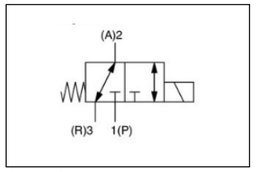
VT317-TF2Z402EN

ORIGINAL INSTRUCTIONS

Instruction Manual

3 Port Solenoid Valve Direct Operated Poppet type

Series (E)VT317/VO317



The intended use of this product is to control compressed air or vacuum in pneumatic industrial automation systems and 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: 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**	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.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

⚠ Caution

- The product is provided for use in manufacturing industries only. Do not use in residential premises.

2 Specifications

2.1 Valve Specifications

Valve configuration	Rubber seal
Actuation	Direct operated type 2 position single solenoid
Fluid	Air
Operating pressure range	0 to 0.9 MPa
Ambient and fluid temperature	-10 °C to 50 °C (No freezing)
Response time Note 1)	30 ms or less (0.5 MPa)
Min. operating frequency	1 cycle / 30 days
Max. operating frequency	10 Hz
Duty cycle	Contact SMC
Flow characteristics	Refer to SMC catalogue
Lubrication	Not required (See section 3.4)
Manual override	Non-locking push style
Mounting orientation	Unrestricted
Impact / Vibration resistance Note 2)	150 / 50 m/s^2

2 Specifications - continued

Enclosure (based on IEC60529)	Grommet (G, H), Conduit (C)	IP40 equivalent
	Conduit terminal (T), DIN terminal	IP50 equivalent
Weight [kg]		(E)VT317: 0.29 / (E)VO317: 0.32

Table 1

Notes:

Note 1) Based on dynamic performance test JIS B8374-1981. (Coil temperature 20 °C, at rated voltage, without surge voltage suppressor.)

Note 2) Impact resistance: No malfunction resulted from the impact test using a drop impact tester. The test was performed on the axis and right angle directions of the main valve and armature, for both energized and de-energized states (Values quoted are for a new valve).

Vibration resistance: No malfunction occurred in a one sweep test between 45 and 1000 Hz. Test was performed at both energized and de-energized states to the axis and right angle directions of the main valve and armature. (Values quoted are for a new valve).

2.2 Solenoid Specifications

Electrical entry			Grommet, conduit, conduit terminal, DIN terminal
Coil rated voltage (V)	AC (50/60 Hz)		100, 200, 110, 220, 240
	DC		12, 24
Allowable voltage fluctuation			-15 to +10% of rated voltage Note 1)
Apparent power Note 2)	AC	Inrush	19 VA (50 Hz), 16 VA (60 Hz)
		Holding	11 VA (50 Hz), 7 VA (60 Hz)
Power consumption Note 2)	DC		Without light: 6 W, With light: 6.3 W
Indicator light and surge voltage suppressor	AC		ZNR (Varistor), Neon lamp
	DC		ZNR (Varistor), LED (Neon lamp for 100 V or more)

Table 2

Notes:

Note 1) Valve state is not defined if electrical input is outside the specified operating range.

Note 2) At rated voltage.

2.3 Continuous Duty Type: (E)VT/VO317E

- Exclusive use of (E)VT/VO317E is recommended for continuous duty with long ON time.

⚠ Caution

- This model is for continuous duty, not for high cycle rates. But even in low cycle rates, if energizing the valve more than once a day, consult SMC.
- De-energize solenoid at least once every 30 days.

2.4 Vacuum Type: (E)VT/VO317V

- This vacuum model has less air leakage than the standard model under low pressure. It is recommended for vacuum applications.

⚠ Caution

- Since this valve has slight air leakage, it cannot be used for vacuum holding (including positive pressure holding) in the pressure container.

