



ORIGINAL INSTRUCTIONS

Instruction Manual

2/3 Port Mechanical Valve

Series VM100-A / VM200-A



VM100-A

VM200-A

The intended use of this product is to switch air pressure.

1 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) (1), and other safety regulations.

- ISO 4414: Pneumatic fluid power - General rules relating to systems.
- ISO 4413: Hydraulic fluid power - General rules relating to systems.
- IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots -Safety. etc.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

2.1 VM100-A

2.1.1 Valve Specifications

Piping	Side ported	Bottom ported
Fluid	Air / Inert gas	
Operating Pressure	-100 kPa to +1.0 MPa	
Ambient and fluid temperature	-5 to +60 °C (No freezing)	
Lubrication	Not required (Note 1)	
Port size	1/8	M5 x 0.8
Bracket part number (Note 2)	VM1-B	-
Min. operating frequency	1 cycle / 30 days	
Max. operating frequency	60 cycles/min (Toggle lever, Selector: 6 cycles/min) (Push button, Foot pedal: 30 cycles/min)	
Filtration	5 µm filtration or smaller	

2 Specifications - continued

Shock resistance (Note 3)	1000 m/s ²
Vibration resistance (Note 4)	50 m/s ²

Table 1

Note 1 If lubrication is used in the system, use class 1 turbine oil (no additive), ISO VG32.

Note 2 The bracket can only be used for side mounting of side ported type.

Note 3 Two axes (horizontal and vertical) and two directions were tested and no malfunction of the valve occurred (pulse shape: sine shape), 3 times (test sample mounted with bracket)

Note 4 No malfunction occurred in a sweep cycle test between 10 to 150 Hz at vibration sweep 0.35mm. The test was performed in the two axes and two directions, 7 min per cycle (20 cycles)

2.1.2 Operating Stroke Range

Actuator type	Operating stroke (mm)
Basic	2.2 to 2.9
Roller lever	4.3 to 5.4
One way roller lever	4.3 to 5.4
Straight plunger	2.7 to 3.4
Roller plunger	2.7 to 3.4
Cross roller plunger	2.7 to 3.4

Table 2

2.1.3 Cam and dog angle and maximum speed

Actuator type	Angle limit of cam and dog	Max. speed limit of cam and dog (m/s)
Roller lever	30°	0.7
	45°	0.3
One way roller lever	30°	0.7
	45°	0.3
Straight plunger	-	0.2
Roller plunger	30°	0.3
Cross roller plunger	30°	0.3

Table 3

2.2 VM200-A

2.2.1 Valve Specifications

Piping	Side ported
Fluid	Air / Inert gas
Operating Pressure	0 to 1.0 MPa
Ambient and fluid temperature	-5 to +60 °C (No freezing)
Lubrication	Not required (Note 1)
Port size	1/4
Bracket part number (Note 2)	VM2-B
Min. operating frequency	1 cycle / 30 days
Max. operating frequency	60 cycles/min (Toggle lever, Selector: 6 cycles/min) (Push button, Foot pedal: 30 cycles/min)
Filtration	5 µm filtration or smaller
Shock resistance (Note 3)	1000 m/s ²
Vibration resistance (Note 4)	50 m/s ²

Table 4

Note 1 If lubrication is used in the system, use class 1 turbine oil (no additive), ISO VG32.

Note 2 The bracket can only be used for side mounting of side ported type.

Note 3 Two axes (horizontal and vertical) and two directions were tested and no malfunction of the valve occurred (pulse shape: sine shape), 3 times (test sample mounted with bracket)

Note 4 No malfunction occurred in a sweep cycle test between 10 to 150 Hz at vibration sweep 0.35mm. The test was performed in the two axes and two directions, 7 min per cycle (20 cycles)

2.2.2 Operating Stroke Range

Actuator type	Operating stroke (mm)
Basic	4 to 4.9
Roller lever	8.7 to 10.9
One way roller lever	9.5 to 11.9
Straight plunger	4.5 to 5.4
Roller plunger	4.5 to 5.4
Cross roller plunger	4.5 to 5.4

Table 5

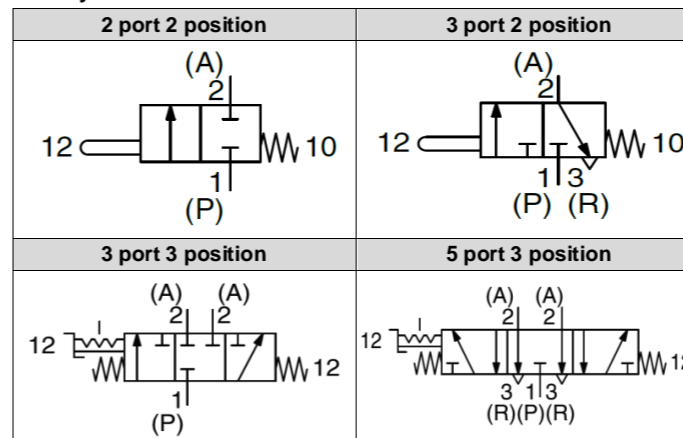
2 Specification - continued

2.2.3 Cam and dog angle and maximum speed

Actuator type	Angle limit of cam and dog	Max. speed limit of cam and dog (m/s)
Roller lever	30°	0.7
	45°	0.3
One way roller lever	30°	0.7
	45°	0.3
Straight plunger	-	0.2
Roller plunger	30°	0.3
Cross roller plunger	30°	0.3

Table 6

2.3 Symbols



3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.

