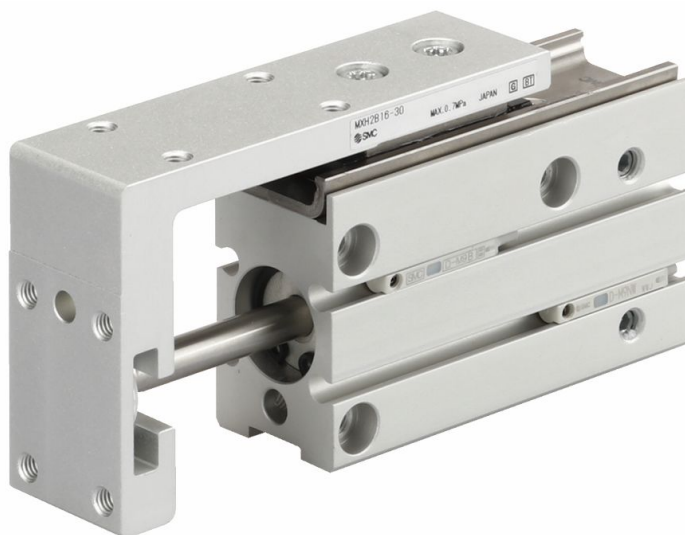




Operation Manual

Product Name
Compact Slide

Model/Series
MXH2 Series



SMC Corporation

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MXH2 Series Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)^{*)}, and other safety regulations.

*) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
etc.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



MXH2 Series Safety Instructions

Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing business.

Use in non-manufacturing business is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Precautions for Design



Warning

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

In such cases, injury to personnel 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 designed to operate smoothly and avoid such dangers.

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

If a driven object and moving parts of the product are in close proximity, injury to personnel may occur. Design the system to avoid all contact with the human body.

- 3. Securely tighten all stationary parts and connected parts so that they will not become loose.**

Be certain to adopt a reliable connecting method if the cylinder is used frequently, or if it is used in a location that is exposed to a large amount of vibration.

- 4. A deceleration circuit or shock absorber etc. may be required.**

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the shock. Install a deceleration circuit to reduce the speed before cushioning, or install an external shock absorber to relieve the shock.

Confirm the rigidity of the equipment after the measure shown above is taken.

- 5. Consider an air pressure drop that is caused by a power source related malfunction.**

When a cylinder is used in a clamping mechanism, the work piece may be released due to a decrease in clamping force because of a decrease in the circuit pressure caused by a power failure, etc. Therefore, safety equipment should be installed to prevent damage to machinery and personal injury. Suspension equipment and lifting devices also require measures to prevent dropping.

- 6. Consider the possibility of power source related malfunctions.**

Measures should be taken to prevent injury and equipment damage in the event that there is a power malfunction to equipment controlled by air pressure, electricity or hydraulics, etc.

- 7. Design a circuit to prevent sudden action of a driven object.**

Design a circuit and choose equipment to prevent quick extension, which may cause injury to personnel, such as hands or feet getting caught in the machinery, or damage to machinery, in the following cases:- activating the cylinder with the exhaust center type direction control valve- starting after the circuit's residual pressure has been emitted- pressure is added to one side of the piston from air within a cylinder

- 8. Consider the behavior of an emergency stop.**

Design the system to prevent injury and damage to machinery and equipment when it is stopped by a safety device for a power outage or manual emergency stop.

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

Design the machinery so that injury to personnel or equipment damage will not occur upon restart of operation.

When the cylinder has to be reset at the starting position, install safety manual control equipment.

Selection



Warning

1. Confirm the specifications.

The products presented in the catalog are designed only for use in industrial compressed air systems. Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction.

2. Intermediate stops

Due to the compressibility of air, it is difficult for this product to make a piston stop at the required intermediate position accurately and precisely by using a 3 position closed center type directional control valve. Furthermore, since valves and cylinders are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for extended periods of time.



Caution

1. Operate the product within a range so that the piston will not collide and be damaged at the stroke end.

If the piston with inertia force is stopped by colliding with the cover at the stroke end, operate the cylinder within a range that will not cause damage. Refer to the cylinder model selection table for the range that will not cause damage.

2. 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 scratch or dent the sliding parts of the cylinder tube or piston rod etc., by striking them with other objects.

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause malfunction. Also, scratches or gouges on the piston rod sliding part may lead to damaged seals and cause air leakage.

2. Do not use the product until you have verified that the equipment can operate properly.

After installation, repair or modification, apply compressed air and power supplies to the equipment and perform appropriate functional and leakage inspections to make sure the equipment is mounted properly.

3. Install and operate only after reading the Operation Manual carefully and understanding the contents.

Keep the manual in a safe place for future reference.

Piping



Caution

1. Before piping

Before piping, perform air blow (flushing) or cleaning to remove any cutting chips, cutting oil, dust, etc. from the piping.

2. Sealant tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping.

If a sealant tape is used, leave 1.5 to 2 threads exposed at the end.

Lubrication



Caution

1. Lubrication of non-lubricating cylinder

As special grease is used on the cylinder of this product, do not supply turbine oil. If turbine oil is supplied, it may adversely affect the cylinder's performance.

Air supply



Warning

1. Use clean air.

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.



Caution

1. Install an air filter.

Install an air filter upstream near the valve.
Select an air filter with a filtration size of 5µm or smaller.

2. Install an aftercooler, air dryer or drain catch before the filter and take appropriate measures.

Compressed air that contains excessive foreign material may cause malfunction of valves and other pneumatic equipment.

Take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

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

When operating at temperatures 5°C or lower, water in the circuit may freeze and cause breakage of seals or malfunction. Measures should be taken to prevent freezing.

For detailed information regarding the quality of the compressed air described above, refer to SMC's "Air Cleaning Systems".

Operating Environment



Warning

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

Refer to the component parts list for cylinder materials.

2. Install a cover over the rod if it is used in an area that is dusty, or in an environment in which water or oil splashes on the cylinder.

Maintenance



Warning

1. Maintenance should be performed according to the procedure indicated in the Operation Manual.

Improper handling can cause damage and malfunction of equipment and machinery.

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

When components are removed, first confirm that measures are in place to prevent workpiece from dropping and/or equipment running away, etc. Cut the supply pressure and electric power and exhaust all compressed air from the system.

When the machinery is restarted, check that operation is normal with the actuators in the proper positions.



