VZM-SMW41EN

SMC

Instruction Manual

Mechanical Valve VZM500 Series

The intended use of this product is to control the movement of an actuator.

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 work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

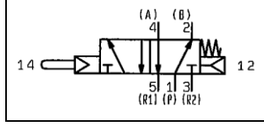
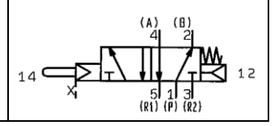
2 Specifications

	Internal pilot	External pilot	
Fluid	Air and inert gas		
Operating pressure	0.15 to 0.7 MPa	Main valve	0 to 0.7 MPa
		Pilot pressure	0.15 to 0.7 MPa
Operating temperature	-5 to 60 C (No freezing)		
Lubrication	Unnecessary / If lubricated, use turbine oil, (ISO VG32)		
Port size	Main valve 1/8		
	Pilot valve (EXH.) M5x0.8		
Options	Foot bracket Note1)		
Construction	Elastic spool		
Weight	110g (Basic type)		
Air quality	5μm or less		
Shock Note 2	1000 m/s^2		
Vibration Note 3	50 m/s^2 (0.35mm)		

2 Specifications - continued

Note1) The configuration of the body with foot bracket is special. Bracket cannot be added afterwards.
Note 2) 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 3) 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)

- **Symbols**

Internal pilot	External pilot
	

3 Installation

3.1 Installation

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.
- **If air leakage increases or the equipment does not operate properly, stop operation.**
- Do not move the mechanical operation beyond the operating limit position.

  This could damage the mechanical valve itself and lead to equipment malfunction. Refer to Mechanical Operating Conditions on Page 13 of this Operation Manual.

  Never perform additional machining such as enlarging the body mounting hole. Scratches or dust may result in air leakage.

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 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.
- If there is a lot of dust, install a silencer onto the exhaust port of the valve to prevent the dust from entering the valve.
- Avoid using in a location where it could be splashed by liquids such as oils, coolant and water, and dust.

3.3 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 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.
- Tightening Torque for applicable piping

Connection screw	Appropriate tightening torque (Nm)	For reference
M5	1 to 1.5	First, tighten it by hand, then give it an additional approximately 1/6 to 1/4 turn with the wrench.
1/8	7 to 9	Add 2 to 3 turns using a tightening tool after tightening by hand.

- Tighten with an appropriate wrench, using the hexagonal face of the fitting.

  Use the root nearest the thread when tightening with a wrench. Tightening with a wrench of the wrong size, or too close to the tube side, may cause damage or deformation of the fitting. After mounting, check that the fitting is not damaged or deformed.

  Note) Excessive tightening may damage the thread, or deform the gasket, causing air leakage.

3 Installation - continued

If the sealant comes out, remove the excess.
Insufficient tightening may loosen the thread or cause air leakage

- Reuse

  Normally, the fittings with sealant can be reused 2 to 3 times. Remove loose sealant stuck to the fitting by blowing air over the threaded portion of the fitting before reusing. If the loose sealant enters adjacent machinery, it may cause air leakage or malfunction.

3.4 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 Operation

- Operate all manual mechanical valves with your finger.
  If equipment such as a cylinder, cam or hammer is used, the mechanical valve will be damaged, which may result in malfunction of the equipment.
- Select the angle and the maximum speed of the operating cam and the dog of the mechanism so that they do not exceed the maximum values. This could damage the mechanical valve itself and lead to equipment malfunction.
- After operating for a long time, it will take some time for the valve to restart as the resistance between the seal and the parts increases.
  Please consult SMC if the operating condition is maintained for a long period of time.

4.1 Operating force

Full operating force increases according to the increase of the supply pressure.

Full operating force for each product type can be found by the formula below.

F1: Full operating force at 0.5MPa of the product type (F.O.F)
F2: Full operating force at supply pressure found from Fig.1

$$F(N) = \frac{F_1(N)}{\quad} \cdot F_2$$

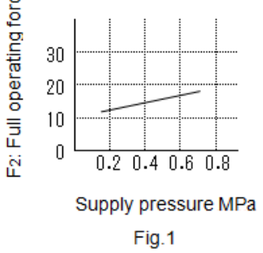
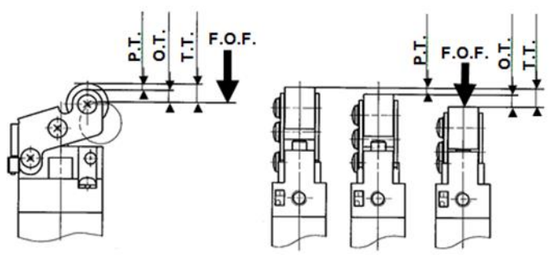


Fig.1

4.2 Mechanical operating conditions

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.

