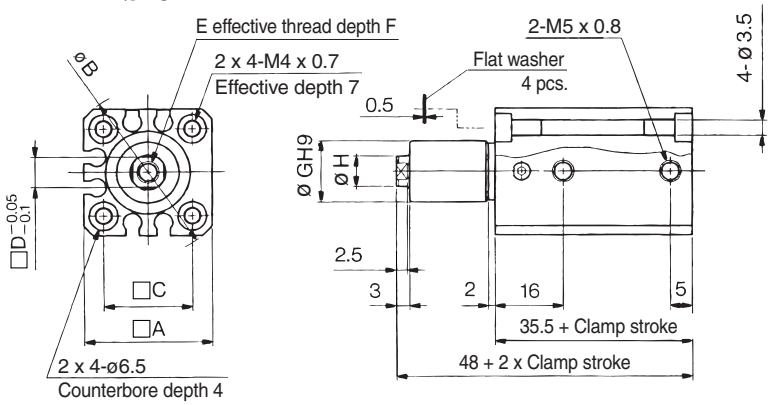
(mm)

Model	A	B	C	D	E	F	G	H
MKB12	25	32	15.5	5	M3 x 0.5	5.5	11h9 $^{0}_{-0.043}$	6
MKB16	29	38	20	7	M5 x 0.8	6.5	14h9 $^{0}_{-0.043}$	8

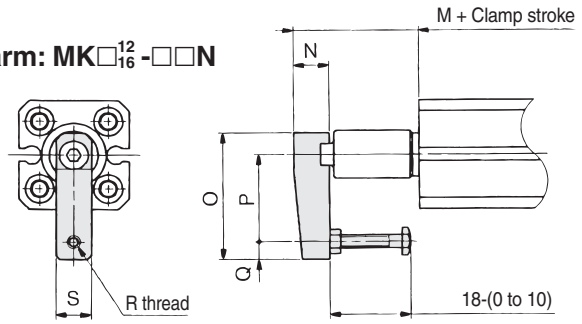
(mm)

Model	M	N	O	P	Q	R	S
MKB12-□□N	18.5	8	29	20	4	M3 x 0.5	8
MKB16-□□N	21.5	11	36	25	5	M4 x 0.7	11

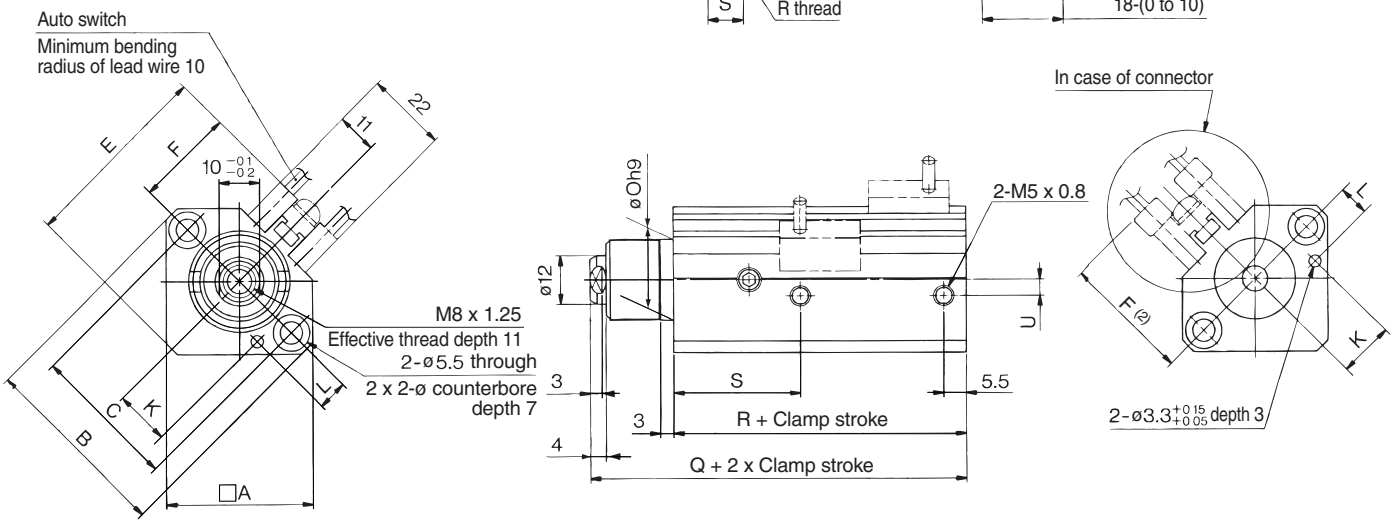
ø16



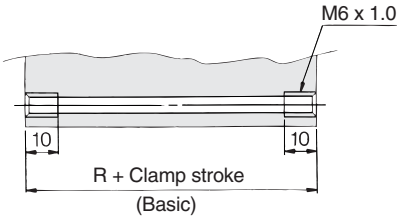
With arm: MK□ $^{12}_{16}$ -□□N



ø20, ø25



Both ends tapped style: MKA

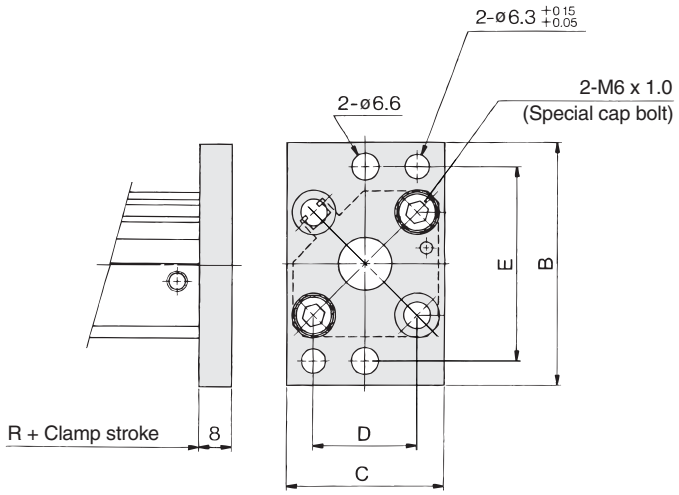


(mm)

Model	A	B	C	E	F	K	L	Oh9	Q	R	S	U
MKB20	36	46.8	36	48	24.5	13.5 $^{\pm 0.15}$	7.5 $^{\pm 0.15}$	20 $^{0}_{-0.052}$	72.5	62	31	4
MKB25	40	52	40	53.8	27.5	16 $^{\pm 0.15}$	8 $^{\pm 0.15}$	23 $^{0}_{-0.052}$	73.5	63	32	5

Note 1) Above figure is for D-A73/A80.
Note 2) Dimensions E and F are 7 mm longer for the auto switches with connector (D-A7□C/A80C/J79C).
Note 3) Dimension when the rod is extended is to be added to clamp stroke plus rotary stroke.

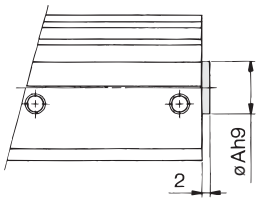
Head side flange style: MKG



(mm)

Model	B	C	D	E
MKG20	60	39	25.5 ±0.1	48 ±0.15
MKG25	64	42	28 ±0.1	52 ±0.15

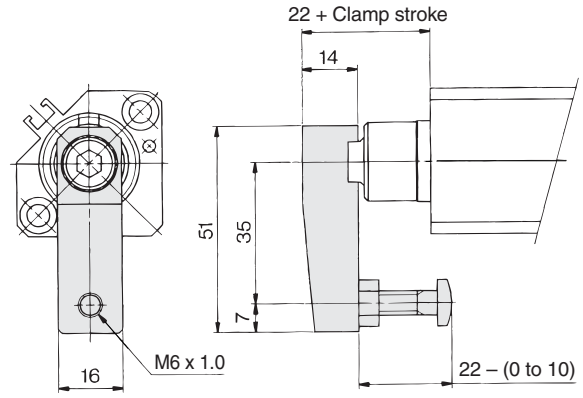
With boss in head side



(mm)

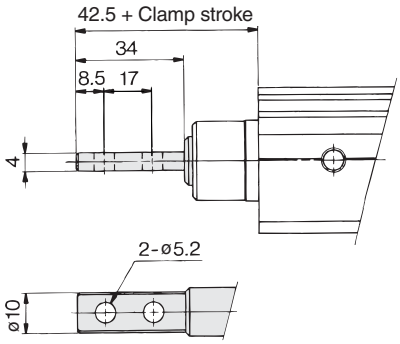
Model	Ah9
MK□20-□□F	13 0 −0.043
MK□25-□□F	15 0 −0.043

