

# Rotary Clamp Cylinder: Standard **MK Series**

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

## How to Order

**MK B 20 - 10 R N Z - M9BW -**

**Rotary clamp cylinder**

**Mounting bracket**

| Symbol   | Mounting                                     |
|----------|--|
| <b>B</b> | Through-hole/Both ends tapped common (Basic) |
| <b>F</b> | Rod flange                                   |
| <b>G</b> | Head flange                                  |

\* Rod flange, head flanges are shipped together, (but not assembled).

**Bore size**

| Symbol    | Bore size |
|-----------|-----------|
| <b>12</b> | 12 mm     |
| <b>16</b> | 16 mm     |
| <b>20</b> | 20 mm     |
| <b>25</b> | 25 mm     |
| <b>32</b> | 32 mm     |
| <b>40</b> | 40 mm     |
| <b>50</b> | 50 mm     |
| <b>63</b> | 63 mm     |

**Port thread type**

| Symbol     | Port thread type | Applicable bore size |
|------------|------------------|----------------------|
| <b>NII</b> | M thread         | ø12 to ø25           |
| <b>TN</b>  | NPT              | ø32 to ø63           |
| <b>TF</b>  | G                | ø32 to ø63           |

**Clamp stroke**

| Symbol    | Clamp stroke | Applicable bore size |
|-----------|--------------|----------------------|
| <b>10</b> | 10 mm        | ø12 to ø63           |
| <b>20</b> | 20 mm        | ø12 to ø63           |
| <b>30</b> | 30 mm        | ø12 to ø63           |
| <b>50</b> | 50 mm        | ø32 to ø63           |

**Auto switch type**

| Symbol     | Auto switch type                      | Quantity |
|------------|---------------------------------------|----------|
| <b>Nil</b> | Without auto switch (Built-in magnet) | 2 pcs.   |
| <b>S</b>   | With auto switch                      | 1 pc.    |

**Auto switch multiple side mounting**

**Body option**

| Symbol   | Body option              |
|----------|--------------------------|
| <b>N</b> | Standard (Female thread) |
| <b>N</b> | With arm                 |

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

**Rotary direction (Unclamp → Clamp)**

| Symbol   | Rotary direction |
|----------|------------------|
| <b>R</b> | Clockwise        |
| <b>L</b> | Counterclockwise |

During unclamping (Extension end)  
L type (Counterclockwise)  
R type (Clockwise)  
During clamping (Retraction end)

