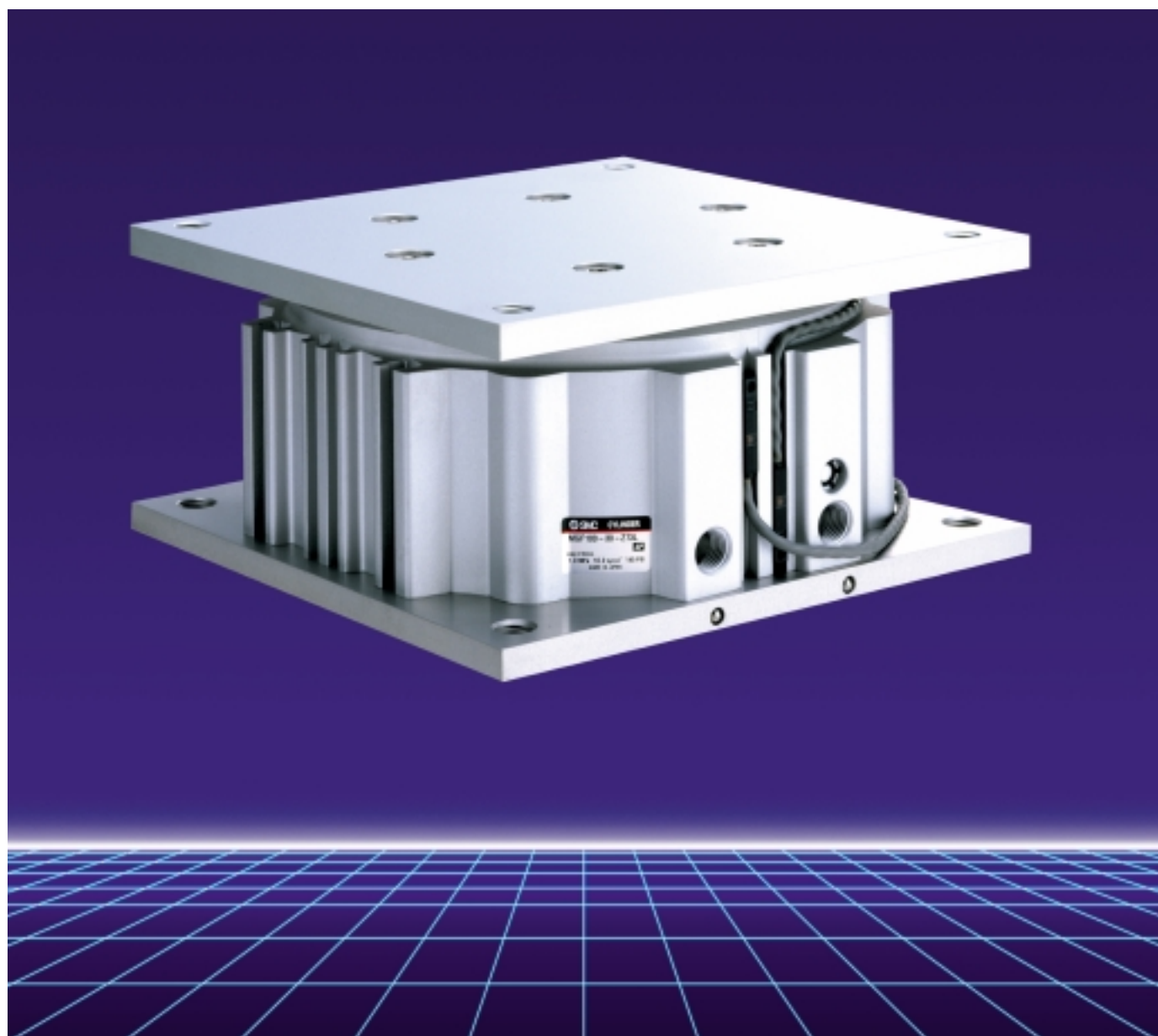




Guide Table
Series MGF
ø40, ø63, ø100



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

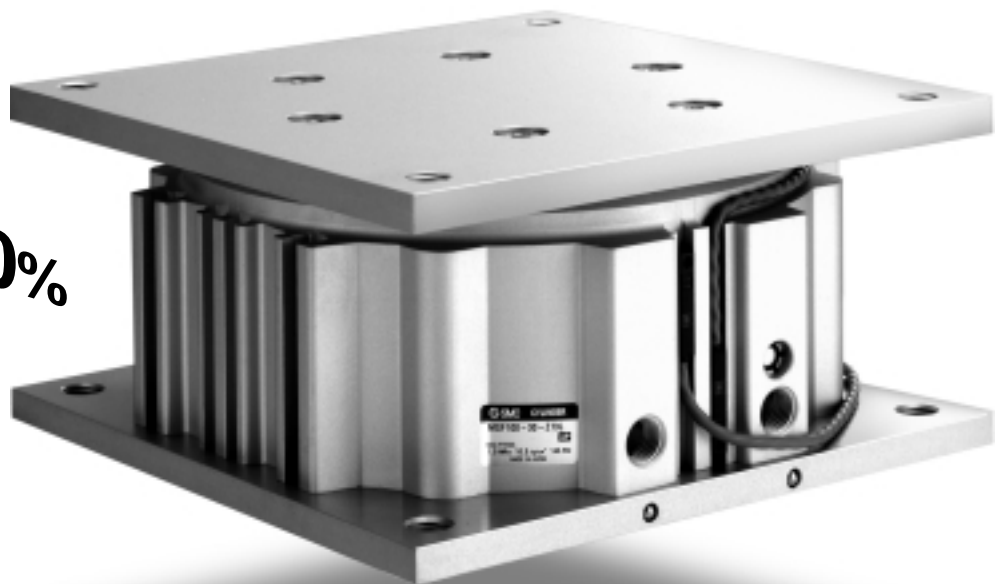
Low-profile compact cylinder

Large concentric guiding sleeve provides superior eccentric load resistance

■ Mounting height greatly reduced

Low-profile cylinder enables compact machine design.

Mounting height
Reduction by **15 to 20%**
(Compared to SMC series MGQ)



Guide Table

Series MGF

■ Built-in non-rotating mechanism

Internal guide pin prevents table rotation.

Non-rotating accuracy

Bore Size (mm)	Non-rotating accuracy
40	$\pm 0.08^\circ$
63	$\pm 0.06^\circ$
100	$\pm 0.05^\circ$

Note) Within allowable rotation torque.

ø40, ø63, ø100

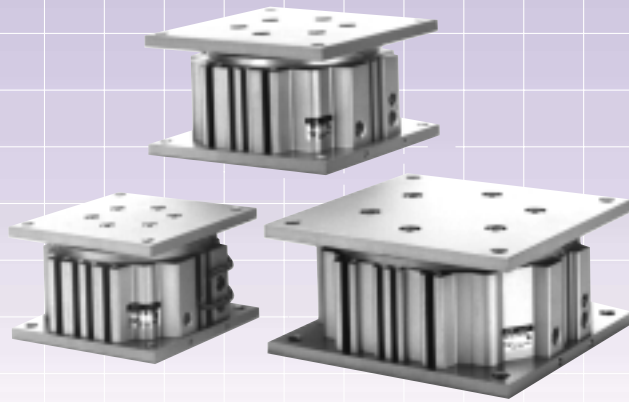
■ Built in T-slots

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.)

