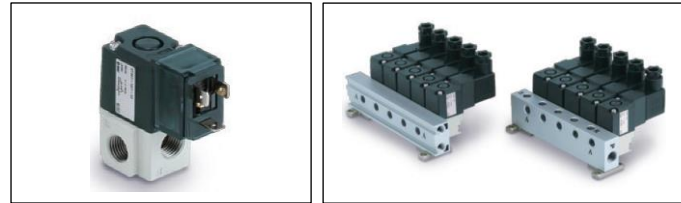




ORIGINAL INSTRUCTIONS

**Instruction Manual**  
**3 Port Solenoid Valve**  
**Direct operated Poppet Type**  
**Series VT307/VO307-1**



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) <sup>(1)</sup>, and other safety regulations.  
<sup>(1)</sup> 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.

<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>Danger</b>	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 VT307/VO307(K) valve specifications**

Type of actuation	Direct operated 2 position single solenoid
Fluid	Air
Operating pressure range [MPa]	0 to 1 (High-pressure type), 0 to 0.7 (Standard type)
Ambient and fluid temperature [°C]	-10 to 50 (No freezing)
Response time [ms] <sup>Note 1)</sup>	≤20 (at 0.5 MPa)
Max. operating frequency [Hz]	10
Min. operating frequency	1 cycle / 30 days (see section 2.3, 3.16)
Lubrication	Not required (See section 3.)
Manual override	Non-locking push type
Mounting orientation	Unrestricted
Impact / Vibration resistance [m/s <sup>2</sup> ] <sup>Note 2)</sup>	150 / 50
Enclosure (based on IEC60529)	IP50 equivalent (for DIN terminal)
Duty cycle	Contact SMC (See Section 2.3 and 3.16)
Flow characteristics	Refer to catalogue

Table 1

**2 Specifications - continued**

Note 1) Based on dynamic performance test, JIS B 8374-1981. (Coil temperature: 20°C, at rated voltage, without surge voltage suppressor).

Note 2) **Impact resistance:** No malfunction occurred when it was tested with a drop tester in the axial direction and at right angles to the main valve & armature; in both energized & de-energised states and for every time in each condition (Values at the initial period).  
**Vibration resistance:** No malfunction occurred in a one-sweep test between 45 and 1000 Hz. Tests was performed at both energized and de-energized states in the axial direction and at right angles to the main valve & armature. (Valves at the initial period).

**2.2 Solenoid specifications**

Electrical entry	DIN terminal, grommet		
Coil rated voltage [V]	AC (50/60 Hz)	100,200,110,220,240	
	DC	24,12	
Coil insulation class	Contact SMC		
Allowable voltage fluctuation	-15 to 10% of rated voltage <sup>Note 1)</sup>		
Apparent power [VA] <sup>Note 2, Note 3)</sup>	AC	Inrush	12.7 (50Hz), 10.7 (60Hz)
		Holding	7.6 (50Hz), 5.4 (60Hz)
Power consumption [W] <sup>Note 2, Note 3)</sup>	DC	Without indicator light:	4
		With indicator light:	4.2
Light/Surge voltage suppressor	AC	Varistor, LED	
	DC	Diode, LED	

Table 2

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

Note 2) At rated voltage.

Note 3) The value is different for continuous duty type (VT307E) and energy-saving type (VT307Y/W). See below for details.

**2.3 Continuous duty type: VT/VO307E**

VT307E is recommended for continuous duty with long ON time.

**Caution**

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

Specifications different from standard are as follows:

Apparent power AC [VA]	Inrush	7.9 (50Hz), 6.2 (60Hz)
	Holding	5.8 (50Hz), 3.5 (60Hz)
Power consumption DC [W]	1.8, With indicator light: 2	
Response time [ms] <sup>Note)</sup>	≤30 (at 0.5 MPa)	

Table 3

Note) Based on dynamic performance test, JIS B 8374-1981. (Coil temperature: 20°C, at rated voltage, without surge voltage suppressor).