**MK**  
**MK2T**  
**CK□**  
**CLK2**  
**CLKG**  
**CKQ**  
**CLKQ**  
**CK□**  
**CLK□**  
**CKQ□**

## Applicable Auto Switches Refer to pages 941 to 1067 for further information on auto switches.

| Type                    | Special function                                   | Electrical entry   | Indicator light     | Wiring (Output)         | Load voltage       |                   | Auto switch model      |                     | Lead wire length (m) |       |       |       |          | Pre-wired connector | Applicable load |               |               |            |
|-------------------------|--|--------------------|---------------------|-------------------------|--------------------|-------------------|------------------------|---------------------|----------------------|-------|-------|-------|----------|---------------------|-----------------|---------------|---------------|------------|
|                         |  |                    |                     |                         | DC                 | AC                | Perpendicular          | In-line             | 0.5 (Nil)            | 1 (M) | 3 (L) | 5 (Z) | None (N) |                     |                 |               |               |            |
| Solid state auto switch | —<br><br>Diagnostic indication (2-color indicator) | Grommet            | Yes                 | 3-wire (NPN)            | 24 V               | 5 V,<br>12 V      | —                      | M9NV                | M9N                  | ●     | ●     | ●     | ○        | —                   | ○               | IC circuit    | Relay,<br>PLC |            |
|                         |  |                    |                     | 3-wire (PNP)            |                    |                   |                        | M9PV                | M9P                  | ●     | ●     | ●     | ○        | —                   | ○               |               |               |            |
|                         |  |                    |                     | 2-wire                  |                    |                   |                        | M9BV                | M9B                  | ●     | ●     | ●     | ○        | —                   | ○               |               |               |            |
|                         |  |                    |                     | 3-wire (NPN)            |                    |                   |                        | M9NVV               | M9NW                 | ●     | ●     | ●     | ○        | —                   | ○               |               |               |            |
|                         | Water resistant (2-color indicator)                |                    |                     | 3-wire (PNP)            |                    |                   |                        | M9PVV               | M9PW                 | ●     | ●     | ●     | ○        | —                   | ○               | IC circuit    |               |            |
|                         |  |                    |                     | 2-wire                  |                    |                   |                        | M9BWW               | M9BW                 | ●     | ●     | ●     | ○        | —                   | ○               |               |               |            |
|                         |  |                    |                     | 3-wire (NPN)            |                    |                   |                        | M9NAV <sup>*1</sup> | M9NA <sup>*1</sup>   | ○     | ○     | ●     | ○        | —                   | ○               |               |               | IC circuit |
|                         |  |                    |                     | 3-wire (PNP)            |                    |                   |                        | M9PAV <sup>*1</sup> | M9PA <sup>*1</sup>   | ○     | ○     | ●     | ○        | —                   | ○               |               |               |            |
|                         | Magnetic field resistant (2-color indicator)       | 2-wire             | M9BAV <sup>*1</sup> | M9BA <sup>*1</sup>      | ○                  | ○                 | ●                      | ○                   | —                    | ○     | —     |       |          |                     |                 |               |               |            |
|                         |  | 2-wire (Non-polar) | —                   | —                       | P3DWA <sup>*</sup> | ●                 | ●                      | ●                   | —                    | ●     |       |       |          |                     |                 |               |               |            |
| Reed auto switch        | —  | Grommet            | Yes                 | 3-wire (NPN equivalent) | —                  | 5 V               | —                      | A96V                | A96                  | ●     | —     | ●     | —        | —                   | —               | IC circuit    | —             |            |
|                         |  |                    | No                  | 2-wire                  | 24 V               | 12 V<br>5 V, 12 V | 100 V<br>100 V or less | A93V <sup>*2</sup>  | A93                  | ●     | ●     | ●     | —        | —                   | —               | Relay,<br>PLC |               |            |
|                         |  |                    |                     |                         |                    |                   |                        |                     | A90V                 | A90   | ●     | —     | ●        | —                   | —               | —             | IC circuit    | —          |

\*1 Water resistant type auto switches can be mounted on the above models, but in such case SMC cannot guarantee water resistance.

Consult with SMC regarding water resistant types with the above model numbers.

\*2 1 m type lead wire is only applicable to D-A93.

\* Lead wire length symbols: 0.5 m ..... Nil (Example) M9NV  
1 m ..... M (Example) M9NWM  
3 m ..... L (Example) M9NWL  
5 m ..... Z (Example) M9NWX

\* Solid state auto switches marked with "○" are produced upon receipt of order.  
\* For D-P3DWA□, ø32 to ø63 are available.

\* Since there are other applicable auto switches than listed, refer to page 400 for details.

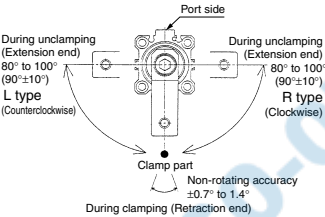
\* For details about auto switches with pre-wired connector, refer to pages 1014 and 1015.