With arm: MK□ 20/25 -□□N

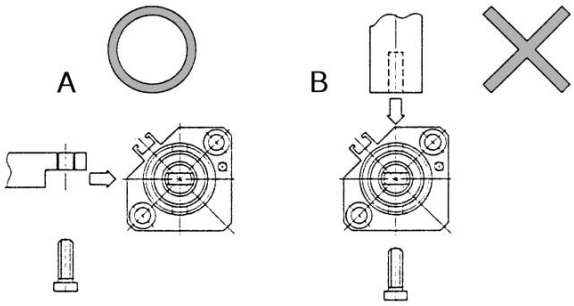


Arm for width across flats

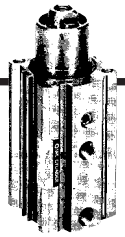
Rod end width across flats: MK□ 20/25 -□□M



Mounting arms for width across flats

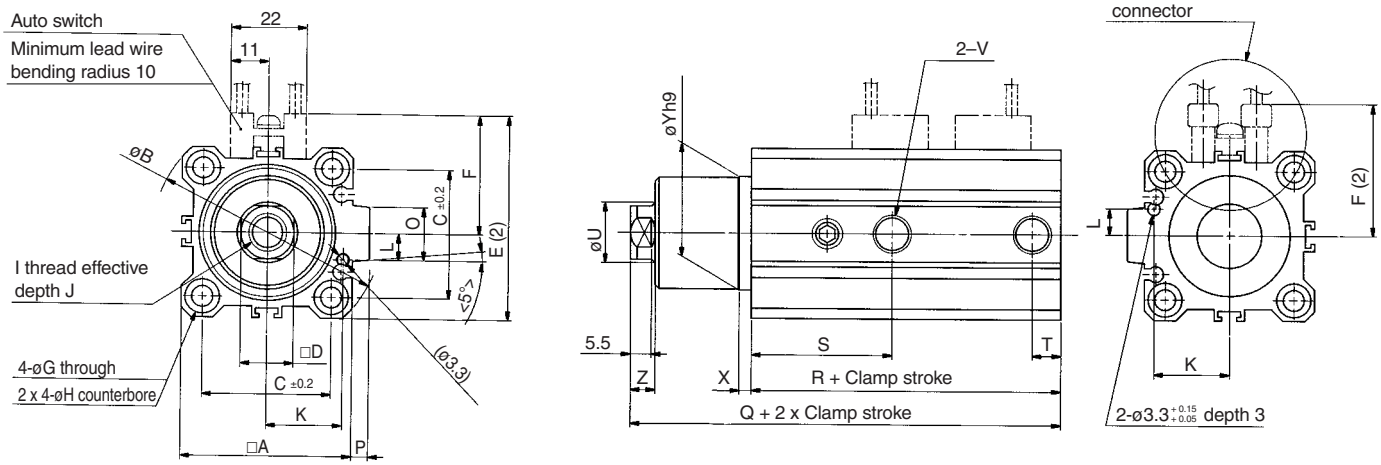


∗ When installing the arm for the parllel section at the rod end, the strength of the piston rod might be insufficient depending on the direction in which the arm is installed. Therefore, make sure to install the arm in the direction indicated in figure A.

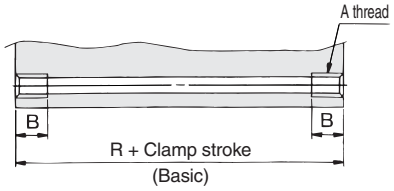


ø32, ø40, ø50, ø63

Through-hole (Basic style): MKB



Both ends tapped style: MKA



(mm)

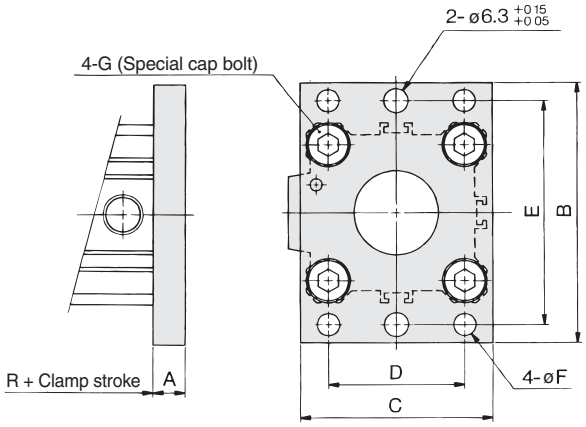
Model	A	B
MKA 32 40	M6 x 1.0	10
MKA50	M8 x 1.25	14
MKA63	M10 x 1.5	18

(mm)

Model	A	B	C	D	E	F	G	H	I	J	K	L	O	P	Q	R	S	T	U	V	X	Yh9	Z
MKB32	45	60	34	$14^{-0.1}_{-0.2}$	54	31.5	5.5	9 depth 7	M10 x 1.5	12	$20^{\pm0.15}$	$7^{\pm0.15}$	14	4.5	93.5	71.5	37	7.5	16	Rc $1/8$	3	$30^{0}_{-0.062}$	6.5
MKB40	52	69	40	$14^{-0.1}_{-0.2}$	61	35	5.5	9 depth 7	M10 x 1.5	12	$24^{\pm0.15}$	$7^{\pm0.15}$	14	5	94.5	65	29.5	8	16	Rc $1/8$	3	$30^{0}_{-0.062}$	6.5
MKB50	64	86	50	$17^{-0.1}_{-0.2}$	73	41	6.6	11 depth 8	M12 x 1.75	15	$30^{\pm0.15}$	$8^{\pm0.15}$	19	7	112	76.5	34	10.5	20	Rc $1/4$	3.5	$37^{0}_{-0.062}$	7.5
MKB63	77	103	60	$17^{-0.1}_{-0.2}$	86	47.5	9	14 depth 10.5	M12 x 1.75	15	$35^{\pm0.15}$	$9^{\pm0.15}$	19	7	115	80	35	10.5	20	Rc $1/4$	3.5	$48^{0}_{-0.062}$	7.5

Note 1) Above figure is for D-A73/A80.
Note 2) Dimensions E and F are 7 mm longer for the auto switches with connector (D-A7□C/A80C/J79C).
Note 3) Dimension when the rod is extended is to be added to clamp stroke plus rotary stroke.

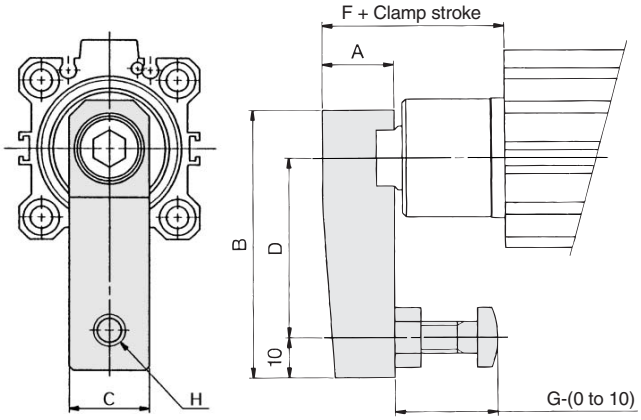
Head side flange style: MKG



(mm)

Model	A	B	C	D	E	F	G
MKG32	8	65	48	$34^{\pm0.1}$	$56^{\pm0.15}$	5.5	M6 x 1.0
MKG40	8	72	54	$40^{\pm0.1}$	$62^{\pm0.15}$	5.5	M6 x 1.0
MKG50	9	89	67	$50^{\pm0.1}$	$76^{\pm0.15}$	6.6	M8 x 1.25
MKG63	9	108	80	$60^{\pm0.1}$	$92^{\pm0.15}$	9	M10 x 1.5

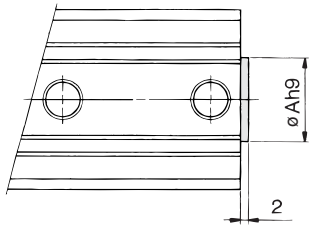
With arm



(mm)

Model	A	B	C	D	F	G	H
MK□32-□□N	18	67	20	45	35.5	25	M8 x 1.25
MK□40-□□N	18	67	20	45	43	25	M8 x 1.25
MK□50-□□N	22	88	22	65	53	40	M10 x 1.5
MK□63-□□N	22	88	22	65	52.5	40	M10 x 1.5

