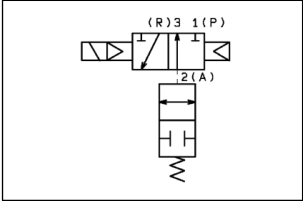




ORIGINAL INSTRUCTIONS

Instruction Manual
High Vacuum Angle Valve
Series XLFV-Q



The intended use of this product is isolation between vacuum pump and chamber.

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)^{*)}, and other safety regulations.
^{*)} 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 type	Normally closed	
Fluid	Inert gas under vacuum	
Fluid and ambient temperature range [°C]	5 to 50	
Operating pressure range [Pa]	Atmospheric to 1 x 10 ⁻⁵	
Leakage [Pa·m ³ /s]	Internal	1.3 x 10 ⁻¹⁰ at ordinary temperatures – excluding gas permeation
	External	1.3 x 10 ⁻¹⁰ at ordinary temperatures – excluding gas permeation
Pilot pressure range [MPa]	0.4 to 0.7	
Body material	Aluminum alloy	
Seal material	FKM	
Other material in contact with fluid ^{Note 1)}	Stainless steel	

Table 1.

Note 1) Vacuum grease (Y-VAC2) is applied to the sliding areas of the seal-material

2 Specifications - continued

2.2 Pilot valve coil specifications

Electrical entry	Grommet, L plug connector, M plug connector, M8 connector
Rated voltage	24 VDC, 12VDC
Allowable voltage fluctuation	±10% of rated voltage
Allowable leakage voltage	3% or less of rated voltage
Power consumption [W]	0.35 (with light: 0.4)
Surge voltage suppressor	Diode (Non-polar type: Varistor)
Indicator light	LED

Table 2

2.3 Connection / flow specifications

Model	Flange Type	Flange Size	Port Size	Conductance [L/s] ^{Note 1)}	Weight [kg]
XLFV-16	KF	16	M5	5	0.29
XLFV-25	KF	25		14	0.49
XLFV-40	KF	40		45	1.14
XLFV-50	KF	50		80	1.66
XLFV-63	KF/K	63	M5 Rc1/8	180	3.06
XLFV-80	KF/K	80		200	4.86
XLFV-100	KF/K	100		300	10.10
XLFV-160	KF/K	160		800	18.70

Table 3

Note 1) Conductance is the value for the elbow with the same dimensions

2.4 Auto switch specifications (option)

2.4.1 Solid state switch

Model	D-M9N	D-M9P	D-M9B
Wiring	3 wire		2 wire
Output	NPN	PNP	-
Application	IC circuit / Relay / PLC		24 VDC Relay / PLC
Power voltage [V]	5 / 12/ 24 (4.5 to 28) DC		-
Current [mA]	10 or less		-
Load voltage [V]	28 DC or less	-	24 DC (10 to 28 DC)

Load current [mA]	40 mA or less	2.5 to 40
Internal voltage drop [V]	0.8 or less at 10 mA load current (2 or less at 40 mA)	4 or less
Current leakage [mA]	100µA or less at 24 VDC	0.8 or less
Operating time [ms]	1 or less	
Indicator light	Operated position: Red LED lights up	
Insulation resistance	50 MΩ or more at 500 VDC mega	
Withstand voltage [V]	1000 for 1 minute (AC) (between terminals and housing)	
Enclosure	IEC60529 standard IP67, JISC0920	

Table 4

2.4.2. Reed switch

Model	D-A93	D-A90	
Wiring	2 wires		
Application	Relay / PLC	Relay / PLC / IC circuit	
Load voltage	24 VDC	24 V ^{AC} _{DC} or less	48 V ^{AC} _{DC} or less
Load current	5 to 40 mA	50 mA	40 mA
Internal voltage drop	2.4 V or less (up to 20 mA) 3 V or less (up to 40 mA)	-	
Internal resistance	-	1 Ω or less (including 3m lead wire)	
Contact protection circuit	None		
Operating time	1.2 ms		
Indicator light	Operated position: Red LED lights up		
Insulation resistance	50 MΩ or more at 500 VDC mega		
Withstand voltage	1500 VAC for 1 minute (between terminals and housing)		
Enclosure	IEC60529 standard IP67, JISC0920		

Table 5

2 Specifications - continued

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.
- Use clean air. Do not use air that contains chemicals, synthetic oils that include organic solvents, salt, corrosive gases, etc., as it can cause damage or malfunction.
- Install an air filter if necessary close to the valve on the upstream side.
- Use within stated ambient temperature range. Check the compatibility of product's materials with any fluid contained in the ambient atmosphere. Ensure that any harmful fluid used does come into contact with the external surface of the product.
- Take measures to prevent static electricity since some fluids can cause static electricity.
- Not suitable for use as an emergency shutoff valve. These valves are not designed for safety applications such as an emergency shutoff valve. If the valves are used for the mentioned applications, additional safety measured should be adopted.
- Be aware that the valve surface may get hot if operated continuously. The solenoid coil will generate heat when continuously energized, so avoid installing it in an enclosed space.
- Do not touch the coil while it is being energized or immediately after energization.

