



Installation and Maintenance Manual

VQ7-6/7-8, ISO Standard Solenoid Valve



Read this manual before using this product

- The information within this document is to be used by pneumatically trained personnel only.
- For future reference, please keep manual in a safe place.
- This manual should be read in conjunction with the current catalogue.

1 SAFETY RECOMMENDATION

1.1 General recommendation

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (Notes), JIS B 8370 (Notes) and other safety practices.

Note 1:ISO 4414:Pneumatic fluid power - General rules relating to systems.

Note 2:JIS B 8370:Pneumatic system axiom.

CAUTION: Operator error could result in injury or equipment damage.

WARNING: Operator error could result in serious injury or loss of life.

DANGER: In extreme conditions, there is a possible result 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 products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.
- Only trained personnel should operate pneumatically operated machinery and equipment.**
 - Compressed air can be dangerous if an operator is unfamiliar with it Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.
- Do not service machinery/equipment or attempt to remove component until safety is confirmed.**
 - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
 - When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
 - Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Bleed air into the system gradually to create backpressure, i.e. incorporate a soft-start valve).
- Contact SMC 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.
 - Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
 - An application, which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

CAUTION:

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

1.2 Conformity to standard

This product is certified to and complies with the following standards:

EMC Directive 89/336/EEC	EN 61000-6-2, EN55011
Low voltage directive 93/68/EEC	DIN VDE 0580
ISO 5599/1	

2 INTENDED CONDITIONS OF USE

2.1 Specifications

Valve specifications	Valve construction	Metal seal	Rubber seal
	Fluid	Air/Inert gas	
Maximum operating pressure	1.0MPa		
Minimum operating pressure	Single	0.15MPa	0.20MPa
	Double	0.15MPa	0.15MPa
	3 position	0.15MPa	0.20MPa
Ambient and fluid temperature	-10 to 60°C (Note 1)	-5 to 60°C (Note 1)	
Lubrication	Not required		
Manual operation	Push type (tool required)		
Impact/Vibration resistance	150/30 m/s ² (Note 2)		
Enclosure	IP65 (splash proof/jetproof)		
Rated coil voltage	12VDC, 24VDC, 100VAC, 200VAC, 220VAC (50/60Hz)		
Allowable voltage fluctuation	±10% of rated voltage		
Coil insulation type	Class B equivalent		
Power consumption (current)	24VDC	DC1W (42mA)	
	12VDC	DC1W (83mA)	
	100VAC	Inrush 1.2VA (12mA), Holding 1.2VA (12mA)	
	110VAC	Inrush 1.3VA (11.7mA), Holding 1.3VA (11.7mA)	
	200VAC	Inrush 2.4VA (12mA), Holding 2.4VA (12mA)	
	220VAC	Inrush 2.6VA (11.7mA), Holding 2.6VA (11.7mA)	

(Note 1) For low temperature, use dry air with no condensation.

(Note 2) Impact resistance: No malfunction when tested with a drop tester in the axial direction and at a right angle to the main valve and armature, one time each in both energized and de-energized states. (initial value)

Vibration resistance: No malfunction when tested with one sweep of 8.3 to 2000Hz in the axial direction and at a right angle to the main valve and armature, one time each in both energized and de-energized states. (initial value)

2.2 Circuit Symbols

2 position single	2 position double (metal)	2 position double (rubber)	
3 position closed centre	3 position exhaust centre	3 position double check	3 position pressure centre

3 INSTALLATION

WARNING:

- Do not install unless the safety instructions have been read and understood.

3.1 Environment

WARNING:

- Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- Do not use in an explosive atmosphere.
- The product should not be exposed to prolonged sunlight. Use a protective cover.
- Do not mount the product in a location where it is subject to strong vibrations and/or shock. Check the product specifications for above ratings.
- Do not mount the product in a location where it is exposed to radiant heat.

3.2 Piping

CAUTION:

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fitting into a port, ensure that sealant material does not enter the port inside. When using seal tape, leave 1.5 to 2 threads exposed on the end of pipe/fitting.