2.4.1 Specification different from standard

Operating pressure range	-101.2 kPa to 0.1 MPa (Vacuum type)

Table 3

2.5 Indicator light

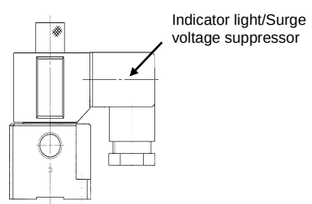


Figure 1: Example of (E)VT317-*DZ

2.6 Special products

⚠ Warning

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

3 Installation

3.1 Installation

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.
- It is possible to install the valve in the open or closed position. Therefore, pay careful attention to the following information:
  Normally closed means that there is no output from port "A" when pressure is connected to port "P" and the solenoid is de-energised.
  Normally open means that there is an output from port "A" when pressure is connected to port "R" and the solenoid is de-energised.

⚠ Caution

Ensure all air and power supplies are isolated before commencing installation.

3.2 Environment

⚠ Warning

- Do not use in an environment where corrosive gases, chemicals, saltwater 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.
- Do not use in high humidity environment where condensation can occur.
- Do not use near water or product malfunction or performance change may occur.
- Contact SMC for altitude limitations.

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 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Port	Connection thread size (R, NPT)	Tightening Torque [N·m]
1 (P), 2 (A), 3 (R)	1/8	3 to 5
	1/4	8 to 12
	3/8	15 to 20

Table 4

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.

3.5 Air supply

⚠ Warning

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.

⚠ Caution

Install an air filter

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

3.6 Bleed port

⚠ Caution

1. The bottom of the solenoid valve has a breather hole for the main valve. Take proper measures to prevent this hole from being blocked as this will lead to a malfunction.

* Ordinarily, when the solenoid valve is mounted on a metal surface, it can breathe through the breather hole, via the breather groove. However, in particular, if the surface to be mounted is made of rubber, the rubber could deform and block the hole.

2. Take proper measures to prevent dust or foreign matter from entering through unused ports. The grommet portion contains a breather hole for the core. Take proper measures to prevent dust or foreign matter from accumulating in this area.

3 Installation - continued

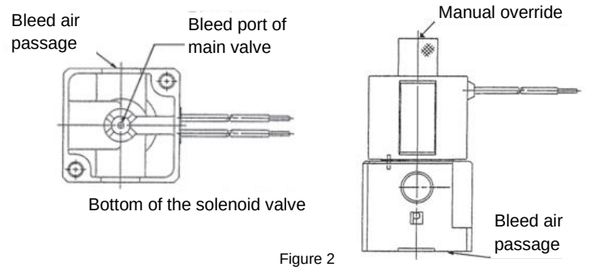


Figure 2

3.7 Light/Surge voltage suppressor

Surge suppression should be specified by using the appropriate part number. If a valve type without suppression is used (Type 'Nil'), suppression must be provided by the host controller.

3.7.1 With indicator light and surge voltage suppressor (Z)

AC	DC
Conduit terminal (T) DIN terminal (D)	

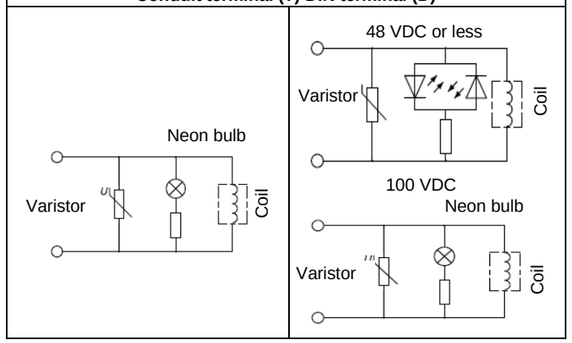


Figure 3

Note) Non polar type valves.

3.7.2 With surge voltage protection circuit (S)

AC	DC
Grommet (G) Conduit (C)	Grommet (G) Conduit (C)
Conduit terminal (T) DIN terminal (D)	Conduit terminal (T) DIN terminal (D)

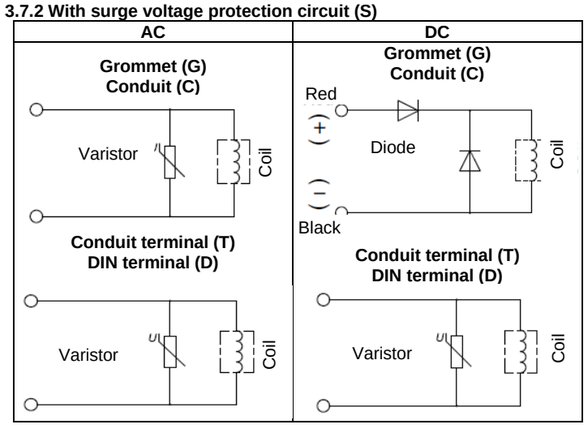


Figure 4

Note) Non polar type valves except DC grommet and conduit.

