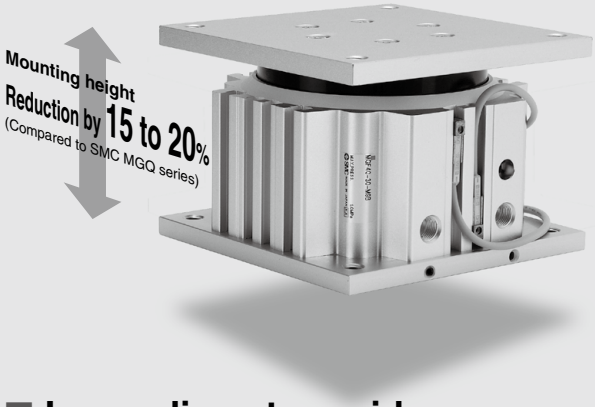
# Low-profile compact cylinder utilizes a large concentric guiding sleeve to provide excellent eccentric load resistance.

## ■ Mounting height greatly reduced

Low-profile cylinder enables compact machine design.




## ■ Large diameter guide (Eccentric load resistant)

A large diameter guide rod enables the cylinder to handle eccentric loads applied from any direction within a 360° angle.

**Allowable moment**

| Bore size (mm) | Allowable moment (N·m) |
|---|---|
| **40** | 10 |
| **63** | 40 |
| **100** | 110 |

∗ Values are at a cylinder speed of 100 mm/s.

## ■ Built-in non-rotating mechanism

Internal guide pin prevents rotation.

**Non-rotating accuracy**

| Bore size (mm) | Non-rotating accuracy θ |
|---|---|
| **40** | ± 0.08° |
| **63** | ± 0.06° |
| **100** | ± 0.05° |

## ■ Series Variations

| Model | Bore size (mm) | Standard stroke (mm) 30 | 50 | 75 | 100 |
|---|---|---|---|---|---|
| **MGF 40** | **40** | | | | |
| **MGF 63** | **63** | | | | |
| **MGF100** | **100** | | | | |

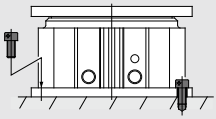
## ■ Built-in T-slots

T-slots are provided on 3 faces of the body (except port face), allowing mounting for various brackets.
(Not suitable for mounting the cylinder itself.)

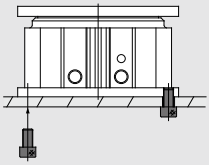
## ■ Auto switches can be mounted on 4 lateral faces of the body.

