SMC ORIGINAL INSTRUCTIONS

Instruction Manual

Micro Mechanical Valve

VM1000 Series

This product is used as a valve 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: 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 electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations
- Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

2 Specifications

2.1. Standard specifications

Valve type	N. C. poppet
Number of ports	2 or 3
Piping	Side or bottom ported
Fluid	Air/inert gas
Filtration	5 µm
Operating pressure	0 to 0.8 MPa
Ambient and fluid temperature	-5 to 60 ˚C (No freezing)
Fitting	With hose nipple
Minimum operating frequency	Once every 30 days
Maximum operating frequency	1 per second
Impact resistance[NOTE 1]	1000 m/s^2
Vibration resistance[NOTE 2]	50 m/s^2 (0.35mm)

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 Specifications - continued

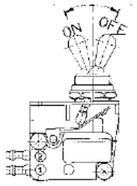
NOTE 2) No malfunction occurred in a sweep cycle test between 10 to 150 Hz at vibration sweep 0.35mm. The test was performed in the two axes and two directions, 7 min per cycle (20 cycles).

2.2. Semi-standard specification

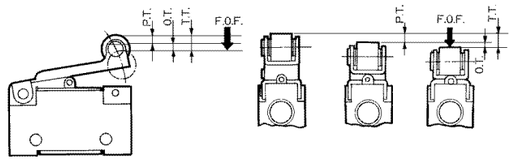
Total travel (T. T.)	2.5 mm (Basic)
*T. T. 2.5 mm is available for basic style only	

2.3. ON/OFF position of the "toggle lever "option

T. T. (Total Travel) 40˚



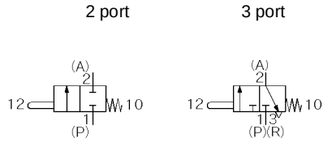
2.4 Definition of symbol



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.

2.5 Pneumatic circuits and full operation forces

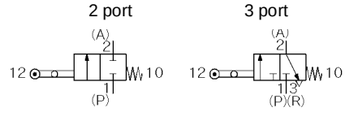
2.5.1 Side ported Basic



		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Side ported	3 port	VM1000-4N-00	VM1000-4NU-00
	2 port	VM1100-4N-00	VM1100-4NU-00
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm (2 mm)	
O.T.		2.3 mm (0.5 mm)	
T.T.		4.8 mm (2.5 mm)	

( ) : T.T. = 2.5mm

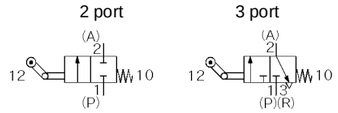
2.5.2 Side ported Roller lever



		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Side ported	3 port	VM1000-4N-01	VM1000-4NU-01
	2 port	VM1100-4N-01	VM1100-4NU-01
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm	
O.T.		2 mm	
T.T.		4.5 mm	

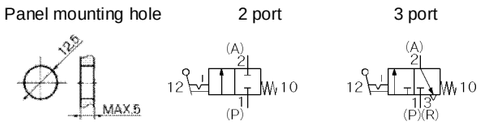
2 Specifications - continued

2.5.3 Side ported One way roller lever



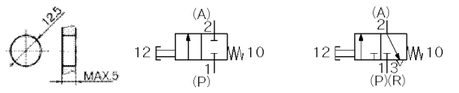
		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Side ported	3 port	VM1000-4N-02	VM1000-4NU-02
	2 port	VM1100-4N-02	VM1100-4NU-02
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm	
O.T.		2 mm	
T.T.		4.5 mm	

2.5.4 Side ported Toggle lever



		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Side ported	3 port	VM1000-4N-08	VM1000-4NU-08
	2 port	VM1100-4N-08	VM1100-4NU-08
F.O.F		4 N (0.5 MPa supply)	
P.T.		40˚	

2.5.5 Side ported Push button



		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Side ported	3 port	VM1000-4N-32(R,B,G)	VM1000-4NU-32(R,B,G)
	2 port	VM1100-4N-32(R,B,G)	VM1100-4NU-32(R,B,G)
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm	
O.T.		2 mm	
T.T.		4.5 mm	

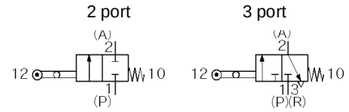
2.5.6 Bottom ported Basic

		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Bottom ported	3 port	VM1010-4N-00	VM1010-4NU-00
	2 port	VM1110-4N-00	VM1110-4NU-00
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm (2 mm)	
O.T.		2.3 mm (0.5 mm)	
T.T.		4.8 mm (2.5 mm)	

( ) : T.T. = 2.5mm

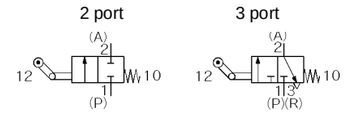
2 Specifications - continued

2.5.7 Bottom ported Roller lever



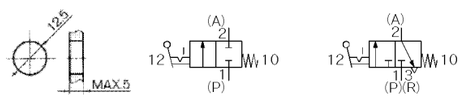
		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Bottom ported	3 port	VM1010-4N-01	VM1010-4NU-01
	2 port	VM1110-4N-01	VM1110-4NU-01
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm	
O.T.		2 mm	
T.T.		4.5 mm	