Caution

1. Draining

Remove drainage from air filters regularly.

Auto Switch Mounting Precautions



Caution

When installing in close proximity to each other

When compact slide with the D-A9□ or D-M9□ auto switch is used, the auto switches could activate unintentionally if the space between the products is less than the dimension shown in Table 1. Therefore, make sure to provide at least this much clearance.

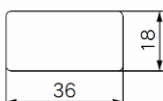
Due to unavoidable circumstances, if they must be used with less distance than the dimensions given in the table below, the cylinders must be shielded. Therefore, affix a steel plate or a magnetic shielding plate (MU-S025) to the area on the cylinder that corresponds to the adjacent auto switch. (Please contact SMC for details.)

The auto switch could activate unintentionally if a shielding plate is not used.

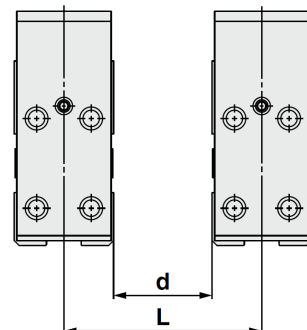
Table 1. [mm]

Bore size [mm]	d	L
6	5	21
10	5	25
16	10	35
20	15	47

Dimensions of a shielding plate (MU-S025) that is sold separately are indicated as reference.



Material: Ferritic stainless steel
 Thickness: 0.3 mm
 Since the back side is treated with adhesive, it is possible to attach to the cylinder.



Operating Precautions

Warning

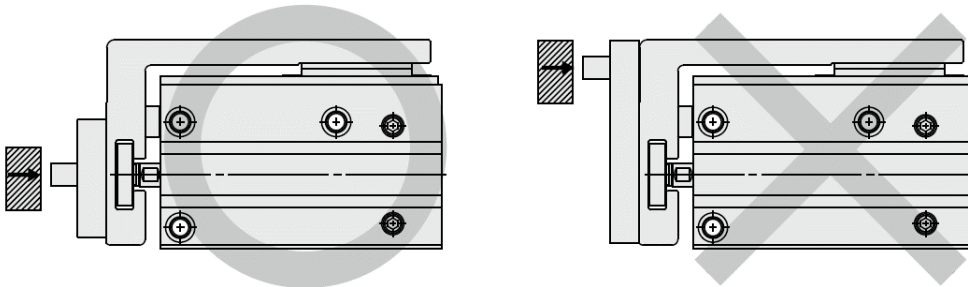
If an operator smokes after directly handling the grease used in the cylinder, it can generate hazardous gases which will harm the human body. Handle this grease with care.

Caution

1. Do not place your fingers in the clearance between the non-rotating plate and the cylinder tube.

Your fingers could get caught between the table and the cylinder tube when the piston rod retracts. If fingers are caught in a cylinder, there is a danger of injury due to the strong cylinder output, and therefore caution must be exercised.

2. In terms of the work load and moment, operate the cylinder below the maximum work load and allowable moment.
3. If the output of the compact slide is applied directly to the table, make sure it is applied along the rod axial line. (Refer to the figure below.)



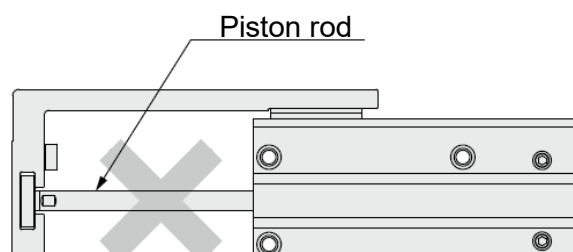
4. Make sure to connect a speed controller and adjust it to a speed of 500 mm/s or less and to lower than the allowable kinetic energy to operate the cylinder.
5. Vibration of the workpiece due to cylinder operation.

If the vibration of the workpiece due to cylinder operation is clearly noticeable, please recheck the operating conditions.

Even when the moment applied to the product is under the allowable moment, the vibration width may be increased if a large amount of unbalanced load is applied.

6. Do not touch the piston rod.

External force may cause the connection between the table and the piston rod to twist, resulting in malfunction.



Caution

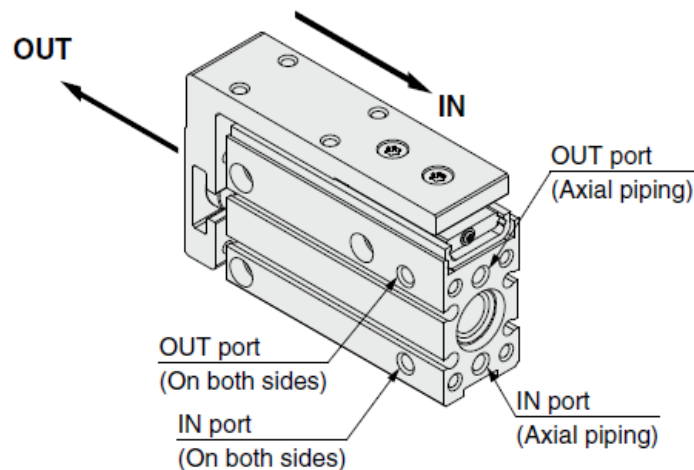
Operating direction with different pressure ports

The compact slide can be piped from 3 directions.

Refer to the figure below for the operating directions of the different pressure ports.

Change the plug position according to the usage conditions. When changing the port position, use the removed plug or a replacement plug (below). If reusing the removed plug, apply sealant, etc., before reassembly. If using a replacement plug, apply a thin layer of grease all the way around the male thread before use. In addition, clear any foreign matter adhered to the port the plug was removed from before piping.

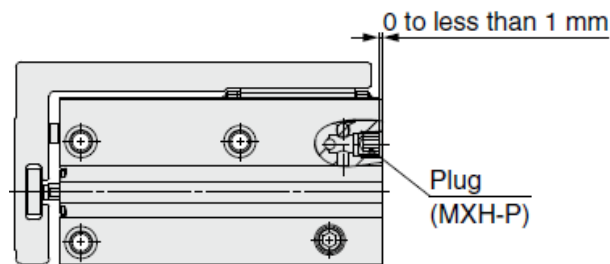
After reassembly, be sure to check for air leakage before operating the product.



Replacement plug part number: MXH-P (2 pcs.)

If the plug is tightened excessively when attaching it to the axial piping of MXH2B6, it may be in contact with the internal steel ball, causing air leakage.