**2.4 Energy saving type: VT/VO307Y (VT/VO307W)**

If low power consumption is required for electronic control, VT307Y(W) (1.8 W) is recommended.

Specifications different from standard are as follows:

Power consumption DC [W]	1.8, With indicator light: 2
Response time [ms] <sup>Note)</sup>	≤25 (at 0.5 MPa)

Table 4

Note) Based on dynamic performance test, JIS B 8374-1981. (Coil temperature: 20°C, at rated voltage, without surge voltage suppressor).

**2.5 Vacuum type: VT/VO307V (VT/VO307W)**

The vacuum model has less air leakage than the standard model under low pressure. It is recommended for vacuum application.

**Caution**

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

Operating pressure range	-101.2kPa to 0.1MPa
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Table 5

**2.6 Pneumatic symbol**

Refer to catalogue for pneumatic symbol.

**2 Specifications - continued**

**2.7 Indicator light**

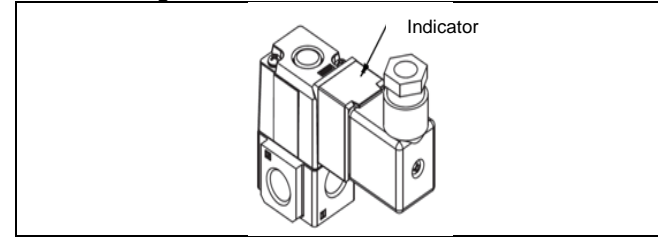


Figure 1

**2.8 Special products**

**Warning**

Special products (-X) 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.

**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.
- Do not use in high humidity environment where condensation can 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.

Connection thread size (R, NPT)	Tightening Torque [N·m]
1/8	3 to 5
1/4	8 to 12

Table 6

**Caution**

For the common-exhaust type, pressurization or evacuation of the 3(R) port can cause a 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.

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

**3 Installation - continued**

**3.6 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.
- Refer to the catalogue for details of manual override operation.

**3.7 Indicator Light/Surge Voltage Suppressor**

**Caution**

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

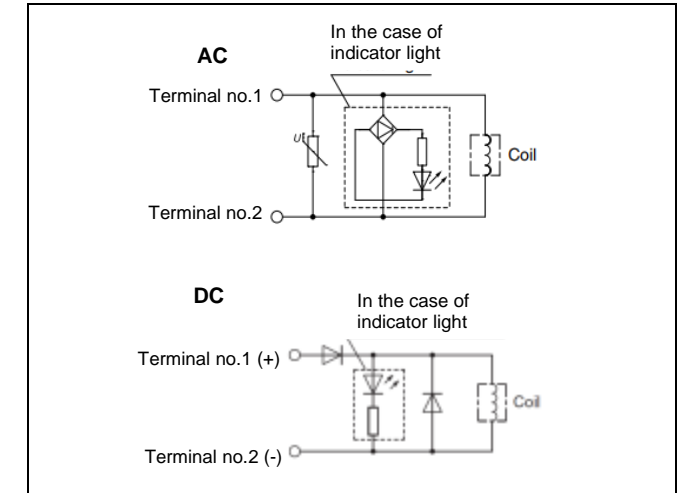


Figure 2

**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.

**3.9 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.

**3.10 Electrical Connection**

**Caution**

DIN terminal is wired internally as shown below. Connect each of the wires to the corresponding wire of the power supply.

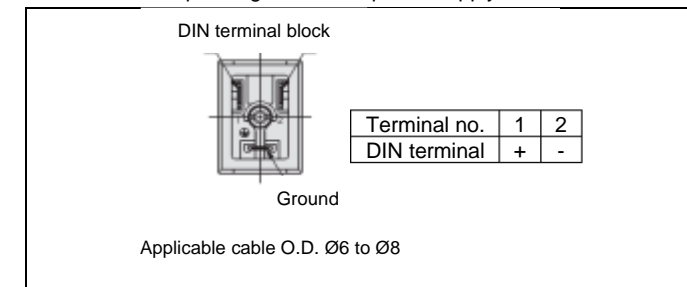


Figure 3

### 3 Installation (continued)

#### 3.11 Lead wire colour (Grommet)

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

Table 7

#### 3.12 Extended periods of continuous energization

##### Caution hot surface

\* Be aware that the valve surface may get hot.