## ■ Can be mounted from two directions

**Mounting from top**

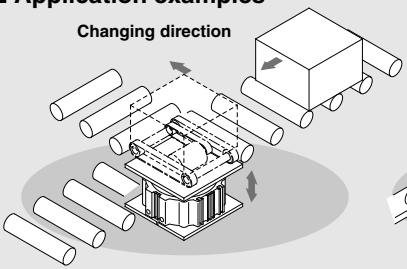


**Mounting from bottom**

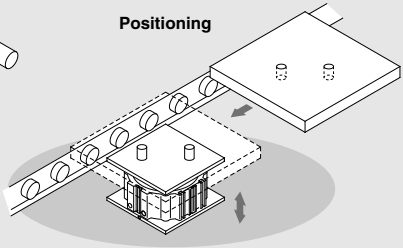


## ■ Application examples

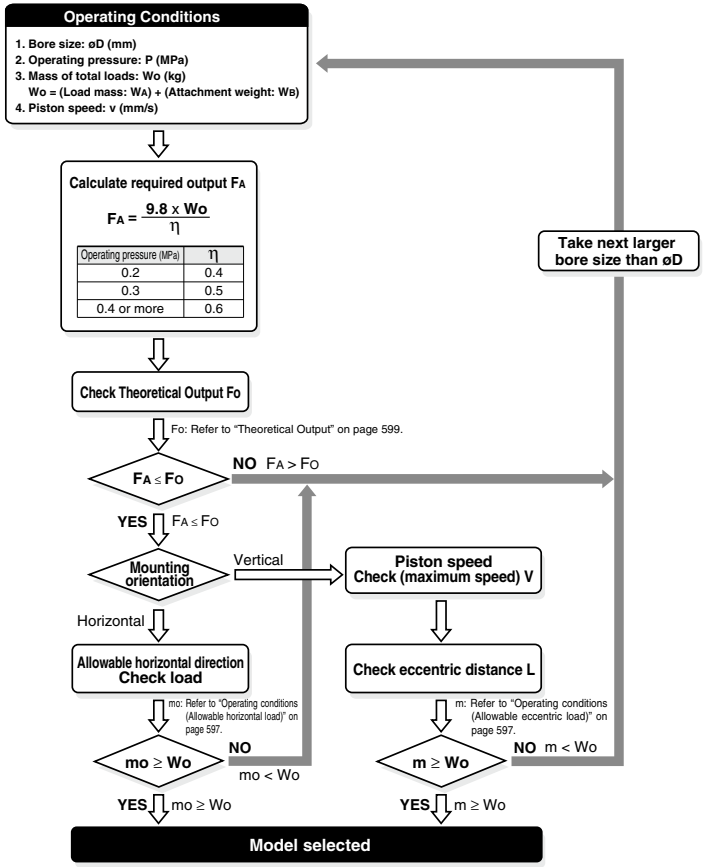
**Changing direction**



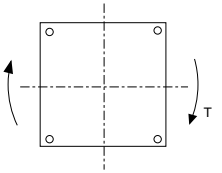
**Positioning**



# Model Selection



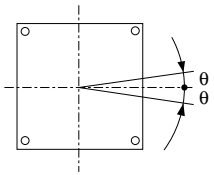

### Allowable rotational torque




T (N·m)

| Bore size (mm) | Stroke (mm) | | | |
|---|---|---|---|---|
| | 30 | 50 | 75 | 100 |
| **40** | 7 | 5 | 4 | 3 |
| **63** | 22 | 16 | 12 | 10 |
| **100** | 30 | 22 | 17 | 13 |

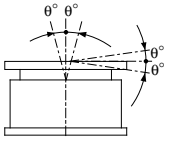
### Non-rotating accuracy




| Bore size (mm) | Non-rotating accuracy θ |
|---|---|
| **40** | ± 0.08° |
| **63** | ± 0.06° |
| **100** | ± 0.05° |

Note) The value given for the non-rotating accuracy is applicable below the allowable rotational torque. If a greater rotational torque is applied, the non-rotating rod (page 601) bends, exceeding the value of the non-rotating accuracy.

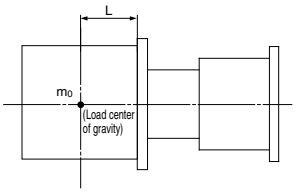
### Deflection angle of plate for eccentric load




| Bore size (mm) | Deflection angle θ° |
|---|---|
| **40** | ± 0.35° or less |
| **63** | ± 0.3° or less |
| **100** | |

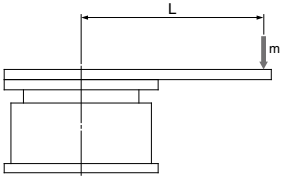
## Operating Conditions

### Allowable horizontal load

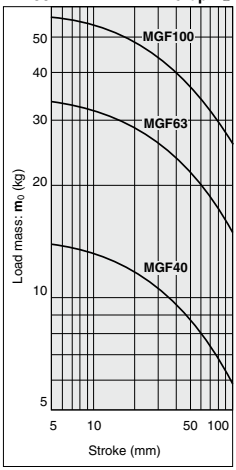



### Allowable eccentric load

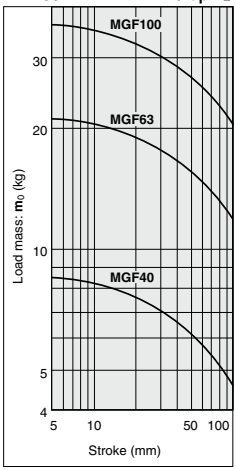
The maximum value of load which can be applied at an eccentric position at a distance of L (mm) from the cylinder center.



