



ORIGINAL INSTRUCTIONS

Instruction Manual
Clean Design Manifold
Series JSY5000-H



The intended use of this valve is to control the movement of an actuator. The protective outside casing is intended for cleaning and wash down environment.

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 and safety requirements for systems and their components.

ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components.

IEC 60204-1: Safety of machinery - Electrical equipment of machines. Part 1: General requirements

ISO 10218-1: Robotics - Safety requirements - Part 1: Industrial 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.

	Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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.

Caution

- The product is provided for use in manufacturing industries only. This product shall not be used in residential areas.

2 Specifications

2.1 Valve specifications

Valve type			Rubber seal
Fluid			Air
Internal pilot operating pressure range [MPa]	2 position single		0.15 to 0.7
	2 position double		0.1 to 0.7
	3 position		0.2 to 0.7
	4 position dual 3 port		0.15 to 0.7
External pilot operating pressure range [MPa]	Operating pressure range		-100 kPa to 0.7
	Pilot pressure range	2 position single / double	0.25 to 0.7
		3 position	
Ambient and fluid temperature [°C] ^{Note 1)}			-10 to 50 (No freezing)
Manual override			Non-locking push type
Flow characteristics			Refer to catalogue
Response time			
Duty cycle			Refer to 3.12
Minimum operating frequency			1 cycle / 30 days
Maximum operating frequency [Hz]	2 position single/double		5
	4 position dual 3 port		3
	3 position		

2 Specifications - continued

Pilot exhaust type	Internal pilot	Common exhaust
	External pilot	
Lubrication		Not required
Mounting orientation		Unrestricted
Impact / vibration resistance [m/s ²] ^{Note 2)}		150 / 30

Table 1.

Note 1) IPX9K (protection against high-pressure, high-temperature liquids) rated, but it is advised be used within the stated ambient and fluid temperature range while the valve is operating.

Note 2) Impact resistance: No malfunction resulted in an impact test using a drop impact tester. The test was performed one time each in the axial and right angle directions of the main valve and armature, for both energized and de-energized states. (Values quoted are for a new valve).

Vibration resistance: No Malfunction resulted in 45 to 2000 Hz, a one-sweep test performed in the axial and right angle directions of the main valve and armature for both energized and de-energized states. (Values quoted are for a new valve).

2.2 Solenoid specifications

Type		V112#-5A
Coil rated voltage [VDC]		24
Allowable voltage fluctuation ^{Note)}		±10% of rated voltage
Power consumption [W]	Standard	0.4
	With power saving circuit	0.1 (Inrush 0.4, Holding 0.1 after 67ms)
Surge voltage suppressor		Diode (Varistor for non-polar type)
Indicator light		LED

Table 2.

Note) Valve state is not defined if electrical input is outside the specified operating range.

2.3 Manifold specifications

Type		Lead wire	Fieldbus (IO-Link)
Manifold type		Plug-in connector connecting base	
SUP / EXH port type		Common SUP / EXH	
Number of stations		2 to 16	
Internal wiring		No polarity	PNP
		NPN	
		PNP	
Port size	1(P), 5(EA), 3(EB)	G1/2 (according to ISO 16030)	
	4(A), 2(B)	G1/4 (according to ISO 16030)	
Enclosure (based on IEC 60529 / ISO 20653)		IP69K	

Table 3.

Note) Refer to catalogue for fitting types. Contact SMC for mixed type fittings.

2.4 Sub-plate specifications

Type		M12 connector mounted plug-in single unit
SUP / EXH port type		1 (P), 5(EA), 3(EB) individual port
Internal wiring		Common
Port size	1(P), 5(EA), 3(EB)	G1/4 (according to ISO 16030)
	4(A), 2(B)	
Enclosure (based on IEC 60529 / ISO 20653)		IP69K

Table 4.

2.5 Manifold / sub-plate material

External Material	Resin: PA
	Metal: Stainless Steel 316
	Rubber: EPDM
Sheath	Lead free heat resistant PVC

Table 5.

2.6 Light indication

When equipped with indicator light and surge voltage suppressor, the light window turns red when solenoid ‘a’ is energized, and it turns green when solenoid ‘b’ is energized.