Thread	Appropriate tightening torque (Nm)
Rc(PT) 1/8	7 to 9
Rc(PT) 1/4	12 to 14
Rc(PT) 3/8	22 to 24
Rc(PT) 1/2	28 to 30
Rc(PT) 3/4	28 to 30

3.3 Electrical connection

CAUTION:

- When DC power is connected to a solenoid valve equipped with light and/or surge voltage suppressor, check for polarity indications.
- For polarity indications:
 - No diode to protect polarity: if polarity connection is wrong, the diode in the valve or switching device at control equipment or power supply may be damaged.
 - With diode to protect polarity: if polarity connection is wrong, the valve does not switch.

Using a DIN connector

ISO# : DIN 43650 A compatible

Connections

- Loosen the holding screw and pull the connector off of the solenoid valve terminal block.
- After removing the holding screw, insert a flat head screw driver, etc., into the notch at the bottom of the terminal block and pry it up, separating the terminal block and housing.
- Loosen the terminal screws on the terminal block, insert the cores of the lead wires into the terminals in accordance with the connection method, and fix securely with the terminal screws. Secure the cord by screwing in the ground nut.

Changing the cord entry

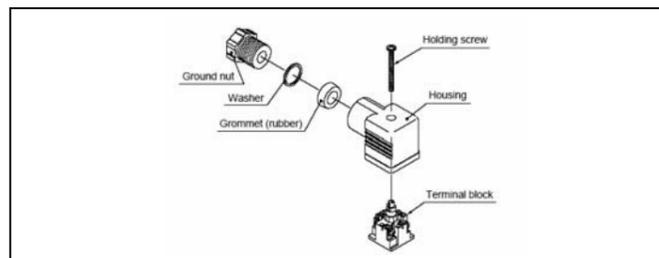
After separating the terminal block and housing, the cord entry direction can be changed by attaching the housing in the desired direction (4 directions at 90° intervals).

Precautions

Insert and pull out the connector in a straight line so that it does not tilt at an angle.

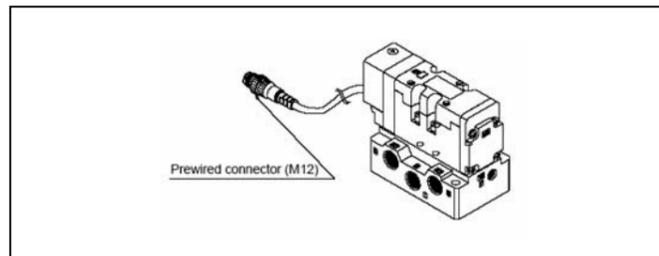
Compatible cable

Cord outside diameter: ϕ 6.8 to ϕ 10.

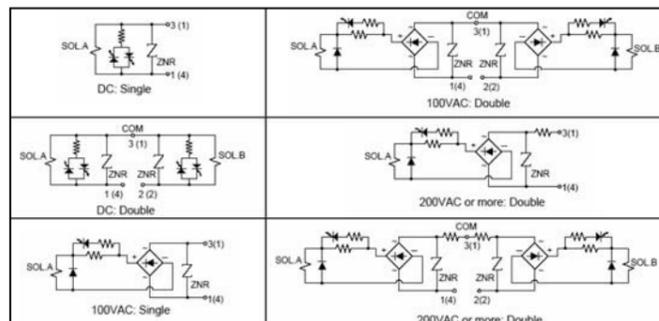


Using a Pre-wired Connector

4 wire round type connector (M12) conforming to NECA (Nippon Electric Control Equipment Industries Association) standard 4202.

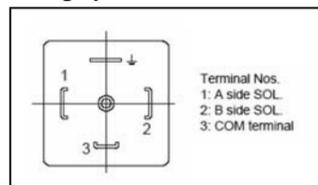


Internal Wiring Specification

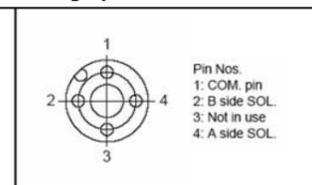


Terminal numbers in the circuits are for a DIN connector. Numbers inside () are pre-wired connector pin numbers.

DIN connector wiring Specification



Pre-wired connector wiring Specification



3.4 Mounting

- If air leakage increases or equipment does not operate properly, stop operation.**

After mounting or maintenance, etc., connect the compressed air and power supplies, and perform appropriate function and leakage inspections to confirm that the unit is mounted properly.