As for the plug tightening guide, make the adjustment so that the plug sunk dimension from the cylinder tube surface is 0 to less than 1mm.

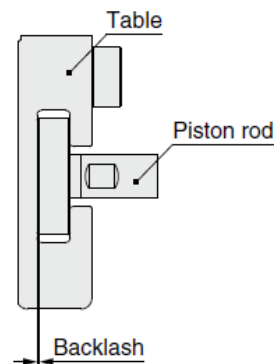


Caution

Backlash in the stroke direction

Since the connection between the piston rod and table is a floating mechanism, the table has backlash in the stroke direction.

(Refer to the figure right)



Connecting part of piston rod and table



Caution

Cylinder mounting

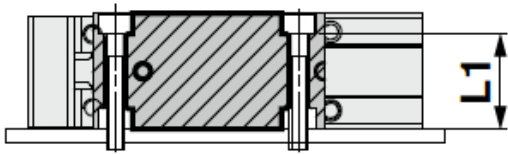
When tightening threads for compact slide, properly tighten with the specified torque.

How to mount a compact slide

A compact slide can be mounted from 4 directions.

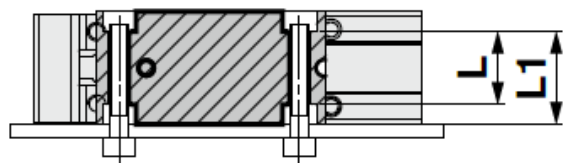
Make a selection suitable for the applicable machinery and workpieces, etc.

Lateral mounting (Body through-hole)



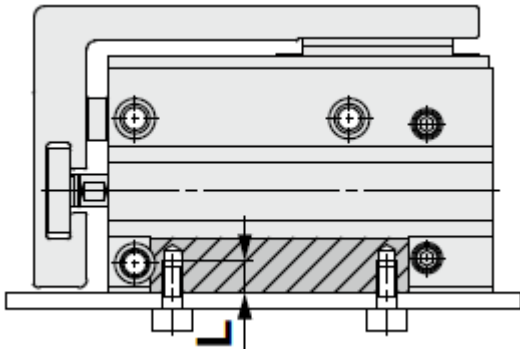
BoreSize (mm)	Bolt	Maximum tightening torque(Nm)	L
6	M3 x 0.5	0.6	12.7
10	M4 x 0.7	1.5	15.6
16	M4 x 0.7	1.5	20.6
20	M5 x 0.8	3.0	24.0

Lateral mounting (Body thread)



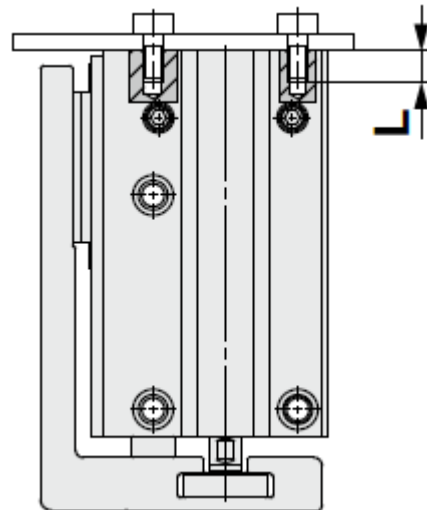
BoreSize (mm)	Bolt	Maximum tightening torque(Nm)	L1	L
6	M4 x 0.7	1.5	12.7	9.4
10	M5 x 0.8	3.0	15.6	11.2
16	M5 x 0.8	3.0	20.6	16.2
20	M6 x 1	5.2	24.0	16.0

Vertical mounting (Body thread)



BoreSize (mm)	Bolt	Maximum tightening torque(Nm)	L
6	M3 x 0.5	0.6	4.8
10	M4 x 0.7	1.5	6
16	M4 x 0.7	1.5	6
20	M5 x 0.8	3.0	8

Axial mounting (Body thread)



BoreSize (mm)	Bolt	Maximum tightening torque(Nm)	L
6	M3 x 0.5	0.6	4.8
10	M4 x 0.7	1.5	6
16	M4 x 0.7	1.5	6
20	M5 x 0.8	3.0	8

⚠ Caution

Workpiece mounting

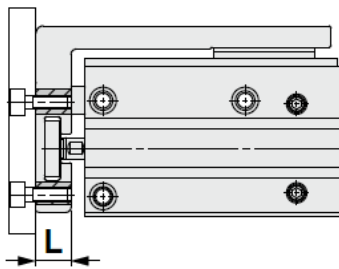
When mounting a workpiece on the top of the table, do not screw a bolt in more deeper than the L dimension shown in the table below.

If screwing a bolt in more deeper than the L dimension, the edge of the bolt could reach the linear guide and might damage the linear guide.

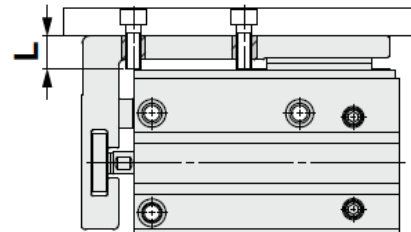
How to mount a workpiece

Workpiece can be mounted on 2 surfaces of the compact slide.

Front mounting



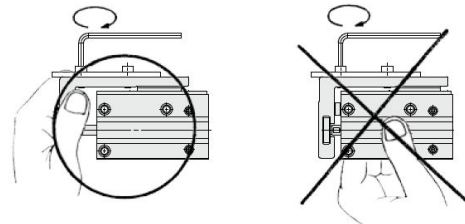
Top mounting



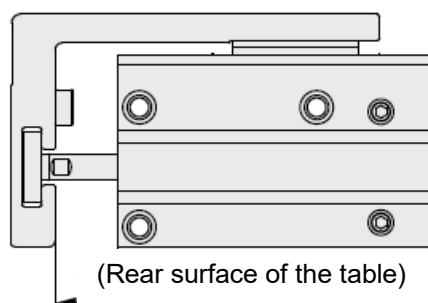
BoreSize (mm)	Bolt	Maximum tightening torque(Nm)	L
6	M3 x 0.5	0.6	6.5
10	M4 x 0.7	1.5	7.5
16	M4 x 0.7	1.5	10
20	M5 x 0.8	3.0	11

BoreSize (mm)	Bolt	Maximum tightening torque(Nm)	L
6	M3 x 0.5	0.6	6.5
10	M4 x 0.7	1.5	8
16	M4 x 0.7	1.5	9
20	M5 x 0.8	3.0	9.5