With boss in head side

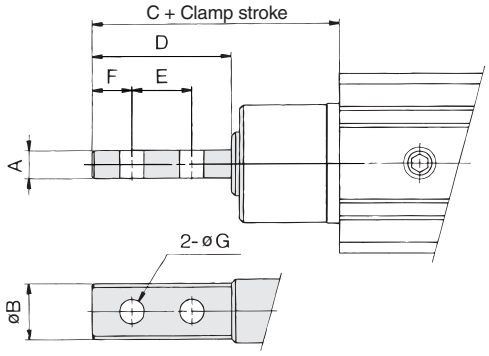


(mm)

Model	Ah9
MK□32-□□F	$21^{\ 0}_{-0.052}$
MK□40-□□F	$28^{\ 0}_{-0.052}$
MK□$^{50}_{63}$-□□F	$35^{\ 0}_{-0.062}$

Arm for width across flats

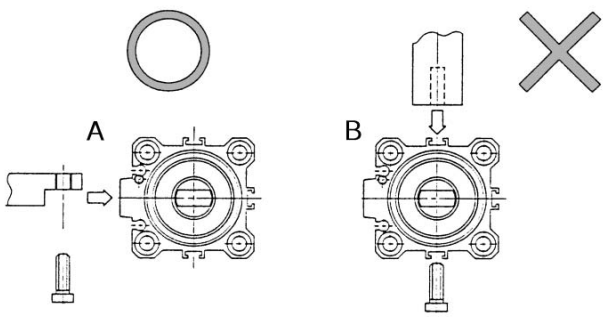
Rod end width across flats



(mm)

Model	A	B	C	D	E	F	G
MK□32-□□M	6	14	53.5	36	18	9	6.2
MK□40-□□M	6	14	61	36	18	9	6.2
MK□50-□□M	8	18	77	46	23	11.5	8.2
MK□63-□□M	8	18	76.5	46	23	11.5	8.2

Mounting arms for width across flats



∗ When installing the arm for the parllel section at the rod end, the strength of the piston rod might be insufficient depending on the direction in which the arm is installed. Therefore, make sure to install the arm in the direction indicated in figure A.

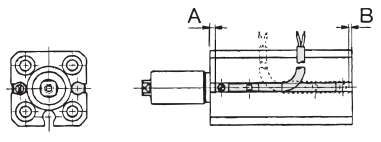
Proper Auto Switch Mounting Position (Detection at stroke end) and Its Mounting Height

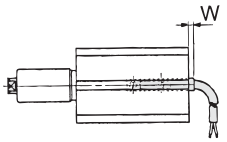
ø12

Mounting

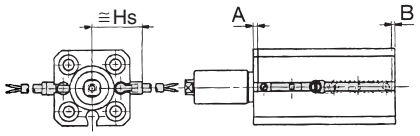
a) **b)**

D-A9□

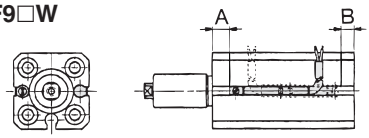


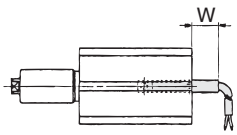


D-A9□V

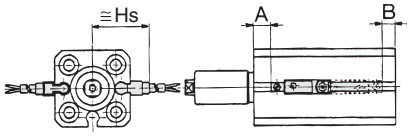


D-M9□
D-F9□W

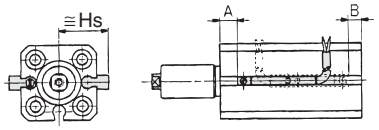


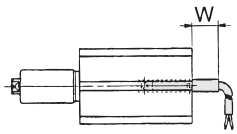


D-M9□V
D-F9□WV



D-F9BAL

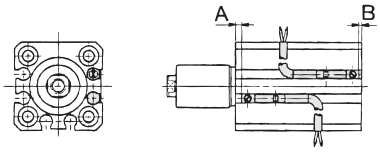


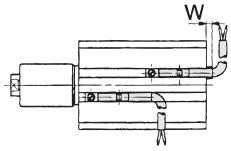


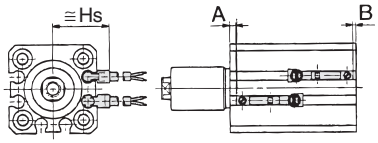
ø16

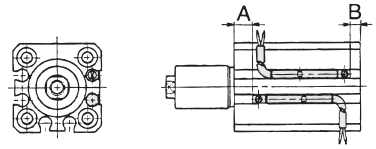
Mounting

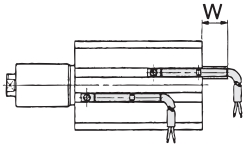
a) **b)**

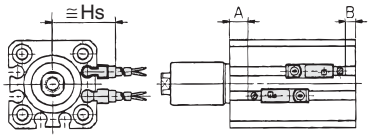


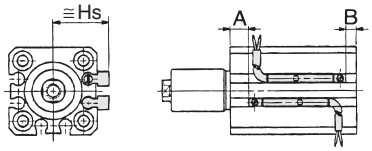


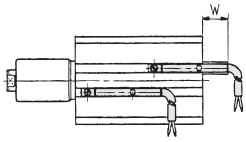












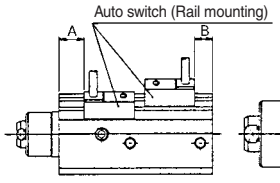
Auto switch model		D-A9□			D-A9□V			D-M9□, D-F9□W			D-M9□V, D-F9□WV		
Symbol		A	B	W	A	B	Hs	A	B	W	A	B	W
Bore size (mm)	12	7.5	0	1.5 (4)	7.5	0	17	11.5	4.5	5.5	11.5	4.5	19.5
	16	8	0	2 (4.5)	8	0	19	12	4	6	12	4	21.5

Auto switch model		D-F9BAL			
Symbol		A	B	W	Hs
Bore size (mm)	12	10.5	3.5	14.5	17
	16	11	3	15	19

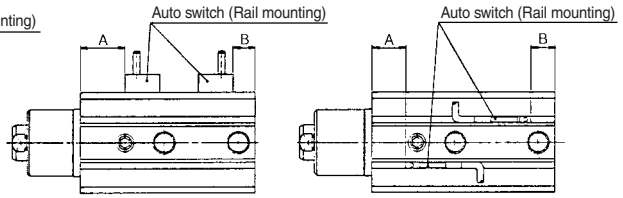
∗ ( ): Denotes the values of D-A93.

Proper Auto Switch Mounting Position (Detection at stroke end)

ø20, ø25



ø32 to ø63



(mm)

Mounting	Rail mounting style								Direct mounting style					
Model	D-A7/A8		D-A7□H/A80H D-A73C/A80C D-F7□/F79F/J79 D-F7□V/J79C D-F7BA□/F7□W D-J79W/F7□WV		D-A79W		D-P5DWL		D-A9□ D-A9□V		D-M9□ D-M9□V D-F9□W VD-F9□W		D-F9BAL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
MK□20	28	6.5	28	7	25.5	4	—	—	—	—	—	—	—	—
MK□25	28.5	7	29	7.5	26	4.5	—	—	—	—	—	—	—	—
MK□32	32.5	6	33	6.5	30	3.5	—	—	31.5	5	35.5	9	34.5	8
MK□40	23.5	8.5	24	9	21	6	19.5	4.5	22.5	7.5	26.5	11.5	25.5	10.5
MK□50	28	11.5	28.5	12	25.5	9	24	7.5	27	10.5	31	14.5	30	13.5
MK□63	28	14.5	28.5	15	25.5	13	24	10.5	27	13.5	31	17.5	30	16.5

Auto Switch Mounting Bracket Part No.

Bore size (mm)	Mounting bracket part no.	Note	Applicable auto switch	
			Reed switch	Solid state switch
20, 25	**BQ-1**	● Switch mounting screw (M3 x 0.5 x 8ℓ) ● Square nut	D-A7/A8 D-A73C/A80C D-A7□H/A80H D-A79W	D-F7□/J79 D-F7□V D-J79C D-F7□W/J79W D-F7□WV D-F7BAL/F7BAVL D-F79F D-F7NTL
32, 40 50, 63	**BQ-2**	● Switch mounting screw (M3 x 0.5 x 10ℓ) ● Switch spacer ● Switch mounting nut		
40, 50 63	**BQP1-050**	● Switch mounting bracket ● Switch mounting nut ● Round head Phillips screw (M3 x 0.5 x 16ℓ) ● Hexagon socket head cap bolt (M3 x 0.5 x 14ℓ)	—	D-P5DWL

Mounting screws set made of stainless steel
The set of stainless steel mounting screws (with nuts) described below is available and can be used depending on the operating environment. (Please order the auto switch spacer, since it is not included.)
BBA2: For D-A7/A8/F7/J7
"D-F7BAL/F7BAVL" switch is set on the cylinder with the stainless steel screws above when shipped. When the switches are shipped as individual parts, the BBA2 is included.

