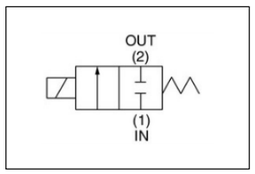
VDW-TF2Z299EN

ORIGINAL INSTRUCTIONS

Instruction Manual
Compact /Lightweight 2 port Solenoid Valve
Series VDW30/40-XF



The intended use of this product is for the control of the downstream fluid supply.

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

2.1 Valve Specifications

Valve construction			Direct operated poppet
Valve type			Normally closed (N.C.)
Fluid	Quick fastener type		Water (1 to 50 ºC), Air, Heated water (80 ºC) Note 1), Low vacuum (133 Pa.abs)
	One-touch fitting type Note 2)		Air, Water (1 to 40 ºC) Note 3), Low Vacuum (133 Pa.abs)
Fluid temperature			1 to 50 °C (No freezing)
Ambient temperature			-10 to 50 °C
Operating pressure range Note 4) Note 5)			-0.1 to 0.6 MPa
Withstand pressure			1.0 MPa
Flow rate characteristics			Refer to catalogue
Max. operating pressure differential	VDW30	Ø1mm	0.6 MPa
		Ø3mm	0.1 MPa
	VDW40	Ø4.5mm	0.1 MPa (With power saving circuit)
			0.05 MPa (Without power saving circuit)
		Ø6mm	0.05 MPa (With power saving circuit)
			0.02 MPa Without power saving circuit)
Ambient humidity			RH85%

2.2 Coil Specifications

Rated voltage	24 VDC, 12 VDC
Allowable voltage fluctuation	±10% of rated voltage
Coil insulation type	Class B
Insulation resistance	500 VDC, 10 MΩ or more
Voltage limit	1800 VAC, 1 sec., 3 mA or less
Noise tolerance Note 1)	Simulation noise: 500 Vp-p (Based on 1 μ sec. pulse width, 50 ±10 Hz frequency noise simulation)
	Fast transient noise: IEC61000-4-4: 1kV
Power consumption	VDW30: 3 W (With 0.5 W power-saving circuit) VDW40: 6.5 W (With 1 W power-saving circuit)
Enclosure	IP65 Note 2)

Table 2.

Note 1) Products with power-saving circuit only.
Note 2) When using the product in a place which requires water resistance, please contact SMC.

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 environment stated below;
  - Atmosphere having corrosive gases, chemicals, sea water or steam or where there is direct contact with any of these.
  - Explosive atmosphere.
  - Location exposed to direct sunlight.
  - Location subject to vibration or impact.
  - Location exposed to radiant heat.

Table 1.

Note 1) Products with power-saving circuit only.
Note 2) When using One-touch fittings, make sure to employ tubing that is compatible with SMC fittings (KQ2 series).
Note 3) When using One-touch fittings with water, care must be taken when handling tubing and piping conditions to prevent water from leaking when the tubes are inserted. Soft nylon tubing cannot be used with water.
Note 4) For low vacuum specifications, the operating pressure range is 1 Torr (1.33 x 10^2 Pa) to 0.6 MPa. Please consult with SMC if using below 1 Torr (1.33 x 10^2 Pa). Some leakage is permitted, so avoid use in situations where a vacuum must be maintained, such as in leak testing.
Note 5) The surge pressure must be under the maximum operating pressure.
Note 6) The amount of leakage from the OUT port when the set pressure is applied to the IN port
Note 7) Vibration resistance: No malfunction when tested with one sweep of 10 to 150 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states.
Impact resistance: No malfunction when tested with a drop tester in the axial direction and at a right angle to the main armature, one time each in energized and deenergized states.

3 Installation - continued

- Do not use in water. Moisture may enter through microscopic gaps and possibly result in short-circuiting, burning out or ignition of coil. Take appropriate protective measures in environments where exposed to constant water splash or condensation caused by high humidity.
- This valve is for indoor use only.
- For low temperature operation, take appropriate measures to prevent solidification or freezing of drainage and moisture, etc.
- In case of use in environments such as cold regions, high dew point temperature with low ambient temperature and high flow rates:
  - Drain water from pipeline.
  - Apply thermal insulating material such as heater etc (avoid on coil portion).
  - Installation of a dryer.
- Employ suitable protective measures in locations where there is contact with oil or welding spatter, etc.

3.3 Piping

⚠ Warning

- To prevent uncontrolled tube movement, install protective covers or fasten tubes securely in place.
- If using tube piping, secure the product to a permanent fixture. Do not suspend it by the tubing.