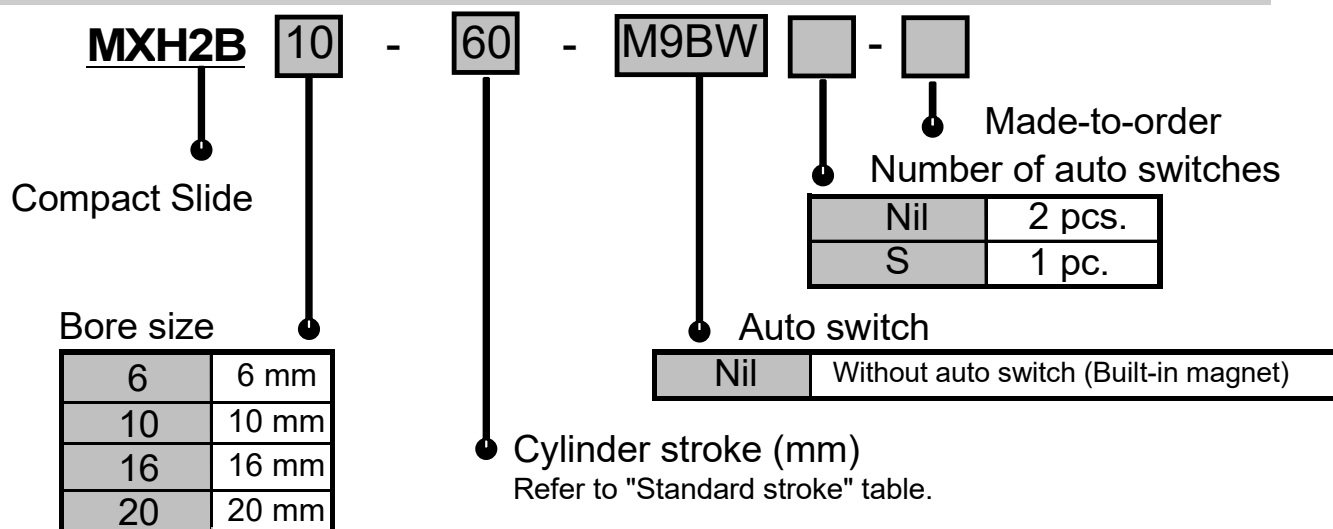
- (1) Since the table is supported by the linear guide, take care not to apply strong impact or large moment, etc. when mounting workpieces.
- (2) Hold the table when fastening workpiece to it with bolts etc.
If the body is held while tightening bolts etc., the guide section will be subjected to a large moment, and there may be a loss of precision.



- (3) For connection with a load having an external support/guide mechanism, select an appropriate connection method and perform careful alignment.
- (4) Use caution, as scratches or nicks, etc. on the sliding parts of the piston rod can cause a malfunction and air leakage.
- (5) Do not install bolts from the back side of the table.



1. Model Indication and How to Order



Standard Strokes

Bore size [mm]	Standard stroke [mm]
6	5, 10, 15, 20, 25, 30, 40, 50, 60
10	5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 100
16	5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 100, 125
20	5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 100, 125, 150

Applicable 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)				
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	—	M9NV	M9N	●	●	●	○	○	○	IC circuit	Relay, PLC
				3-wire (PNP)					●	●	●	○				
				2-wire					●	●	●	○				
				3-wire (NPN)					●	●	●	○				
	3-wire (PNP)			●	●	●			○	○						
	2-wire			●	●	●			○							
	3-wire (NPN)			●	●	●			○							
	3-wire (PNP)			●	●	●			○							
Water resistant (2-color indicator)	Grommet	No	3-wire (NPN)	24 V	12 V	A96V	A96	○	○	○	○	○	○	IC circuit	—	
			3-wire (PNP)					○	○	○	○					
			2-wire					○	○	○	○					
			3-wire (NPN)					○	○	○	○					
3-wire (PNP)	○	○	○	○	○											
2-wire	○	○	○	○												
3-wire (NPN)	○	○	○	○												
3-wire (PNP)	○	○	○	○												
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	12 V	A93V*2	A93	●	●	●	●	—	—	Relay, PLC	
				2-wire					●	●	●	●				
				2-wire					●	●	●	●				
Reed auto switch	—	Grommet	No	3-wire (NPN equivalent)	24 V	12 V	A90V	A90	●	●	●	●	—	—	IC circuit	
				2-wire					●	●	●	●				

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

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

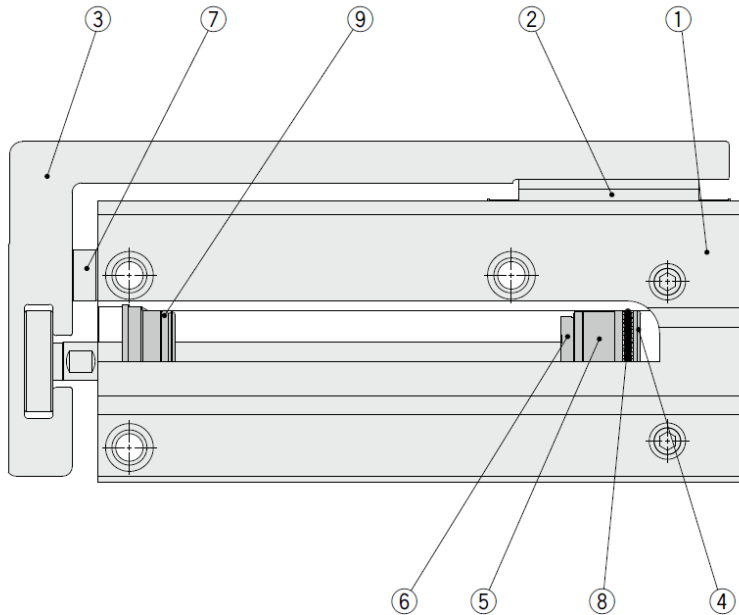
* Lead wire length symbols

0.5 m	• • • Nil	(Example) M9NV
1 m	• • • M	(Example) M9NWM
3 m	• • • L	(Example) M*NL
5 m	• • • Z	(Example) M9NZ

* Solid state auto switches marked with "o" are produced upon receipt of order.