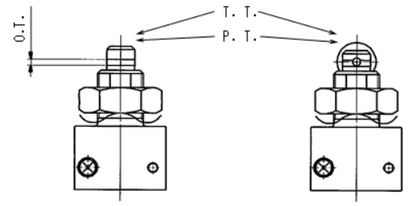


4 Operation - continued

Actuator type	F.O.F.at 0.5 MP [N]	P.T. [mm]	O.T. [mm]	T.T.	Stroke range P.T.+(0.5~0.95)×O.T. [mm]
Basic style	16	1	2	3 mm	2.0 to 2.9
Roller lever	8	2.2	4	6.2 mm	4.2 to 6.0
One way lever	7	2.4	4.6	7 mm	4.7 to 6.7
Straight plunger	18	1.5	2	3.5 mm	2.5 to 3.4
Roller plunger	18	1.5	2	3.5 mm	2.5 to 3.4
Flip toggle	15	—	—	40°	—
Mushroom button	21	4.8	1.7	6.5 mm	—
Flat head button	21	4.8	1.7	6.5 mm	—
Flat button	21	4.8	1.7	6.5 mm	—
Selector (2 position)	23	—	—	90°	—
Key selector (2 position)	26	—	—	90°	—
Push-pull	20	—	—	2.7 mm	—

Note 1. Representative values are shown here. P.T. depends on pressure or individual difference between products. Keep the mechanical operating stroke value within the range of values obtained by calculation in the table to close the value securely.

Note 2. Do not move more than operation limit (T.T.). The plunger type rod has grooves as guidelines for P.T. and T.T.



4.3 Angle and maximum speed limit for cam and dog

Actuator	Dog angle	Max. speed limit for dog
Roller lever	30°	1.5
	45°	0.7
One way roller lever	30°	0.7
	45°	0.3
Straight plunger	-	0.4
Roller plunger	30°	0.7

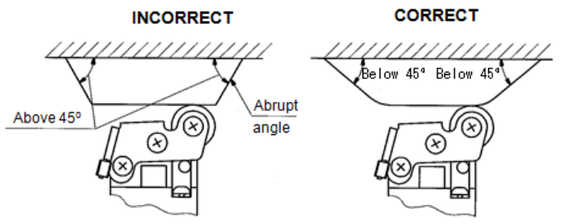
4.4 Cam and dog materials

Roller material	Dog material	Finish accuracy for dog
Polyacetal	Metal	Rz3.2 or less
Hard steel	Metal, resin	Rz12.5 or less

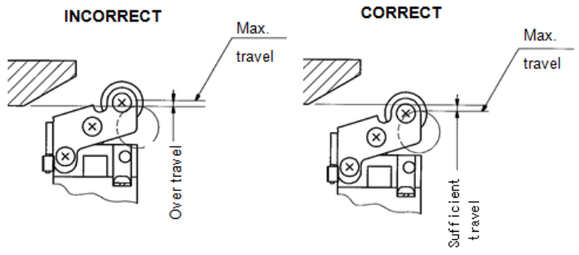
4 Operation - continued

4.5 Operation mechanism and configuration

(1) Avoid acute angles on limit switch actuator.



(2) Do not move more than max. travel



5 How to Order

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

6 Outline Dimensions (mm)

Refer to drawings/catalogue for outline dimensions.

7 Maintenance

7.1 General Maintenance

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.
- Perform inspection on a regular basis as necessary, such as at the beginning of operation, to make sure that the mechanical valve operates properly.
- 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.

8 Limitations of Use

8.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

- Cannot be used for sealing pressure.
  This product cannot be used for an application in which the pressure must be sealed because there will be a slight leakage.
- Not suitable for use as an emergency shutoff valve, etc.
  The mechanical valves are not designed for safety applications such as an emergency shutoff valve.

8 Limitations of Use - continued

If the valves are used for the mentioned applications, additional safety measures should be adopted.

- This product cannot be pressurized backwards.
  Air pressure cannot be supplied from the OUT port.
- This product cannot be used with negative pressure.
  Please keep the operating pressure within the specification range.
- It is possible to select N.C. or N.O. specification
  The product can be used as a 3 port valve normal closed (N.C.) by plugging B port, and normal open (N.O) by plugging A port. Do not plug the exhaust ports (EXH.1 or EXH.2) during use.
- When there is an orifice at the exhaust, do not use the product in a sealed condition.

9 Contacts

Refer to Declaration of Conformity and www.smcworld.com for contacts.

SMC Corporation

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