- Instruction manual.**

Mount and operate the product after reading the manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

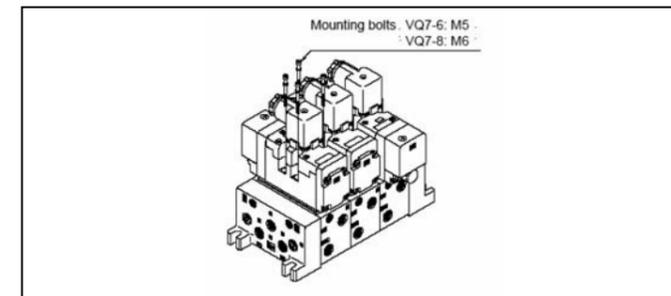
- Painting and coating.**

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

Mounting Valves

After confirming installation of the gasket, securely tighten the bolts with the proper torque shown in the table below.

Series	Proper tightening torque Nm
VQ7-6	2.3 to 3.7
VQ7-8	4.0 to 6.0



3.5 Lubrication

CAUTION:

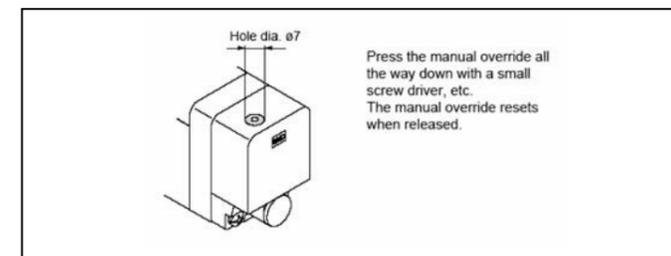
- SMC products have been lubricated for life at manufacturer, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1(no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.
- The valve has been lubricated for life at the factory, and does not require any further lubrication.
- In the event that it is lubricated, use Class 1 turbine oil (without additives), ISO VG32. However, once lubrication is applied it must be continued, as the original lubricant may be eliminated leading to malfunction.

4 SETTINGS AND PROGRAMMING

Manual Override Operation

Since connected equipment will be actuated when the manual override is operated, first confirm that conditions are safe.

The push type is standard (tool required).



5 MAINTENANCE

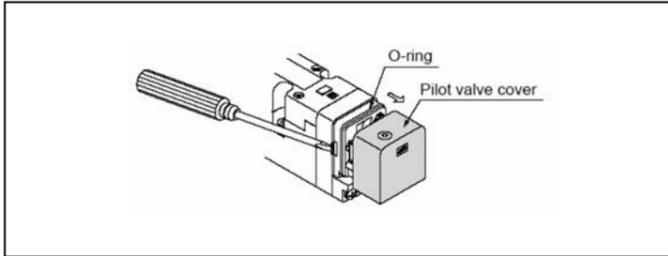
WARNING:

- Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.
- If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic system should be performed by qualified personnel only.
- Drain: remove condensate from the filter bowl on a regular basis.
- Shut-down before maintenance: before attempting any kind of maintenance make sure the supply pressure is shut off and all residual air pressure is released from the system to be worked on.
- Start-up after maintenance: apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, please verify product set-up parameters.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

- **Perform maintenance procedures as shown in the instruction manual.**
If handled improperly, malfunction or damage of machinery or equipment may occur.
- **Equipment removal and supply/exhaust of compressed air**
When equipment is removed, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc. Then cut the supply pressure and power, and exhaust all compressed air from the system using its residual pressure release function.
When the equipment is to be started again after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc., and then confirm that the equipment is operating normally.
- **Low frequency operation**
Valves should be switched at least once every 30 days to prevent malfunction. (Use caution regarding the air supply.)
- **Manual override operation**
When the manual override is operated, connected equipment will be actuated. Confirm safety before operating.

