



Installation and Maintenance Manual
Series : VV061



1 Safety Instructions

- This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.
- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "DANGER", "WARNING" or "CAUTION", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

CAUTION	If instructions are not followed there is a possibility of injury or equipment damage.
WARNING	If instructions are not followed there is a possibility of serious injury or loss of life.
DANGER	In extreme conditions, there is a possibility of serious injury or loss of life.

WARNING

- The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

- Only trained personnel should operate pneumatically operated machinery and equipment.**
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
 - The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or prevention of the danger by the fluid have been confirmed.
 - When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
 - Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
 - Conditions and environments beyond the given specifications, or if product is used outdoors or with direct sunlight.
 - With fluids whose application causes concern due to the type of fluid or additives, etc.
 - An application that has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

1 Safety Instructions (continued)

- The product is provided for use in manufacturing industries.**
The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

CAUTION

- Ensure that the air supply system is filtered to 5 microns.

2 Specifications

2.1 Unit manifold specifications

Operating fluid		Air	
Operating pressure MPa	Standard	0~0.7	
	Large flow capacity	0~0.3	
Vacuum specification MPa		1 (P) port	3 (R) port
	Standard	-100 kPa ~ 0.6	-100kPa ~ 0
Large flow capacity		-100 kPa ~ 0.2	-100kPa ~ 0
	Ambient temperature °C	-10 to 50 (No freezing)	
Max. operating frequency Hz	20		
Lubrication	Not required		
Mounting orientation	Unrestricted		
Shock/vibration resistance m/s ² Note	150/30		
Enclosure	IP40		

Table 1

Note : **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 2000 Hz. Tests ere 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 Coil specifications

Coil rated voltage DC		12, 24 V	
Allowable voltage fluctuation		12 VDC	24 VDC
	Standard	-7%~+10%	-4%~+10%
Power consumption W	Standard	0.55	
	Power saving type	0.23	
Surge voltage suppressor	Diode		
Indicator light	LED		

Table 2

2 Specifications (Continued)

2.3 Circuit symbol

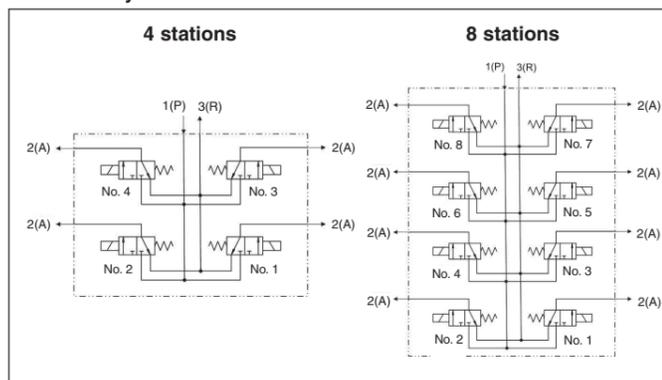


Figure 1

3 Installation

3.1 Environment

WARNING

- Do not use in atmosphere where the valve is in direct contact with corrosive gases, chemicals, salt water, water or steam.
- Do not use in an explosive atmosphere.
- Do not use in a place subject to heavy vibrations and/or shocks. Check the specifications for each series.
- The valve should not be exposed to prolonged sunlight. Use a protective cover.
- Remove emissive heat.
- If using in an atmosphere where there is possible contact with water drop-lets, oil, weld spatter, etc., take suitable preventative measures.
- When the solenoid valve is mounted in a control panel or when it's energized for a long time, make sure that the ambient temperature is within the valve's specified range.

3.2 Piping

- Preparation before piping**
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe. Install piping so that it dose not apply pulling, pressing, bending or other forces the valve body.
- Sealant tape**
When installing piping or fitting into a port, ensure that sealant material does not enter the port internally. Furthermore, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.

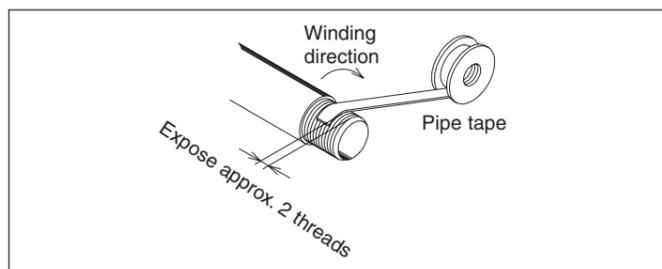


Figure 2

- Avoid connection of ground lines to piping, as this may cause electric corrosion of the system.
- Always tighten threads with the proper tightening torques. When screwing fittings into valves, tighten with the proper tightening torque shown below.

3 Installation (Continued)

3.3 How to use plug connector

CAUTION

Mounting and removal of the connector cable.

- Mounting**
When inserting the cable connector, insure that the rib (see Figure 3) is facing upwards and fully insert the socket into the unit. To insure it has been correctly inserted, lightly pull on the connector cable to make sure that it does not come out.

2) Removal

Hold & pull the socket to remove the connector cable. If an excessive force is applied directly to the connector cable then the connector may come off. Do not apply a force of 20N or more to the lead wire.