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

2. Construction



Component Parts

No.	Description
1	Cylinder tube
2	Guide
3	Table
4	Piston
5	Magnet
6	Bumper
7	Bumper
8	Piston seal
9	Gasket

3. Specifications

Bore size [mm]	6	10	16	20
Fluid	Air			
Action	Double acting			
Piping port size	M5 x 0.8			
Minimum operating pressure	0.2 MPa	0.1 MPa	0.08 MPa	
Maximum operating pressure	0.7 MPa			
Proof pressure	1.05 MPa			
Ambient and fluid temperature	Without auto switch: -10 to 70°C (No freezing) With auto switch: -10 to 60°C (No freezing)			
Piston speed	50 to 500 mm/s			
Allowable kinetic energy [J]	0.0125	0.025	0.05	0.1
Lubrication	Cylinder unit	Non-lube		
	Guide unit	Lubrication recommended*1		
Cushion	Rubber bumper on both ends			
Stroke length tolerance	+1.0 0			

*1 It is possible to maintain the performance of the guide for longer by applying grease to the guide bearing after six months have passed from the start of use, or when the running distance reaches 100 km, whichever comes first. The time period/distance travelled before maintenance can vary depending on the use conditions and the environment. The grease pack does not come with the product and should be ordered separately. Grease pack part number : **GR-S-010(10g)**

Theoretical Output

[N]

Bore size [mm]	Rod size [mm]	Operating direction	Piston area [mm ²]	Operating pressure [MPa]		
				0.3	0.5	0.7
6	3	OUT	28	8	14	19
		IN	21	6	10	14
10	4	OUT	78	23	39	55
		IN	66	19	33	46
16	6	OUT	201	60	101	141
		IN	172	51	86	121
20	8	OUT	314	94	157	220
		IN	264	79	132	185

4. Model Selection



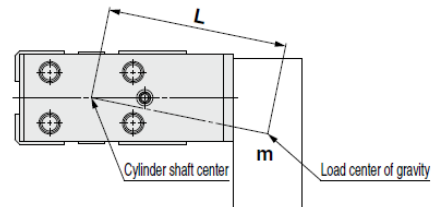
Caution Confirmation of theoretical output is required separately. Refer to "Theoretical Output" on page 15.

Selection Conditions: Follow the tables below in order to determine selection conditions and choose one selection graph.

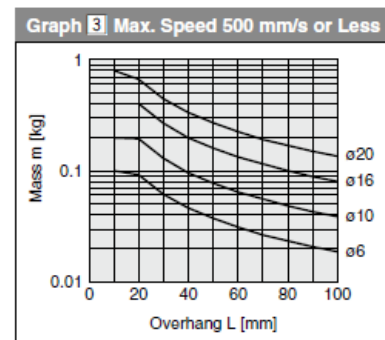
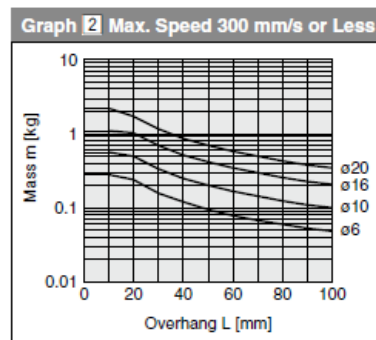
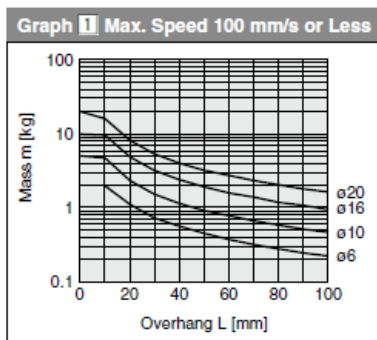
Mounting orientation	Vertical			Horizontal								
Max. speed [mm/s]	Up to 100	Up to 300	Up to 500	Up to 100			Up to 300			Up to 500		
Load eccentricity L _i [mm]	—			50	100	200	50	100	200	50	100	200
Selection graph	1	2	3	4	5	6	7	8	9	10	11	12

- * L: Overhang (the distance from the cylinder shaft center to the load center of gravity)
The direction of L can also be a diagonal direction. (Refer to the drawing at right.)
- * H: Distance from the cylinder center axis to the mounting surface for the table

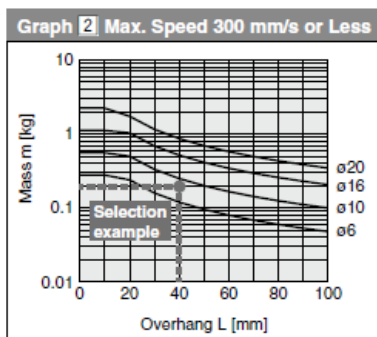
H dimension [mm]	5 to 60 mm stroke			75 to 150 mm stroke			
	ø6	ø10	ø16	ø10	ø16	ø20	ø20
H dimension [mm]	24.5	30.5	34.5	41.5	32.5	36.5	45.5



Selection Graph **1** to **3** (Vertical Mounting)



Selection Example (Vertical Mounting)



Selection conditions { Mounting: Vertical
Max. speed: 300 mm/s
Overhang L: 40 mm
Load mass m: 0.2 kg

* The load mass m should be: mass of workpiece + mass of moving parts (see table below).

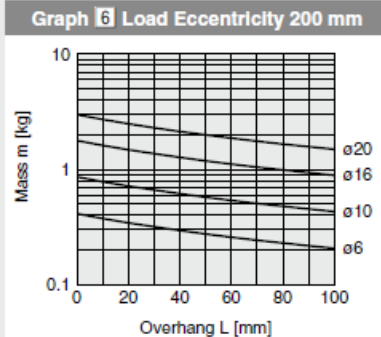
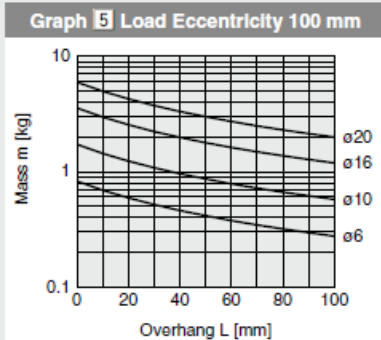
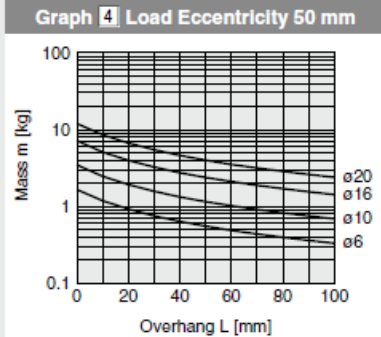
Refer to Graph 2 based on vertical mounting and a speed of 300 mm/s.
From Graph 2, as the intersection of overhang L: 40 mm and load mass m: 0.2 kg is in the area below the ø10 line, a ø10 is selected.