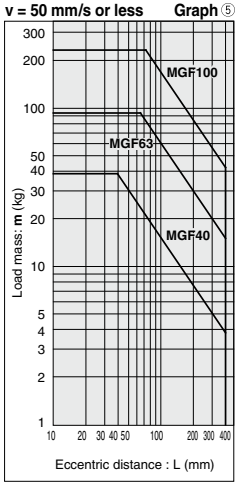

**L = 50 mm** Graph ①



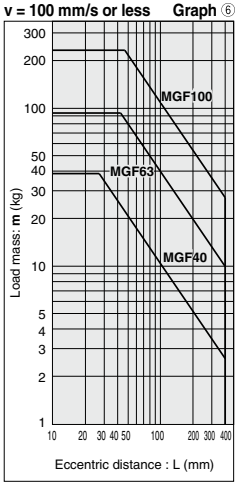

**L = 100 mm** Graph ②



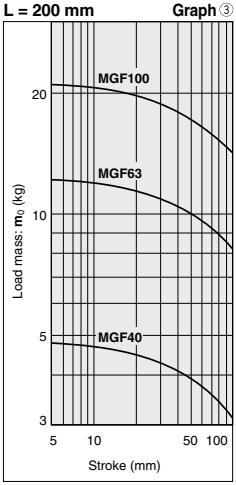

**v = 50 mm/s or less** Graph ⑤



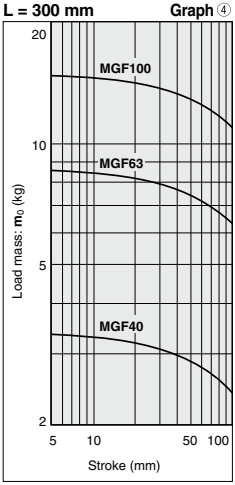

**v = 100 mm/s or less** Graph ⑥



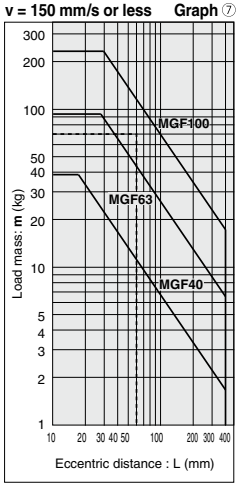

**L = 200 mm** Graph ③



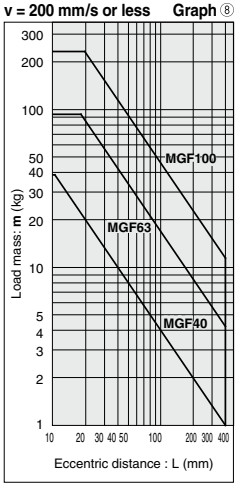

**L = 300 mm** Graph ④




**v = 150 mm/s or less** Graph ⑦




**v = 200 mm/s or less** Graph ⑧

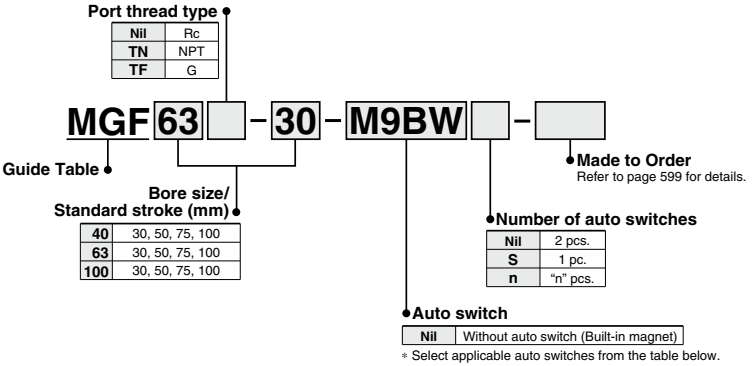



**How to read the graph**

1) When the load mass is 70 kg, eccentric distance is 60 mm, and the maximum speed is 150 mm/s → Select MGF100 from Graph ⑦.
2) When MGF63 is operated with a load mass 30 kg and 100 mm eccentric distance → From Graph ⑥, the cylinder can be used at a maximum speed of 100 mm/s or less.

# Guide Table
# *MGF* Series
## ø40, ø63, ø100

## How to Order




**Applicable Auto Switches**/Refer to pages 1119 to 1245 for further information on auto switches.

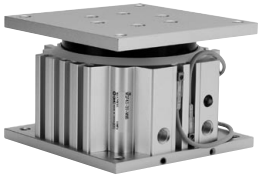
| Type | Special function | Electrical entry | Indicator light | Wiring (Output) | Load voltage DC | Load voltage DC | Load voltage AC | Auto switch model: Perpendicular | Auto switch model: In-line | Lead wire length (m): 0.5 (Nil) | Lead wire length (m): 1 (M) | Lead wire length (m): 3 (L) | Lead wire length (m): 5 (Z) | Pre-wired connector | Applicable load | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Solid state auto switch | —— | Grommet | Yes | 3-wire (NPN) | 24 V | 5 V, 12 V | — | **M9NV** | **M9N** | ● | ● | ● | ○ | ○ | IC circuit | Relay, PLC |
| | | | | 3-wire (PNP) | | | | **M9PV** | **M9P** | ● | ● | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **M9BV** | **M9B** | ● | ● | ● | ○ | ○ | — | |
| | Diagnostic indication (2-color indicator) | | | 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 indicator) | | | 3-wire (NPN) | | 5 V, 12 V | | **M9NAV**** | **M9NA**** | ○ | ○ | ● | ○ | ○ | IC circuit | |
| | | | | 3-wire (PNP) | | | | **M9PAV**** | **M9PA**** | ○ | ○ | ● | ○ | ○ | | |
| | | | | 2-wire | | 12 V | | **M9BAV**** | **M9BA**** | ○ | ○ | ● | ○ | ○ | — | |
| Reed auto switch | —— | Grommet | Yes | 3-wire (NPN equivalent) | — | 5 V | — | — | **Z76** | ● | — | ● | — | — | IC circuit | — |
| | | | No | 2-wire | 24 V | 12 V | 100 V | — | **Z73** | ● | — | ● | — | — | — | Relay, PLC |
| | | | | | | | 100 V or less | — | **Z80** | ● | — | ● | — | — | IC circuit | |

** 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.

∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ ○: D-A9□/A9□V cannot be mounted.