3.4 Connector cable length

CAUTION

Standard length is 300 mm, but the following are also available.

How to order connector cable

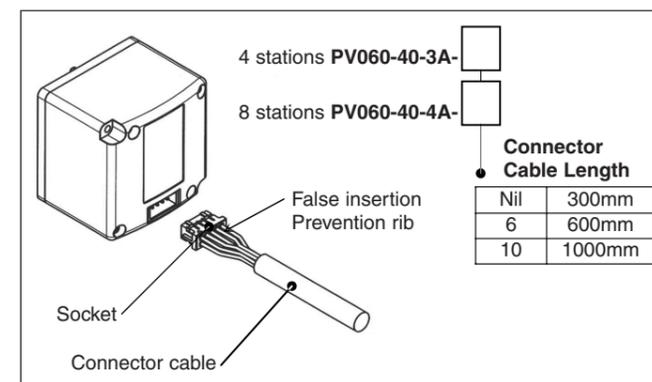


Figure 3

3.5 Surge Voltage suppressor

CAUTION

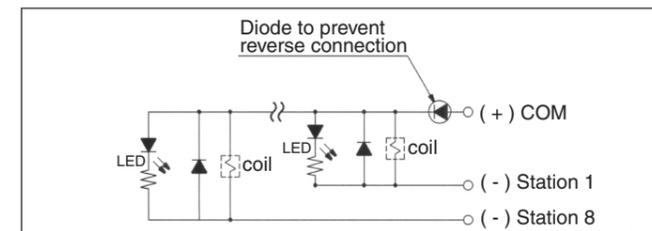


Figure 4

There is a voltage drop of around 1 V due to the Diode in the valve which prevents reverse connection. Be careful to allow for voltage fluctuation.

With power saving circuit

Power consumption is decreased by 1/2 by reducing the wattage required to hold the valve in an energized state. (Effective energising time is over 62 ms at 24 VDC.)

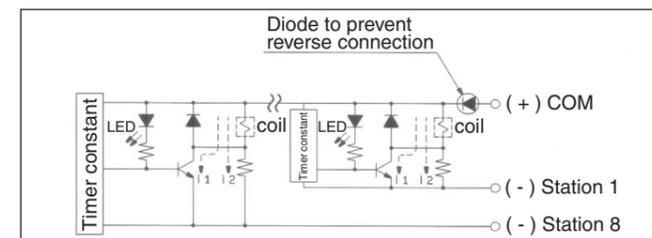


Figure 5

- The impact and vibration should be 50/10 [m/s²] or less.
- The voltage fluctuation should be ±5% of the rated voltage.

3 Installation (Continued)

3.4 Operating principle

Figure 5 is a power saving circuit where the holding current consumption is reduced to save energy. Please refer to the wave form data below.

<In the case of VV061-****-T, the wave form of energy saving type>

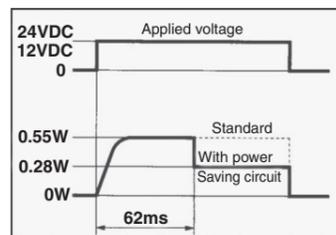


Figure 6

- There is not a Diode to prevent reverse connection, in the case of 12 V specifications do not make a mistake with the polarity.
- There is a voltage drop of around 0.5 V due to a transistor, please make allowances for this voltage fluctuation.

3.5 Mounting

⚠ WARNING

1. Stop operation if air leakage increases and the equipment does not operate properly.

Check mounting conditions after air and power supplies are connected. Initial function and leakage tests should be performed after installation.

2. Instruction manual (this document)

Install product only after reading and understanding the safety instructions. Keep on file so that it can be referred to when necessary.

3. Coating

Warnings or specifications indicated on the product should not be erased, removed, or covered up.

⚠ CAUTION

Clamping method of M3 screw

When using KLS02-M3 (One-touch fittings); Initially tighten by hand and then tighten an additional 1/6 turn with a tightening tool. Air leakage can occur due to threads breaking or gaskets being deformed when the fittings are over tightened. However, if fittings are not tightened sufficiently then can become loose and air leakage may occur.

3.6 One-touch fittings

⚠ CAUTION

Tube attachment

- Take a tube having no flaws on its periphery and cut it off at a right angle. When cutting the tube, use tube cutters TK-1,2 or 3. Do not use pincers, nippers or scissors etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened. This makes a secure installation impossible, and causes problems such as air leakage or the tube being pulled out after installation. Allow some extra length in the tube.
- Grasp the tube and push it slowly, inserting it securely all the way into the fitting.
- After inserting the tube, pull on it lightly to confirm that it will not come out. Problems such as air leakage or the tube being pulled out can occur if the tube is not inserted securely all the way into the fittings.

Tube detachment

- Push in the release bushing and the collar at the same time.
- Pull out the tube while holding down the release bushing so that it does not come out. If the release bushing is not pressed down sufficiently there will be increased bite on the tube and it will become more difficult to pull out.
- When the removed tube is to be used again, cut off the portion which has been chewed before reusing it. If this is not done then the chewed portion of the tube can cause problems such as air leakage or difficulty in removing the tube from the fitting.