Installation and Removal of Pilot Valve Cover

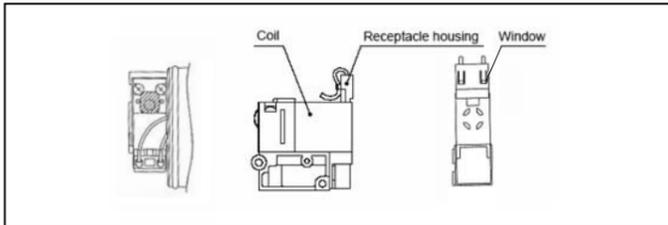
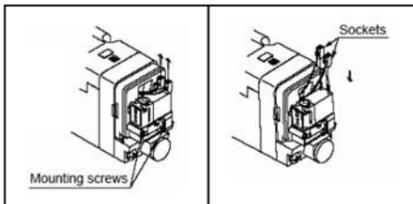
- **Removal**
To remove the pilot valve cover, spread the cover's hook outward about 1mm with a flat head screw driver, and pull the cover straight off. If it is pulled off at an angle, the pilot valve may be damaged or the protective O-ring may be scratched.
- **Installation**
Put the cover back on straight without touching the pilot valve, and push it all the way until the cover's hook locks, without twisting the protective O-ring. (When pushed in, the hook opens and locks automatically.)



Replacement of Pilot Valve

- **Removal**
 - 1) Take off the sockets which are installed on the pilot valve pins by pulling them straight upward.
 - 2) Remove the pilot valve mounting screws with a small screw driver.
- **Installation**
 - 1) After confirming installation of the gasket, securely tighten the mounting screws with the proper torque shown in the table below.
 - 2) Put the sockets on straight and install them securely so that the receptacle housings touch the coil surface as shown in the drawing below.

If they are pushed in with excessive force, there is a danger of the sockets coming off of the receptacle housings. Confirm that the sockets do not protrude from the windows on the side of the receptacle housings.



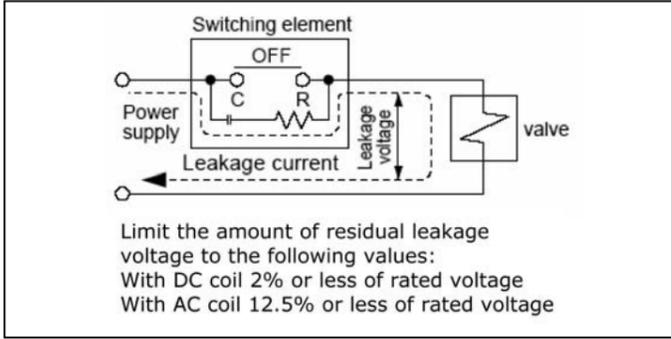
Proper tightening torque Nm
0.8 to 1.2

6 LIMITATIONS OF USE

- ⚠ **WARNING:**
 - Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue.

- **Momentary energization**
 - If a double solenoid valve will be operated with momentary energization, it should be energized for at least 0.1 second.

- **Leakage voltage**
 - Particularly when using a C-R element (surge voltage suppressor) for protection of the switching element, take note that leakage voltage will increase due to leakage current flowing through the C-R element, etc.



- **Low temperature operation**
 - Avoid ambient temperatures outside the range of -10 to 60°C (-5°C minimum for rubber seals). At low temperatures, appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

- **Operation for air blowing**
 - When using solenoid valves for air blowing, an external pilot type or direct solenoid operated type should be used. Also, supply to the external pilot port compressed air within the pressure range prescribed in the specifications.

- **Mounting orientation**
 - In the case of a single solenoid, the mounting orientation is unrestricted. In the case of double solenoid or 3 position valves, mount so that the spool valve is horizontal. Also, when mounting in a location with vibration or impact, mount so that the spool valve is at a right angle to the direction of vibration.
Do not use in locations where vibration or impact exceeds the product's specifications.

7 EUROPEAN CONTACT LIST

7.1 SMC Corporation

Country	Telephone	Country	Telephone
Austria	(43) 2262-62 280	Italy	(39) 02-92711
Belgium	(32) 3-355 1464	Netherlands	(31) 20-531 8888
Czech Republic	(420) 5-414 24611	Norway	(47) 67 12 90 20
Denmark	(45) 70 25 29 00	Poland	(48) 22-548 50 85
Finland	(358) 9-859 580	Portugal	(351) 22 610 89 22
France	(33) 1-64 76 1000	Spain	(34) 945-18 4100
Germany	(49) 6103 4020	Sweden	(46) 8 603 12 00
Greece	(30) 1- 342 6076	Switzerland	(41) 52-396 3131
Hungary	(36) 23 511 390	Turkey	(90) 212 221 1512
Ireland	(353) 1-403 9000	United Kingdom	(44) 1908-56 3888

7.2 Websites

SMC Corporation www.smcworld.com
SMC Europe www.smceu.com