∗ Since there are other applicable auto switches than listed, refer to page 605 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1192 and 1193.
∗ Auto switches are shipped together (not assembled).



## Specifications

| Bore size (mm) | 40 | 63 | 100 |
|---|---|---|---|
| **Action** | Double acting | | |
| **Fluid** | Air | | |
| **Proof pressure** | 1.5 MPa | | |
| **Maximum operating pressure** | 1.0 MPa | | |
| **Minimum operating pressure** | 0.1 MPa | | |
| **Ambient and fluid temperature** | –10 to 60°C | | |
| **Piston speed** | 20 to 200 mm/s | | |
| **Cushion** | Rubber bumper on both ends | | |
| **Lubrication** | Non-lube | | |
| **Stroke length tolerance** | $^{+1.0}_{0}$ mm | | |

Made to Order

**Made to Order Specifications**

Click here for details

| Symbol | Specifications |
|---|---|
| **-XC79** | Machining tapped hole, drilled hole and pin hole additionally |

## Standard Stroke

| Model | Standard stroke (mm) | Intermediate stroke |
|---|---|---|
| **MGF 40** | 30, 50, 75, 100 | As for the intermediate strokes (in 5 stroke increments) other than the standard strokes at left are manufactured by means of installing a spacer with the width of 5, 10, 15, 20, 25 mm.<br>Example) In the case an MGF63-15 specification is required, a spacer of 15 mm is installed in the MGF63-30.The full length dimension when the cylinder is retracted is the same as that of 30 mm stroke. |
| **MGF 63** | | |
| **MGF100** | | |

## Theoretical Output

OUT (N) IN (N) (N)

| Bore size (mm) | Rod size (mm) | Operating direction | Piston area ($mm^2$) | Operating pressure (MPa) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| **40** | 25 | OUT | 1256 | 251 | 376 | 502 | 628 | 753 | 879 | 1004 | 1130 | 1256 |
| | | IN | 765 | 153 | 229 | 306 | 382 | 459 | 535 | 612 | 688 | 765 |
| **63** | 36 | OUT | 3117 | 623 | 935 | 1246 | 1558 | 1870 | 2182 | 2493 | 2805 | 3117 |
| | | IN | 2099 | 419 | 629 | 839 | 1049 | 1259 | 1469 | 1679 | 1889 | 2099 |
| **100** | 36 | OUT | 7853 | 1570 | 2356 | 3141 | 3926 | 4711 | 5497 | 6282 | 7067 | 7853 |
| | | IN | 6835 | 1367 | 2050 | 2734 | 3417 | 4101 | 4784 | 5468 | 6151 | 6835 |

Note) Theoretical output (N) = Pressure (MPa) x Piston area ($mm^2$)

## Weight

(kg)

| Model | Bore size (mm) | Standard stroke (mm) | | | |
|---|---|---|---|---|---|
| | | 30 | 50 | 75 | 100 |
| **MGF 40** | 40 | 2.0 | 2.4 | 3.0 | 3.6 |
| **MGF 63** | 63 | 4.1 | 4.8 | 5.7 | 6.6 |
| **MGF100** | 100 | 6.2 | 7.2 | 8.4 | 9.6 |

## Clean Series

**Port thread type**

| | |
|---|---|
| **Nil** | Rc |
| **TN** | NPT |
| **TF** | G |

**10** – **MGF** **40** □ – **50** – **M9BW** □

**Clean Series**
**Relief type**

**Number of auto switches**

| | |
|---|---|
| **Nil** | 2 pcs. |
| **S** | 1 pc. |
| **n** | "n" pcs. |

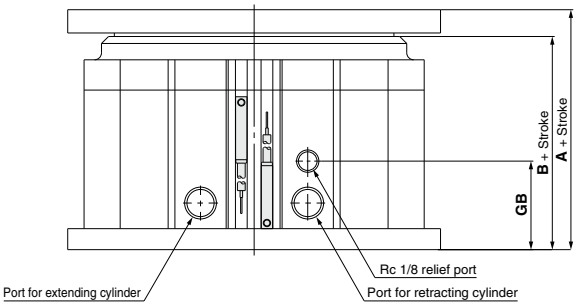
**Bore size/**
**Standard stroke (mm)**

| | |
|---|---|
| **40** | 30, 50, 75, 100 |
| **63** | 30, 50, 75, 100 |
| **100** | 30, 50, 75, 100 |

**Auto switch**

| | |
|---|---|
| **Nil** | Without auto switch (Built-in magnet) |

∗ Auto switches are shipped together (not assembled).