2 Specifications - continued

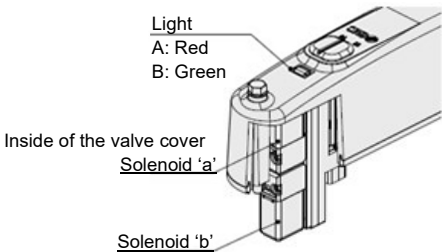


Figure 1. Valve cover cut away.

2.7 Pneumatic symbol

Refer to catalogue.

2.8 Special products

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.
- If supply port (P) piping is downsized, the flow rate may be reduced even if the inlet pressure is within the operating pressure range, preventing valve switching and causing a malfunction of the cylinder.

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals*, salt water or steam are present.
*Check section 6.2 on cleaning and the product component list of external materials used in Table 5 and ensure compatibility with any chemicals used in the cleaning solution.
- 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.
- Contact SMC for altitude limitations.
- Do not use the manifold in a food zone: An environment where food which will be sold as merchandise, directly touches the manifold components.
- The manifold may be installed in:
 - Splash zone: An area where food splashes directly touching manifold components, but the food will not be sold as merchandise or consumed.
 - Non-food zone: An environment where there is no contact with food.

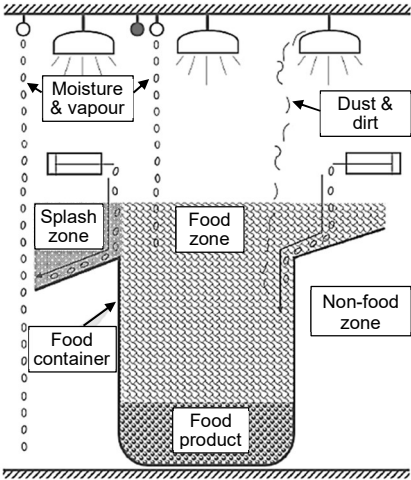


Figure 2.

3 Installation - continued

- IP69K compliant products are protected against dust and high pressure hot water jetwash. However, when operating a valve, keep the ambient temperature and fluid temperature within specification. (No freezing). These products cannot be used in water.
- IP69K is only guaranteed to the factory condition (finished as a manifold).
- Although the product is IPX9K compliant, it does not prevent fluid from entering the manifold under all conditions. When cleaning the manifold, it is recommended to keep the distance from the nozzle of the washer to the manifold at least 20 cm. Wash the manifold while moving the nozzle, do not fix the cleaning point to one place.
- Products compliant with IP69K enclosures satisfy the specifications by mounting each product properly. Be sure to read the Specific Product Precautions for each product.
- When installing the manifold, make sure that the gaskets are not misaligned, are in good condition, not forgotten to be attached, and that there are no foreign objects.

3.3 Piping

Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When screwing in the half union with hexagon hole, use a proper a hexagonal wrench and be careful not to deform or damage the internal parts. If the internal parts are deformed or damaged, it may cause the tube to come off.
- Uni-thread fittings cannot be used. When using Uni-thread fittings, the tightening load on the chamfered part of the female thread on the manifold side can cause the female thread side to deform or break.
- Tighten fittings to the specified tightening torque.

Port	Thread size	Tightening torque [N·m]
VENT	M5	1 to 1.5
X, PE	G1/8	2.9 to 3.2
4(A), 2(B)	G1/4	5.7 to 6.3
1(P), 5(EA), 3(EB)	G1/2	14.3 to 15.8

Table 6.

3.4 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If an external lubricant is used in the system, the existing NSF-H1 grade lubricant used inside the valve will be affected and the (H1) category conformity invalidated.

3.5 Air supply

Warning

- Use clean air. If the compressed air supply includes chemicals, synthetic materials (including organic solvents), salinity, corrosive gas etc., it can lead to damage or malfunction.

Caution

- Install an air filter upstream of the valve. Select an air filter with a filtration size of 5 µm or smaller.

