

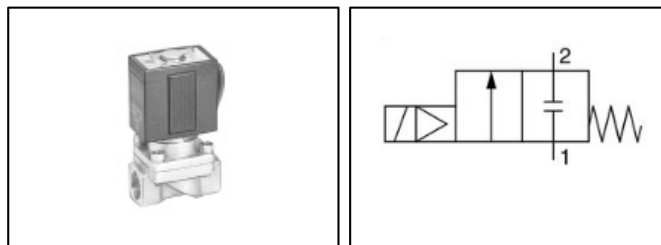


ORIGINAL INSTRUCTIONS

Instruction Manual

Diaphragm Type Pilot Operated 2 Port Solenoid Valve for High Pressure

Series VXH



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: 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.

2 Specifications

2.1 General Specifications

Valve construction	Pilot operated diaphragm	
Valve type	Normally closed (N.C.)	
Orifice diameter (mm)	10	
Port sizes	1/4, 3/8, 1/2	
Minimum operating pressure differential (MPa)	0.05	
Maximum operating pressure differential (MPa)	Water	2.0
	Air	2.0
	Oil	1.5
Maximum system pressure (MPa)	2.0	
Weight (g) ^{Note 1)}	1/4"	550
	3/8"	550
	1/2"	630
Fluid	Air, Water, Oil	
Ambient temperature (°C)	-20 to +60	
Valve Internal Leakage (cm ³ /min)	Air	1
Valve External Leakage (cm ³ /min)	Water, oil	0.1
	Air	1
Flow rate characteristics	Water, oil	0.1
	Refer to catalogue	

2 Specification - continued

Body material	Brass (C37)
Seal material	NBR
Enclosure	Dust-tight, Low jet-proof (equivalent to IP65) ^{Note 2)}

Table 1.

Note 1) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal, 60 g for conduit terminal type respectively.

Note 2) Electrical entry: Grommet type has a rating of IP40.

2.2 Coil Specifications

Rated voltage (VAC)	100, 200, 110, 220, 240, 48
Allowable voltage fluctuation	±10% of rated voltage
Allowable leakage voltage	20% of rated voltage
Coil insulation type	Class B

Table 2.

Frequency [Hz]	Apparent Power [VA]		Power consumption (Holding) [W]
	Inrush	Holding	
50	53	18	7.5
60	44	12	6

Table 3.

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.
- 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 splatter, 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 installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 thread exposed on the end of the pipe/fitting.
- 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.
- Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.

3 Installation - continued

- When connecting piping/fitting to the valve, clamp the side of the body with a vice, etc.
- Refer to the tightening torque in the table below for connecting steel piping. Lower tightening torque can lead to fluid leakage. For mounting fittings, refer to the specified tightening torque.

Thread Size	Proper Tightening Torque (N·m)
Rc1/4	12 to 14
Rc3/8	22 to 24
Rc1/2	28 to 30

Table 4.

3.4 Mounting

Warning

- Ensure sufficient space for maintenance activities.
- Avoid sources of vibration or adjust the distance from the body to a minimum length so that resonance will not occur.
- Do not apply external force to the coil section: When tightening fittings, apply a wrench or other tool to the outside of the piping connection parts.
- 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.
- 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.

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 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 wire with a cross sectional area of 0.5 to 1.25 mm².
- Use electrical circuits that do not generate chattering in their contacts.
- When a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However, a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with SMC).
- Use voltage that is within ±10% of the rated voltage. Incorrect voltage could cause 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.
- Ensure that any leakage voltage caused by the leakage current when the switching element is OFF is or ≤20% of the rated voltage across the valve.
- Do not bend or pull lead wires and cables repeatedly.
- Do not apply more than 30N of force to the lead wires or damage may occur.
- Do not bend the lead wires beyond 90° with a radius of less than 20mm or damage may occur.

3.5.1 Grommet

Class B coil: Lead wire AWG20, outer diameter 2.5 mm.

Voltage Type	Lead Wire Colour	
	1	2
AC 100V	Blue	Blue
AC 200V	Red	Red
Other AC	Grey	Grey

Table 5.

Note: There is no polarity

3 Installation - continued

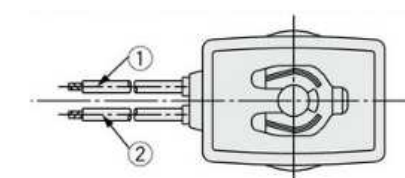


Figure 1. Grommet type

3.5.2 DIN Terminal

- Internal connections are as shown in Figure 2. Make connections to the power supply accordingly.

Contact	1	2
DIN Terminal	+(-)	-(+)

Table 6.

Note: There is no polarity

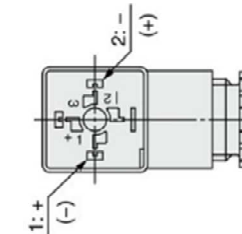


Figure 2. DIN terminal polarity

- DIN terminal corresponds to the Form A DIN connector with an 18 mm terminal pitch, which complies with EN175301-803B.

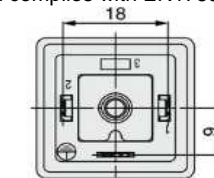


Figure 3. DIN type (EN175301-803B complaint)

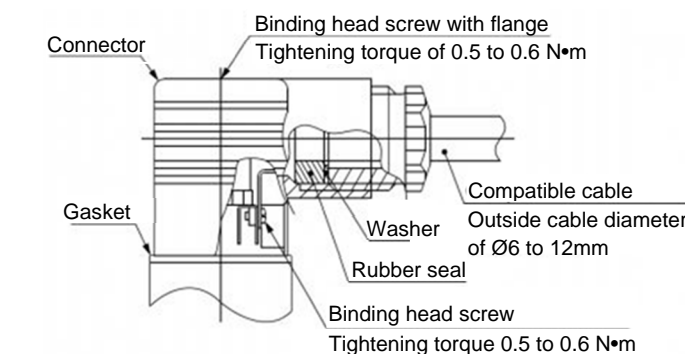


Figure 4. DIN connector construction

3.5.3 Conduit terminal

Make connections according to the marks shown in Figure 6.