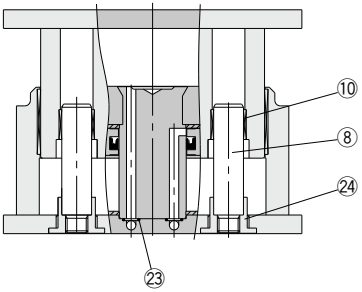

**Dimensions** (mm)

| Bore size (mm) | A | B | GB |
|---|---|---|---|
| **40** | 58 | 48.5 | 36.5 |
| **63** | 73 | 61.5 | 38 |
| **100** | 78 | 66.5 | 38 |

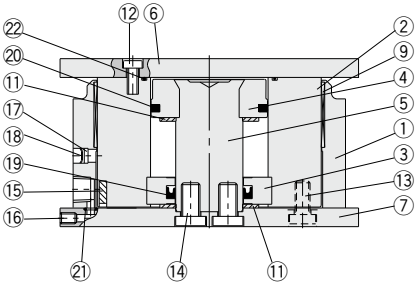
Dimensions other than the above are the same as standard products.

Refer to "Pneumatic Clean Series" catalog (CAT.E02-23) for details.

## Construction




When the cylinder is extended




When the cylinder is retracted

### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Body** | Aluminum alloy | Clear anodized |
| 2 | **Tube** | Aluminum alloy | Black hard anodized |
| 3 | **Rod cover** | Aluminum alloy | Black hard anodized |
| 4 | **Piston** | Aluminum alloy | Chromated |
| 5 | **Piston rod** | Carbon steel | Electroless nickel plated |
| 6 | **Plate** | Aluminum alloy | Anodized |
| 7 | **End plate** | Aluminum alloy | Anodized |
| 8 | **Non-rotating rod** | Stainless steel | Hard chrome plated |
| 9 | **Bushing** | Resin | |
| 10 | **Bushing (For non-rotating rod)** | Bearing alloy | |
| 11 | **Bumper** | Urethane | |
| 12 | **Hexagon socket head cap screw A** | Carbon steel | Nickel plated |

### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| 13 | **Hexagon socket head cap screw B** | Carbon steel | Nickel plated |
| 14 | **Hexagon socket head cap screw C** | Carbon steel | Nickel plated |
| 15 | **Magnet** | — | |
| 16 | **Plug** | Carbon steel | |
| 17 | **Element** | Resin | |
| 18 | **Retaining ring** | Spring steel | |
| 19 | **Rod seal** | NBR | |
| 20 | **Piston seal** | NBR | |
| 21 | **O-ring A** | NBR | |
| 22 | **O-ring B** | NBR | |
| 23 | **O-ring C** | NBR | |
| 24 | **Reinforcement ring** | Carbon steel | Electroless nickel plated |

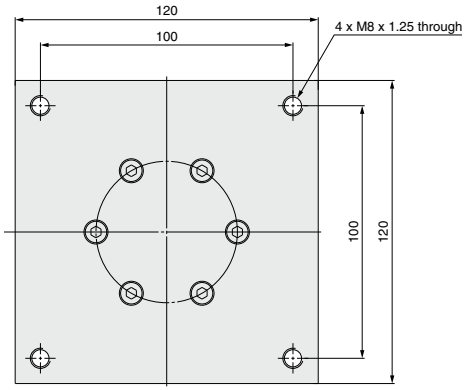
### Replacement Parts: Seal Kit

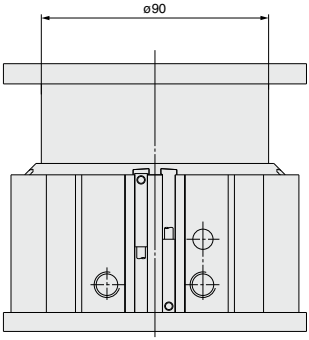
| Bore size (mm) | Kit no. | Contents |
|---|---|---|
| **40** | MGF40-PS | Items ⑲ to ㉓ from the table above. |
| **63** | MGF63-PS | |
| **100** | MGF100-PS | |

∗ Seal kit is not compatible with the clean series.
Seal kit includes ⑲ to ㉓. Order the seal kit based on each bore size.
∗ Since the seal kit does not include a grease pack, order it separately.
**Grease pack part no.: GR-L-010** (10g)