Operating Range

(ℓ dimensions)

Auto switch model	Bore size (mm)							
	12	16	20	25	32	40	50	63
D-A7□/A80 D-A7H/A80H D-A73C/A80C	—	—	12	12	12	11	10	12
D-A79W	—	—	13	13	13	14	14	16
D-A9□/A9□V	6	7.5	—	—	9.5	9.5	9.5	11.5
D-F7□/J79 D-F7□V/J79C D-F7□W/F7□WV/J79W D-F79F/F7BAL/F7BAVL/F7NTL	—	—	5.5	5	6	6	6	6.5
D-M9□/M9□V	2	2.5	—	—	4.5	4	4.5	5
D-F9□W/F9□WV D-F9BAL	3	4	—	—	5.5	5.5	5.5	6
D-P5DWL	—	—	—	—	—	5	5	5

∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.)
There may be varied substantially depending on the surrounding environment.

Other than the models listed in "How to Order", the following auto switches are applicable.
For detailed specifications, refer to page 10-20-1.

Type	Model	Electrical entry (Fetching direction)	Features	Applicable bore size (mm)
Reed switch	D-A80	Grommet (Perpendicular)	Without indicator light	20 to 63
	D-A80H	Grommet (In-line)		
	D-A80C	Connector (Perpendicular)		
	D-A90	Grommet (In-line)		12, 16 32 to 63
	D-A90V	Grommet (Perpendicular)		
Solid state switch	D-F7NTL	Grommet (In-line)	With timer	20 to 63

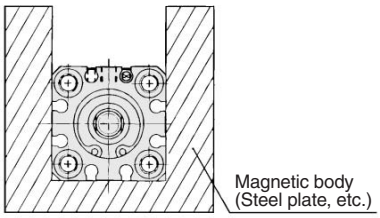
∗ With pre-wire connector is available for D-F7NTL type, too. For details, refer to page 10-20-66.
∗ Normally closed (NC = b contact), solid state switch (D-F9G/F9H type) are also available. For details, refer to page 10-20-40.

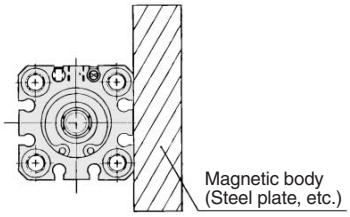
⚠Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 10-24-3 to 10-24-6.

Mounting

●As shown in the figure below, when a magnetic body is in close contact with the cylinder body periphery (including the case where only one side is in contact), the function of the auto switch may be unstable. Please contact SMC if this occurs.





Rotary Clamp Cylinder: Heavy Duty Type

Series MK2

ø20, ø25, ø32, ø40, ø50, ø63

How to Order

MK2 B 20 – 10 R F – F9BW S

Mounting style

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

∗ The head side flange is equipped with boss mounting, so be sure to specify body option "F".

Bore size

20	20 mm	**40**	40 mm
25	25 mm	**50**	50 mm
32	32 mm	**63**	63 mm

Clamp stroke

Symbol	Clamp stroke	Applicable bore (mm)
10	10 mm	20 to 40
20	20 mm	20 to 63
50	50 mm	50 to 63

Rotary direction (Release → Clamp)

R	Clockwise
L	Counterclockwise

Body option

Symbol	Standard (Female thread)
F	With boss on head end
N	With arm

Auto switch

Nil	Without auto switch (Built-in magnet)

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

Number of auto switches

Nil	2 pcs.
S	1 pc.

Applicable Auto Switch/Refer to page 10-20-1 for further information on auto switches.

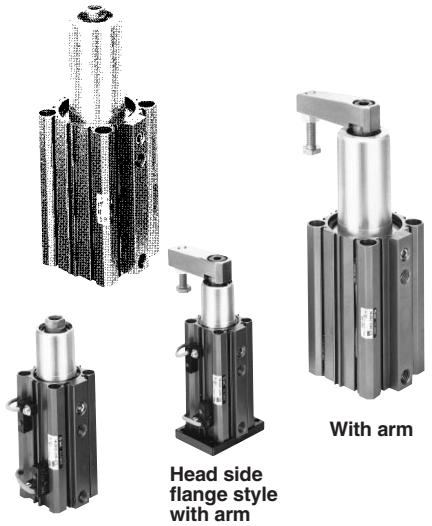
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Rail mounting ø20 to ø63 Perpendicular	Rail mounting ø20 to ø63 In-line	Direct mounting ø12, ø16, ø32 to ø63 Perpendicular	Direct mounting ø12, ø16, ø32 to ø63 In-line	Lead wire length (m)∗ 0.5 (Nil)	3 (L)	5 (Z)	None (N)	Pre-wire connector	Applicable load	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	—	**A76H**	**A96V**	**A96**	●	●	—	—	—	IC circuit	—
				2-wire	—	—	200 V	**A72**	**A72H**	—	–	●	●	—	—	—	—	Relay, PLC
					24 V	12 V	100 V	**A73**	**A73H**	—	–	●	●	●	—	—		
								—	—	**A93V**	**A93**	●	●	—	—	—		
		Connector				12 V	—	**A73C**	—	—	—	●	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet				—	—	**A79W**	—	—	—	●	●	—	—	—		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**F7NV**	**F79**	—	—	●	●	○	—	○	IC circuit	Relay, PLC
								—	—	**M9NV**	**M9N**	●	●	○	—	○		
				3-wire (PNP)				**F7PV**	**F7P**	—	—	●	●	○	—	○		
								—	—	**M9PV**	**M9P**	●	●	○	—	○		
				2-wire		12 V		**F7BV**	**J79**	—	—	●	●	○	—	○	—	
								—	—	**M9BV**	**M9B**	●	●	○	—	○		
		Connector						**J79C**	—	—	—	●	●	●	●	—		
	Diagnostic output (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		**F7NWV**	**F79W**	—	—	●	●	○	—	○	IC circuit	
								—	—	**F9NWV**	**F9NW**	●	●	○	—	○		
				3-wire (PNP)				—	**F7PW**	—	–	●	●	○	—	○		
								—	—	**F9PWV**	**F9PW**	●	●	○	—	○		
				2-wire		12 V		**F7BWV**	**J79W**	**F9BWV**	**F9BW**	●	●	○	—	○	—	
	Water resistant (2-color indication)							—	**F7BA**	—	**F9BA**	—	●	○	—	○		
								F7BAV	—	—	—	—	●	○	—	—		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		—	**F79F**	—	—	●	●	○	—	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire		—		—	**P5DW**	—	—	—	●	●	—	○	—	

∗ Lead wire length symbols: 0.5 m·····Nil (Example) A73C
3 m····· L (Example) A73CL
5 m····· Z (Example) A73CZ
None····· N (Example) A73CN

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

∗ D-P5DWL type can only be mounted for bore sizes ø40, ø50, ø63.
∗ Only D-P5DWL type is assembled at the time of shipment.

• Since there are other applicable auto switches than listed, refer to page 10-7-20 for details.
• For details about auto switches with pre-wire connector, refer to page 10-20-66.

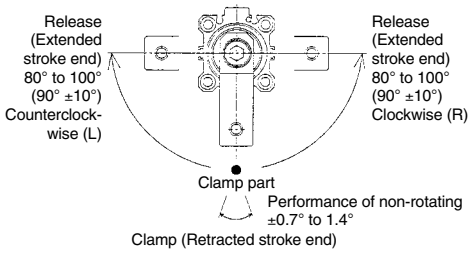


Specifications

Bore size (mm)	20	25	32	40	50	63
Action	Double acting					
Rotary angle (1)	90° ±10°					
Rotary direction (2)	R: Clockwise, L: Counterclockwise					
Rotary stroke (mm)	9.5		15		19	
Clamp stroke (mm)	10, 20				20, 50	
Allowable moment (N·m) (3)	7	13	27	47	107	182
Theoretical clamp force (N) (4)	100	185	300	525	825	1400
Fluid	Air					
Proof pressure	1.5 MPa					
Operating pressure range	0.1 to 10 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		Rc 1/8		Rc 1/4	
Mounting	Through-hole/Both ends tapped common, Head side flange					
Cushion	Rubber bumper					
Stroke length tolerance	$^{+0.6}_{-0.4}$					
Piston speed	50 to 200 mm/s					
Non-rotating accuracy	±1.2°		±0.9°		±0.7°	

Note 1) Refer to "Rotary Angle" diagram.
Note 2) Direction of rotation viewed from the rod side when the piston rod is retracting.
Note 3) Max. bending moment applied to the piston rod side.
Note 4) At 0.5 MPa.