■ Series Variations

Model	Bore size (mm)	Standard stroke (mm)				Applicable auto switches
		30	50	75	100	
MGF 40	40	●	●	●	●	Reed: D-Z7, D-Z8 Solid state: D-Y5, D-Y6, D-Y7 2-color indication solid state: D-Y7 Water resistant 2-color indication solid state: D-Y7BA
MGF 63	63	●	●	●	●	
MGF100	100	●	●	●	●	



Large diameter concentric guide rod (Eccentric load resistant)

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

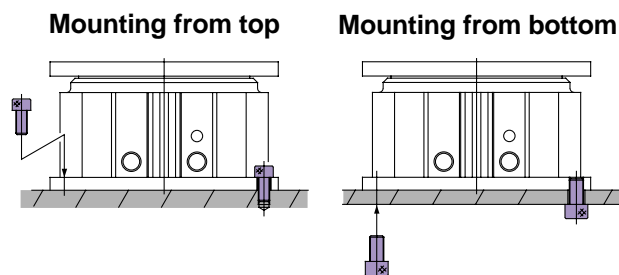
Allowable moment

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

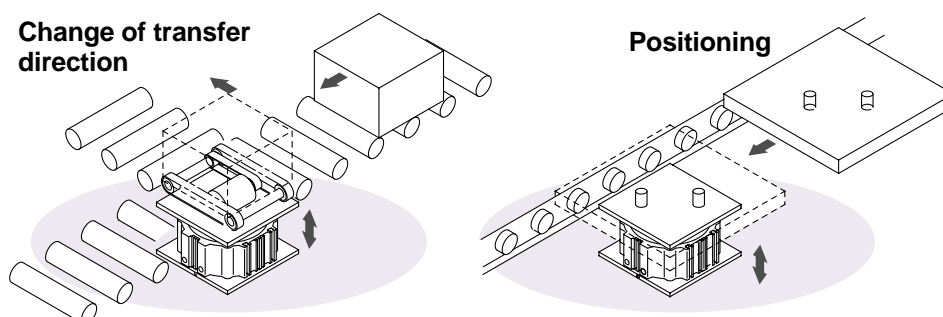
* Values at cylinder speed of 100mm/s.

Auto switch can be mounted on 4 lateral faces of the body.

Mounting from two directions is possible.



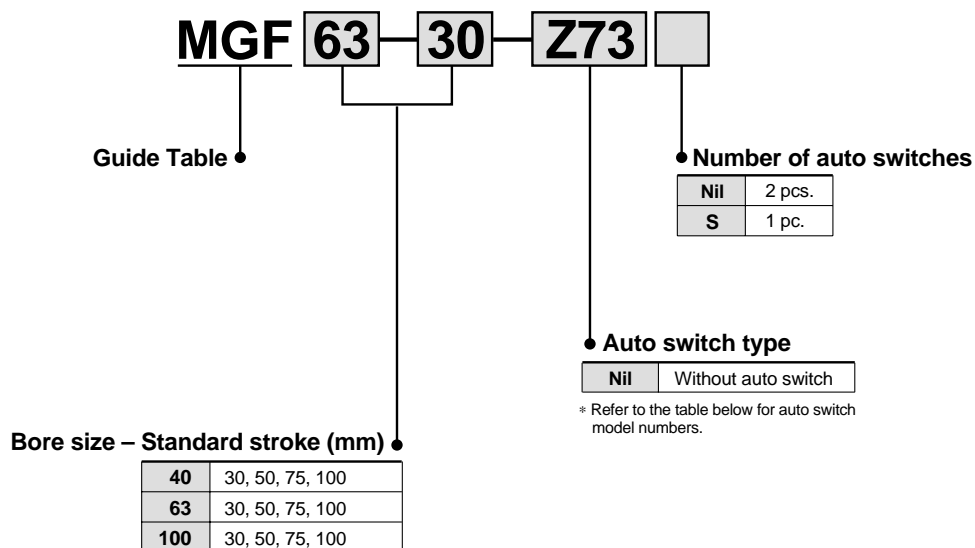
Typical application



Series MGF

Ø40, Ø63, Ø100

How to Order



Applicable auto switches

Type	Special function	Electrical entry	Indicator light	Wiring (output)	Load voltage			Auto switch model no.		Lead wire length (m)*			Applicable load	
					DC		AC	Electrical entry direction		0.5 (Nil)	3 (L)	5 (Z)		
					Perpendicular	In-line								
Reed switches	—	Grommet	Yes	3-wire	—	5V	—	—	Z76	●	●	—	IC circuit	Relay PLC
				2-wire	24V	12V	100V	—	Z73	●	●	●	—	
			No		5V 12V	100V or less	—	Z80	●	●	—	IC circuit		
Solid state switches	—	Grommet	Yes	3-wire (NPN)	24V	5V 12V	—	Y69A	Y59A	●	●	●	IC circuit	Relay PLC
				3-wire (PNP)				Y7PV	Y7P	●	●	●		
				2-wire		12V		Y69B	Y59B	●	●	●	—	
	Diagnostic indication (2-color indication)			3-wire (NPN)	5V 12V	Y7NWW		Y7NW	●	●	●	IC circuit		
				3-wire (PNP)		Y7PWV		Y7PW	●	●	●			
	Water resistant (2-color indication)			2-wire	12V	Y7BWV		Y7BW	●	●	●	—		
						—		Y7BA	—	●	●			

* Lead wire symbols 0.5m Nil (Example) Y59A
 3m L Y59AL
 5m Z Y59AZ

* Refer to pages 8 and 9 for information related to auto switches.



Specifications

Action	Double acting
Fluid	Air
Proof pressure	1.5MPa
Maximum operating pressure	1.0MPa
Minimum operating pressure	0.1MPa
Ambient and fluid temperature	-10° to 60°C
Piston speed	20 to 200mm/s
Cushion	Rubber bumper at both ends
Lubrication	Non-lube
Stroke length tolerance	+1.0 0 mm

Standard Strokes

Model	Standard stroke (mm)	Intermediate stroke
MGF 40	30, 50, 75, 100	Intermediate strokes (at increments of 5mm) other than standard strokes are available with spacers of 5, 10, 15, 20 and 25mm. Example) In case an MGF63-15 specification is required, a spacer of 15mm is installed in the MGF63-30. Therefore, the total length is same as that of 30mm stroke.
MGF 63		
MGF100		

Minimum Strokes for Mounting Auto Switches

Switch type Number of pcs.	(mm)	
	D-Z7, D-Z8	D-Y5, D-Y6, D-Y7
1 pc.	10	5
2 pcs.	15	10

Theoretical Output

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

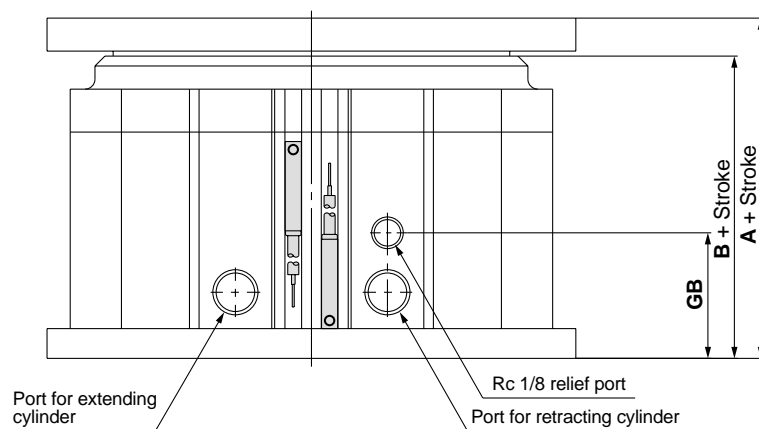
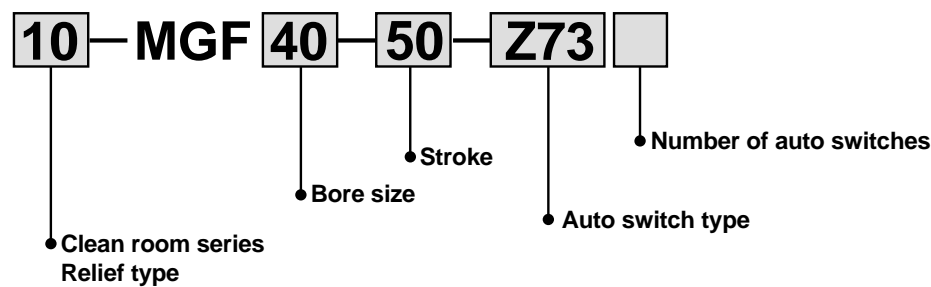
Note) Theoretical output (N) = Pressure (MPa) x Piston area (mm²)

Weights

Model	Bore size (mm)	Standard stroke (mm)				(kg)
		30	50	75	100	
MGF 40	40	2.1	2.6	3.2	3.8	
MGF 63	63	4.3	5.1	6.1	7.1	
MGF100	100	7.0	8.2	9.6	11.0	