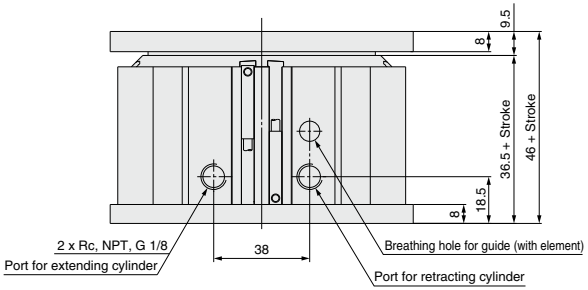
## Dimensions: ø40

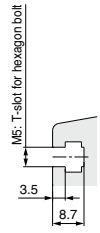
### MGF40



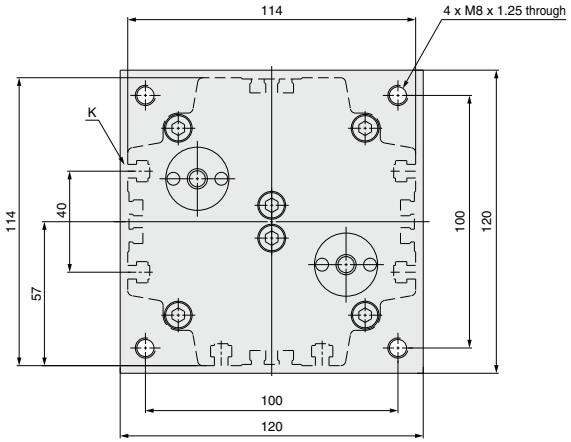




When the cylinder is extended



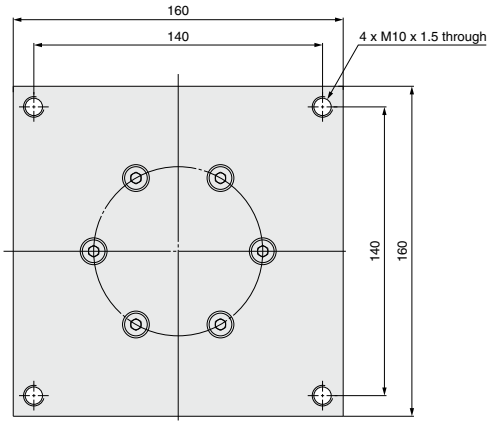



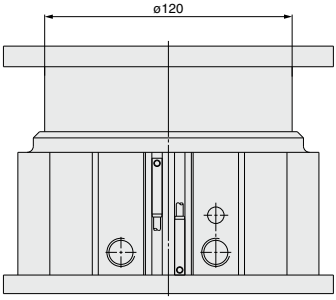

6 x K (6 places)