Rotary Angle



Theoretical Output

(N)

Bore size (mm)	Rod size (mm)	Operating direction	Piston area (cm^2)	Operating pressure (MPa) 0.3	0.5	0.7	1.0
20	12	R	2	60.8	100	139	200
		H	3	90.2	149	208	298
25	12	R	3.7	112	185	258	370
		H	4.9	149	245	341	490
32	16	R	6	182	300	418	600
		H	8	243	400	557	800
40	16	R	10.5	319	525	731	1050
		H	12.5	380	625	870	1250
50	20	R	16.5	502	825	1149	1648
		H	19.6	596	980	1365	1961
63	20	R	28	851	1400	1950	2801
		H	31.2	948	1560	2172	3121

Note) Theoretical output (N) = Pressure (MPa) x Piston area (cm^2) x 100
Operating direction R: Rod side (Clamp)
H: Head side (Release)

Option Part No./Arm

Bore size (mm)	Part no.	Accessory
20	**MK-A020**	Clamp bolt Hexagon socket head cap screw Hexagon nut Spring washer
25		
32	**MK-A032**	
40		
50	**MK-A050**	
63		

Mounting Bracket Part No./Flange

Bore size (mm)	Part no.	Accessory
20	**MK2-F020**	Centering location ring Set pin Bolt for cylinder body
25	**MK2-F025**	
32	**MK2-F032**	
40	**MK2-F040**	
50	**MK2-F050**	
63	**MK2-F063**	

Weight/Mounting

(g)

Clamp stroke (mm)	Bore size (mm) 20	25	32	40	50	63
10	260	295	353	635	—	—
20	300	335	555	680	1170	1620
50	—	—	—	—	1420	1890

Additional Weight

(g)

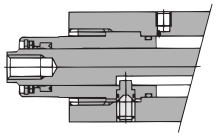
Bore size (mm)	20	25	32	40	50	63
With boss in head side	2	3	5	7	13	25
With arm	100	100	200	200	350	350
Rear flange style (including mounting bolt)	133	153	166	198	345	531

Calculation: (Example) MK2G20-10RFN
- Standard calculation: MK2B20-10R 260 g
- Extra weight calculation:
  - Rear flange 133 g
  - With boss in head side 2 g
  - With arm 100 g

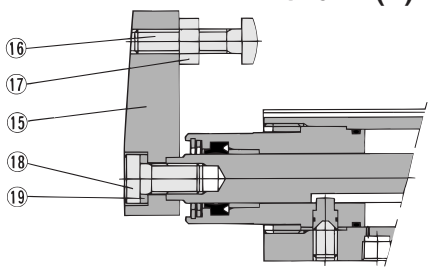
495 g

Construction

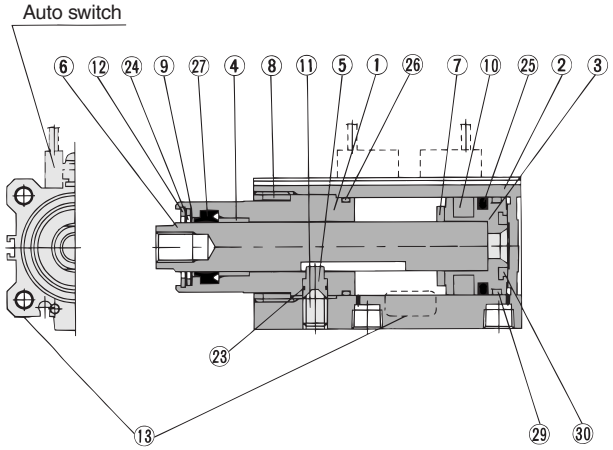
MK2□20, 25



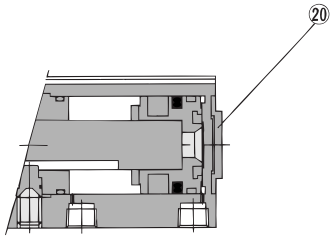
With arm (N)



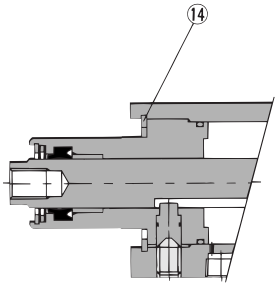
MK2□32



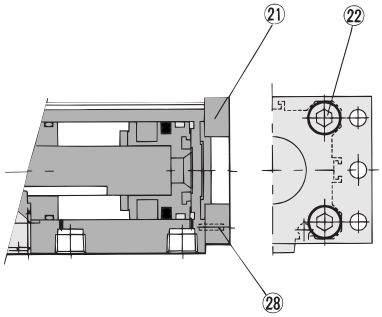
With boss in head side (F)



MK2□40 to 63



Head side flange style (G)



Component Parts

No.	Description	Material	Note
①	Rod cover	Aluminum alloy	
②	Cylinder tube	Aluminum alloy	
③	Piston	Aluminum alloy	
④	Bushing	Copper bearing material	Only ø32 to ø63
⑤	Guide pin	Stainless steel	Nitrided
⑥	Piston rod	Stainless steel	Nitrided
⑦	Bumper	Urethane	
⑧	Ring nut	Copper alloy	Only ø20 to ø32
⑨	Scraper pressure	Stainless steel	
⑩	Magnet		
⑪	Hexagon socket head set screw	Chromium molybdenum steel	Sharp end section: 90°
⑫	Round R type retainer	Spring steel	
⑬	Name plate	Aluminum	
⑭	Type C snap ring	Carbon tool steel	Only ø40 to ø63
⑮	Arm	Rolled steel	
⑯	Clamp bolt	Chromium molybdenum steel	

No.	Description	Material	Note	
⑰	Hexagon nut	Rolled steel		
⑱	Hexagon socket head cap screw	Chromium molybdenum steel		
⑲	Spring washer	Hard steel		
⑳	Centering location ring	Aluminum alloy		
㉑	Flange	Rolled steel		
㉒	Hexagon socket head cap screw	Chromium molybdenum steel	Qty.	ø20, 25: 2 ø32 to 63: 4
㉓	O-ring	NBR		
㉔	Coil scraper	Phosphor bronze		
㉕	Piston seal	NBR		
㉖	Gasket	NBR		
㉗	Rod seal	NBR		
㉘	Parallel pin	Stainless steel		
㉙	Wear ring	Resin		
㉚	Bumper B	Urethane		

Replacement Parts: Seal Kit

Bore size (mm)	20	25	32	40	50	63
Kit no.	Not able to disassemble			MK2-40-PS	MK2-50-PS	MK2-63-PS
Content	Set of nos. above ㉓ ㉔ ㉕ ㉖ ㉗					

∗ Seal kit includes ㉓ to ㉗. Order the seal kit, based on each bore size.

⚠Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to pages 10-24-3 to 10-24-6.

⚠Caution

Mounting of Clamp Arm

1. 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.
If a clamp arm that exceeds the specified value is installed, the internal mechanism in the cylinder could become damaged.

Ensuring Safety

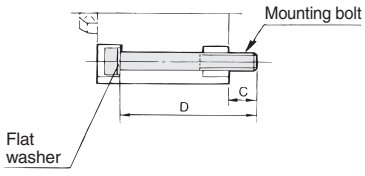
1. If one side of the piston is pressurized by supplying air with the clamp arm attached, the piston will move vertically while the clamp arm rotates. This operation could be hazardous to personnel, as their hands or feet could get caught by the clamp arm, or could lead to equipment damage. Therefore, 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.

Installation and Adjustment/Regarding Clamp Arm Removal and Reinstallation

1. During the removal or reinstallation of the clamp arm, make sure to use a wrench or a vise to secure the clamp arm before removing or tightening the bolt.
This is to prevent the bolt tightening torque from being applied to the piston rod, which could damage the cylinder's internal mechanism.