Series MGF

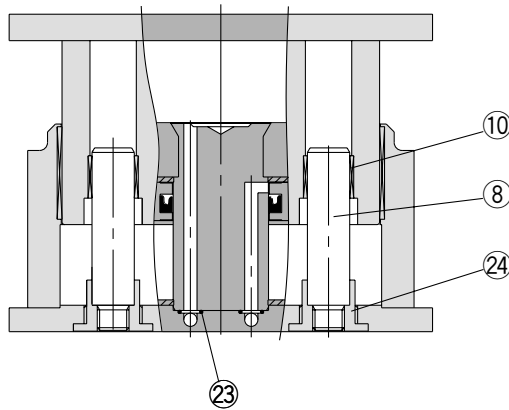
Clean Room Series



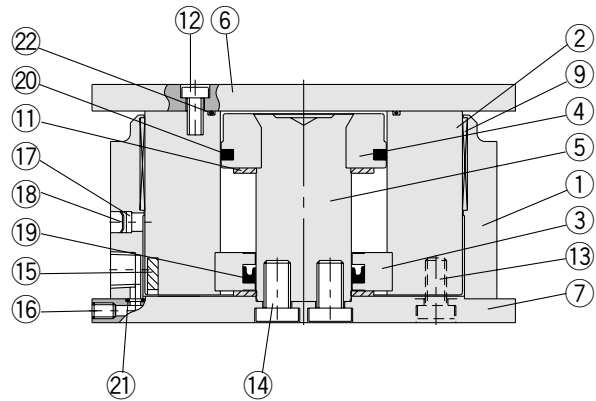
Dimensions (mm)			
Bore size	A	B	GB
40	58	48.5	36.5
63	73	61.5	38
100	78	66.5	38

Dimensions not listed above are the same as the standard model.

Construction



When the cylinder is extended



When the cylinder is retracted

Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Clear anodized
2	Tube	Aluminum alloy	Hard anodized
3	Rod cover	Aluminum alloy	Clear 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)	Lead-bronze casting	
11	Bumper	Urethane rubber	
12	Hexagon socket head cap screw A	Carbon steel	Nickel plated

Parts list

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	Magnet	
16	Plug	Carbon steel	
17	Element	Resin	
18	Snap 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 kits

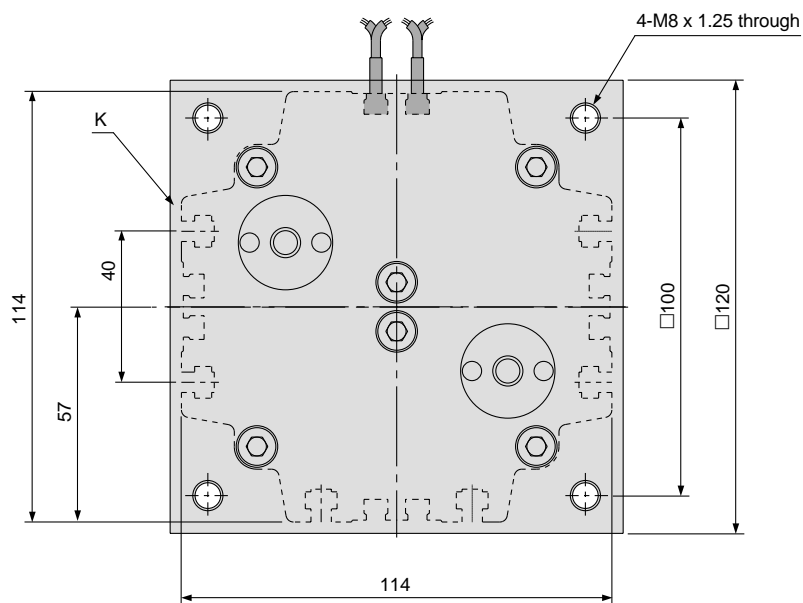
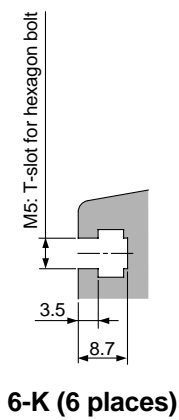
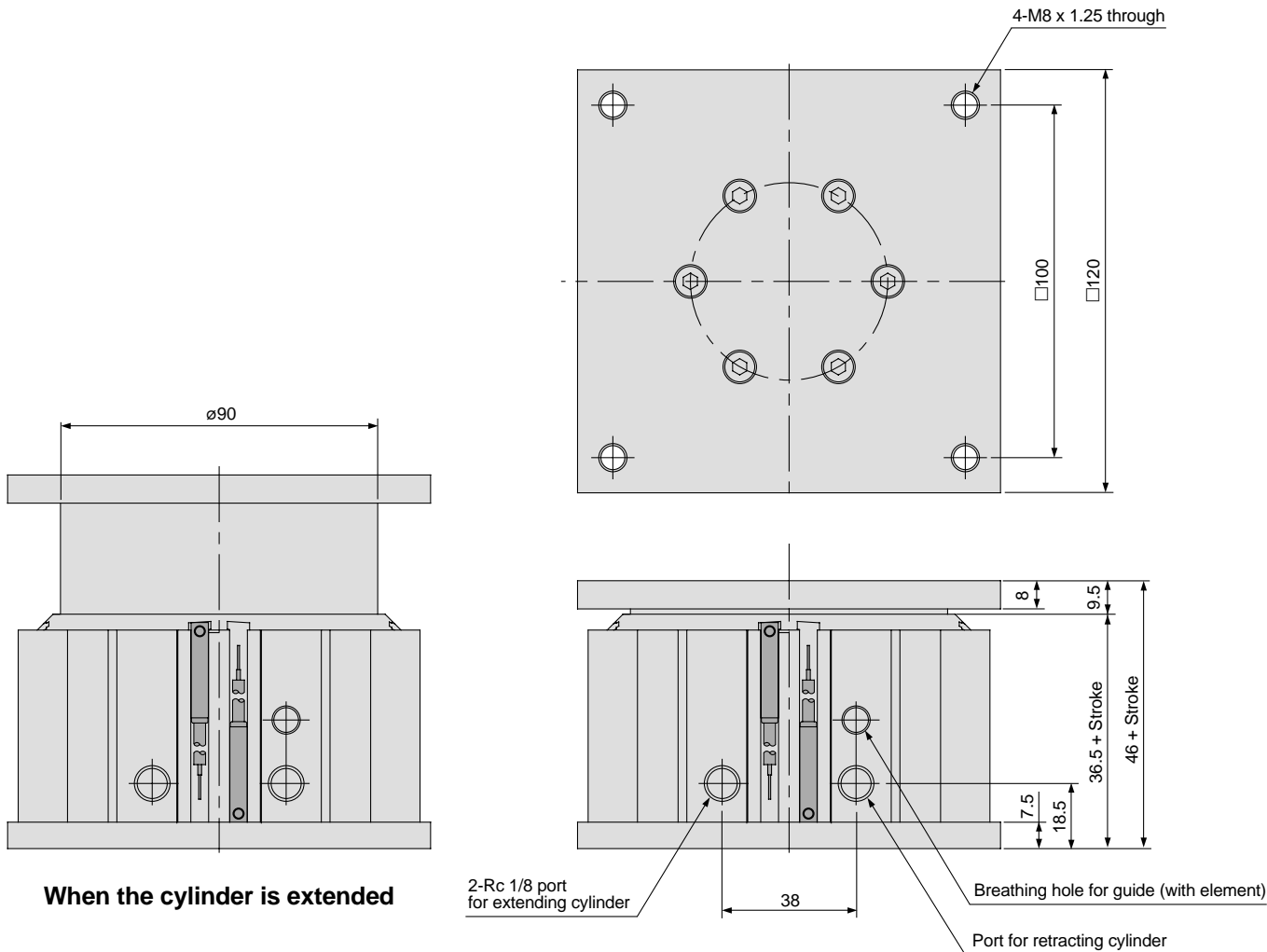
Bore size (mm)	Order no.	Kit components
40	MGF 40-PS	Items 19 through 23 from the table above.
63	MGF 63-PS	
100	MGF100-PS	