3.2 Vacuum piping

Warning

- Before piping make sure to clean up chips, cutting oil, dust etc. Clean the surface of the flange seal and the O-ring with ethanol, etc.
- Be sure that the flange O-ring is compressed by 15% or more.

- In high humidity environments, keep valves packed until the time of installation.
- Seal part on flange is protected, but for safety reasons, do not handle.
- Perform piping so that excessive force is not applied to the flange sections. In case there is vibration of heavy objects or attachments, secure them so that torque is not applied directly to the flanges.

3.3 Leakage voltage

Caution

Particularly when using a resistor in parallel with a switching element and when using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., which may prevent the valve from turning off. Ensure that any leakage current, when the switching element is OFF, meets the following limits:

DC coil: 3% or less of the rated voltage

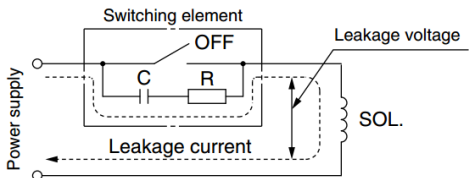


Figure 1

3.4 Valve Mounting

Warning

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If leakage increases or equipment does not operate properly, stop operation.
- After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

3 Installation - continued

- Do not warm the coil assembly with a heat insulator, etc. Use tape, heaters, etc., for freeze prevention on the piping and the body only. The coil can cause it to burn out.
- Avoid sources of vibration or adjust the arm from the body to the minimum length so that resonance will not occur.
- Warnings or specifications printed or labelled on the product should not be erased, removed, or covered up.

3.5 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.

3.6 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.

3.7 Piping (fitting)

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. A reference value for the tightening torque is below:
M5: 1 to 1.5 Nm
Rc1/8: 3 to 5 Nm

- When mounting the fitting to the pilot port, ensure that the solenoid valve and plate are held securely at the same time.

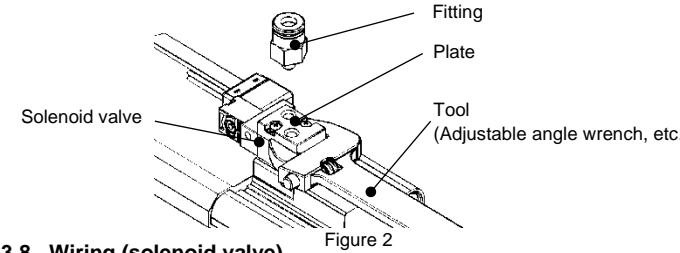


Figure 2

3.8 Wiring (solenoid valve)

3.8.1 How to use plug connector

Caution

Attaching and detaching connectors

- To attach a connector, hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever's pawl is pushed into the groove and locks.
- To detach a connector, remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.

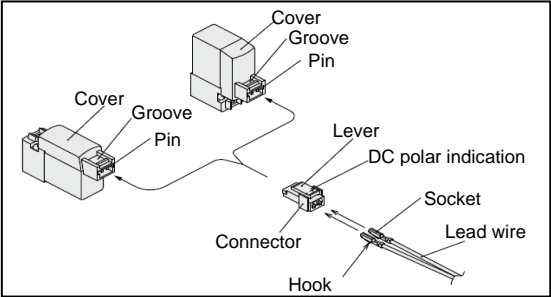


Figure 1

3 Installation - continued

- Crimping connection of lead wire and socket**
- Strip 3.2 to 3.7 mm at the end of lead wires, insert the end of the core wires evenly into the sockets, and then crimp it by a crimping tool. When this is done, take care that the coverings of the lead wires do not enter the core wire crimping area (contact SMC for the dedicated crimping tools).

