Rotary Clamp Cylinder: Standard

Series MK

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

How to Order

MK A 20 ☐ – 10 R F – M9BW ☐ – ☐☐

Rotary clamp cylinder
Standard

Mounting bracket

Symbol	Mounting	Applicable bore size
B	Through-hole/Both ends tapped common (Standard)	ø12, ø16
A	Both ends tapped	ø20 to ø63
B	Through-hole	
G	Head end flange	

∗ Head end flange is equipped with a boss mounting. 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

Port thread type

Nil	M thread	ø12 to ø25
	Rc	ø32 to ø63
TN	NPT	
TF	G	

Clamp stroke

Symbol	Clamp stroke	Applicable bore size
10	10 mm	ø12 to ø40
20	20 mm	ø12 to ø63
50	50 mm	ø50 to ø63

Number of auto switches

Nil	2 pcs.
S	1 pc.

Auto switch type

Nil	Without auto switch (Built-in magnet)

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

Body option

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

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

Made to Order ●
(Refer to page 1237.)

Body Option Manufacturable Range

Bore size	Nil	M	F	N	MF	FN
ø12, ø16	●	—	—	●	—	—
ø20 to ø63	●	●	●	●	●	●

Rotary direction (Unclamp → Clamp)

R	Clockwise
L	Counterclockwise

Applicable Auto Switches

/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Perpendicular ø12, ø16	Perpendicular ø20 to ø63	In-line ø12, ø16	In-line ø20 to ø63	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9NV		M9N		●	—	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9PV		M9P		●	—	●	○	—	○		
				2-wire	12 V		M9BV		M9B		●	—	●	○	—	○	—	
		Connector					—	J79C	—		●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		M9NWV		M9NW		●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PWV		M9PW		●	●	●	○	—	○		
				2-wire	12 V		M9BWV		M9BW		●	●	●	○	—	○	—	
	Water resistant (2-color indication)			3-wire (NPN)	5 V, 12 V		M9NAV		M9NA		○	○	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PAV		M9PA		○	○	●	○	—	○		
				2-wire	12 V		M9BAV		M9BA		○	○	●	○	—	○	—	
	Diagnostic output (2-color indication)			4-wire	5 V, 12 V		—		—	F79F	●	—	●	○	—	○	IC circuit	
	Magnetic field resistant (2-color indication)			2-wire (No polarity)	—		—		—	P4DW**	—	—	●	●	—	○	—	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—		A96		●	—	●	—	—	—	IC circuit	—
				2-wire		—	200 V	—	A72	—	A72H	●	—	●	—	—	—	—	Relay, PLC
			No		24 V	12 V	100 V	A93V		A93		●	—	●	—	—	—		
						5 V, 12 V	100 V or less	A90V		A90		●	—	●	—	—	—	IC circuit	
		Connector	Yes			12 V	—	—	A73C	—		●	—	●	●	●	—	—	
			No			5 V, 12 V	24 V or less	—	A80C	—		●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indication)	Grommet	Yes			—	—	—	A79W	—		●	—	●	—	—	—	—	

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ
None ····· N (Example) J79CN

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗∗ For D-P4DW, ø40 to ø63 are available.
∗∗ Only D-P4DW type is assembled at the time of shipment.

∗ Since there are other applicable auto switches than listed, refer to page 1253 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ When mounting models D-M9□(V), M9□W(V), M9□A(V), and A9□(V) with between ø32 and ø50 on sides other than the port side, please order a switch mounting bracket separately as per the instructions on page 1252.
∗ Auto switches are shipped together (not assembled).

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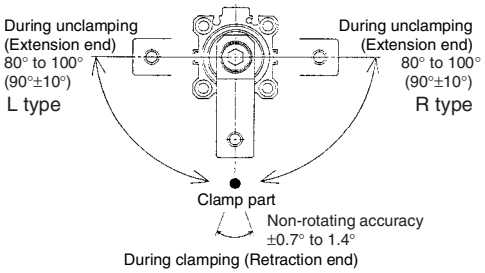
Specifications

Bore size (mm)	12	16	20	25	32	40	50	63
Action	Double acting							
Rotation 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						20, 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							
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	Both ends tapped, Through-hole, Head end flange						
Cushion	Rubber bumper							
Stroke length tolerance	$^{+0.6}_{-0.4}$							
Piston speed	50 to 200 mm/s							
Non-rotating accuracy (Clamp part) Note 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 end when the piston rod is retracting.
Note 3) At 0.5 MPa.