- For the type with bottom-mounting thread, select a suitable screw lead length so that the number of female thread ridges is four to six.

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact exceeding limits listed in specification. Do not mount in a location exposed to radiant heat.

Warning

- Do not operate in an area in which fluids such as oil, coolant or water splash on it or dust comes in contact with it. Because it does not have a waterproof or dustproof construction, fluids or dust could enter the valve, leading to malfunction. Therefore, take measures such as providing a protective cover to prevent direct exposure.

3.3 Air Supply

Warning

- Operable fluid is either air or inert gas only. It cannot be used for corrosive gas and fluid.

Caution

- When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please contact SMC.
- Install an air filter
Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 µm or smaller.

3 Installation - continued

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

Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer or water separator.

- Grease is used for the inside of the valves. Grease may enter into the outlet port of the valve.
- When using vacuum pressure for the VM100, supply vacuum pressure to P port.

3.4 Piping

Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.
- Tightening torque is 0.76 ± 10% N·m. Take a measure to prevent the screw from being loosened due to vibration or impact.

3.5 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to catalogue for details.

3.6 Mounting

Warning

- When installing the mechanical operation type mechanical valves, adjust the position so that the valves do not operate over the operating limit range.

Operating over the limit could damage the mechanical valve or actuator, and lead to equipment malfunction.

- Actuator Stroke
P.T. depends on pressure or differences between the individual product specifications. In order to ensure that the valve opens, keep the operating stroke value for the mechanical operations type within the range specified by the following formula.
Operating stroke = (P.T. + 0.5 X O.T.) to (P.T. + O.T. - 0.1)

For straight and roller plunger styles, there is a groove indicating P.T. and T.T. for stroke adjustment.

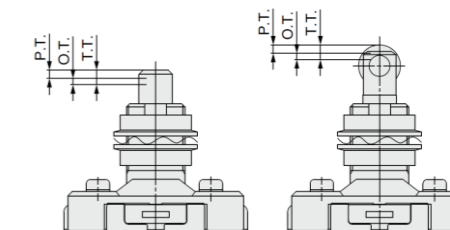


Figure 1

- P.T. (Pre Travel): From free position to initial valve operating position
- O.T. (Over Travel): From initial valve operating position to total travel position.
- T.T. (Total Travel): From free position to total travel position.

Warning

- Do not make any alterations to the valve body, such as enlarging the body mounting holes. Doing so could lead to unexpected abnormal conditions such as air leakage.

3.7 Operation

Warning

- Operate the manual operation type mechanical valves (such as push button, twist selector and toggle lever types) with your finger.

3 Installation - continued

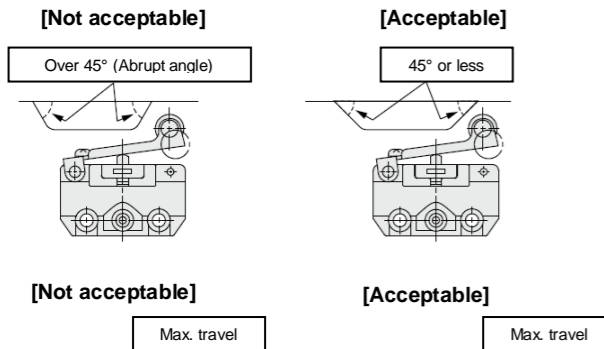
The use of equipment such as a cylinder, cam or hammer, can result in the actuator and the valve being damaged.

Do not operate over the operation limit. If excessive operation force is applied over total travel position, actuator part can get deformed and lead to equipment malfunction.

- **When operating the mechanical operation type mechanical valves, select the angle and the maximum speed limit of cam and dog so that valves do not operate over the following maximum values.**

If operated over the maximum values, impact force from cam and dog will be applied to the actuator, leading to damage of the actuator or the valve itself.

Refer to tables 3 and 6.



Over travel. Excessive force is applied due to the maximum travel position being exceeded.

Sufficient travel. The actuator can reach the total travel position without excessive force being applied.