Series **MGF**

Dimensions $\varnothing 40$

MGF40

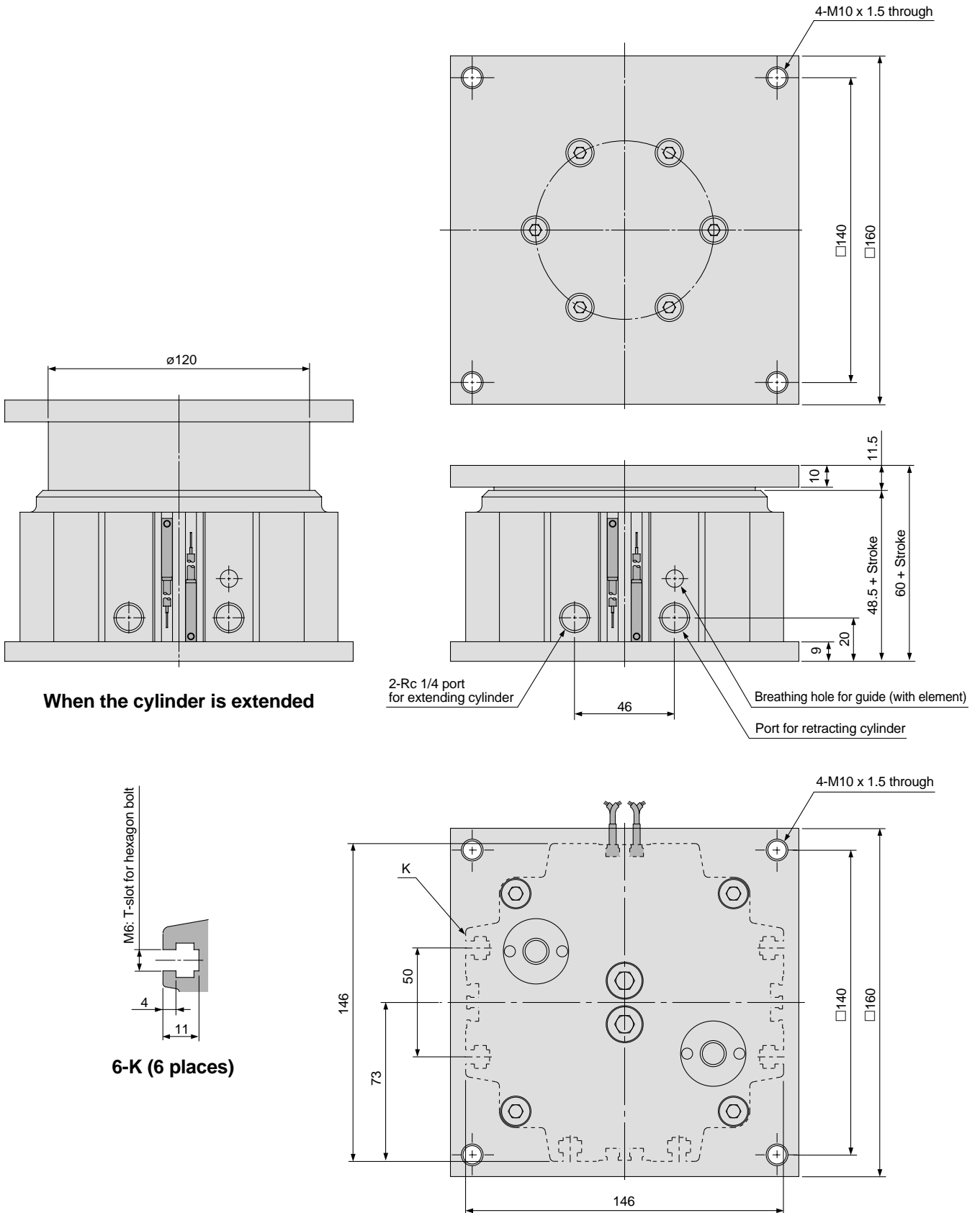
Scale: 50%



ø63

MGF63

Scale: 40%

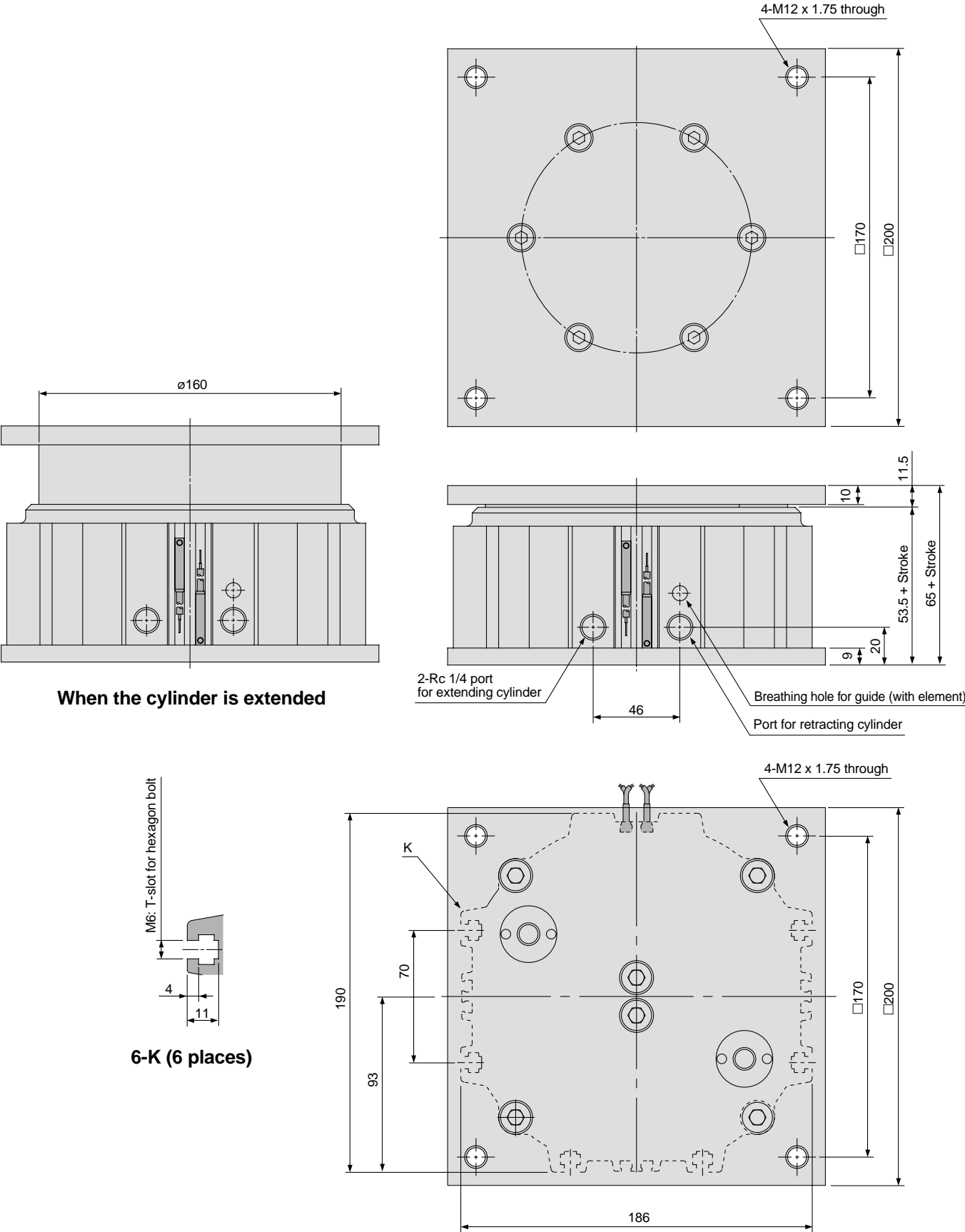


Series **MGF**

Dimensions $\varnothing 100$

MGF100

Scale: 35%

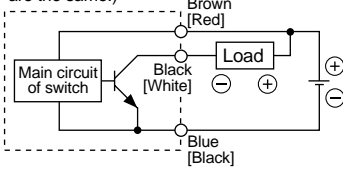


Solid State Switch Connections and Examples

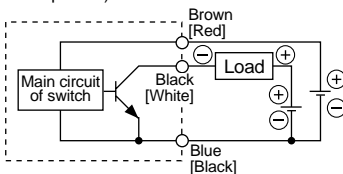
Basic Wiring

3-wire, NPN

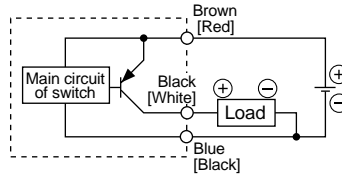
(Power supplies for switch and load are the same.)