Rotary Angle



Made to Order
(For details, refer to page 1853.)

Symbol	Description
XB6	Heat resistant cylinder (–10 to 150°C)

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	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 end (Clamp)
H: Head end (Unclamp)

Option/Arm

Bore size (mm)	Part no.	Accessories
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/Flange

Bore size (mm)	Part no.	Accessories
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**	

Mass/Through-hole Mounting

Unit: 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 Mass

Unit: g

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

Calculation: (Example) **MKG20-10RFN**

• Standard calculation:	MKB20-10R	250 g
• Extra mass calculation:	Both ends tapped	6 g
	Head end flange	133 g
	With boss on head end	2 g
	With arm	100 g
		491 g

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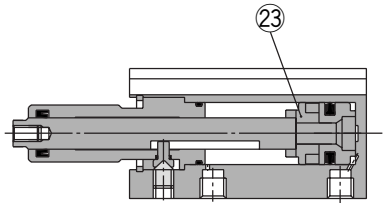
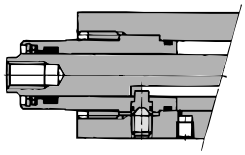
Construction

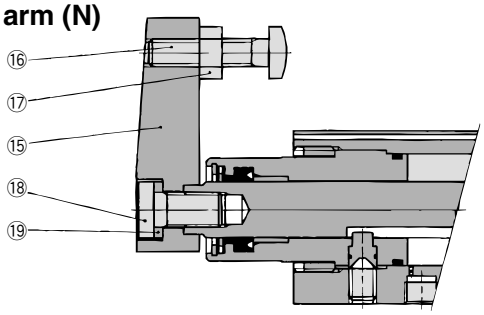
MK□12, 16



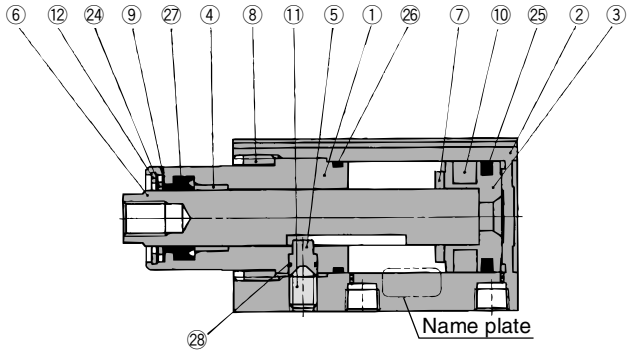
MK□20, 25



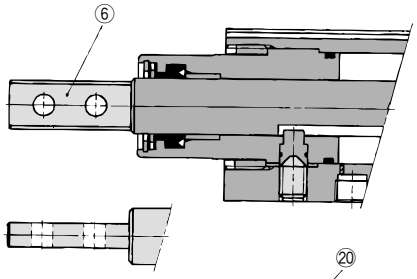
With arm (N)



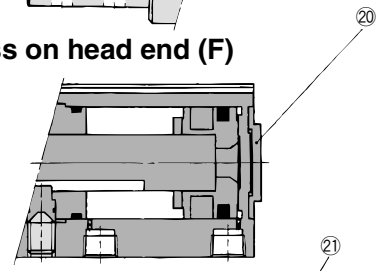
MK□32



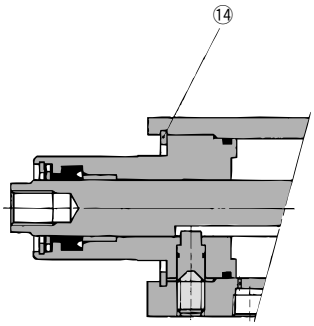
Rod end width across flats (M)