Mounting bolt for MK2B

Mounting method: Mounting bolt for through-hole type is available as an option.
Ordering: Add the word "MK2B" in front of the bolts to be used.
Example) M5 x 75ℓ (MK2B)



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

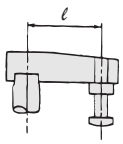
Model	C	D	Mounting bolt
MK2B20-10	8.5	75	M5 x 75ℓ
MK2B20-20		85	M5 x 85ℓ
MK2B25-10	10.5	80	M5 X 80ℓ
MK2B25-20		90	M5 x 90ℓ
MK2B32-10	10	90	M5 x 90ℓ
MK2B32-20		100	M5 x 100ℓ
MK2B40-10	6	80	M5 x 80ℓ
MK2B40-20		90	M5 x 90ℓ
MK2B50-20	10.5	105	M6 x 105ℓ
MK2B50-50	10.5	135	M6 x 135ℓ
MK2B63-20	9	105	M8 x 105ℓ
MK2B63-50		135	M8 x 135ℓ

Precautions for Designing and Mounting Arms

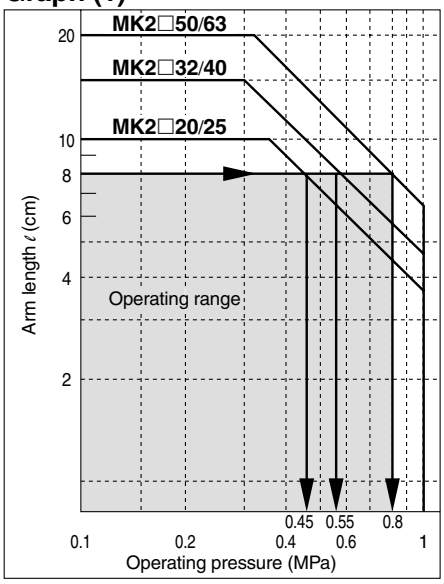
When arms are to be made separately, their length and weight should be within the following range.

1. Allowable bending moment

Use the arm length and operating pressure within graph (1) for allowable bending moment loaded piston rod.



Graph (1)

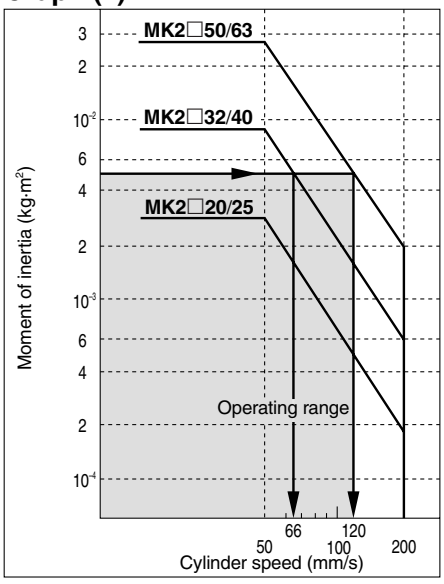


When arm length is 8 cm, pressure should be less than
MK2□20/25: 0.45 MPa
MK2□32/40: 0.55 MPa
MK2□50/63: 0.8 MPa.

2. Moment of inertia

When the arm is long and heavy, damage of internal parts may be caused due to inertia. Use the inertia moment and cylinder speed within graph (2) based on armrequirements.

Graph (2)

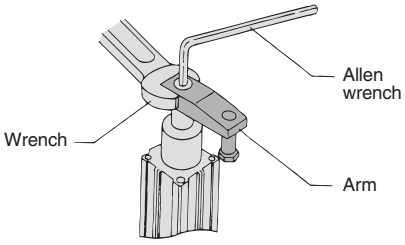


When arm's moment of inertia is 5 x 10^{-3} kg·m², cylinder speed should be less than
MK2□32/40: 66 mm/s
MK2□50/63: 120 mm/s.
For calculating moment of inertia, refer to page 10-7-21.

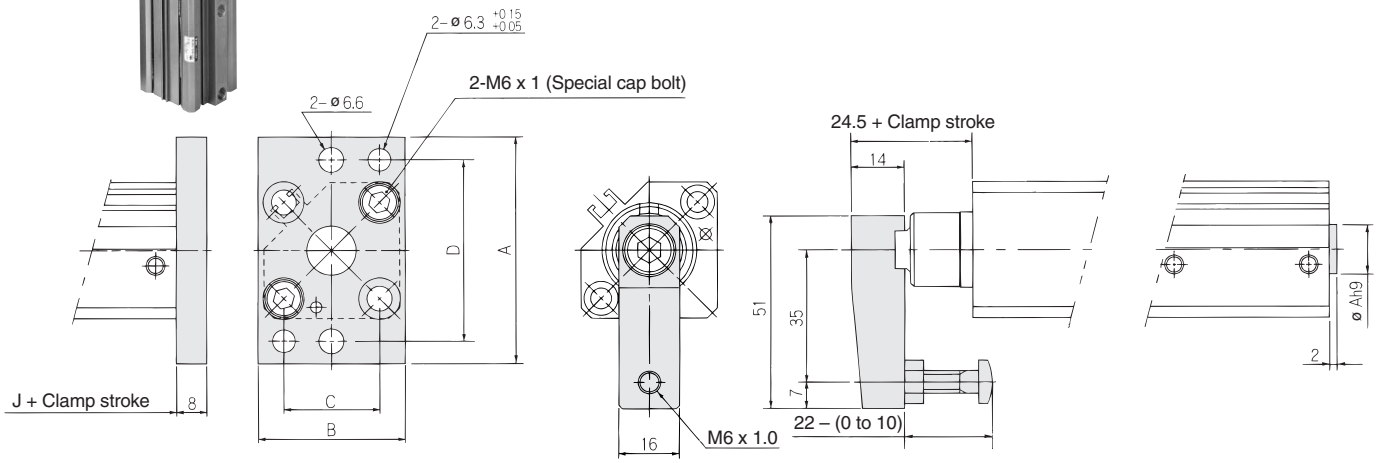
● To attach and detach the arm to and from the piston rod, fix the arm with a wrench or vise and then tighten the bolt.
(If an excessive force is applied in the rotary direction, it may bring about the damage to the internal mechanism.)
Refer to the following table for the tightening torque for mounting.

(N·m)

Bore size (mm)	Proper tightening torque
20, **25**	4 to 6
32, **40**	8 to 10
50, **63**	14 to 16



ø20, ø25



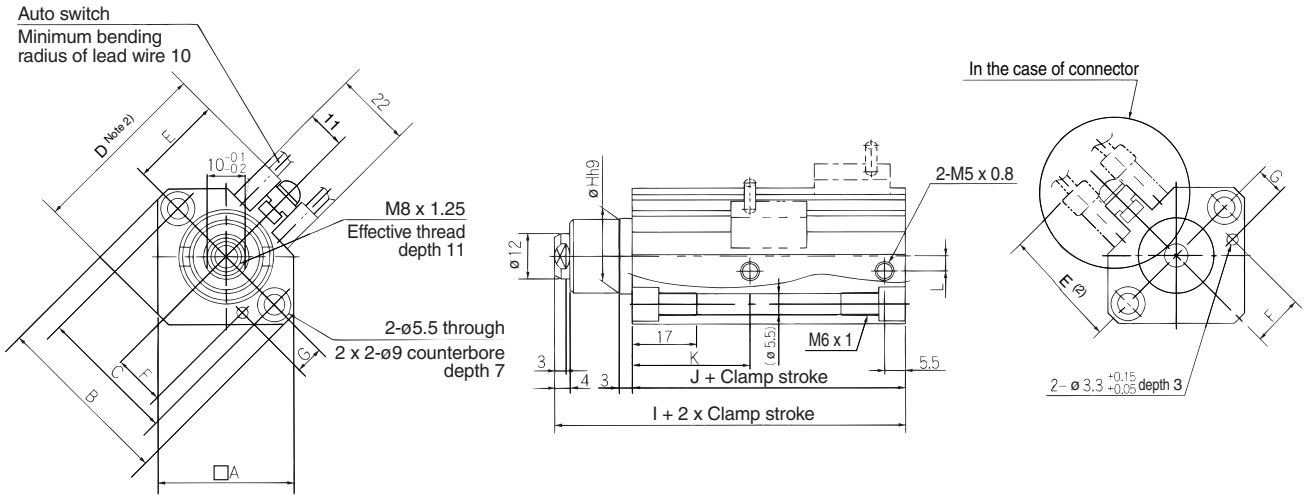
With arm

Head Side Flange Style (mm)

Model	A	B	C	D
MK2G20	60	39	25.5 ±0.1	48 ±0.15
MK2G25	64	42	28 ±0.1	52 ±0.15

With Boss in Head Side (mm)