3.6 Manual override

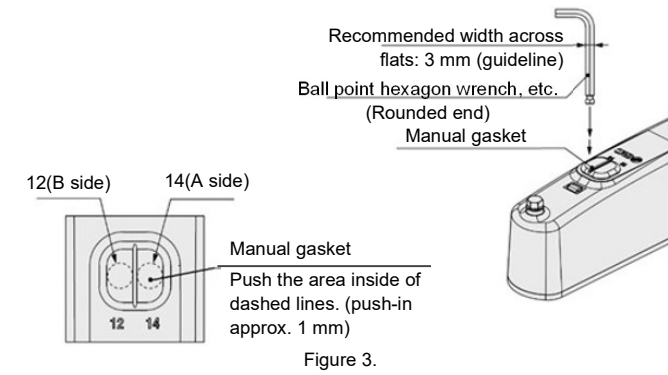
Warning

- Manual override is used to switch the main valve without inputting an electrical signal for the valve. When manual operation is performed, the connected actuator will start operating, so be sure to confirm that it is safe to operate beforehand.

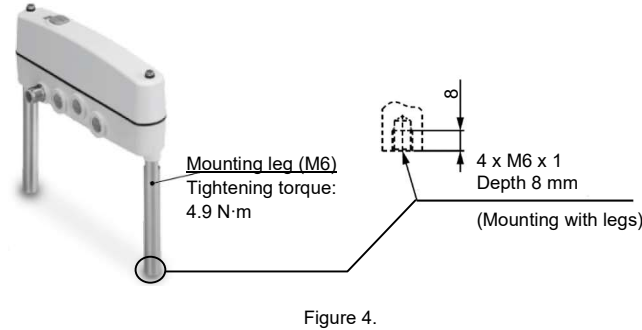
Caution

- Use a rounded tool (such as a ballpoint hex wrench) for manual override operations. Manipulating manual override with a sharp tool will damage the manual gasket and the IP69K is not satisfied.

3 Installation - continued



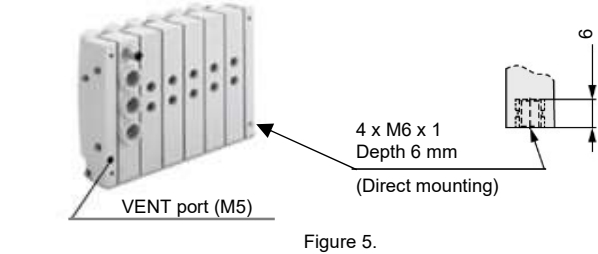
3.7 Mounting
3.7.1 Mounting leg



3.7.2 VENT port

- Caution**
- A VENT port is installed on the manifold so that even if a valve leaks, the leaked pressure does not accumulate inside.
 - Prevent liquid from entering the VENT port.
 - Do not block the VENT port. If the VENT port is used with the port closed, internal pressure may build up and the product gasket may

- come off and IP69K is not satisfied.
- Do not pressurize the VENT port. The sealing performance of the gasket will be reduced and the IP69K may not be satisfied.
 - Do not pipe the VENT port and the exhaust port (3/5 port) in the same piping. The back pressure of the exhaust port may be applied to the VENT port, increasing the internal pressure.



3.7.3 Valve / cover mounting

- Caution**

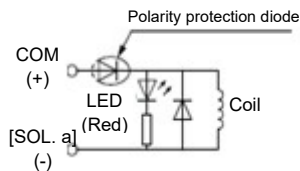
Refer to Maintenance section.

3.8 Indicator light / surge voltage suppressor

3.8.1 Polar type

Positive Common
Single solenoid

Light/surge voltage suppressor (□Z)



Negative Common
Single solenoid

Light/surge voltage suppressor (□NZ)

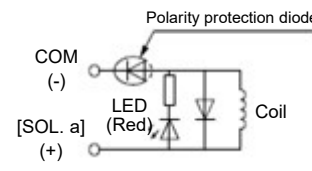


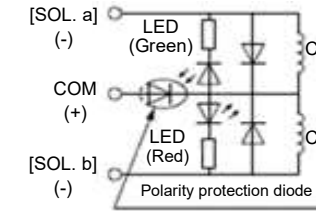
Figure 6.