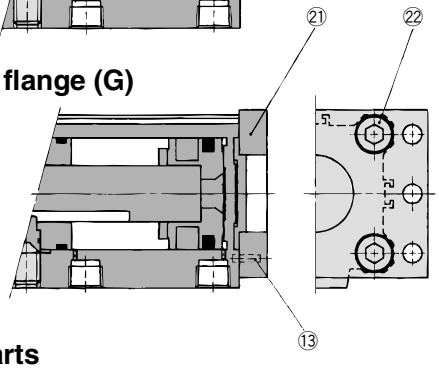
With boss on head end (F)



MK□40 to 63



Head end flange (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	ø32 to ø63 only
5	**Guide pin**	Stainless steel	Nitriding
6	**Piston rod**	Stainless steel	ø12 to ø25 Nitriding
		Carbon steel	ø32 to ø63 Heated, Nickel plated
7	**Bumper**	Urethane	
8	**Ring nut**	Copper alloy	ø20 to ø32 only
9	**Scraper pressure**	Stainless steel	Except ø12, ø16
10	**Magnet**	—	
11	Hexagon socket head set screw	Chromium molybdenum steel	Sharp end section: 90°
12	Round R-type retaining ring	Spring steel	
13	**Parallel pin**	Stainless steel	
14	**Type C retaining ring**	Carbon tool steel	Used at ø12, ø16, ø32 to ø63

Component Parts

No.	Description	Material	Note	
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.	ø20, ø25: 2
				ø32 to ø63: 4
23	**Spacer for switch type**	Aluminum alloy	ø12, ø16 only	
24	**Coil scraper**	Phosphor bronze	Except ø12, ø16	
25	**Piston seal**	NBR		
26	**Gasket**	NBR		
27	**Rod seal**	NBR		
28	**O-ring**	NBR		

Replacement Parts: Seal Kit

Bore size (mm)	ø12	ø16	ø20 to ø32	ø40	ø50	ø63
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. Order the seal kit, based on each bore size (except ø20 to ø32).
∗ Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10g)

⚠ Precautions

Be sure to read before handling.
Refer to front matters 42 and 43 for Safety Instructions and pages 3 to 11 for Actuator and Auto Switch Precautions.

⚠ Caution

Clamp Arm Mounting

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.

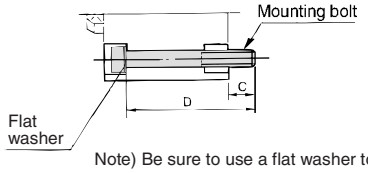
Installation and Adjustment/ Clamp Arm Removal and Reinstallation

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

Example) **M5 x 75 L (MKB)**



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

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

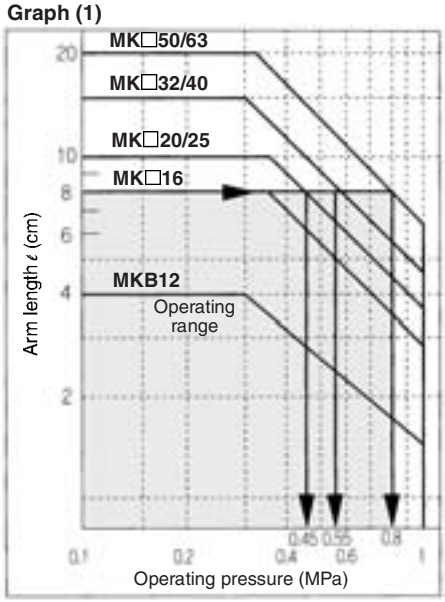
Precautions for Designing and Mounting Arms

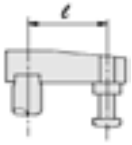
When arms are to be made separately, their length and weight should be within the following range.

1. Allowable bending moment

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

Graph (1)



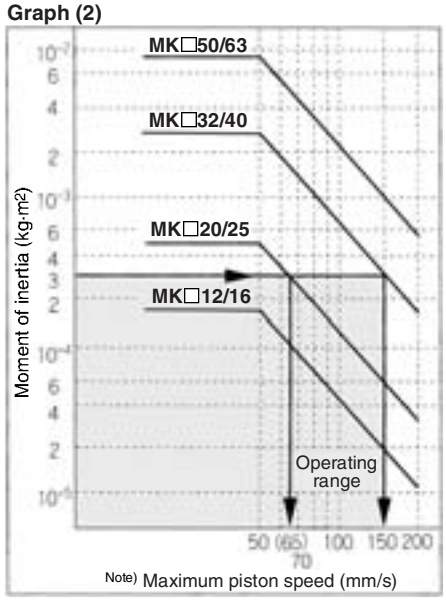


When arm length is 8 cm, pressure should be less than
MK□20/25: 0.45 MPa
MK□32/40: 0.55 MPa
MK□50/63: 0.8 MPa.