⚠ Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- During use, deterioration of the tubing or damage to the fittings could cause tubes to come loose from their fittings and thrash about. To prevent uncontrolled tube movement, install protective covers or fasten tubes securely in place.
- When connecting tubes using the one-touch fittings, provide some spare tube length as shown in Figure 1. Also, do not apply external force to the fittings when binding tubes with bands, etc. (see figure 2.)

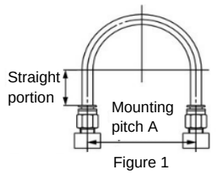


Figure 1

Tube size	Mounting pitch A			Straight portion length
	Nylon tube	Soft nylon tube	Polyurethane tube	
Ø4	56 or more	30 or more	26 or more	20 or more
Ø6	84 or more	39 or more	39 or more	30 or more
Ø8	112 or more	58 or more	52 or more	40 or more
Ø10	140 or more	70 or more	69 or more	50 or more

Table 3.

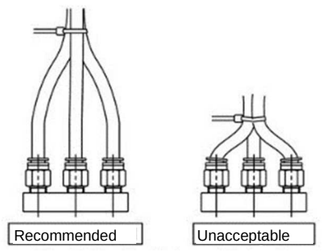


Figure 2

- When attaching fittings to a solenoid valve, do not use fittings that do not conform to the quick fastener standard.
- Handle with care when attaching fittings because the application of excessive stress to the quick fastener portion could damage the body.

3 Installation - continued

- When using non-SMC brand tubes and fittings, refer to the Specific Precautions in the catalogue.
- When connecting piping to the product, avoid mistakes regarding the supply ports etc.

3.4 Mounting

⚠ Warning

- **Ensure sufficient space for maintenance activities.**
- **Do not warm the coil assembly with a heat insulator, etc.**
  Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.
- **Avoid sources of vibration and ensure resonance will not occur.**
- Do not apply external force to the coil when holding it to connect piping, as the tube may deform.
- After installation, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly. If leakage increases or equipment does not operate properly, stop operation.
- Valve becomes hot during and after energization. Do not touch it with bare hands as it may cause burns.
- When the valve is secured using an insert nut (part number suffix "-N"), handle with care during installation because the application of excessive stress to the body could damage it (appropriate tightening torque: 0.8 to 1.0 N·m).

⚠ Caution

- Do not install with the coil downwards. If a valve is mounted with the coil positioned downwards, foreign objects in the fluid will adhere to the core/armature leading to a malfunction.
- Painting and coating: Warnings or specifications printed or labelled on the product should not be erased, removed or covered up.

3.5 Electrical circuits

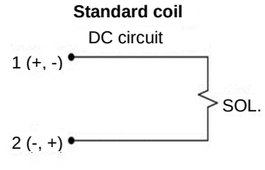


Figure 3

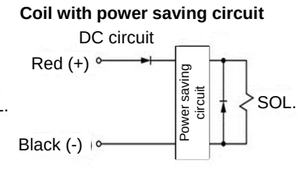


Figure 4

3.6 Electrical connections

⚠ Warning

The solenoid valve is an electrical product. For safety, install an appropriate fuse and circuit breaker before use according to local regulations. When using a number of solenoid valves, installing one fuse on the primary side is not enough. To protect the device more safely, select and install a fuse for each circuit.

⚠ Caution

- **Avoid mis-wiring, as this can cause malfunction and damage to the product.**
- **Use electrical circuits that do not generate chattering in their contacts.**
- **Solenoid valves with power-saving circuits (coil part number "-5GE") have polarity, so follow the wiring diagram (Fig.4) when making connections. Standard coils have no polarity (Fig.3).**
  The solenoid valve will not switch properly if the polarity is reversed.
- **Apply the correct voltage.**
  Use voltage that is within ±10% of the rated voltage. Incorrect voltage could cause shorting of the power-saving circuit, coil burnout, or valve malfunction. Also, do not use excessive power supply voltage or superimpose electrical noise such as ripple voltage on the power supply voltage as these could harm the valve.

3 Installation - continued

- **Do not apply a tension load of 30 N or more to the solenoid valve lead wires.**
- When connecting an induction load such as a circuit protector to the solenoid valve connection, take measures to ensure that the current to the solenoid valve is not too low.
- Ensure that any leakage voltage caused by the leakage current when the switching element is OFF is 2% or less of the rated voltage across the valve.
- Do not bend or pull lead wires and cables repeatedly.
- Do not bend the lead wires beyond 90° with a radius of less than 20mm or damage may occur.

