

ORIGINAL INSTRUCTIONS

Instruction Manual Micro Mechanical Valve Series VM1000



The intended use of this product is to be used in pneumatic control circuits to transmit signals at the short parts of long piping for machining tools or general industrial machinery.

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.

¹⁾ 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: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

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

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- 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 Standard enecifications

2.1 Standard specifications			
Valve type	N. C. poppet		
Number of ports	2 or 3		
Piping	Side or bottom ported		
Fluid	Air		
Filtration [µm]	5		
Operating pressure [MPa]	0 to 0.8		
Ambient and fluid temperature [°C]	-5 to 60 (no freezing)		
Flow characteristics	Refer to catalogue		
Fitting	With hose nipple		
Minimum operating frequency	Once every 30 days		
Maximum operating frequency	1 per second		
Lubrication	Not required (If lubricated, use turbine oil Class 1 ISO VG32)		
Impact resistance [m/s ²] Note 1)	1000		
Vibration resistance [m/s ²] Note 2)	50 (0.35mm)		
Mounting orientation	Unrestricted		
Weight	Refer to catalogue		
Total travel (T.T.) [mm]	4.8		
Table 1.			

Note 1) Two axes (horizontal and vertical) and two directions were tested 3 times and no malfunction of the valve occurred (pulse shape: sine shape).

2 Specification - continued

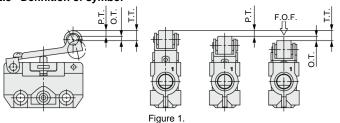
Note 2) No malfunction occurred in a sweep cycle test between 10 to 150 Hz at vibration sweep 0.35mm. The test was performed in the two axes and two directions, 7 min per cycle (20 cycles).

2.2 Semi-standard specification

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Total travel (T. T.) [mm]	2.5
Table 2.	

Note) Only available for 'Basic' actuator type.

2.3 Definition of symbol



Note) Figure shows VM100 series.

- F.O.F (Full operating force): Required force to total travel position.
- 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.

A Caution

Refer to catalogue for F.O.F., P.T., O.T. and T.T. values.

2.4 ON/OFF position of the "toggle lever" option

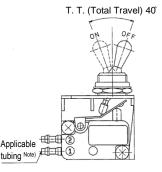


Figure 2.

Note) Refer to catalogue for applicable tubing.

2.5 Pneumatic symbol

Refer to catalogue for pneumatic symbol.

2.6 Special products

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Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

3.1 Installation

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

3.2 Environment

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- 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.

3 Installation - continued

- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- Do not use in high humidity environment where condensation can occur.

3.3 Piping

A 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 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

3.4 Lubrication

A 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.

3.5 Air supply

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 Use clean air. If the compressed air supply includes chemicals, synthetic materials (including organic solvents), salinity, corrosive gas etc., it can lead to damage or malfunction.

A Caution

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

3.6 Mounting

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- Do not perform mechanical operation exceeding the operation limit position. The mechanical valve itself may be damaged leading to equipment malfunction.
- Never perform additional machining such as enlarging the body mounting holes as it could lead to unexpected abnormal conditions

such as air leakage.

3.6.1 Stroke range

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Operate the mechanism within the stroke range given below

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Actuator		Actuator stroke [mm]		
Basic	T.T. = 4.8 mm	3.7 to 4.7		
	T.T. = 2.5 mm	2.2 to 2.4		
Roller lever		3.5 to 4.4		
One way roller lever		3.5 10 4.4		

Table 3.

3.6.2 Cam and dog angle and maximum speed

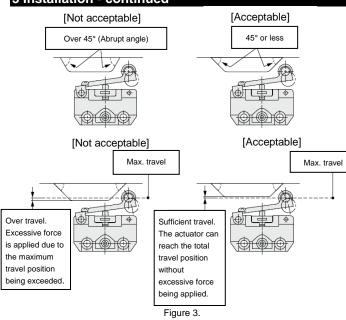
Actuator type	Angle limit of cam and	Max. speed limit of	
Actuator type	dog	cam and dog [m/s]	
Roller lever,	30°	0.7	
One way roller lever	45°	0.3	
Table 4.			

3.7 Operation

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

3 Installation - continued



Note) Figure shows VM100 series.

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	
Table 5				

⚠ 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.

4 How to Order

Refer to catalogue for 'How to Order'.

5 Outline Dimensions

Refer to catalogue for outline dimensions.

↑ Caution

Dimensions of the roller lever type may exceed the values specified in the catalogue if the roller lever is positioned in any direction other than upwards, due to the design of the lever.

6 Maintenance

6.1 General maintenance

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 To prevent unexpected movements of the pneumatic actuator, the user shall consider the state of the valve before conducting maintenance. Additional consideration shall be given when the valve is held in the ON position by an external mechanism such as cam, lever, etc., or in the case that locking type valve actuators are used.

Caution

- 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.

6 Maintenance - continued

- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

6.2 How to change buttons on push button type - VM1000-□-32□



- To remove the button, turn it anticlockwise.
- Tighten it by turning the button clockwise.
- Refer to catalogue for part numbers of buttons and cover for push button.

7 Limitations of Use

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The system designer should determine the effect of the possible failure modes of the product on the system.

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

7.2 Effect of energy loss on valve switching

Valves with locking type actuators or valves operated by an external mechanism such as cam, lever, etc., remain in the ON position even when the energy source is interrupted. If the air supply is reconnected again, e.g. after maintenance, it may behave unexpectedly.

7.3 Holding of pressure

Since valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a system.

7.4 Safety related applications

This product shall not be used as an emergency shut-off valve or as any part of an emergency stop circuit.

A Caution

7.5 Low temperature operation

Unless otherwise indicated in the specifications for each valve, operation is possible to -5 °C, but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

8 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

9 Contacts

Refer to <u>www.smcworld.com</u> or <u>www.smc.eu</u> for your local distributor/importer.

SMC Corporation

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