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

**D-□**  
**-X□**



Rotary Angle



Made to Order: Individual Specifications  
(For details, refer to pages 401 and 402.)

| Symbol | Description  |
|--------|--|
| -X2071 | Max. operating pressure 1.0 MPa  |
| -X2094 | Overall length is the same as the MK2 series                                   |
| -X2172 | With boss in head end  |
| -X2177 | The dimension of head end flange is the same as the current series MK and MK2. |

Made to Order Specifications  
(For details, refer to pages 1069 to 1262.)

| Symbol | Description  |
|--------|--|
| -XB6   | Heat resistant cylinder (-10 to 150°C) w/o auto switch only <sup>Note 1)</sup> |
| -XC22  | Fluororubber seals <sup>Note 2)</sup>  |

Note 1) Except ø12 and ø16.  
Note 2) The bumper is a standard product.

Specifications

| Bore size (mm)  | 12  | 16 | 20    | 25  | 32                    | 40  | 50                    | 63                                       |
|---|---|----|-------|-----|-----------------------|-----|-----------------------|--|
| Action  | Double acting   |    |       |     |                       |     |                       |  |
| Rotary angle <small>Note 1)</small>                       | 90° ±10°  |    |       |     |                       |     |                       |  |
| Rotary direction <small>Note 2)</small>                   | 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) <small>Note 3)</small>        | 40  | 75 | 100   | 185 | 300                   | 525 | 825                   | 1400                                     |
| Fluid   | Air   |    |       |     |                       |     |                       |  |
| Proof pressure  | 1.5 MPa   |    |       |     |                       |     |                       |  |
| Operating pressure range                                  | 0.1 to 1 MPa  |    |       |     |                       |     |                       | <small>Note 4)</small><br>0.1 to 0.6 MPa |
| Ambient and fluid temperature                             | Without auto switch: -10 to 70°C (No freezing)<br>With auto switch: -10 to 60°C (No freezing) |    |       |     |                       |     |                       |  |
| Lubrication   | Non-lube  |    |       |     |                       |     |                       |  |
| Piping port size  | M5 x 0.8  |    |       |     | Rc1/8, NPT1/8<br>G1/8 |     | Rc1/4, NPT1/4<br>G1/4 |  |
| Mounting  | Through-hole/Both ends tapped common, Head flange   |    |       |     |                       |     |                       |  |
| Cushion   | Rubber bumper   |    |       |     |                       |     |                       |  |
| Stroke length tolerance                                   | +0.6<br>-0.4  |    |       |     |                       |     |                       |  |
| Piston speed <small>Note 5)</small>                       | 50 to 200 mm/s  |    |       |     |                       |     |                       |  |
| Non-rotating accuracy (Clamp part) <small>Note 1)</small> | ±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) Clamp force at 0.5 MPa  
Note 4) When using the cylinder within a pressure range from 0.61 to 1 MPa, please use -X2071.  
Note 5) Be sure to install a speed controller to the cylinder, and adjust the cylinder speed to make it within the range from 50 to 200 mm/s. To adjust the speed, start with the needle in the completely closed position, and then adjust it by opening gradually.

Theoretical Output

| Bore size (mm) | Rod size (mm) | Operating direction | Piston area (cm <sup>2</sup> ) | 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 (cm<sup>2</sup>) x 100  
Operating direction IN: Clamp OUT: Unclamp

Option/Arm

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

Mounting Bracket/Flange

| Bore size (mm) | Rod flange | Head flange | Accessories                                       |
|----------------|------------|-------------|---|
| 12             | MKZ-RF012  | CQS-F012    | Special hexagon socket head cap screw<br>(4 pcs.) |
| 16             | MKZ-RF016  | CQS-F016    |   |
| 20             | MKZ-RF020  | MKZ-F020    | Special hexagon socket head cap screw<br>(2 pcs.) |
| 25             | MKZ-RF025  | MKZ-F025    |   |
| 32             | MKZ-RF032  | MK2T-F032   | Special hexagon socket head cap screw<br>(4 pcs.) |
| 40             | MKZ-RF040  | MK2T-F040   |   |
| 50             | MKZ-RF050  | MK2T-F050   |   |
| 63             | MKZ-RF063  | MK2T-F063   |   |