##### Warning

- If the standard and low-power consumption types 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 (VT307E).
- 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.

##### Caution

- 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.

#### 3.13 Operation in a vacuum condition

##### Caution

For operation in a vacuum condition, use VT/VO307V.

Note that if the valve is used in an environment where the product is exposed to a large amount of dust, install a filter to the R port.

If a suction pad is used, install a filter between the suction pad and valve. These valves are not intended as vacuum retaining valves.

#### 3.14 Bracket mounting:

#### VT307

Description	Part no.
Bracket	DXT152-25-1A (with screws)

Table 8

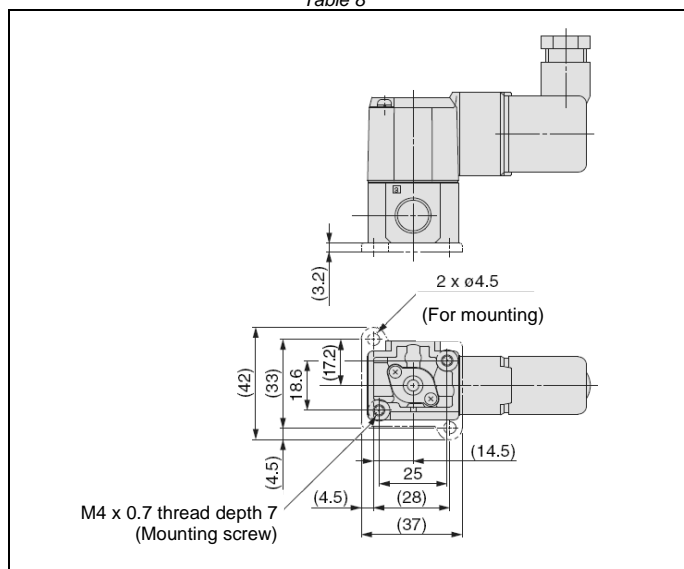


Figure 4

#### 3.15 Manifold mounting

##### 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.

### 3 Installation - continued

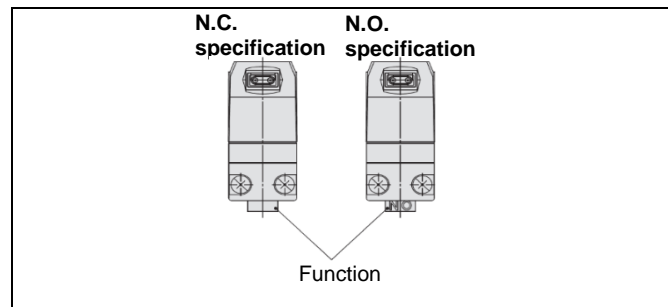


Figure 5

##### 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 M4 screws evenly to a torque of 1.4 N·m.

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

##### Caution

This product is delivered as N.C. valve.

If N.O. valve is required, remove mounting screws of the required valve and turn over the function plate. (Ensure that there are gaskets on both sides of the plate.)

Then, tighten the mounting screws to fix the valve to the manifold base.

Description	Part no.
Function Plate (with gasket)	DXT152-14-1A
	DXT152-14-1B (for 'E' option)

Table 9

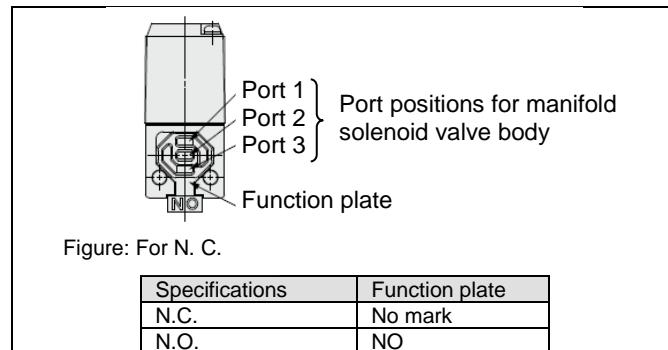


Figure: For N. C.