4 How to Order

4.1 Standard products

Refer to product catalogue or SMC website (URL https://www.smcworld.com) to obtain more detail information for 'How to Order'.

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 product catalogue or SMC website (URL https://www.smcworld.com) to obtain more detail information for outline dimensions.

6 Maintenance

6.1 General Maintenance

⚠ Caution

- Perform maintenance inspection according to the procedures indicated in the operation manual.
  If handled improperly, malfunction and damage of machinery or equipment may occur. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- Removal of product.

  1) Cut off the supply pressure and exhaust pressure from the system.
  2) Cut off electric power.
  3) Make sure that temperature of the valve has reduced sufficiently and remove the valve.
- Perform appropriate functional and leakage tests periodically to confirm the operating condition. If leakage increases or equipment does not operate properly, stop operation.
- Periodic maintenance of filter and strainer
  - Replace filter element every 1 year or when the pressure drop becomes 0.1MPa, whichever comes first.
  - Wash strainer when the pressure drop becomes 0.1MPa.
- Exhaust drainage from the air filters periodically.
  If drainage overflows and enters the air line, this may cause malfunction of pneumatic equipment.
- Low frequency operation
  Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once every 6 months.
- Storage
  In the case of long term storage after use, thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

7 Limitations of Use

⚠ Warning

Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue, as this can cause damage or malfunction. We do not guarantee against any damage if the product is used outside of the specification range.

7.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

7 Limitations of Use - continued

7.2 Cannot be used as an emergency shut-off valve

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.

7.3 Pressure holding

Do not use for applications such as holding the pressure inside a pressure vessel due to the possibility of air leakage of the valve.

7.4 Closed liquid circuit

In a closed circuit, when liquid is static, pressure could rise due to changes in temperature. This pressure rise could cause malfunction and damage to components such as valves. To prevent this, install a relief valve in the system.

7.5 Extended periods of continuous energization

- The solenoid coil will generate heat when continuously energized, so avoid installing in an enclosed space. Install in a well-ventilated area.
- Do not touch the coil while it is being energized or immediately after energization.

7.6 Impact by rapid pressure fluctuation

When an impact caused by the rapid pressure fluctuation, such as water hammer etc., is applied, the solenoid valve may be damaged. Install water hammer relief equipment (accumulator, etc.), or use a SMC water hammer relief valve (e.g. VXR series).

7.7 Back pressure

If there is a possibility of back pressure being applied to the valve, take countermeasures such as mounting a check valve on the downstream side of the valve.

7.8 Do not disassemble or modify

Do not disassemble or make any modification, including additional machining, to the product and replacement parts. It may cause an accident and/or injury to persons.

7.9 Fluids

- The compatibility of the components of this product with the fluid used may vary depending on the type of fluid, additives, concentration, temperature, etc. Check the compatibility with the actual machine before use.
- The kinematic viscosity of fluid must not exceed 50 mm^2/s.
- Do not use the product with the fluids listed below:

  - Fluids that are harmful to the human body.
  - Combustible or flammable fluids.
  - Corrosive gas and fluid.
  - Sea water, saline.
- Take measures to prevent static electricity since some fluids can cause static electricity.
- The use of a fluid that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature and by sticking to the sliding parts of the armature etc. Install a suitable filter (strainer) immediately upstream from the valve. Filtration size is 5 μm or less for air, and 100 mesh for water.

7.9.1 Fluids: Air

- Use clean air. Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction of the valve.
- Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer or after cooler, etc.
- If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction. Install mist separators upstream of the valves to eliminate it.

7.9.2 Fluids: Water

- Corrosion resulting from rust stains, chloride, etc., from the piping may cause malfunction, seal failure, or damage. Also, such damage may result in the spraying of fluids or scattering of parts. Please be sure to have protective measures in place in case such incidents should occur.

7 Limitations of Use - continued

- In the case that water contains substances such as calcium and magnesium, which generate hard scale and sludge, install water softening equipment and a filter (strainer) directly upstream from the valve to remove these substances, as this scale and sludge can cause the valve to malfunction.

7.10 Low temperature operation

- The valves can be used up to an ambient temperature of -10°C. However, take measures to prevent solidification of impurities or freezing, etc.
- When using valves for water application in cold climates, first stop the water supply/discharge of the pump, etc., and then take measures to prevent freezing such as draining water in pipe. When heating by steam, be careful not to expose the coil portion to steam. Also, please take measures to prevent freezing such as heating the body.

8 Product disposal

This product should 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 contacts.

SMC Corporation

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