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)



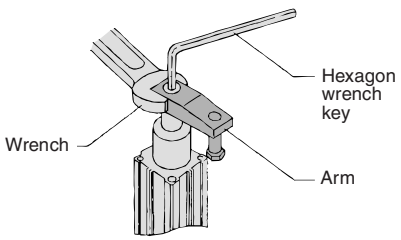
When arm's moment of inertia is 3 x 10^{-4} kg·m², cylinder speed should be less than
MK□20/25: 65 mm/s
MK□32/40: 150 mm/s.
For calculating moment of inertia, refer to pages 1234, 1235 and 1264.

Note) Maximum piston speed is equivalent to approximately 1.6x the average piston speed. (Rough indication)

• 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



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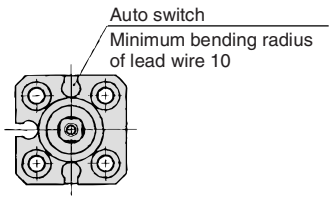
Dimensions: ø12, ø16, ø20, ø25

Through-hole (Basic): MKB

ø12



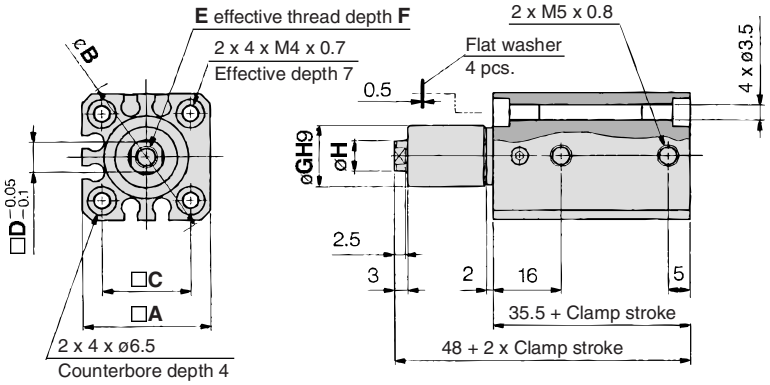
(mm)

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

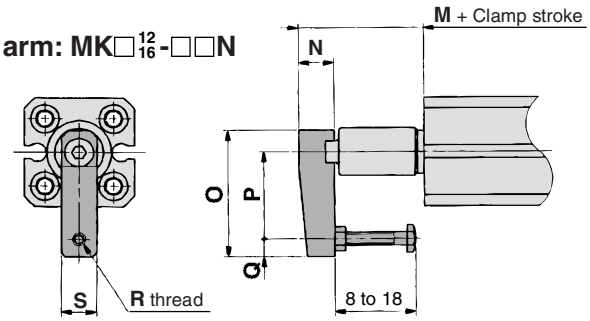
(mm)