Mass of Moving Parts

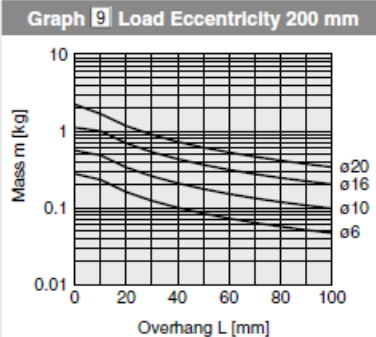
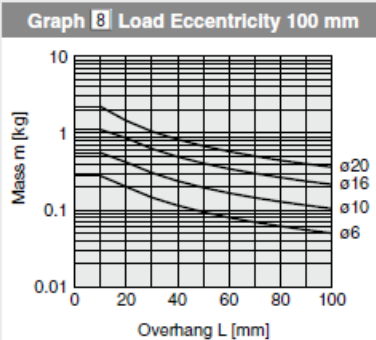
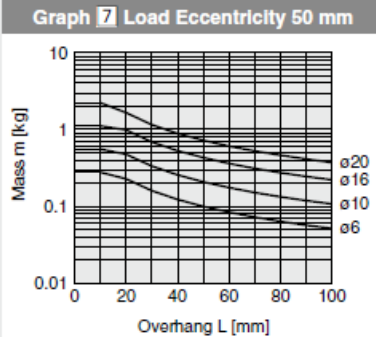
Bore size [mm]	Stroke [mm]												
	5	10	15	20	25	30	40	50	60	75	100	125	150
6	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	—	—	—	—
10	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.08	0.10	—	—
16	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.11	0.11	0.14	0.16	0.19	—
20	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.19	0.24	0.28	0.31	0.35

Selection Graph 4 to 12 (Horizontal Mounting)

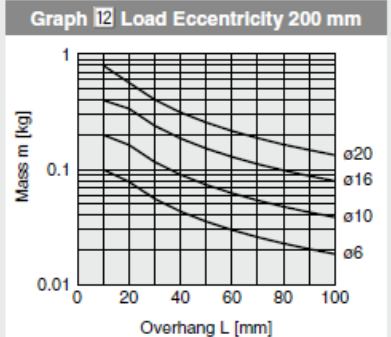
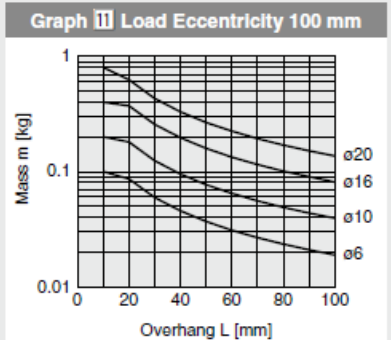
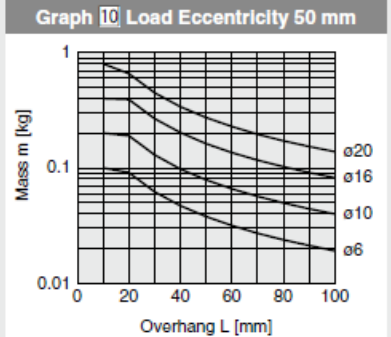
Max. Speed 100 mm/s or Less



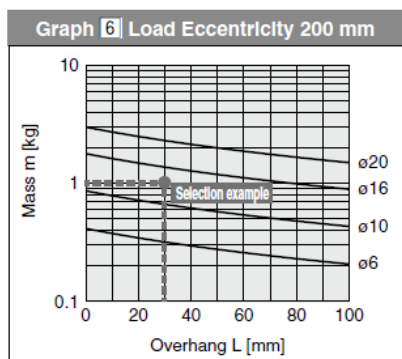
Max. Speed 300 mm/s or Less



Max. Speed 500 mm/s or Less



Selection Example (Horizontal Mounting)



Selection conditions

- Mounting: Horizontal
- Max. speed: 100 mm/s
- Load eccentricity L_1 : 200 mm
- Overhang L: 30 mm
- Load mass m: 1.0 kg

* The load mass m should be: mass of workpiece + mass of moving parts (see table below).

Refer to Graph 6 based on horizontal mounting, a speed of 100 mm/s and load eccentricity L_1 of 200 mm. From Graph 6, as the intersection of overhang L: 30 mm and load mass m: 1.0 kg is in the area below the ø16 line, a ø16 is selected.

Mass of Moving Parts

Bore size [mm]	Stroke [mm]												
	5	10	15	20	25	30	40	50	60	75	100	125	150
6	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	—	—	—	—
10	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.08	0.10	—	—
16	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.11	0.11	0.14	0.16	0.19	—
20	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.18	0.19	0.24	0.28	0.31	0.35

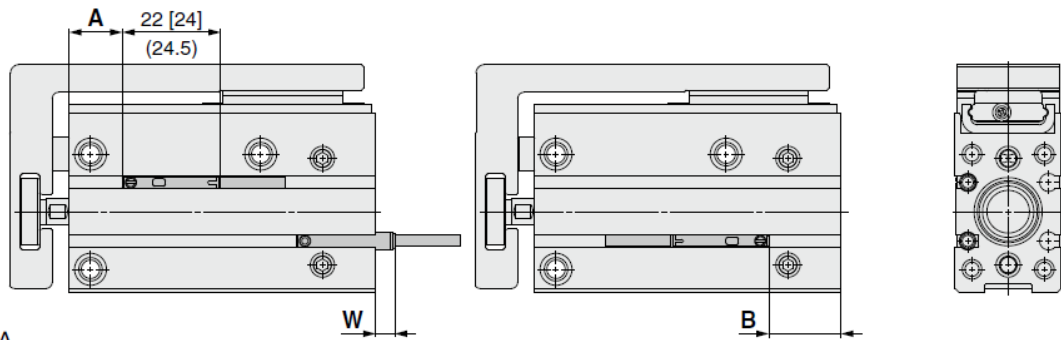
5.Auto Switch Mounting

● Minimum stroke for auto switch mounting

Number of auto switches mounted	Applicable auto switch model		
	D-M9□, M9□V	D-M9□W, M9□WV D-M9□A, M9□AV	D-A9□, A9□V
1 pc.	5	5	5
2 pcs.	5	10	10