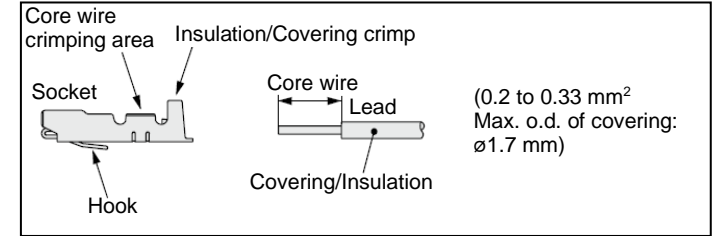


Figure 4

Attaching and detaching lead wires with sockets

- Attaching**
- Insert the sockets into the square holes of the connection (+,- indication), and continue to push the sockets all the way in until they lock by hooking into the seats in the connector (When they are pushed in, their hooks open and they are locked automatically.). Then confirm that they are locked by pulling lightly on the lead wires.
- Detaching**
- To detach a socket from a connector, pull out the lead wire while pressing the socket's hook with a stick having a thin tip (approx. 1 mm).
 - If the socket will be used again, first spread the hook outward.

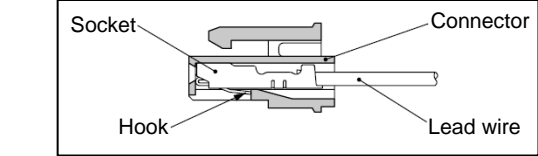


Figure 2

3.8.2 Surge voltage suppressor

Grommet, L/M Plug Connector

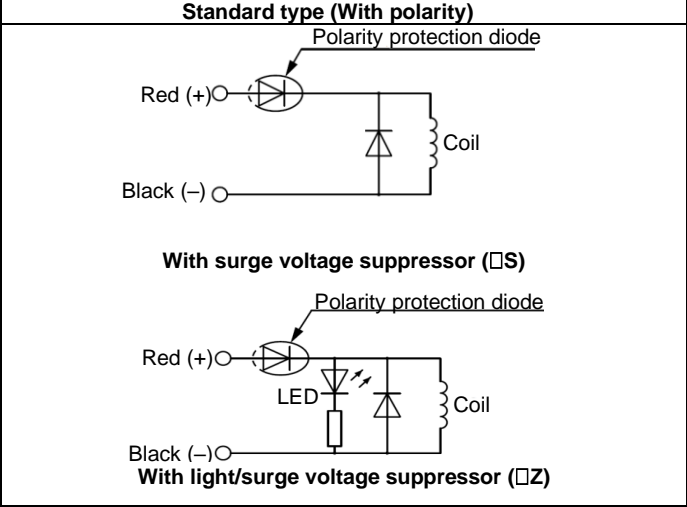


Figure 3

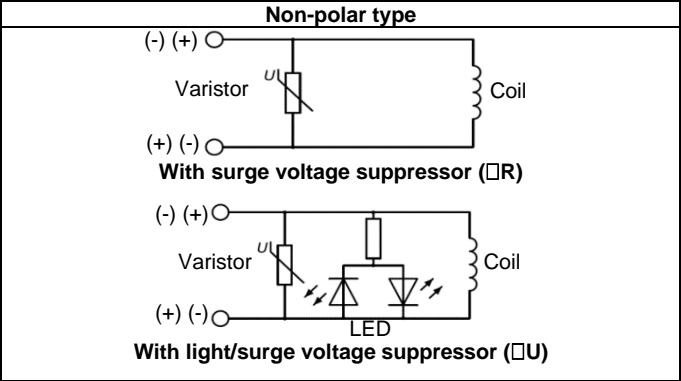


Figure 4

3 Installation - continued

- Connect the standard type in accordance with the +, - polarity indication (the non-polar type can be used with the connections made either way)
- When wiring is done at the factory, positive (+) is red and negative (-) is black.