3 Installation - continued

Positive Common

Double solenoid, 3-position,
4-position

Light/surge voltage suppressor (□Z)



Negative Common

Double solenoid, 3-position,
4-position

Light/surge voltage suppressor (□NZ)

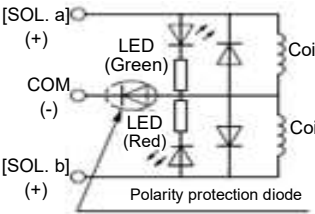
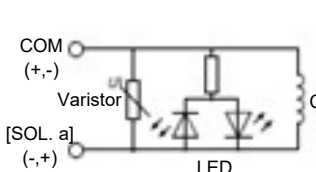


Figure 7.

3.8.2 Non-polar type

With light / surge voltage suppressor (□U)

Single solenoid



Double solenoid

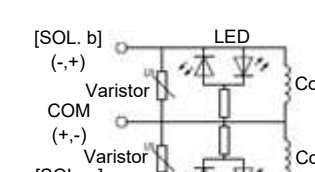


Figure 8.

3.8.3 With power saving circuit

- Power consumption is decreased by approximately 1/4 of the amount required at start up by reducing the wattage required to hold the valve in an energized state.
(Effective energizing time is over 67ms at 24 VDC).

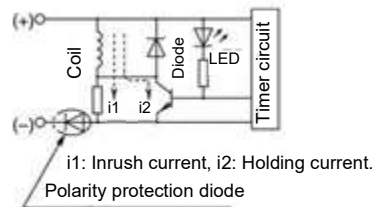


Figure 9.

- The above circuit reduces the power consumption for holding in order to save energy.
- Since the voltage will drop by approx. 0.5 V due to the transistor, pay attention to the allowable voltage fluctuation. (For details, refer to the solenoid specifications of each type of valve).

3.9 Electrical specification

- Caution**

3.9.1 Lead wire type (34 cores)

Cannot be used for movable wiring.

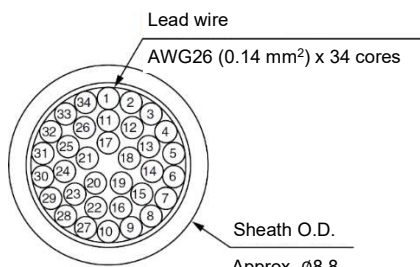


Figure 10.

3 Installation - continued

Minimum bend radius [mm]	55 or more
Conductor resistance [Ω/km]	143 or less (at 20 °C)
Voltage limit [VAC]	2000 (1 minute)
Insulation resistance [MΩ/km]	10 or more (at 20 °C)

Table 7. Lead wire electrical characteristics

3.9.2 M12 single sub-plate type

For further cable specifications, refer to <https://www.phoenixcontact.com>.

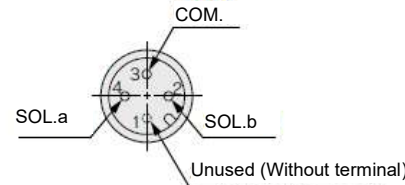


Figure 11. Sub-plate pin arrangement (no numeric indication)

Cable length [m]	Phoenix contact product number	Phoenix contact order number	Note
1.5	SAC-4P-1,5-600/M12FS HD	1403956	Produced upon receipt of order
3	SAC-4P-3,0-600/M12FS HD	1403957	
5	SAC-4P-5,0-600/M12FS HD	1403958	
10	SAC-4P-10,0-600/M12FS HD	1403959	

Table 8. M12 connector cable (IP69K and FDA compliant).

3.9.3 M12 EX430 fieldbus type

No.	Designation	Description
1	L+	+24 V for SI unit
2	SV24 V	+24 V for solenoid valve
3	L-	0 V for SI unit
4	C/Q	IO-Link communication line
5	SV0 V	0 V for solenoid valve

Insulation resistance (at 500 VAC) [MΩ/km]	10 or more
Withstand voltage [VAC]	500

Table 9.