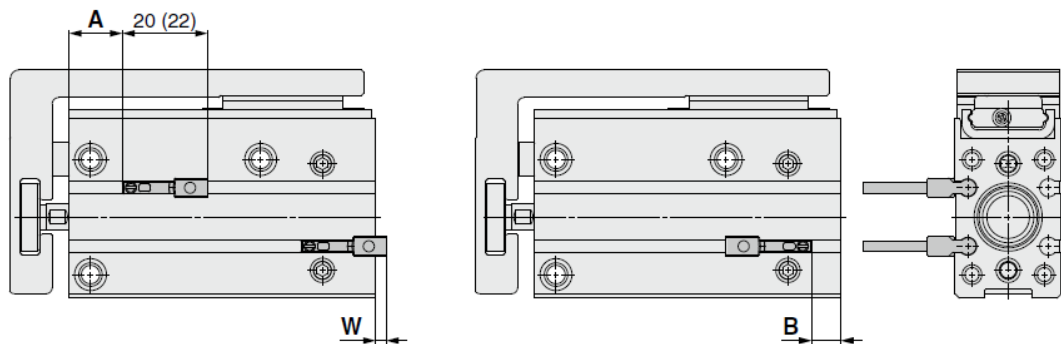
● Auto switch proper mounting position (detection at stroke end) and its mounting height

D-M9□
D-M9□W
D-M9□A
D-A9□



[]: Value of the D-M9□A
(): Value of the D-A90/A93

D-M9□V
D-M9□WV
D-M9□AV
D-A9□V



(): Value of the D-M9□AV/A9□V

Bore size [mm]	D-M9□W/D-M9□			D-M9□WV/D-M9□V			D-M9□A			D-M9□AV			D-A90, A93			D-A96/D-A9□V		
	A	W	B	A	W	B	A	W	B	A	W	B	A	W	B	A	W	B
6	12.0	3.5	6.5	12.0	1.5	6.5	12.0	5.5	6.5	12.0	3.5	6.5	8.0	2.0	2.5	8.0	-0.5	2.5
10	10.0	-2.5 (-4.5)	12.5 (14.5)	10.0	-4.5 (-6.5)	12.5 (14.5)	10.0	-0.5 (-2.5)	12.5 (14.5)	10.0	-2.5 (-4.5)	12.5 (14.5)	6.0	-4.0 (-6.0)	8.5 (10.5)	6.0	-6.5 (-8.5)	8.5 (10.5)
16	12.0	-7.0 (-11.5)	17.0 (21.5)	12.0	-9.0 (-13.5)	17.0 (21.5)	12.0	-5.0 (-9.5)	17.0 (21.5)	12.0	-7.0 (-11.5)	17.0 (21.5)	8.0	-8.5 (-13.0)	13.0 (17.5)	8.0	-11.0 (-15.5)	13.0 (17.5)
20	17.5	-14.0	24.0	17.5	-16.0	24.0	17.5	-12.0	24.0	17.5	-14.0	24.0	13.5	-15.5	20.0	13.5	-18.0	20.0

Note 1: Negative figures in the table W indicate an auto switch is mounted inward from the edge of the cylinder body.

Note 2: In the case of models with 5 and 10 strokes, the switch may not turn off due to operating range or two switches may turn on simultaneously.

Fix auto switches outside 1 to 4 mm further than the values in the above table. (If one auto switch is used, make sure that it turns ON and OFF properly; if two auto switches are used, make sure that both auto switches turn ON.)

Note 3: Values in brackets () in the tables are dimensions for 75mm or longer strokes.

Operating Range

[mm]

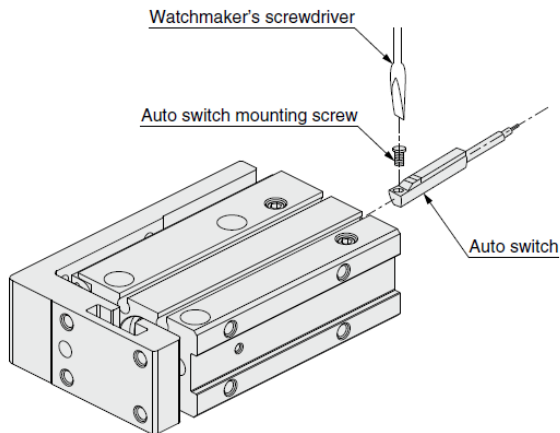
Auto switch model	Bore size			
	6	10	16	20
D-M9□, M9□V D-M9□W, M9□WV D-M9□A, M9□AV	3	3.5	5	6
D-A9□, A9□V	5	6	9	11

* Values which include hysteresis are for guideline purposes only, they are not a guarantee (assuming approx. ±30% dispersion) and may change substantially depending on the ambient environment.

Other than the applicable auto switches listed in "How to Order", the following auto switches can be mounted.

* Normally closed (NC = b contact) solid state auto switches (D-M9□E(V)) are also available. Refer to the **Web Catalog** for details.

Auto switch mounting

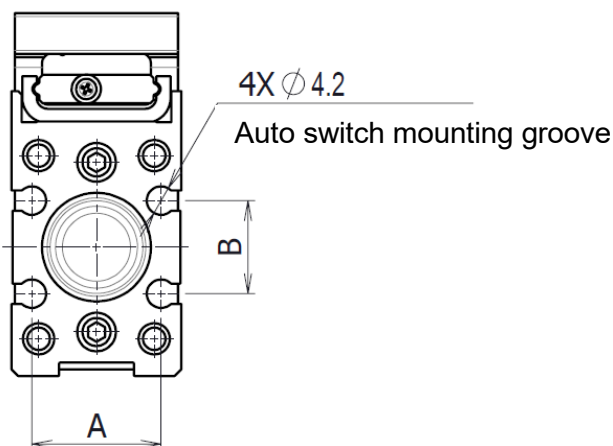


● When tightening the auto switch mounting screw, use a watchmaker's screwdriver with a handle 5 to 6 mm in diameter.