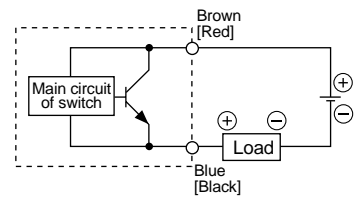
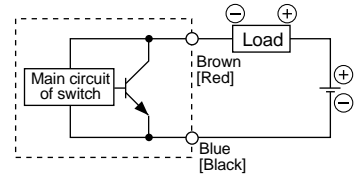
(Power supplies for switch and load are separate.)



3-wire, PNP



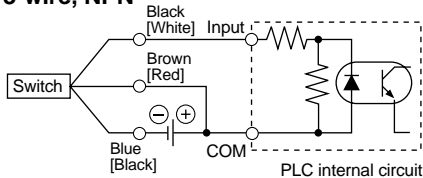
2-wire



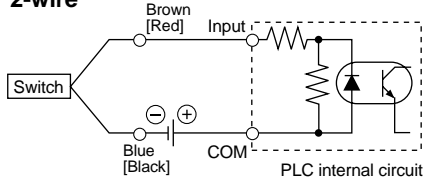
Examples of Connection to PLC

Sink input specifications

3-wire, NPN

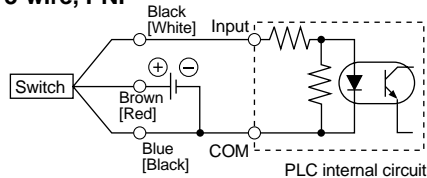


2-wire

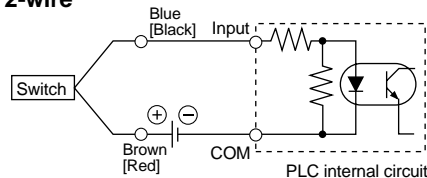


Source input specifications

3-wire, PNP



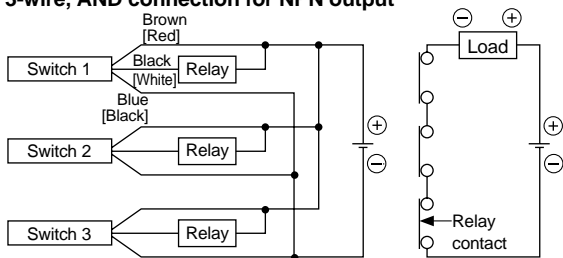
2-wire



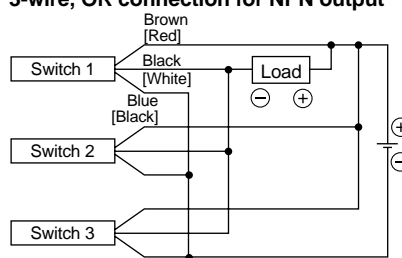
Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

Connection Examples for AND (Series) and OR (Parallel)

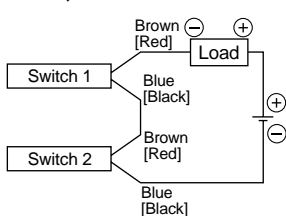
3-wire, AND connection for NPN output



3-wire, OR connection for NPN output



2-wire, with 2-switch AND connection

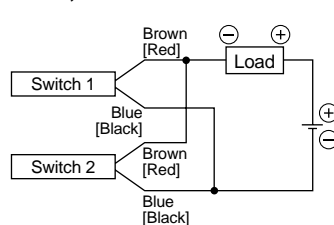


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up when both of the switches are in the ON state.

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

Example: Power supply is 24VDC.
Internal voltage drop in switch is 4V.

2-wire, with 2-switch OR connection

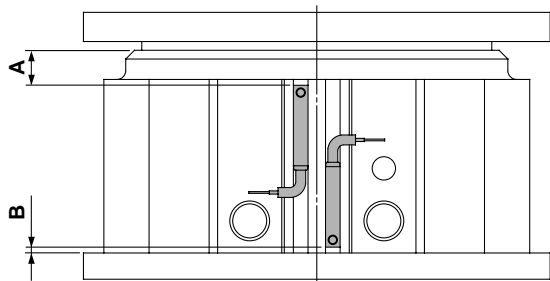


When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

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

Example: Load impedance is 3kΩ.
Leakage current from switch is 1mA.

Auto Switches Proper Mounting Position for Stroke End Detection



Proper mounting position (mm)		
Bore size (mm)	A	B
40	4	0
63	14.5	0
100	19.5	0

Above dimensions are for standard strokes.
Adjustment on A dimension is required for intermediate strokes.

Auto Switch Mounting

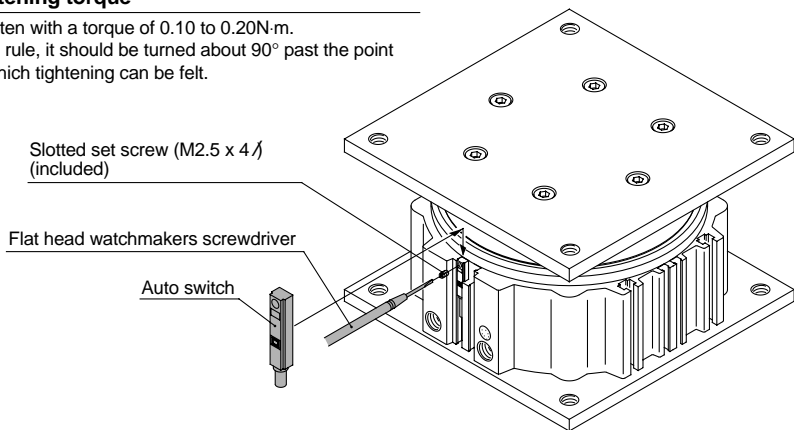
Caution

Auto switch mounting tool

- When tightening the auto switch mounting screw (included with auto switch), use a watchmakers screwdriver with a handle about 5 to 6mm in diameter.

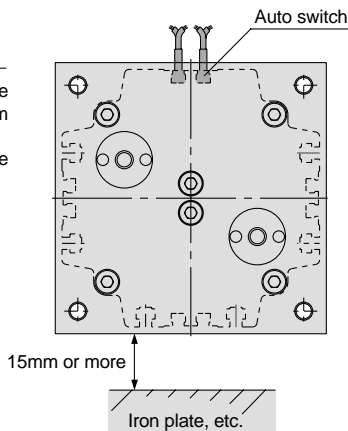
Tightening torque

- Tighten with a torque of 0.10 to 0.20N·m.
As a rule, it should be turned about 90° past the point at which tightening can be felt.



Auto switch mounting surface

Magnetic substances such as an iron plate should be separated at least 15mm away from auto switch mounting surface.
Magnetic substances may cause unstable operation of the auto switch.
There is no problem if a magnetic substance is close to any side where an auto switch is not mounted.



Contact Protection Boxes/CD-P11, CD-P12

D-Z7 and D-Z8 type switches do not have built-in contact protection circuits.
A contact protection box should be used in any of the following cases.

- The operated load is an induction load.
- The length of wiring to the load is 5m or more.
- The load voltage is 100V or 200VAC.