Model	øAh9
MK2□20-□□F	13 $^{0}_{-0.043}$
MK2□25-□□F	15 $^{0}_{-0.043}$

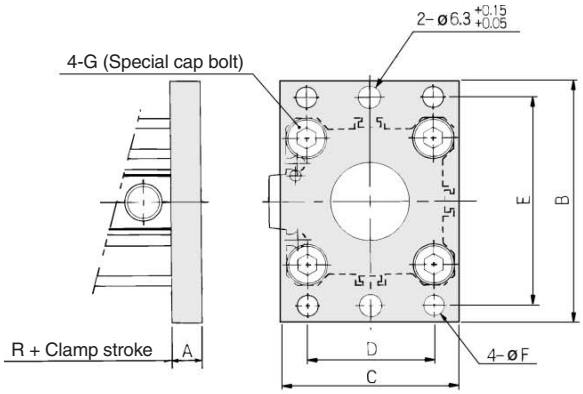


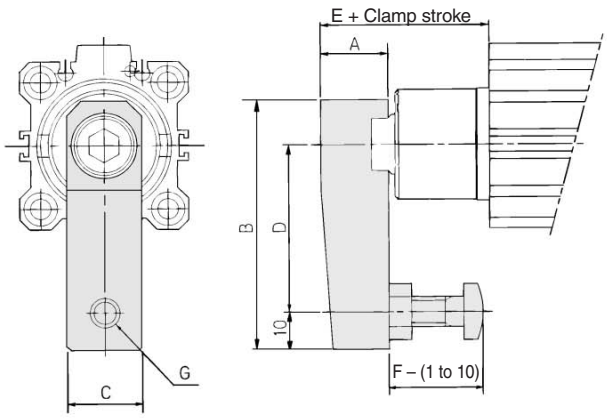
Through-hole/Both Ends Tapped Common (Standard) (mm)

Model	□A	B	C	D	E	F	G	øHh9	I	J	K	L
MK2B20	36	46.8	36	48	24.5	13.5 ±0.15	7.5 ±0.15	20 $^{0}_{-0.052}$	75.5	62.5	31	4
MK2B25	40	52	40	53.8	27.5	16 ±0.15	8 ±0.15	23 $^{0}_{-0.052}$	78.5	65.5	32	5

Note 1) Above figure is for D-A73/A80.
Note 2) Dimensions E and F are 7 mm longer for the auto switches with connector (D-A7□C/A80C/J79C).
Note 3) Dimension when the rod is extended is to be added to clamp stroke plus rotary stroke.

ø32, ø40, ø50, ø63





Head Side Flange Style

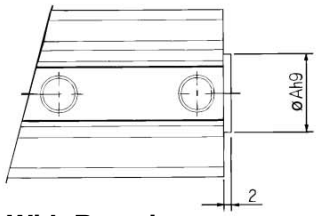
(mm)

Model	A	B	C	D	E	øF	G
MK2G32	8	65	48	34 ±0.1	56 ±0.15	5.5	M6 x 1.0
MK2G40	8	72	54	40 ±0.1	62 ±0.15	5.5	M6 x 1.0
MK2G50	9	89	67	50 ±0.1	76 ±0.15	6.6	M8 x 1.25
MK2G63	9	108	80	60 ±0.1	92 ±0.15	9	M10 x 1.5

With Arm

(mm)

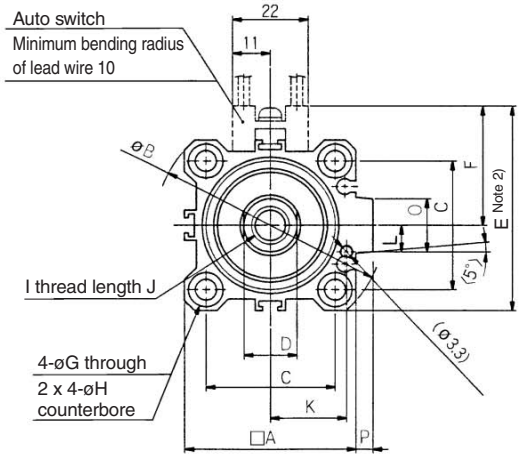
Model	A	B	C	D	E	F	G
MK2□32-□□N	18	67	20	45	39	25	M8 x 1.25
MK2□40-□□N	18	67	20	45	46	25	M8 x 1.25
MK2□50-□□N	22	88	22	65	58	40	M10 x 1.5
MK2□63-□□N	22	88	22	65	57.5	40	M10 x 1.5

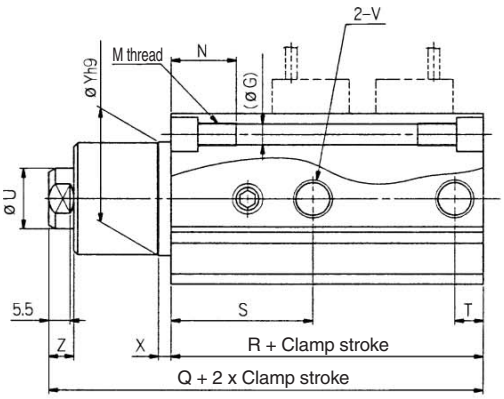


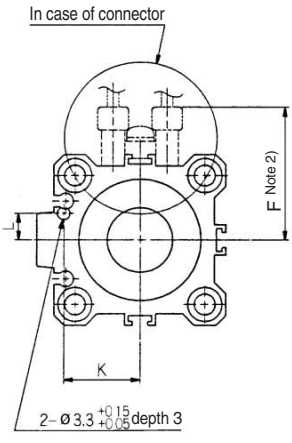
With Boss in Head Side

(mm)

Model	øAh9
MK2□32-□□F	21 $^{0}_{-0.052}$
MK2□40-□□F	28 $^{0}_{-0.052}$
MK2□$^{50}_{63}$-□□F	35 $^{0}_{-0.062}$







Through-hole/Both Ends Tapped Common (Standard)

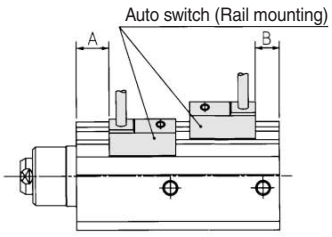
(mm)

Model	□A	B	C	D	E	F	øG	øH	I	J	K	L	M	N	O	P	Q	R	S	T	øU	V	X	øYh9	Z
MK2B32	45	60	34	14 $^{-0.1}_{-0.2}$	54	31.5	5.5	9 depth 7	M10 x 1.5	12	20 ±0.15	7 ±0.15	M6 x 1.0	17	14	4.5	101.5	76	37	7.5	16	Rc 1/8	3	30 $^{0}_{-0.062}$	6.5
MK2B40	52	69	40	14 $^{-0.1}_{-0.2}$	61	35	5.5	9 depth 7	M10 x 1.5	12	24 ±0.15	7 ±0.15	M6 x 1.0	17	14	5	102.5	70	29.5	8	16	Rc 1/8	3	30 $^{0}_{-0.062}$	6.5
MK2B50	64	86	50	17 $^{-0.1}_{-0.2}$	73	41	6.6	11 depth 8	M12 x 1.75	15	30 ±0.15	8 ±0.15	M8 x 1.25	22	19	7	122	81.5	34	10.5	20	Rc 1/4	3.5	37 $^{0}_{-0.062}$	7.5
MK2B63	77	103	60	17 $^{-0.1}_{-0.2}$	86	47.5	9	14 depth 10.5	M12 x 1.75	15	35 ±0.15	9 ±0.15	M10 x 1.5	28.5	19	7	125	85	35	10.5	20	Rc 1/4	3.5	48 $^{0}_{-0.062}$	7.5

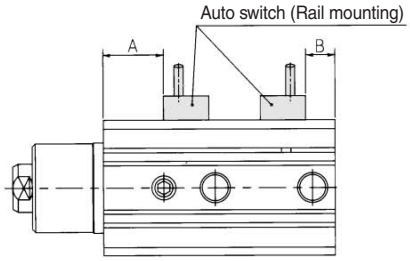
Note 1) This cylinder rod is retracted.
Note 2) Rotary direction is viewed from the rod side when the piston rod is retracting.
Note 3) Dimension when the rod is extended is to be added to clamp stroke plus rotary stroke.