Figure 6

#### 3.17 How to use DIN Terminal

Refer to Specific Product Precautions in the catalogue for more details.

#### Connector for DIN terminal

Description	Part no.
DIN connector	B1B09-2A (Standard)
	GM209NJ-B17 (CE-compliant)

Table 10

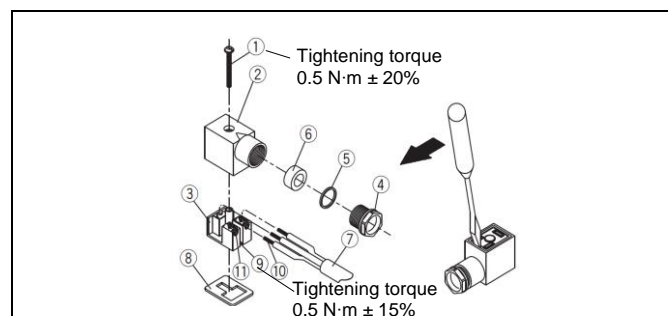


Figure 7

### 3 Installation - continued

##### Warning

The ground terminal is connected to the coil assembly only and does not provide a protective earth for the body of the valve.

#### 3.18 Effect of back pressure when using a manifold

##### Warning

- 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.

### 4 How to Order

Refer to catalogue for 'How to order' or to product drawing for special products.

### 5 Outline Dimensions

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.

#### 6.2 Mounting

##### Caution

- Refer to 3.14 and 3.15 for valve mounting

#### 6.3 Maintainable parts

##### Caution

- Refer to 3.16 and 3.17 for applicable function plate and DIN connector part number.
- Refer to catalogue for how to order mounting screws.

#### 6.3.1 Blanking plate assembly

Description	Part no.
Blanking Plate (with gasket and screws)	DXT060-51-13A
	DXT060-51-13B (for 'E' option)

Table 11

- For blanking off any spare stations on the manifold assembly.
- Assemble blanking plate to manifold block ensuring gasket is present.
- Tighten mounting screws to a torque of 1.4 N·m.

##### Caution

- Take care not to get scratches or dirt etc. on the seals, as this can cause leakage.

### 7 Limitations of Use

##### Warning

System designer should determine the effect of the possible failure states on the system.

#### 7.1 Limited warranty and disclaimer/compliance requirements

##### Caution

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.

### 7 Limitations of use - continued

#### 7.2 Leakage voltage

##### Caution

If a resistor or C-R element is used in parallel with the switching element, ensure that any leakage voltage, due to the leakage current when the switching element is OFF causes  $\leq 3\%$  (for DC coils) or  $\leq 15\%$  (for AC coils) of the rated voltage across the valve.

#### 7.3 Solenoid valve drive for AC with a solid state output (SSR, TRIAC output, etc.)

##### 7.3.1 Current leakage

##### Caution

When using a snubber circuit (C-R element) for surge protection of the output, a very small amount of electrical current will continue to flow even during the OFF state. This results in the valve not returning. In a situation where the tolerance is exceeded, as in the above case, take measures to install a bleeder resistor.

##### 7.3.2 Minimum allowable load amount (Min. load current)

##### Caution

When the consumption current of a valve is less than the output's minimum allowable load volume or the margin is small, the output may not switch normally. Please contact SMC.

#### 7.4 Low temperature operation

##### Caution

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

#### 7.5 Holding of pressure

##### Warning

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

#### 7.6 Cannot be used as an emergency shutoff 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.

#### 7.7 Mounting orientation

Mounting orientation is universal.

##### Danger

This product has variants which can be configured Normally Open (N.O.) or Normally Closed (N.C.). The user is responsible for ensuring that all necessary measures are taken to prevent foreseeable misuse.

#### 7.8 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.

#### 7.9 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.

### 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](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for your local distributor/importer.

## SMC Corporation

URL : <https://www.smcworld.com> (Global) <https://www.smc.eu> (Europe)  
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