3.8 Residual voltage

⚠ Caution

If a surge protection circuit contains non-ordinary diodes such as zener diodes or varistor, a residual voltage will remain that is in proportion to the protective elements and the rated voltage.
Therefore, give consideration to surge voltage protection of the controller.
In the case of diodes, the residual voltage is approximately 1 V.
Contact SMC for the varistor's residual voltage.

3 Installation - continued

3.9 Countermeasure for surge voltage

Caution

At times of sudden interruption of the power supply, the energy stored in a large inductive device may cause non-polar type valves in a de-energised state to switch.
When installing a breaker circuit to isolate the power, consider a valve with polarity (with polarity protection diode), or install a surge absorption diode across the output of the breaker.
Refer to Specific Product Precautions in the catalogue for more details.

3.10 Connector for DIN terminal

Refer to the Operation Manual for details.

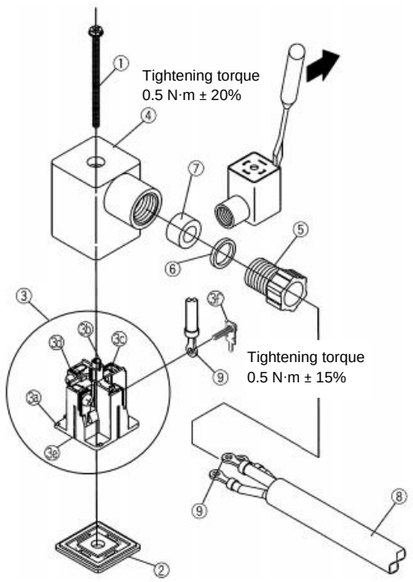


Figure 5

3.11 Inside wiring DIN connector

DIN terminal and conduit terminal (with indicator light/surge voltage suppressor) are wired internally as shown below. Connect each of the wires to the corresponding wire of the power supply.

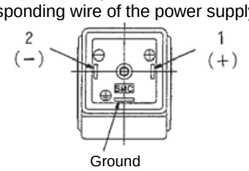


Figure 6

- Applicable cable O.D.: ø6 to ø12

Note) For those with an external measurement of ø9 to ø12, remove the inner portion of the ground gasket before using.

- Applicable crimping terminal:

The maximum size for the round terminal is 1.25 mm^2 -3.5 and for the Y terminal is 1.25 mm^2 – 4.

3.12 Change of electrical entry angle

Series (E)VT317 can change electrical entry angle (4 positions).

How to change it: Loosen nut ①, remove coil ② from the body assembly ③, place positioning pin ④ at the required place, put back coil ② to its place and tighten sufficiently with lock nut ①.

3 Installation - continued

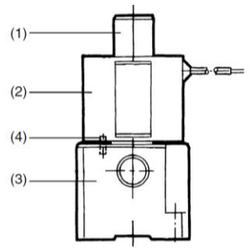


Figure 7

3.13 Lead wire colour (Grommet)

Voltage	Colour
100VAC	Blue
200VAC	Red
DC	Red (+), Black (-)
Others	Grey

Table 5

3.14 Extended periods of continuous energization

Caution for high temperature

Be aware that the valve surface may get hot.