Proper Auto Switch Mounting Position (Detection at stroke end)

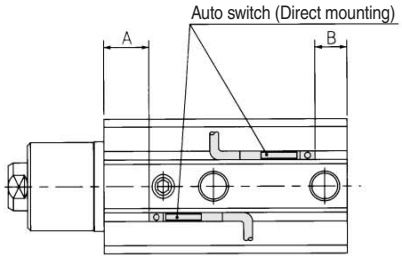
ø20, ø25



ø32 to ø63



ø32 to ø63



(mm)

Mounting	Rail mounting style								Direct mounting style					
Model	D-A7/A8		D-A7□H/A80H D-A73C/A80C D-F7□/F79F/J79 D-F7□V/J79C D-F7BA□/F7□W D-J79W/F7□WV		D-A79W		D-P5DWL		D-A9□ D-A9□V		D-M9□ D-M9□V D-F9□W D-F9□WV		D-F9BAL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
MK2□20	28.5	6	29	6.5	26	3.5	—	—	—	—	—	—	—	—
MK2□25	29	6.5	29.5	7	26.5	4	—	—	—	—	—	—	—	—
MK2□32	32.5	10.5	33	11	30	8	—	—	31.5	9.5	35.5	13.5	34.5	12.5
MK2□40	23.5	13.5	24	14	21	11	19.5	9.5	22.5	12.5	26.5	16.5	25.5	15.5
MK2□50	28	16.5	28.5	17	25.5	14	24	12.5	27	15.5	31	19.5	30	18.5
MK2□63	28.5	19.5	29	20	26	17	24.5	15.5	27.5	18.5	31.5	22.5	30.5	21.5

Auto Switch Mounting Bracket Part No.

Bore size (mm)	Mounting bracket part no.	Note	Applicable auto switch	
			Reed switch	Solid state switch
20, 25	BQ-1	• Switch mounting screw (M3 x 0.5 x 8ℓ) • Square nut	D-A7/A8 D-A73C/A80C D-A7□H/A80H D-A79W	D-F7□/J79, D-F7□V, D-J79C D-F7□W/J79W/D-F7□WV D-F7BAL, D-F7BAVL, D-F79F, D-F7NTL
32, 40 50, 63	BQ-2	• Switch mounting screw (M3 x 0.5 x 10ℓ) • Switch spacer • Switch mounting nut		
40, 50 63	BQP1-050	• Switch mounting bracket • Auto switch mounting nut • Round head Phillips screw (M3 x 0.5 x 16ℓ) • Hexagon socket head cap bolt (M3 x 0.5 x 14ℓ)	—	D-P5DWL

Mounting screws set made of stainless steel
The set of stainless steel mounting screws (with nuts) described below is available and can be used depending on the operating environment. (Please order the auto switch spacer, since it is not included.)
BBA2: For D-A7/A8/F7/J7
"D-F7BAL/F7BAVL" switch is set on the cylinder with the stainless steel screws above when shipped.
When only a switch is shipped independently, "BBA2" screws are attached.

Operating Range

Operating Range (Dimension)

Auto switch model	Bore size (mm)					
	20	25	32	40	50	63
D-A7□/A80 D-A7H/A80H D-A73C/A80C	12	12	12	11	10	12
D-A79□W	13	13	13	14	14	16
D-A9□/A9□V	—	—	9.5	9.5	9.5	11.5
D-F7□/J79 D-F7□V/F79F/J79C D-F7□W/F7□WV D-F79F/F7BAL/F7BAVL/F7NTL	5.5	5	6	6	6	6.5
D-M9□/M9□V	—	—	4.5	4.5	5	5
D-F9□W/F9□WV D-F9BAL	—	—	5.5	5.5	5.5	6
D-P5DWL	—	—	—	5	5	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.

Other than the models listed in "How to Order", the following auto switches are applicable.
For detailed specifications, refer to page 10-20-1.

Type	Model	Electrical entry (Fetching direction)	Features	Applicable bore size (mm)
Reed switch	D-A80	Grommet (Perpendicular)	Without indicator light	20 to 63
	D-A80H	Grommet (In-line)		
	D-A80C	Connector (Perpendicular)		
	D-A90	Grommet (In-line)		12, 16 32 to 63
	D-A90V	Grommet (Perpendicular)		
Solid state switch	D-F7NTL	Grommet (In-line)	With timer	20 to 63

∗ With pre-wire connector is available for D-F7NTL type, too. For details, refer to page 10-20-66.
∗ Normally closed (NC = b contact), solid state switch (D-F9G/F9H type) are also available. For details, refer to page 10-20-40.

Caution on Handling

⚠ Caution

Be sure to read before handling. For Auto Switch Precautions, refer to pages 10-20-4 to 10-20-6.

Magnetic field resistant auto switch resistant auto switch D-P5DWL

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 20,000 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 with a bore of ø7 or more, which excels in heat resistance and flexibility.

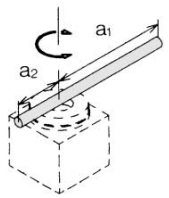
Please contact SMC if an inverter welder or a DC welder will be used.

Calculation for Moment of Inertia

I: Moment of Inertia (kg·m²) m: Load weight (kg)

1. Thin bar

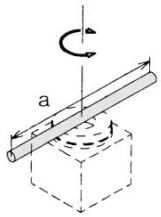
Position of rotary axis: Vertical to the bar and through the end



$$I = m_1 \cdot \frac{a_1^2}{3} + m_2 \cdot \frac{a_2^2}{3}$$

2. Thin bar

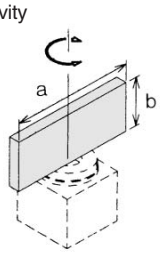
Position of rotary axis: Vertical to the bar and through the center of gravity



$$I = m \cdot \frac{a^2}{12}$$

3. Thin rectangular plate (Rectangular parallelepiped)

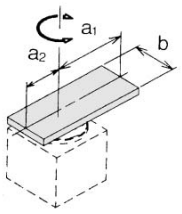
Position of rotary axis: Parallel to side b and through the center of gravity



$$I = m \cdot \frac{a^2}{12}$$

4. Thin rectangular plate (Rectangular parallelepiped)

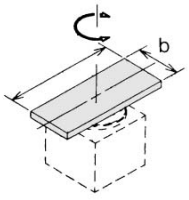
Position of rotary axis: Vertical to the plate and through the end



$$I = m_1 \cdot \frac{4a_1^2 + b^2}{12} + m_2 \cdot \frac{4a_2^2 + b^2}{12}$$

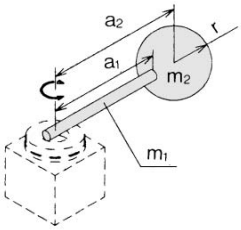
5. Thin rectangular plate (Rectangular parallelepiped)

Position of rotary axis: Through the center of gravity and vertical to the plate (Same as also thick rectangular plate)



$$I = m \cdot \frac{a^2 + b^2}{12}$$

6. Load at the end of lever arm



$$I = m_1 \cdot \frac{a_1^2}{3} + m_2 \cdot a_2^2 + K$$

$$k = m_2 \cdot \frac{2r^2}{5}$$

Product Profile:
Clamp Cylinders

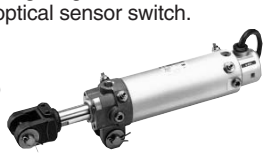
Clamp cylinder
Series CK1/CKS1
Series CK1

Two sizes of clevis width
(16.5 mm and 19.5 mm)

Series CKS1

(With magnetic field resistant auto switch)
It is not affected by strong magnetic fields due to the adoption of an optical sensor switch.

Series CK1



Series CKS1

Series	Type	Width of clevis		Bore size (mm)	Standard stroke (mm)	Speed controller	Mounting style	Option
		16.5	19.5					
CK1	Standard	**CK1A**	**CK1B**	40 50 63	50, 75 100, 125 150	Built-in	Double clevis	Single knuckle joint Double knuckle joint (With pin) Dog for limit switch Dog fitting
CKS1	Magnetic field resistant auto switch	**CKS1A**	**CKS1B**	40 50 63	50, 75 100, 125 150			

Clamp cylinder with lock
Series CLK1

Maintains a clamped or unclamped state when air supply pressure drops or residual pressure is released.
Since it can be locked at any position, it can deal with freely the changes of thickness of a workpiece.

Series CLK1

With magnetic field resistant auto switch
Series CLK1G

Series	Type	Bore size (mm)	Standard stroke (mm)	Mounting style	Locking method	Option
CLK1	Standard	32 40 50 63	50, 75 100, 125 150	Double clevis	Spring rod	Single knuckle joint Double knuckle joint (with pin) Dog for limit switch Dog fitting
CLK1G	With magnetic field resistant auto switch	40 50 63	50, 75 100, 125 150			