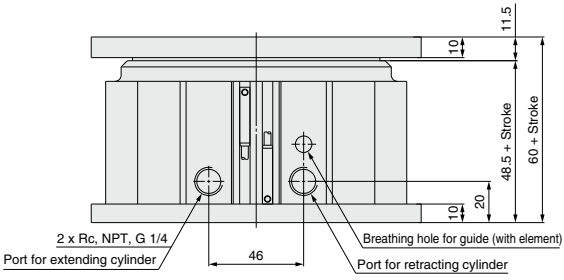
ø63

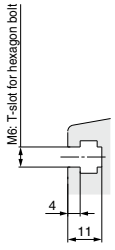
## MGF63



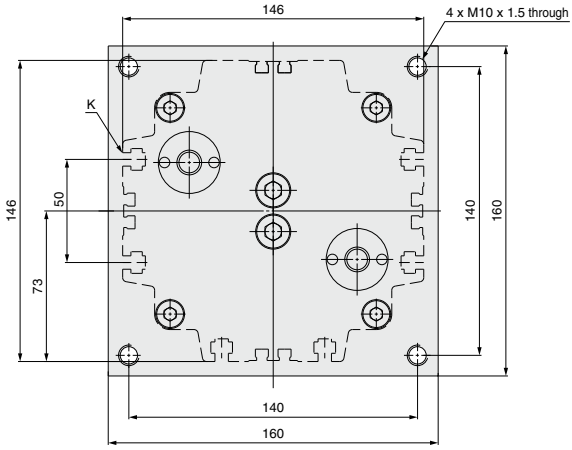




**When the cylinder is extended**



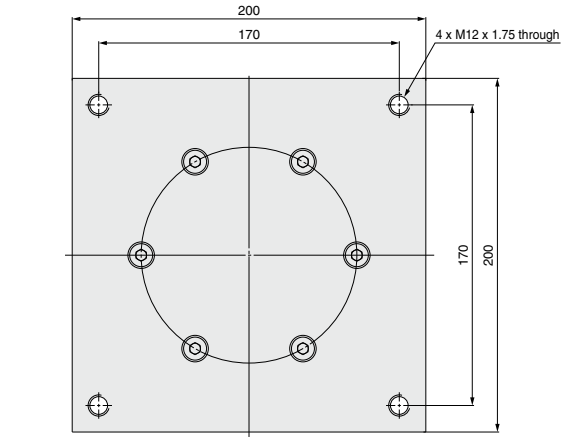



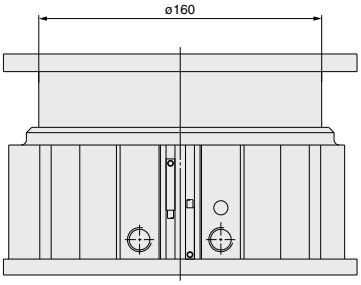

**6 x K (6 places)**



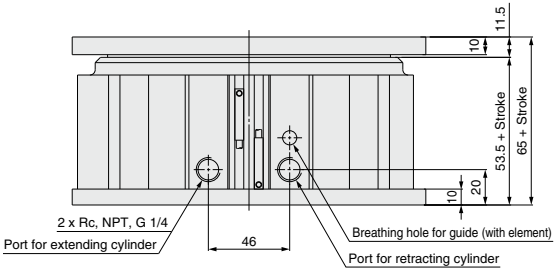
## Dimensions: ø100

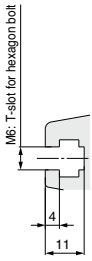
# MGF100



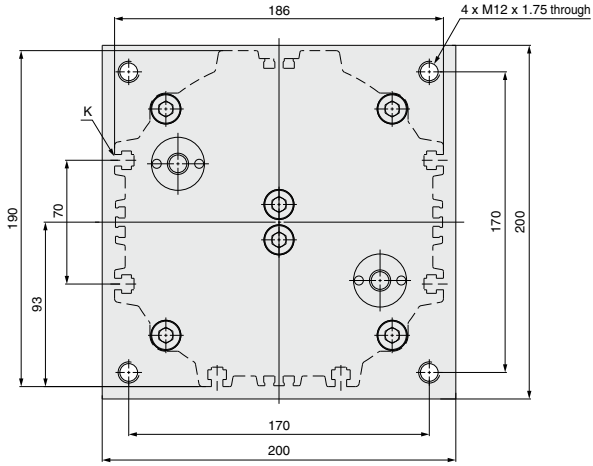




When the cylinder is extended




6 x K (6 places)



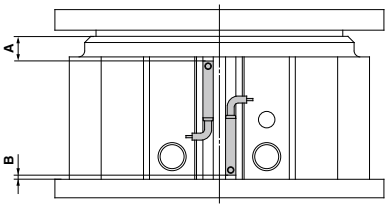
# *MGF Series*
# Auto Switch Mounting

## Minimum Auto Switch Mounting Stroke

(mm)

| No. of auto switches mounted | Applicable auto switch model | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | D-M9□V | D-M9□WV<br>D-M9□AV | D-M9□<br>D-M9□W | D-M9□A | D-Z7□<br>D-Z8□ | D-Y69□<br>D-Y7PV | D-Y59□<br>D-Y7P | D-Y7□WV | D-Y7□W<br>D-Y7BA |
| 1 pc. | 5 | 10 | 15 | 20 | 10 | 5 | 10 | 15 | 20 |
| 2 pcs. | 10 | 10 | 20 | 25 | 15 | 10 | 10 | 15 | 20 |

## Auto Switch Proper Mounting Position (Detection at Stroke End)




### Auto Switch Proper Mounting Position

(mm)

| Auto switch model / Bore size (mm) | D-M9□<br>D-M9□V<br>D-M9□W<br>D-M9□WV<br>D-M9□A<br>D-M9□AV | | D-Z7□/Z80<br>D-Y59□/Y69□<br>D-Y7P/Y7PV<br>D-Y7□W/Y7□WV<br>D-Y7BA | |
|---|---|---|---|---|
| | A | B | A | B |
| 40 | 9 | 4.5 | 4 | 0 |
| 63 | 19.5 | 4 | 14.5 | 0 |
| 100 | 24.5 | 4 | 19.5 | 0 |

Dimensions above denote the standard strokes.
Adjustment on A dimension is required for intermediate strokes.
Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

## Operating Range

(mm)

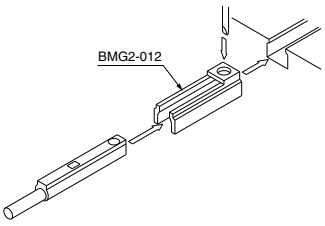
| Auto switch model | Bore size (mm) | | |
|---|---|---|---|
| | 40 | 63 | 100 |
| D-M9□/M9□V<br>D-M9□W/M9□WV<br>D-M9□A/M9□AV | 6 | 6.5 | 6 |
| D-Z7□/Z80 | 10 | 10 | 10 |
| D-Y59□/Y69□<br>D-Y7P/Y7PV<br>D-Y7□W/Y7□WV<br>D-Y7BA | 6 | 6 | 6 |

∗ 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.