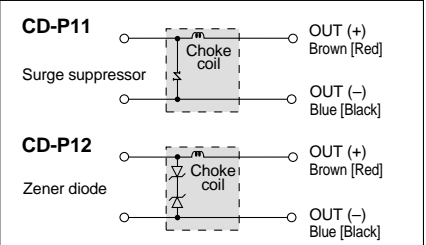
Contact protection box specifications

Part no.	CD-P11		CD-P12
Load voltage	100VAC	200VAC	24VDC
Max. load current	25mA	12.5mA	50mA

* Lead wire length Switch connection side 0.5m
Load connection side 0.5m



Contact protection box internal circuits

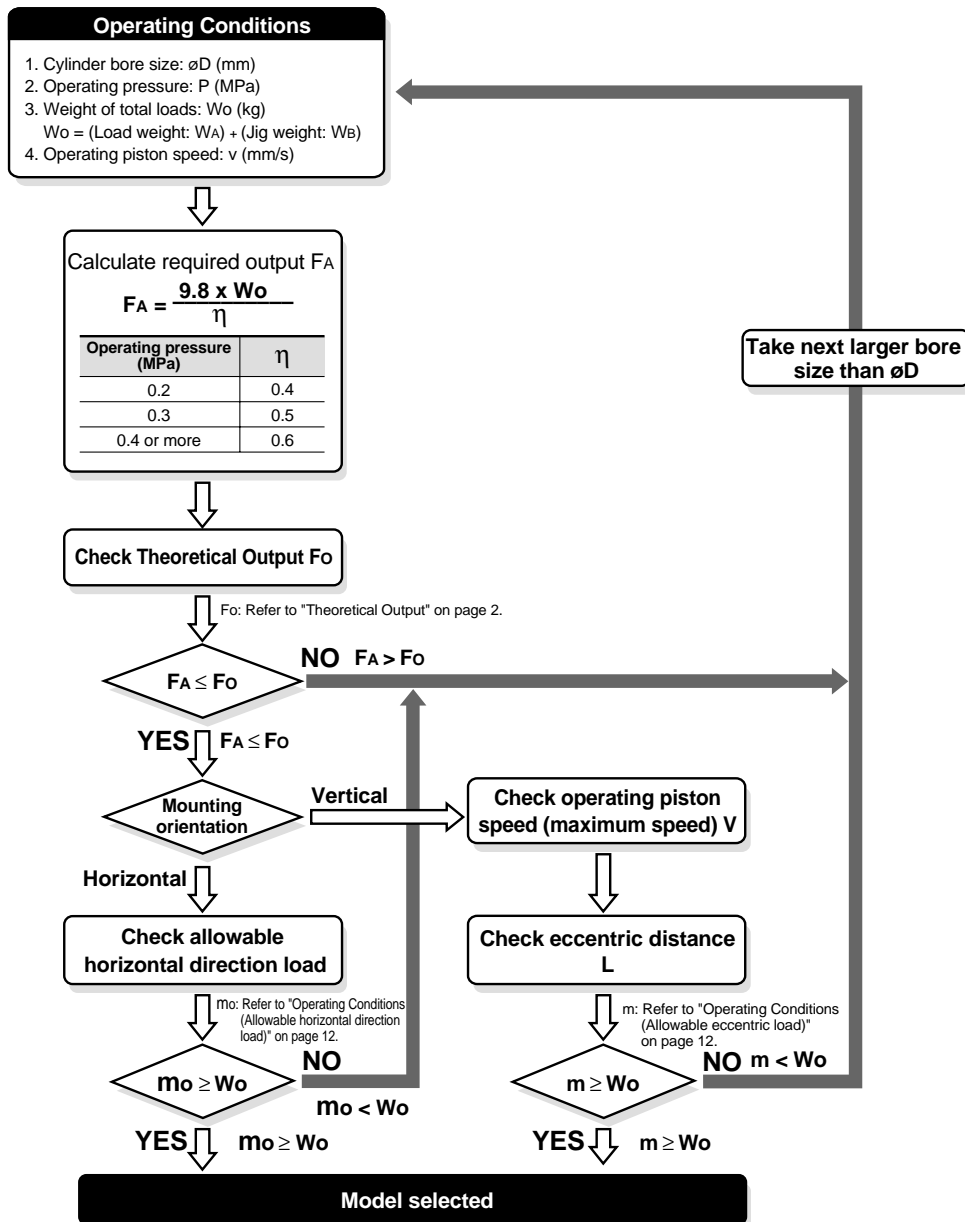


Contact Protection Box/Connection

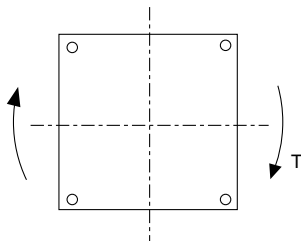
To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked "SWITCH" to the lead wire coming out of the switch unit.
The length of the lead wires between the switch unit and contact protection box should be no more than 1m, and they should be placed as close together as possible.

Series MGF

Model Selection



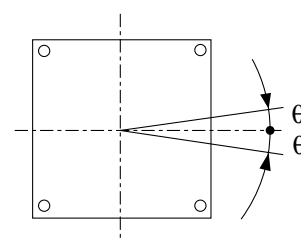
Allowable rotational torque



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

T (N·m)

Non-rotating accuracy

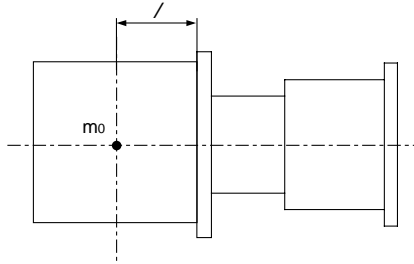


Bore size (mm)	Non-rotating accuracy θ
40	± 0.08
63	± 0.06
100	± 0.05

Note) The value given for the non-rotating accuracy is applicable below the allowable rotation torque. If a greater rotational torque is applied, the non-rotating rod (page 4) bends, exceeding the value of the non-rotating accuracy.

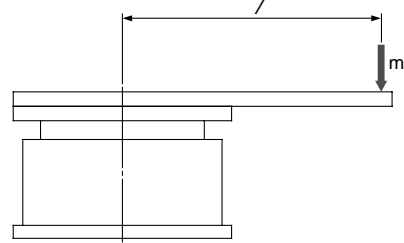
Operating Conditions

Allowable horizontal direction 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.

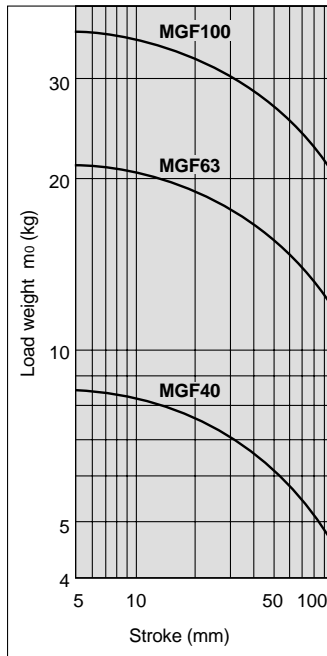
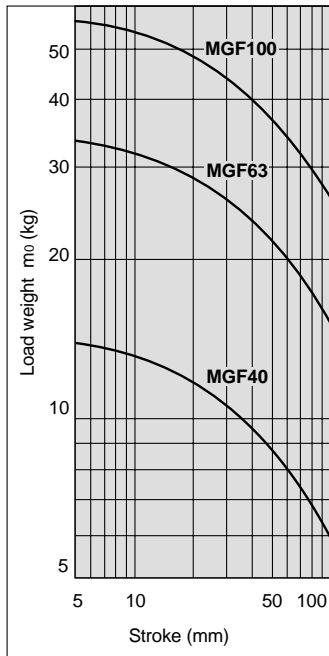