Tightening Torque of Auto Switch Mounting Screw [N·m]

Auto switch model	Tightening torque
D-M9□(V) D-M9□W(V) D-A93	0.05 to 0.15
D-M9□A(V)	0.05 to 0.10
D-A9□(V)(Excludes the D-A93)	0.10 to 0.20

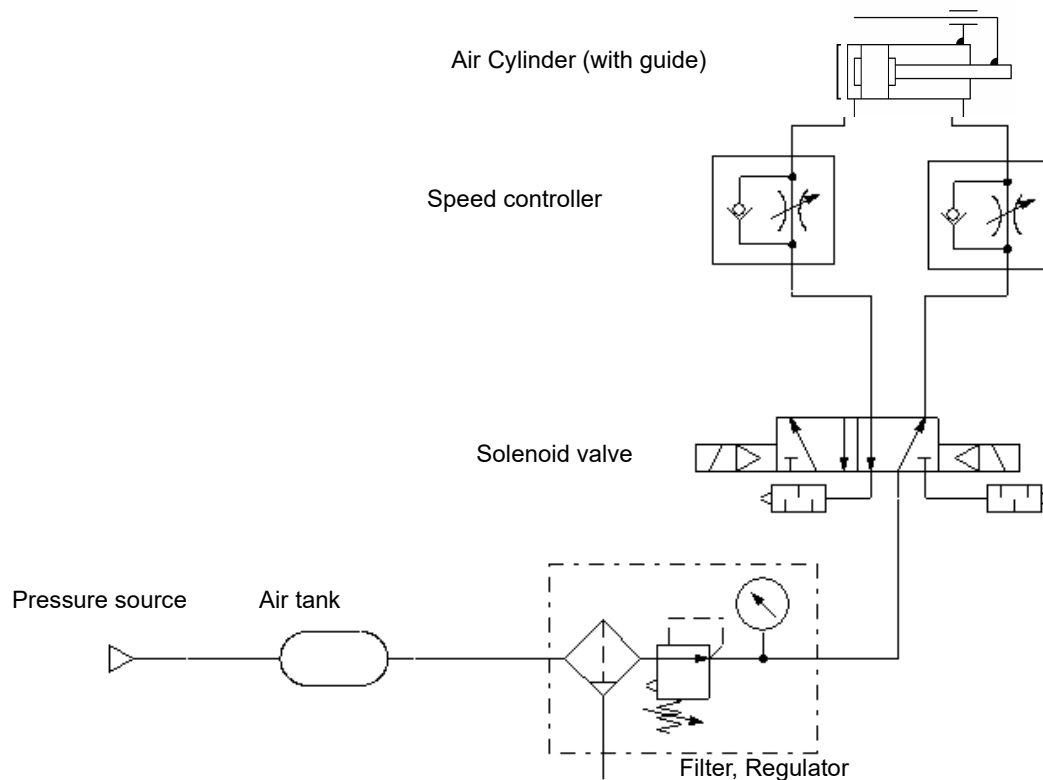
* When used with side ported type, it is not possible to mount the D-A9□V/M9□V type on the side to which the piping is connected.



Bore size [mm]	[mm]	
	A	B
6	10	6.9
10	14	8.8
16	19	13.7
20	26	17.1

6. Basic Circuit for Cylinder Operation

The basic circuit for operating the product with air filter, regulator, solenoid valve and speed controller is shown in the following figure.



7. Maintenance

Caution

MXH2 series cannot be disassembled.

Inspection

1. Daily inspection

- (1) Check if the product operates smoothly with air
- (2) Check if the piston speed and cycle time vary.
- (3) Check if the slide table moves smoothly for the entire stroke

2. Regular inspection

- (1) Check if all the mounting bolts are securely fastened
- (2) Check if the product operates smoothly with air
- (3) Check if the piston speed and cycle time vary.
- (4) Check if an external air leakage occurs
- (5) Check if the slide table moves smoothly for the entire stroke
- (6) Check for scratches or dents on the sliding part of the piston rod or guide
- (7) Check if the grease lubrication is enough
- (8) Check if drainage in the air filter is regularly discharged

Check the points above, and contact your SMC sales representative if any failure is found.

8. Troubleshooting

Failure	Possible causes	Countermeasures	Remarks
The product does not operate smoothly.	The cylinder speed is outside of the specification range.	<ul style="list-style-type: none"> - Use the products within the specified cylinder speed range. - Review the bore size of the cylinder tube. 	Refer to "4. Model Selection".
	The moment of the cylinder is above the allowable range.	<ul style="list-style-type: none"> - Change the moment to be within the allowable range. - Review the bore size of the cylinder tube. 	Refer to "4. Model Selection".
	Speed controller is meter-in control.	<ul style="list-style-type: none"> - Change it to meter-out control. 	
	Vibration is generated.	<ul style="list-style-type: none"> - Install the product in a place where it is not subjected to vibration. - Avoid applying external forces to the product. - Check the load eccentricity. 	Even when the moment applied to the product is under the allowable moment, the vibration width may be increased if a large amount of load eccentricity is applied.
	Water or coolant liquid, splash over the product.	<ul style="list-style-type: none"> - Protect the cylinder with a cover to avoid liquid splash. 	
	The operation is not checked with air.	<ul style="list-style-type: none"> - Check the operation of the product by supplying air, not by hand. 	If resistance is generated due to preload of the guide, the product may not be operated smoothly by hand, but there is no problem on performance.
Deformation or breakage	Impact applied due to high speed operation	<ul style="list-style-type: none"> - Reduce the cylinder speed to be within the allowable specification range. - Reduce the load. 	Refer to "4. Model Selection".
		<ul style="list-style-type: none"> - Install an external impact absorbing mechanism. 	
Auto switch does not operate. (Malfunction)	The auto switch is not mounted in the proper mounting position.	<ul style="list-style-type: none"> - Mount the auto switch in a proper position. 	Refer to "5. Auto Switch Mounting".
	Multiple cylinders are mounted horizontally in close proximity.	<ul style="list-style-type: none"> - When mounting the cylinders, ensure the specified distance for close proximity installation is met. - Affix a magnetic shielding plate (MU-S025) to the area on the cylinder that corresponds to the adjacent auto switch. 	Refer to "Caution on Mounting Auto Switches". (When installing in close proximity to each other)

* In the guide, the rolling resistance is increased by applying a preload to the ball for the purpose of increasing the rigidity. A feeling of grinding is felt when it is operated by hand, but there is no problem with performance.

Revision history

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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