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

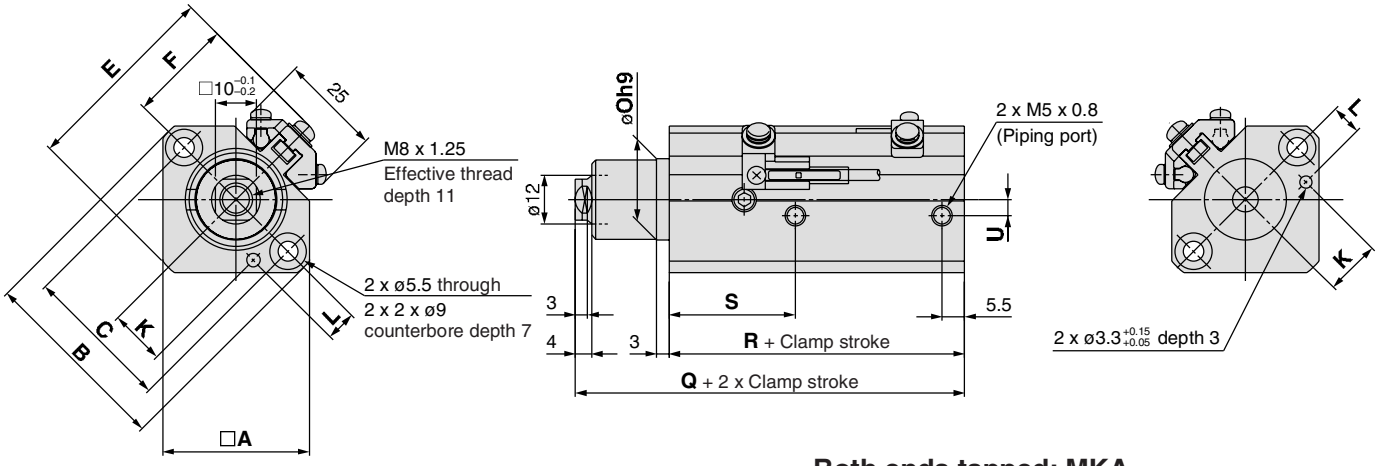
ø16



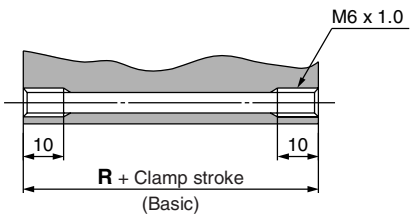
With arm: MK□ 12/16 -□□N



ø20, ø25



Both ends tapped: MKA



(mm)

Model	A	B	C	E	F	K	L	Oh9	Q	R	S	U
MKB20	36	46.8	36	49	25.5	13.5 $^{\pm 0.15}$	7.5 $^{\pm 0.15}$	20 $^{0}_{-0.052}$	72.5	62	31	4
MKB25	40	52	40	54.5	28.5	16 $^{\pm 0.15}$	8 $^{\pm 0.15}$	23 $^{0}_{-0.052}$	73.5	63	32	5

Note) Dimension when the rod is extended is to be added to clamp stroke plus rotary stroke.

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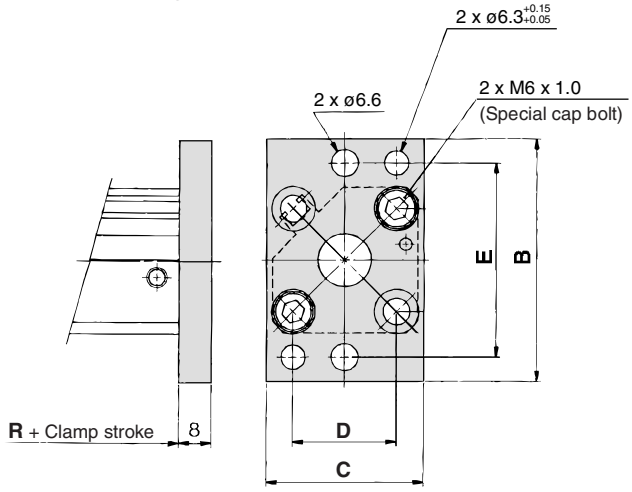
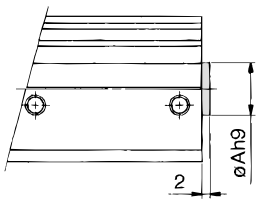
Head end flange: MKG