## Auto Switch Mounting Bracket: Part No.

| Auto switch model | Bore size (mm) |
|---|---|
| | ø40, ø63, ø100 |
| D-M9□/M9□V<br>D-M9□W/M9□WV<br>D-M9□A/M9□AV | BMG2-012 |

**D-M9□(V)/M9□W(V)/M9□A(V)**




Other than the applicable auto switches listed in “How to Order”, the following auto switches can be mounted.
For detailed specifications, refer to pages 1119 to 1245.

| Auto switch type | Model | Electrical entry (Fetching direction) | Features |
|---|---|---|---|
| Solid state | D-Y69A, Y69B, Y7PV | Grommet (Perpendicular) | — |
| | D-Y7NWV, Y7PWV, Y7BWV | | Diagnostic indication (2-color indicator) |
| | D-Y59A, Y59B, Y7P | Grommet (In-line) | — |
| | D-Y7NW, Y7PW, Y7BW | | Diagnostic indication (2-color indicator) |

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1192 and 1193 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)/Y7G/Y7H) are also available. For details, refer to pages 1592-1 and 1139.

# *MGF Series*
# Specific Product Precautions

**Be sure to read this before handling the products.**
**Refer to back page 50 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.**

## Selection

## ⚠Caution

① **Operate loads within the range of the operating limits.**

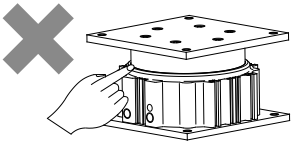
Select a model taking into consideration the allowable horizontal loads, rotational torque and eccentric loads that will apply. When used in excess of the applicable limit, eccentric loads applied to the tube guide will cause wear of the guide, increase the guide's deviation range, cause stress cracks and breaks on the mounting bolts, and decrease the life of the cylinder.

② **Do not allow any dents, scratches, or other damage on the mounting faces of either the plate or end plate.**

The flatness of the mounting face may deteriorate, the guide's deviation range may increase and the sliding resistance may become greater.

③ **Do not allow hands or fingers near the cylinder during its operation.**

Your fingers may be caught between the body and the plate. If you need to come near the cylinder during its operation, install a cover on the cylinder.



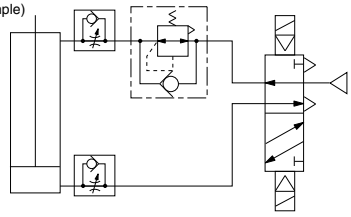
④ **Do not bring objects that are sensitive to magnetism near the cylinder.**

There is a magnetic built into the cylinder. Do not bring magnetic disks, cards, or tapes near the cylinder. Data may be lost.

⑤ **If the cylinder is operated vertically with heavy loads, measures must be taken to prevent rapid advancement of the piston rod when starting to operate in the downward direction.**

If the cylinder is operated vertically with heavy loads at the same pressure for both upward and downward directions, the starting speed in the downward direction may be highter than the speed controlled with a speed controller. In such cases, use a dual pressure control circuit as an pneumatic circuit.

Example)



⑥ **Avoid use in environments where a cylinder will come in contact with coolants, cutting oil, water, adhesive matter, or dust, etc. Also avoid operation with compressed air that contains drain or foreign matter, etc.**

Foreign matter or liquids on the cylinder's interior or exterior can wash out the lubricating grease, which can lead to deterioration and damage of bearing sliding parts and seal materials, causing a danger of malfunction.

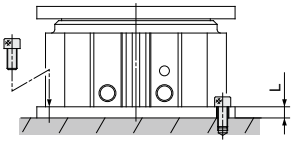
When operating in locations with exposure to water and oil, or in dusty locations, provide protection such as a cover to prevent direct contact with the cylinder and operate with clean compressed air.

## Mounting

## ⚠Caution

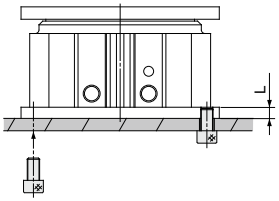
① **For mounting the cylinder, use screws that meet the appropriate length and tighten within the limits of the maximum tightening torque.**

**Mounting from upper side**




| Model | Bolt | Maximum tightening torque (N·m) | L (mm) |
|---|---|---|---|
| **MGF 40** | M6 x 1 | 10 | 8 |
| **MGF 63** | M8 x 1.25 | 25 | 10 |
| **MGF100** | M10 x 1.5 | 51 | 10 |

**Mounting from bottom side**




| Model | Bolt | Maximum tightening torque (N·m) | L (mm) |
|---|---|---|---|
| **MGF 40** | M8 x 1.25 | 18 | 8 |
| **MGF 63** | M10 x 1.5 | 36 | 10 |
| **MGF100** | M12 x 1.75 | 65 | 10 |

② **When mounting a workpiece to the cylinder, do so only when the piston is retracted. Also make sure that the rotational torque applied to the cylinder body does not exceed the allowable rotational torque (given on page 596).**

(Otherwise, the excessive rotational torque will damage the non-rotating mechanism and lead to a malfunction.)