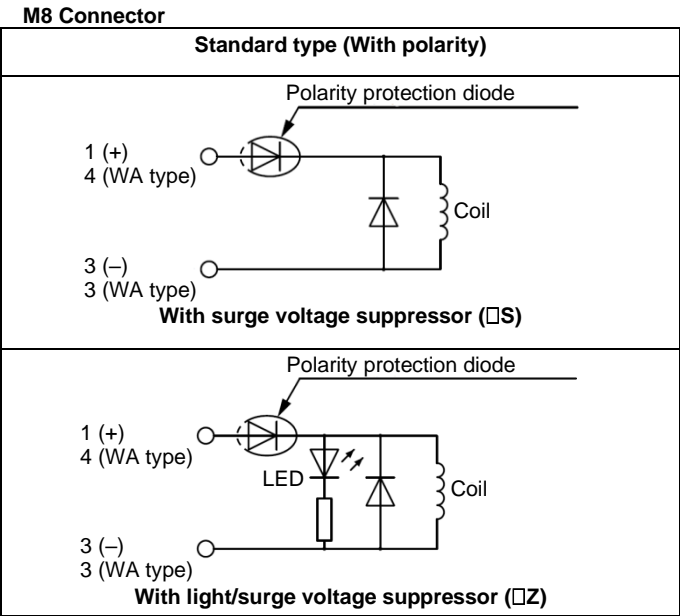


Figure 5

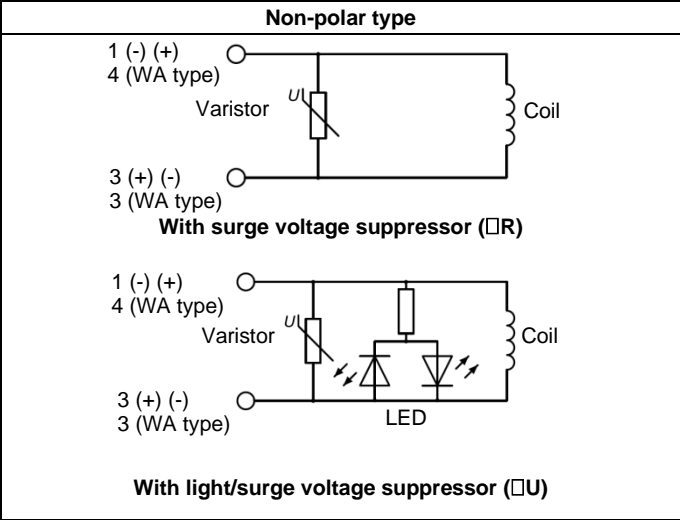


Figure 6

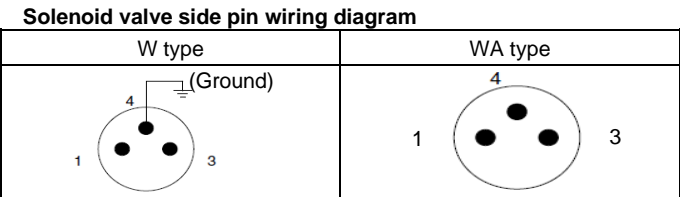


Figure 7

- For the standard type, connect + to 1 and - to 3 for Type W according to polarity, while + to 4 and - to 3 for Type WA.
- For DC voltages other than 12 V and 24 V, incorrect wiring will cause damage to the surge suppressor circuit.
- The WA-type valve cannot be grounded.

3 Installation - continued

3.9 Wiring (auto switch) - option

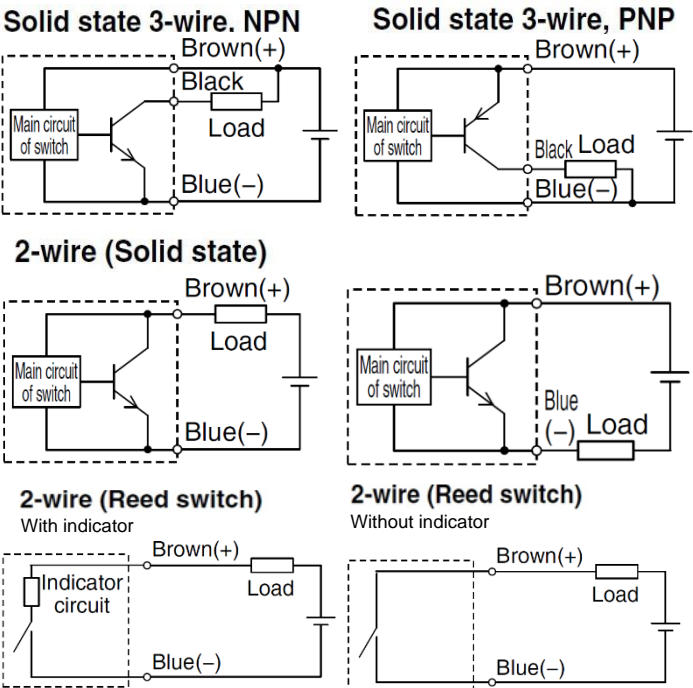


Figure 8

3.10 Manual override (solenoid valve)

- Warning**
- Regardless of an electric signal to the valve, when the manual override is operated, the main valve will be actuated. Confirm safety before operating. The manual override is used for switching the main valve.
- Non-locking push type (Standard)**
- Press in the direction of the arrow.

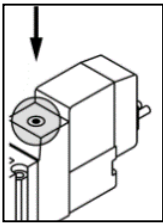


Figure 12

4 How to Order

Refer to catalogue for 'How to Order'.

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.

7 Limitations of Use

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.
- Warning**
- If a safe output contact 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/operating.

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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