Caution

- If a valve is energized continuously for a long period of time, the rise in temperature due to heat rise of the coil assembly may cause a decline in solenoid valve performance, reduce service life, or have adverse effects on peripheral equipment.
- If the valves are energized continuously for a long time, switch the valve at least once every 30 days and the operating time should not exceed 1400 hours (equivalent to 2 months) per year.
- If the operating time exceeds 1400 hours, use a continuous duty type valve ((E)VT317E).
- Note that the valve should be switched at least once every 30 days in this case.
- If the valve is used for special applications, please contact your SMC sales representative.
- When solenoid valves are mounted in a control panel, employ measures to radiate excess heat, so that temperatures remain within the valve specification range. Use special caution when three or more stations sequentially aligned on the manifold are continuously energized since this will cause a drastic temperature rise.

3.15 Manifold

Warning

When mounting a valve on the manifold base, N.C. and N.O. can be selected by the function plate orientation. Also, since the cylinder operates in reverse, confirm that the function plate is correctly mounted.

Caution

- Ensure gaskets are in good condition, not deformed and are dust and debris free.
- When mounting valves ensure gaskets are present, aligned and securely in place and tighten screws to a torque of 1.4 N·m.

Caution

1. Each valve is fixed to the manifold base with two M4 mounting screws. Tighten the screws firmly when re-mounting.
2. For mounting, tighten M4, or equivalent screws, evenly to the manifold base.

3.16 Changing from N.C. to N.O. (Manifold)

Caution

Universal porting permits convertibility N.C./N.O. by a simple 180 degree rotation.
Mounting conditions for N.C. and N.O. are indicated below.

3 Installation - continued

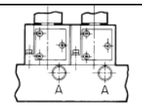
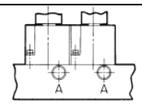
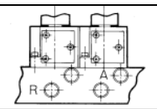
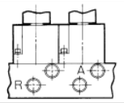
Valve / External port type	N.C.	N.O.
Common exhaust		
Individual exhaust		

Figure 8

Note: This product is delivered as N.C. valve. If N.O. valve is needed, remove mounting screws of the required valve and turn over the valve 180 degrees. (Ensure that there are O-rings fixed on 4 positions of the valve surface). Then, tighten the mounting screws to fix the valve to the manifold.

3.17 Effect of back pressure when using a manifold

Use caution when valves are used on a manifold, because an actuator may malfunction due to back-pressure.
For single acting cylinder take appropriate measures to prevent malfunction by using it with an individual exhaust manifold.

3.18 Manual Override

Warning

Regardless of an electric signal for the valve, the manual override is used for switching the main valve. Since connected equipment will operate when the manual override is activated, confirm that conditions are safe prior to activation.

Warning

Locked manual overrides might prevent the valve responding to being electrically de-energised or cause unexpected movement in the equipment.
Refer to the catalogue for details of manual override operation.

4 How to Order

4.1 Standard products

Refer to catalogue for ‘How to order’ information.

4.2 Special products

For special products (-X number) refer to product drawing for ‘How to order’ details and specifications.

5 Outline Dimensions (mm)

Refer to catalogue for outline dimensions.

6 Maintenance

6.1 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.
- 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.
- Operate the valve at least once every 30 days.

7 Limitations of Use

Warning

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.

Warning

Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue.

Caution

7.2 Leakage voltage

Ensure that any leakage current, when the switching element is OFF, meets the following limits:
DC coil: 2% or less of rated voltage
AC coil: 20% or less of rated voltage

7.3 Low temperature operation

Unless otherwise indicated in the specifications for each valve, operation is possible to -10°C, but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

7.4 Mounting orientation

Mounting orientation is universal.

7.5 Safety relay or PLC

Warning

If a safe output from a safety relay or PLC is used to operate this valve, ensure that any output test pulse duration is shorter than 1 ms to avoid the valve solenoid responding.

7.6 Return of the spool to the de-energised position

Warning

When electricity is cut, the spool valve returns to the de-energised position by spring force.

7.7 Cannot be used as an emergency shut-off valve

Warning

This product is not designed for safety applications such as an emergency shut-off valve. If the valves are used in this type of system, other reliable safety assurance measures should be adopted.

7.8 Holding of pressure

Warning

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

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 www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

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