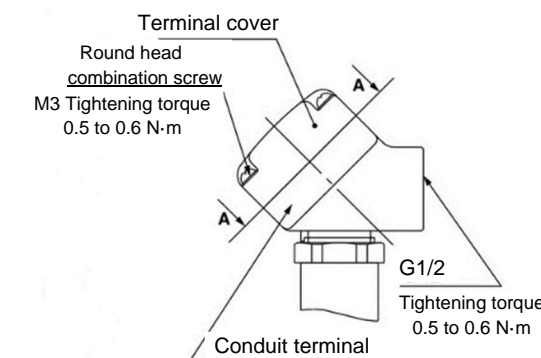


Figure 5. Conduit terminal

3 Installation - continued

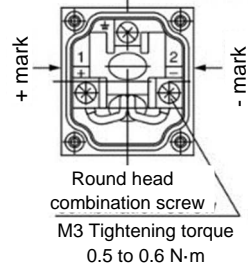


Figure 6. Conduit terminal internal connection

3.5.4 Conduit

Class B coil: Lead wire AWG20, outer diameter 2.5 mm.

Voltage Type	Lead Wire Colour	
	1	2
AC 100	Blue	Blue
AC 200	Red	Red
Other AC	Grey	Grey

Table 7.

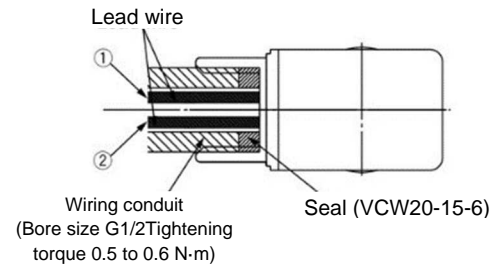
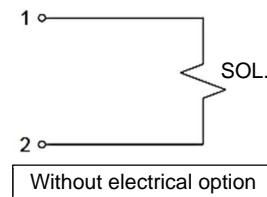


Figure 7. Conduit

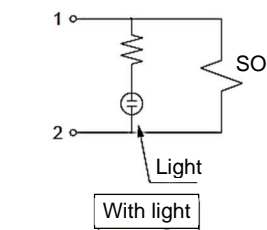
3.6 Electrical circuits

3.6.1 AC circuit

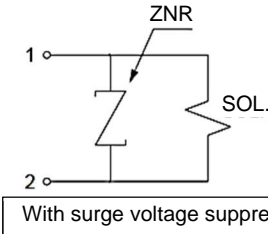
Grommet, Conduit, Conduit terminal



Conduit terminal



Grommet, DIN, Conduit terminal



Conduit terminal, DIN

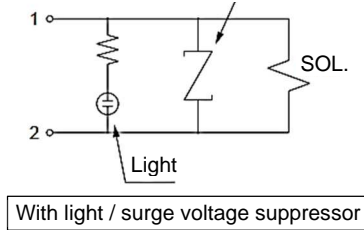


Figure 8.

Warning

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

4 How to Order

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

5 Outline Dimensions (mm)

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

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
 - Cut off the supply pressure and exhaust pressure from the system.
 - Cut off electric power.
 - 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 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.

Warning

7.2 Cannot be used as an emergency shutoff valve etc.

These valves are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

7.3 Pressure (including vacuum) holding

It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a 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. Avoid using in a tightly shut container. Install it in a well ventilated area.
- Furthermore, do not touch it while it is being energized or right after it is energized.

7.6 Impact by rapid pressure fluctuation

When problems are caused by a water hammer, install water hammer relief equipment (accumulator etc.), or use an SMC water hammer relief valve (VXR series). For details, please consult with SMC.

7 Limitations of Use - continued

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 mm²/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 Air

- Use clean air. Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.
- Install an aftercooler or air dryer, etc. Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler or air dryer, 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 Water

- The supply water includes materials that generate hard sediment or sludge such as calcium and magnesium. Since such scale and sludge can cause the valve to malfunction, install water softening equipment to remove these substances.
- Tap water pressure: The water pressure for tap water is normally 0.4 MPa or less. However, in places like a high-rise building, the pressure may be 1.0 MPa. When selecting tap water, be careful of the maximum operating pressure differential.

7.9.3 Oil

- Generally, NBR is used as seal material, as it is resistant to oil.
- The resistance of the seal material may deteriorate depending on the type of oil, manufacturer or additives. Check the resistance before using.
- The kinematic viscosity must not exceed 50 mm²/s.

7.10 Low temperature operation

- The valves can be used up to an ambient temperature of -20°C. However, take measures to prevent solidification of impurities or freezing, etc.
- When using valves for water applications in cold climates, take appropriate countermeasures to prevent the water from freezing in tubing after cutting the water supply from the pump, by draining the water, etc. When warming by a heater, etc., be careful not to expose the coil portion to the heater. The installation of a dryer, retaining the heat of the body, etc., is recommended to prevent a freezing condition in which the dew point temperature is high and the ambient temperature is low, or the high flow is running.

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

URL : <http://www.smcworld.com> (Global) <http://www.smc.eu> (Europe)
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 Specifications are subject to change without prior notice from the manufacturer.
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