$l = 50\text{mm}$

Graph 1

$l = 100\text{mm}$

Graph 2

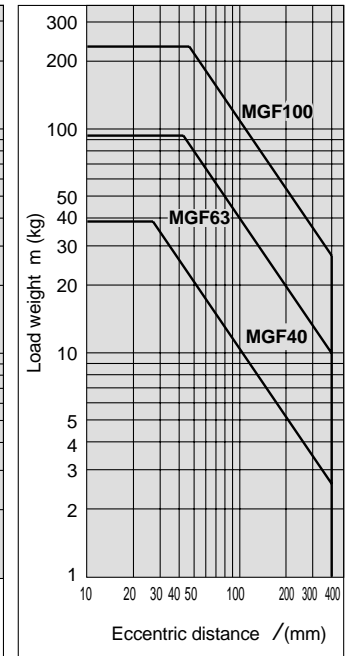
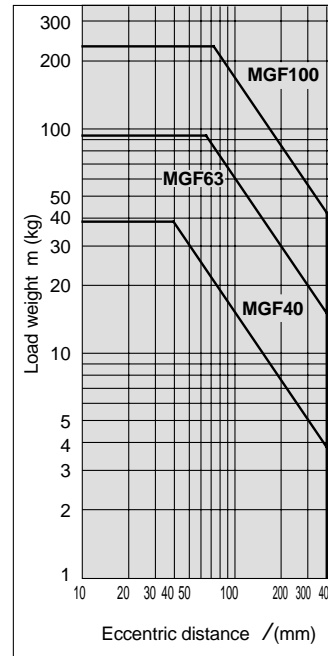


$v = 50\text{mm/s}$ or less

Graph 5

$v = 100\text{mm/s}$ or less

Graph 6

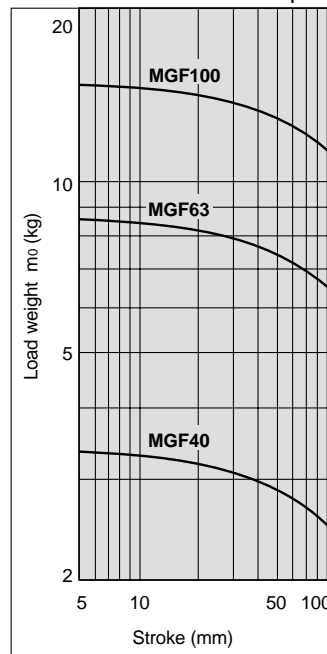
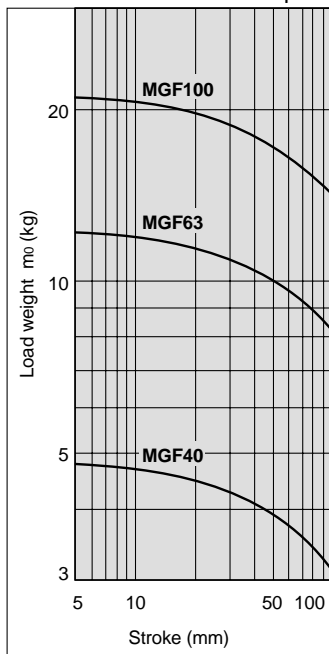


$l = 200\text{mm}$

Graph 3

$l = 300\text{mm}$

Graph 4

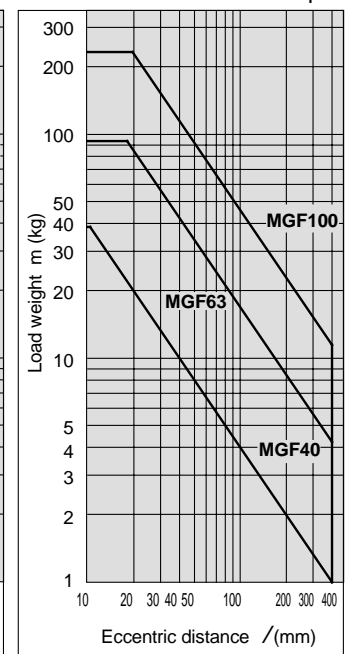
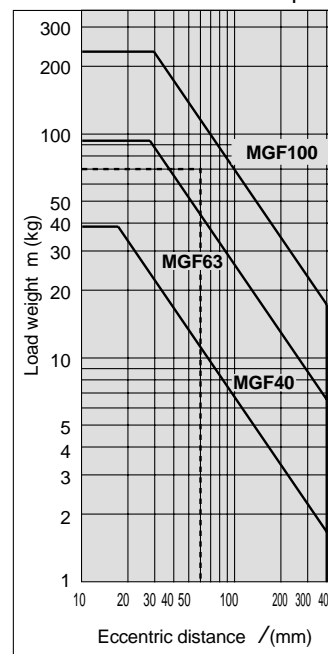


$v = 150\text{mm/s}$ or less

Graph 7

$v = 200\text{mm/s}$ or less

Graph 8



How to read the graph


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





Series MGF

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power — Recommendations for the application of equipment to transmission and control systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc. (Bleed air into the system gradually to create back pressure.)

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, press applications, or safety equipment.
3. An application that has the possibility of having negative effects on people, property, or animals, and therefore requires special safety analysis.



Series MGF Actuator Precautions 1

Be sure to read before handling.

Design

Warning

1. **There is a danger of sudden action by air cylinders if sliding parts of machinery are twisted and changes in forces occur.**

In such cases, human injury may occur, e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be adjusted to operate smoothly and designed to avoid such dangers.

2. **A protective cover is recommended to minimize the risk of personal injury.**

If driven objects and moving parts of a cylinder pose a likely threat of personal injury, design the structure to avoid direct human contact with that area.

3. **Securely tighten all of the cylinder's stationary parts and connected parts so that they will not become loose.**

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure tightening so that all parts remain secure.

4. **A deceleration circuit or shock absorber may be required in some cases.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will most likely not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the impact. In this case, the rigidity of the machinery should also be examined.

5. **Consider a possible drop in circuit pressure due to a power outage.**

When the cylinder is used with a clamping mechanism, there is a danger of work pieces dropping out of it if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage. Therefore, safety equipment should be installed to prevent damage to machinery and human injury. Drop prevention measures should also be considered for suspension mechanisms and lifting devices.

6. **Consider a possible loss of power supply.**

Measures should be taken to protect against human injury and equipment damage in the event that there is a loss of power to equipment controlled by air pressure, electricity, or hydraulics.

7. **Design circuits to prevent sudden lurching of driven objects.**

When a cylinder is driven by an exhaust center type directional control valve or when starting up after residual pressure is exhausted from the circuit, the piston and its driven object will lurch at high speed if pressure is applied to one side of the piston because of the absence of air pressure inside the cylinder. Therefore, equipment should be selected and circuits designed to prevent sudden lurching, because there is a danger of human injury (particularly injury to limbs) and/or damage to equipment when this occurs.

8. **Consider emergency stops.**

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, a power outage or a manual emergency stop.

Design

Warning

9. **Consider the action when operation is restarted after an emergency stop or abnormal stop.**

Design machinery so that human injury or equipment damage will not occur upon restart of operation. In the case that the cylinder needs to be reset at the starting position, install safe manual control equipment.

Selection

Warning

1. **Confirm the specifications.**

The products featured in this catalog are designed strictly for use in industrial compressed air systems. If the products are used in conditions that are outside the range of pressure and temperature specifications, damage and/or malfunction may occur. Do not use in these conditions. (Refer to specifications.)

Consult SMC if a fluid other than compressed air is used.

2. **Intermediate stops**

When intermediate stopping of a cylinder piston is performed with a 3-position closed center type directional control valve, it is difficult to achieve stopping positions as accurately and precisely as with hydraulic pressure due to the compressibility of air.

Furthermore, since valves and cylinders are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Contact SMC in case it is necessary to hold a stopped position for an extended period.

Caution

1. **Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.**

Mounting

Caution

1. **Do not use until you can verify that equipment can operate properly.**

Following mounting, repairs or conversions, verify correct mounting by conducting appropriate function and leakage tests after compressed air and power are connected.

2. **Instruction manual**

The product should be mounted and operated only after thoroughly reading the manual and understanding its contents. Keep the instruction manual readily available for easy reference as needed.



Series MGF Actuator Precautions 2

Be sure to read before handling.

Piping

⚠ Caution

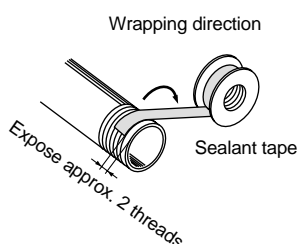
1. Preparation before piping

Before piping is connected, it should be thoroughly flushed out with air (flushing) or washed out to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of sealant tape

When screwing together pipes and fittings, make sure that chips from the pipe threads and sealing material do not get inside the piping.