2.5.8 Bottom ported One way roller lever



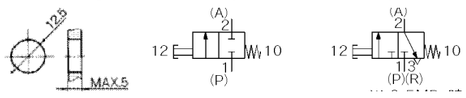
		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Bottom ported	3 port	VM1010-4N-02	VM1010-4NU-02
	2 port	VM1110-4N-02	VM1110-4NU-02
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm	
O.T.		2 mm	
T.T.		4.5 mm	

2.5.9 Bottom ported Toggle lever



		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Bottom ported	3 port	VM1010-4N-08	VM1010-4NU-08
	2 port	VM1110-4N-08	VM1110-4NU-08
F.O.F		4 N (0.5 MPa supply)	
P.T.		40˚	

2.5.10 Bottom ported Push button



		Applicable tubing	
		T0425	TU0425, T0403, TS0425
Bottom ported	3 port	VM1010-4N-32(R,B,G)	VM1010-4NU-32(R,B,G)
	2 port	VM1110-4N-32(R,B,G)	VM1110-4NU-32(R,B,G)
F.O.F		6 N (0.5 MPa supply)	
P.T.		2.5 mm	
O.T.		2 mm	
T.T.		4.5 mm	

3 Installation

⚠ Warning

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

3.1 Mounting

- **Ensure sufficient space for maintenance activities.**

When installing the products allow access for maintenance.

- **Mechanical Operation Conditions**

Do not perform mechanical operation exceeding the operation limit position. The mechanical valve itself may be damaged leading to equipment malfunction.

- **Operating stroke range**

Please set the mechanical operation stroke within the range shown by the formula below. Do not move beyond the operating limit position).
Operating Stroke Range: (P.T.＋0.5×O.T.)～(P.T.＋O.T.－0.1)

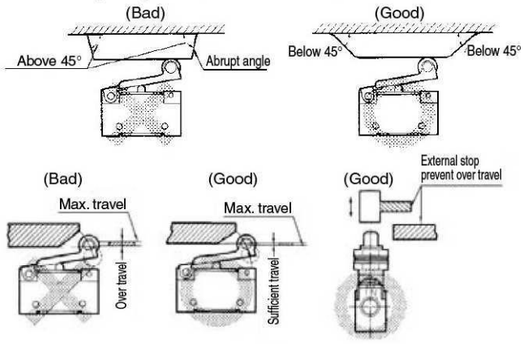
Series	Actuator		Actuator stroke (mm)
VM1000	Basic	T.T. = 4.8 mm (T.T. = 2.5 mm)	3.7 to 4.7 (2.2 to 2.4)
	Roller lever		3.5 to 4.4
	One way roller lever		3.5 to 4.4

- **Maximum speed and angle for cam or dog**

Select the maximum speed and angle for the mechanical operation cam or dog from the table below. If used outside of the instructed ranges, impact force may be applied to the actuator by the cam or dog, resulting in product damage.

Series	Actuator	Angle limit switch actuator	Max. speed limit switch actuator (m/s)
VM1000	Roller lever	30°	0.7
		45°	0.3
	One way roller lever	30°	0.7
		45°	0.3

Avoid abrupt angles on limit switch actuator.



- **Cam and dog material**

Roller material	Plunger material	Plunger surface finish
Polyacetal	Steel	Rz6.3

3.3. Operating Environment

⚠ Warning

- Use only with air or inert gas.
- 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 in excess if product specifications.

3 Installation - continued

- Do not mount in a location exposed to radiant heat.
- Avoid using the product in environments where dust or liquids such as oil, coolants or water may come into contact with the product. As this product is not water or dust proof, liquids or dust could enter the valve leading to product malfunction. Prevent direct contact from water droplets by mounting a protective cover.

3.4. Piping

⚠ Caution

- Before 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.
- Cut the tube perpendicularly to the required length. Please use a TK-1, 2 or 3 tube cutter. Allow a margin of length when cutting the tubing.
- Insert the tube up to the hub end. Air leakage or tube detachment may be caused by only inserting the tube in half way.

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.

4 How to Order

Refer to catalogue for 'How to Order'.

5 Outline Dimensions (mm)

Refer to catalogue for outline dimensions.

6 Maintenance

6.1 General Maintenance

⚠ Caution

* Perform inspections on a regular basis as necessary, such as at the beginning of an operation, to make sure that the mechanical valve operates properly. 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.
* To replace the push button and push button cover alone, refer to section 6.2. Other parts and actuator cannot be replaced.

6.2 Replacement parts

To order a single push button for series VM1000 and a single cover use the part number below.

Colour	Mushroom button	Extended button
Red	3410701-R	3410703 (white only)
Black	3410701-B	
Green	3410701-G	

7 Limitations of Use

7.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

- Do not make any additional machining to enlarge the body mounting holes. This may result in abnormalities such as air leakage.
- Operate all manual valves such as the push button, selector and flip toggle types with your finger. Use of hammers or mechanical methods such as cylinders may result in damage.

8 Contacts

Refer to www.smcworld.com for contacts.

SMC Corporation

URL : http// www.smcworld.com (Global) http// www.smceu.com (Europe)
'SMC Corporation, Akihabara UDX15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101 0021
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