3 Installation (Continued)

3.7 Precautions on other tube brands

⚠ CAUTION

- When using non-SMC brand tubing, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tubing.
 - 1) Soft nylon tubing ± 0.1 mm
 - 2) Polyurethane tubing ± 0.15 mm
- Do not use tubes that do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other problems, such as air leakage or the tube pulling out the connection.

3.8 Piping

⚠ CAUTION

1. Before piping

Make sure that all debris, cutting oil, dust, etc. are removed from the piping.

2. Piping to products

When piping to a product, refer to the instruction manual to avoid mistakes regarding the supply port etc.

3.9 Wiring

⚠ CAUTION

1. Polarity

When connecting power to a solenoid valve check for polarity.

2. Applied voltage

When electric power is connected to the solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.

3. Confirm the connections.

After completing the wiring, confirm that the connections are made correctly.

3.10 Air supply

⚠ WARNING

Use clean air

If the compressed air supply is contaminated with chemicals, synthetic materials, corrosive gas, etc., it may lead to the breakdown or malfunction of the equipment.

⚠ CAUTION

1. Install an air filter

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

2. Take measures to ensure air quantity, such as by installing an aftercooler, air dryer, or drain catch.

Compressed air that contains a large amount of drainage could cause the pneumatic equipment to malfunction. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or drain catch.

3. Drain flushing

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. This causes pneumatic devices to malfunction.

If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.

4. If excessive carbon powder is seen, install a mist separator on the upstream side of the valve.

If excessive carbon dust is generated by the compressor, it may adhere to the inside of a valve and cause it to malfunction.

4 Maintenance

4.1 Electrical precautions

⚠ CAUTION

1. Applied voltage.

When electric power is connected to the solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.

2. Confirm the connections.

After completing the wiring, confirm that the connections are made correctly.

3. Use electrical circuits that do not generate chattering in their contacts.

4. Use a voltage that is within $\pm 10\%$ of the rated voltage.

5. When a surge from the solenoid affects the electrical circuitry, adopt an option that comes with the surge voltage protection circuit.

4.2 Operating Environment

⚠ WARNING

1. Do not use in an environment where the product is in direct contact with corrosive gases, chemicals, salt water, water or steam.
2. Do not use in an environment where flammable gas or explosive gas exists. Usage may cause a fire or explosion. The products do not have an explosion proof construction.
3. Do not use in a place subject to heavy vibration and/or shock.
4. The valve should not be exposed to prolonged sunlight. Use a protective cover.
5. Remove any sources of excessive heat.
6. If it is used in an environment where there is possible contact with oil, weld spatter, etc., take protection plan.
7. When the solenoid valve is mounted in a control panel or its energized for a long time, make sure that the ambient temperature is within the valve specification.

⚠ WARNING

1. Perform maintenance procedures as shown in the instruction manual. (This document)

If it is handled improperly, malfunction or damage of machinery/equipment may occur.

2. Removing the product

To avoid the risk of being burned, ensure that the valve has had sufficient time to cool before performing work.

1. Shut off the fluid supply and release the fluid pressure in the system.
2. In the case of air pilot or air-operated type, shut off the supply air source and discharge the compressed air inside a pilot piping.
3. Shut off the power supply.
4. Remove the product.

3. Low frequency operation.

Valves should be operated at least once every 30 days to prevent malfunction. (Use caution regarding the air supply).

For optimum usage, conduct regular inspections every 6 months.

4. Do not disassemble the product. Products that have been disassembled cannot be guaranteed.

⚠ CAUTION

1. Filters and strainers

1. Be careful regarding clogging of filters and strainers.
2. Replace filter elements after one year of use, or earlier if the pressure drop reaches 0.1 MPa.
3. Clean strainers when the pressure drop reaches 0.1 MPa.

2. Lubrication (Pilot air line)

When using after lubricating, never forget to lubricate continuously.

3. Storage

In case of long term storage after use with heated water, thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

4. Drain flushing

Remove drainage from air filters regularly. (Refer to the specifications.)

4 Maintenance (Continued)

Precautions on Handling

Valves will reach high temperatures from high temperature fluids. Use caution, as there is a danger of being burned if a valve is touched directly.

5 Contacts

AUSTRIA	(43) 2262 62280	NETHERLANDS	(31) 20 531 8888
BELGIUM	(32) 3 355 1464	NORWAY	(47) 67 12 90 20
CZECH REP.	(420) 541 424 611	POLAND	(48) 22 211 9600
DENMARK	(45) 7025 2900	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	SLOVAKIA	(421) 2 444 56725
FRANCE	(33) 1 6476 1000	SLOVENIA	(386) 73 885 412
GERMANY	(49) 6103 4020	SPAIN	(34) 945 184 100
GREECE	(30) 210 271 7265	SWEDEN	(46) 8 603 1200
HUNGARY	(36) 23 511 390	SWITZERLAND	(41) 52 396 3131
IRELAND	(353) 1 403 9000	UNITED KINGDOM	(44) 1908 563 888
ITALY	(39) 02 92711		

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