Also, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Lubrication

⚠ Caution

1. Lubrication of non-lube type cylinder

Since the cylinder is lubricated at the factory, use it without any further lubrication.

Special grease is used, so do not use turbine oil or any other lubricating oil.

Air Supply

⚠ Warning

1. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, as these materials can cause damage or malfunction.

⚠ Caution

1. Install air filters.

Install air filters at the upstream side of valves. The filtration degree should be 5μm or finer.

2. Install an air dryer, after-cooler or water separator.

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer, after-cooler or water separator.

3. Use the product within the specified range of fluid and ambient temperature.

Take measures to prevent freezing, since moisture in circuits will freeze at or below 5°C, and this may cause damage to seals and lead to malfunction.

Refer to SMC's "Air Cleaning Equipment" catalog for further details on compressed air quality.

Operating Environment

⚠ Warning

1. Do not use in environments where there is a danger of corrosion.

Refer to the construction drawings regarding cylinder materials.

2. Install a protective cover if the product is to be used in a dusty environment or where it will be exposed to splashing water or oil.

3. When using auto switches, do not operate in an environment with strong magnetic fields.

Malfunction of auto switches may occur.

Maintenance

⚠ Warning

1. Perform maintenance according to the procedure indicated in the instruction manual.

If handled improperly, malfunction and damage of machinery or equipment may occur.

2. Removal of equipment, and supply/exhaust of compressed air

When machinery is removed, first ensure that there are measures in place to prevent the fall of driven objects and the run-away of equipment. Then cut off the air supply and electric power, and exhaust all compressed air from the system.

When machinery is restarted, proceed with caution after confirming measures to prevent cylinder lurching.

⚠ Caution

1. Drain flushing

Remove drainage from air filters regularly.



Series MGF/Specific Product Precautions

Be sure to read before handling.

Refer to pages 13 through 15 for actuator safety instructions and precautions.

Selection

⚠ Caution

1. Use the cylinder within its load limitation.

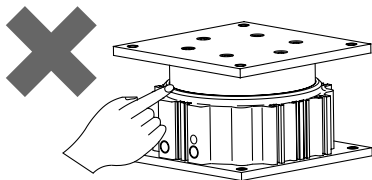
Select a model taking into consideration the allowable horizontal loads, rotation torque and eccentric loads that will apply. When used in excess of the applicable limit, eccentric loads applied to the tube guide will cause wear of the guide, increase the guide's deviation range, cause stress cracks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



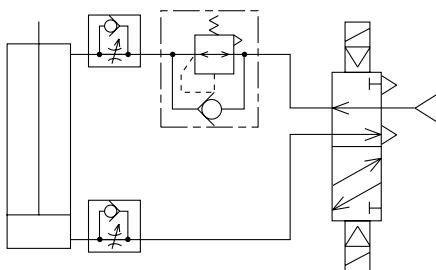
4. Do not bring objects that are sensitive to magnetism near the cylinder.

There is a magnet 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 higher than the speed controlled with a speed controller. In such cases, use a dual pressure control circuit as an air circuit.

Example)



6. Avoid the use in an environment where the cylinder is exposed to coolant, cutting oil, water droplets, adhesive materials and dust, or an operation with compressed air that contains drainage or other extraneous materials.

Extraneous materials or liquid on the inside and/or outside of the cylinder may cause an outflow or deterioration of lubricating grease, or damage bearing sliding parts or sealing material, and cause a malfunction.

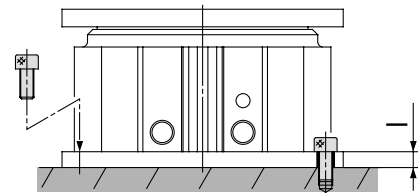
Install a cover so that cylinders will operate with clean compressed air if they are used in an environment where they are exposed to water/oil droplets and dust.

Mounting

⚠ Caution

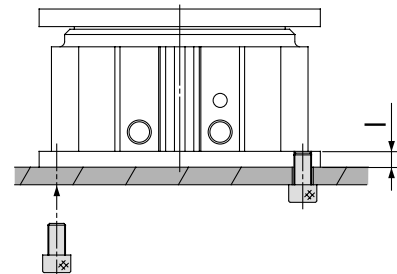
1. For mounting the cylinder, use screws that meet the appropriate length and tighten within the limits of the maximum tightening torque.

Mounting from top



Model	Applicable screw	Max. tightening torque N·m	/(mm)
MGF 40	M6 x 1	10	7.5
MGF 63	M8 x 1.25	25	9
MGF100	M10 x 1.5	51	9

Mounting from bottom

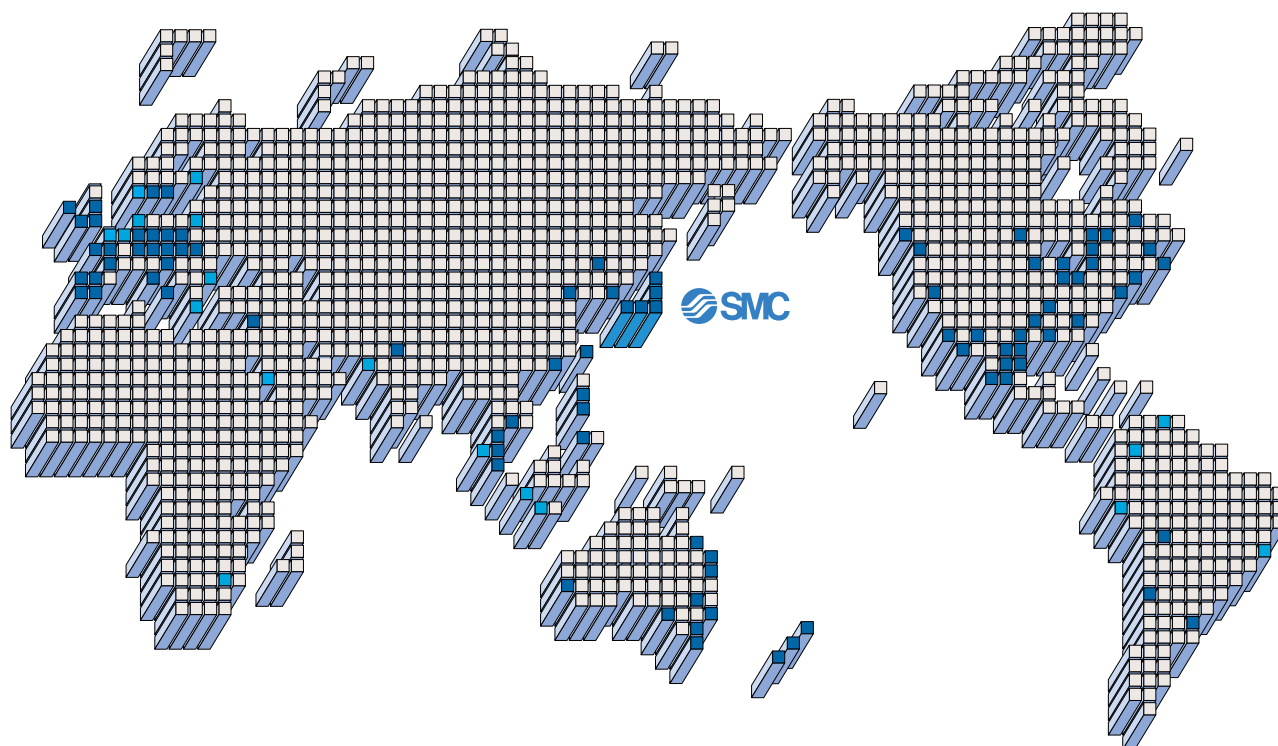


Model	Applicable screw	Max. tightening torque N·m	/(mm)
MGF 40	M8 x 1.25	18	7.5
MGF 63	M10 x 1.5	36	9
MGF100	M12 x 1.75	65	9

2. When mounting a work piece 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 11). (Otherwise, the excessive rotational torque will damage the non-rotating mechanism and lead to a malfunction.)



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