(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

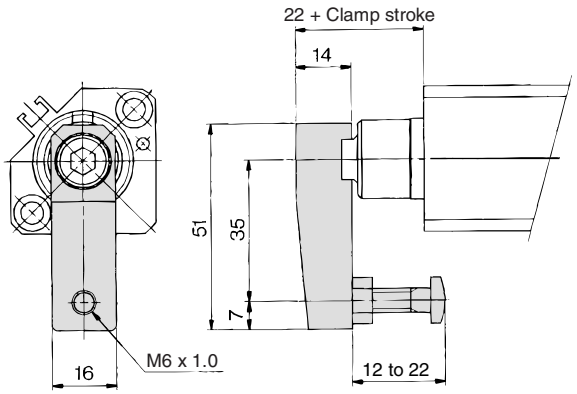
With boss on head end



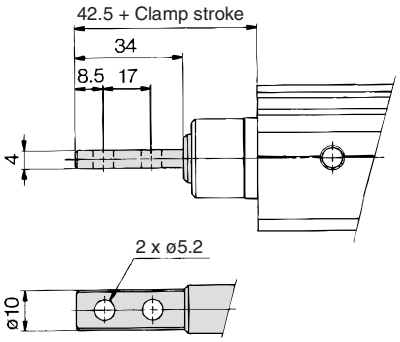
(mm)

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

With arm: MK□ 20 25 -□□N



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



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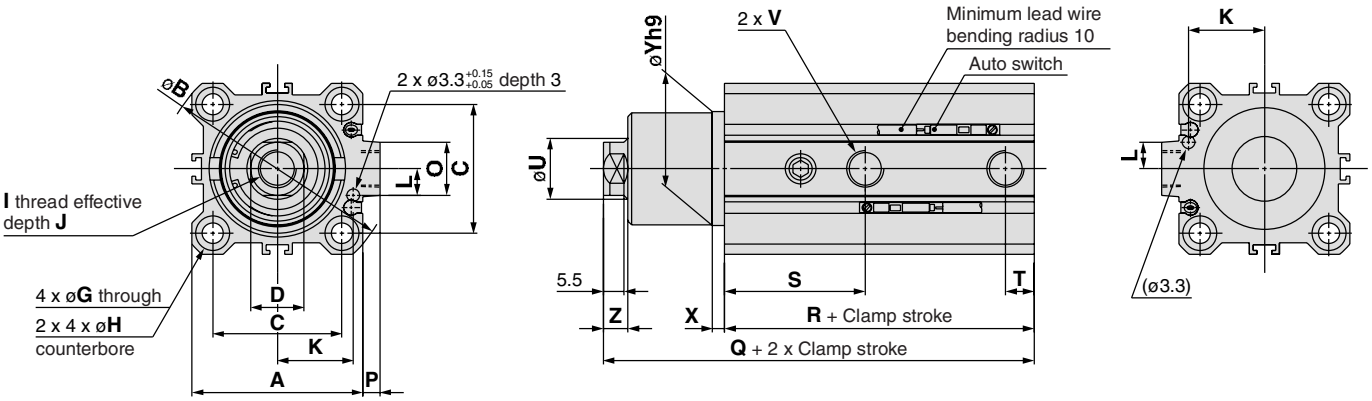
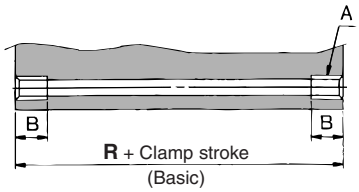
Dimensions: ø32, ø40, ø50, ø63

Through-hole (Basic): MKB



Both ends tapped: 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	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V			X	Yh9	Z
																				—	TN	TF			
MKB32	45	60	34	14 $^{-0.1}_{-0.2}$	5.5	9 depth 7	M10 x 1.5	12	20 ±0.15	7 ±0.15	M6 x 10	10	14	4.5	93.5	71.5	37	7.5	16	Rc 1/8	NPT 1/8	G 1/8	3	30 $^{0}_{-0.062}$	6.5
MKB40	52	69	40	14 $^{-0.1}_{-0.2}$	5.5	9 depth 7	M10 x 1.5	12	24 ±0.15	7 ±0.15			14	5	94.5	65	29.5	8	16	Rc 1/8	NPT 1/8	G 1/8	3	30 $^{0}_{-0.062}$	6.5
MKB50	64	86	50	17 $^{-0.1}_{-0.2}$	6.6	11 depth 8	M12 x 1.75	15	30 ±0.15	8 ±0.15	M8 x 1.25	14	19	7	112	76.5	34	10.5	20	Rc 1/4	NPT 1/4	G 1/4	3.5	37 $^{0}_{-0.062}$	7.5
MKB63	77	103	60	17 $^{-0.1}_{-0.2}$	9	14 depth 10.5	M12 x 1.75	15	35 ±0.15	9 ±0.15	M10 x 1.5	18	19	7	115	80	35	10.5	20	Rc 1/4	NPT 1/4	G 1/4	3.5	48 $^{0}_{-0.062}$	7.5

Note 1) Above figures are for the D-M9□, M9□W, M9□A, A9□.
Note 2) Dimension when the rod is extended is to be added to clamp stroke plus rotary stroke.