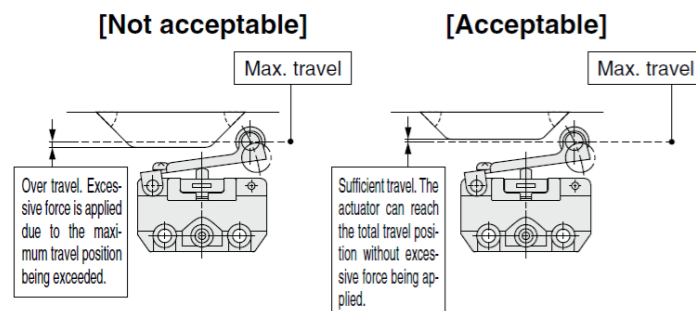


Figure 2

3.7.1 Cam and Dog Material

Roller material	Cam and dog material	Surface finish of cam and dog
Polyacetal	Steel	Rz 6.3 or less
Hard steel	Steel, Resin	Rz 25 or less

Table 7

Caution

- If the operating condition is maintained for long periods of time, it may take some time for the valve to restart due to the adherence of the seals and there might be a delay for recovery.

3.8 How to Change the Buttons

Caution

Replace the button in the following manner to change colour of the button.

3.8.1 Push button (Flush type)

Installation:

3 Installation - continued

Of the four colours, red, green, black and yellow, select and align the protruding portion of the button with the recessed portion of the body and push in.

Removal:

Remove the fastening ring and insert the tip of a small flat head screwdriver into the groove of the button to pry it up.

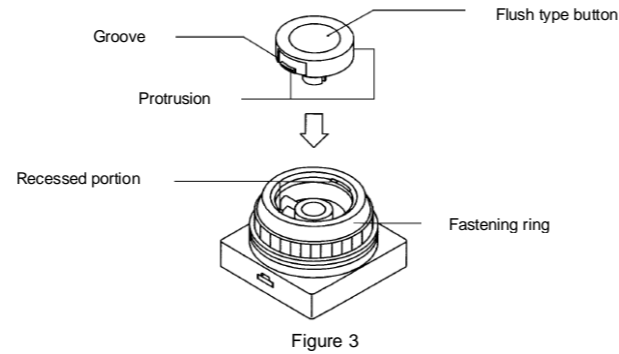


Figure 3

3.8.2 Push button (Mushroom and Extended types)

At the time of shipment, only 1 button of the colour that you specified is attached to the body.

	Mushroom type	Extended type
Installation	Align the protruding portion of the button with the recessed portion of the body and push in. (Use the mark on the button as a reference to align the protruding part.)	Align the protruding portion of the button with the recessed portion of the body and push in.
Removal	Placing your finger under the collar of the button on the side of the mark, tilt it upward.	Remove the fastening ring and insert the tip of a small flat head screwdriver into the groove of the button to pry it up.

Table 11

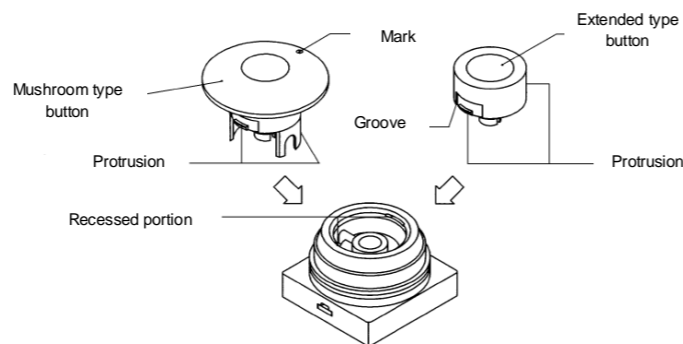


Figure 4

3 Installation - continued

3.8.3 Remove a mushroom type button

3.8.3.1 How to remove at panel mount



Figure 5

3.8.3.2 Removing the valve as a unit

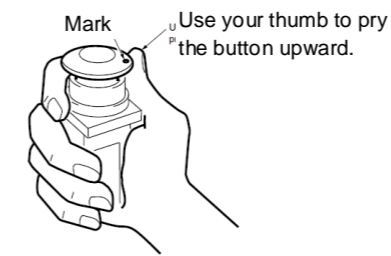


Figure 6

3.9 Design

Warning

- **This product cannot be used for applications in which the pressure must be sealed.**

Since the VM100 and VM200 are poppet type valves, fluid flows backward when the pressure on port 2 (A) rises.

Since the valves are subject to air leakage, they cannot be used for

applications such as holding pressure (including vacuum).

- **Not suitable for use as an emergency shutoff valve**

This mechanical valve is not designed for safety applications such as an emergency shutoff valve. If the valves are used for the mentioned applications, additional safety measures should be adopted.

4 How to Order

Refer to drawings/catalogue for 'How to Order'.

5 Outline Dimensions (mm)

Refer to drawings/catalogue for outline dimensions.

6 Maintenance

General Maintenance

Warning

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

7 Limitations of Use

Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

- VM100-A series valves may not be closed only by load pressure, if the spring that closes the valve is damaged.

- VM200A series valves do not close, if the spring that closes the valve is damaged.

8 Contacts

Refer to www.smcworld.com for contacts.

SMC Corporation

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