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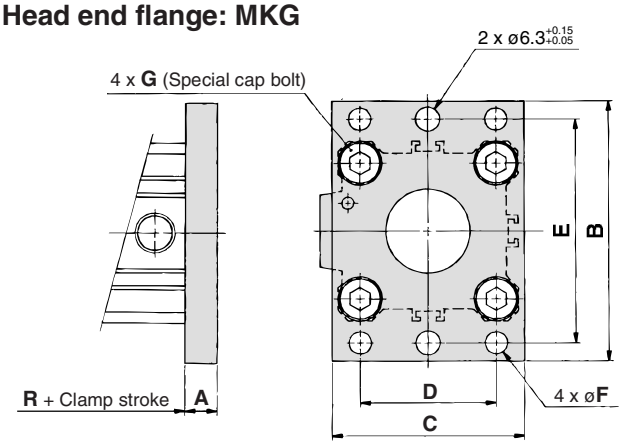
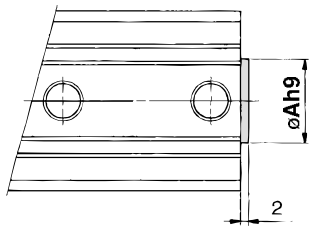
Head end flange: MKG



(mm)

Model	A	B	C	D	E	F	G
MKG32	8	65	48	34 ±0.1	56 ±0.15	5.5	M6 x 1.0
MKG40	8	72	54	40 ±0.1	62 ±0.15	5.5	M6 x 1.0
MKG50	9	89	67	50 ±0.1	76 ±0.15	6.6	M8 x 1.25
MKG63	9	108	80	60 ±0.1	92 ±0.15	9	M10 x 1.5

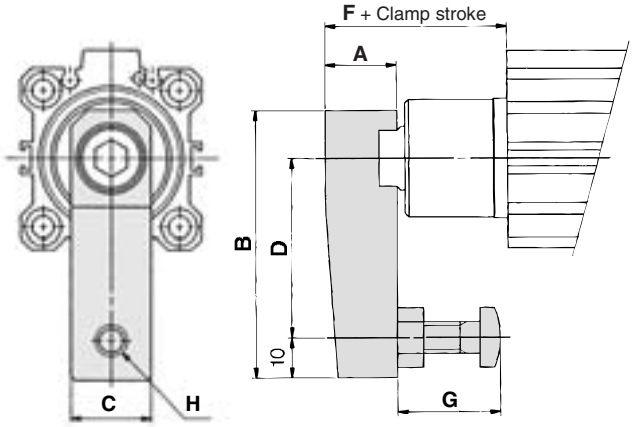
With boss on head end



(mm)

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

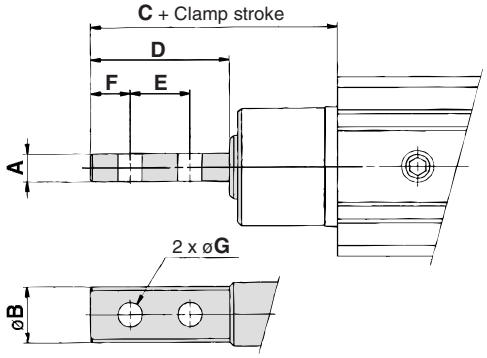
With arm



(mm)

Model	A	B	C	D	F	G	H
MK□32-□□N	18	67	20	45	35.5	15 to 25	M8 x 1.25
MK□40-□□N	18	67	20	45	43		M8 x 1.25
MK□50-□□N	22	88	22	65	53	30 to 40	M10 x 1.5
MK□63-□□N	22	88	22	65	52.5		M10 x 1.5

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

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