Station	Lead wire no.	Polarity	Lead wire colour	Printed mark (Both sides)	
				Type	Colour
Station 1	SOL.a	1 (-)	(+)	Orange	Red
	SOL.b	2 (-)	(+)		Black
Station 2	SOL.a	3 (-)	(+)	Light grey	Red
	SOL.b	4 (-)	(+)		Black
Station 3	SOL.a	5 (-)	(+)	White	Red
	SOL.b	6 (-)	(+)		Black
Station 4	SOL.a	7 (-)	(+)	Yellow	Red
	SOL.b	8 (-)	(+)		Black
Station 5	SOL.a	9 (-)	(+)	Pink	Red
	SOL.b	10 (-)	(+)		Black
Station 6	SOL.a	11 (-)	(+)	Orange	Red
	SOL.b	12 (-)	(+)		Black
Station 7	SOL.a	13 (-)	(+)	Light grey	Red
	SOL.b	14 (-)	(+)		Black
Station 8	SOL.a	15 (-)	(+)	White	Red
	SOL.b	16 (-)	(+)		Black
Station 9	SOL.a	17 (-)	(+)	Yellow	Red
	SOL.b	18 (-)	(+)		Black
Station 10	SOL.a	19 (-)	(+)	Pink	Red
	SOL.b	20 (-)	(+)		Black
Station 11	SOL.a	21 (-)	(+)	Orange	Red
	SOL.b	22 (-)	(+)		Black
Station 12	SOL.a	23 (-)	(+)	Light grey	Red
	SOL.b	24 (-)	(+)		Black
Station 13	SOL.a	25 (-)	(+)	White	Red
	SOL.b	26 (-)	(+)		Black
Station 14	SOL.a	27 (-)	(+)	Yellow	Red
	SOL.b	28 (-)	(+)		Black
Station 15	SOL.a	29 (-)	(+)	Pink	Red
	SOL.b	30 (-)	(+)		Black
Station 16	SOL.a	31 (-)	(+)	Orange	Red
	SOL.b	32 (-)	(+)		Black
	COM.	33 (+)	(-)	Light grey	Red
	COM.	34 (+)	(-)		Black

Positive Negative common common
Figure 13.

3 Installation - continued

Cable length [m]	Phoenix contact product number	Phoenix contact order number	Note
1.5	SAC-5P-M12MS/1,5-600/M12FS HD	1404065	Produced upon receipt of order
3	SAC-5P-M12MS/3,0-600/M12FS HD	1404066	
5	SAC-5P-M12MS/5,0-600/M12FS HD	1413144	
10	SAC-5P-M12MS/10,0-600/M12FS HD	1413143	

Table 10. Communication cable (IP69K and FDA compliant)^{Note)}

Note) IO-Link compatible, plug on both sides / with M12 connector socket.

3.10 Residual voltage

- Caution**

- If a varistor or diode surge voltage suppressor is used, the suppressor arrests the back EMF voltage from the coil to the level indicated in Table 11.
- Ensure the transient voltage is within the specification of the host controller.
- Valve response time is dependent on surge suppression method selected.

Surge voltage suppressor	24 VDC
Z	Approx. 1 V
U	Approx. 47 V

Table 11.

3.11 Countermeasure for surge voltage

- Caution**

- At times of sudden interruption of the power supply, the energy stored in a large inductive device may cause non-polar type valves in a de-energized state to switch.
- When installing a breaker circuit to isolate the power, consider a valve with polarity (with polarity protection diode), or install a surge absorption diode across the output of the breaker.

3.12 Extended period of continuous energization

- Caution**

- If a valve is energized continuously for a long period of time or is mounted in a control panel, the rise in temperature due to heating-up

of the coil assembly may cause a decline in solenoid valve performance, reduce service life, or have adverse effects on peripheral equipment. Therefore, if the valve is to be energized for periods of longer than 30 minutes at a time or if during the hours of operation, the energized period per day is longer than the de-energized period, we advise using a valve with a power saving circuit. If the valve is energized continuously for long periods of time or if the valves on A side and B side are energized simultaneously for long periods of time, be sure to use a valve with power saving circuit.

- Do not simultaneously energise A-side and B-side of the 2-position double solenoid; otherwise, a malfunction may be caused.

3.13 Effect of back pressure when using a manifold

- Warning**

- Use caution when valves are used on a manifold, because an actuator may malfunction due to back-pressure.
- For 3-position exhaust centre valve or single acting cylinder, take appropriate measures to prevent malfunction by using it with an individual EXH interface block or an individual exhaust manifold.

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.

6 Maintenance - continued

- 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.
- Regular inspection and tightening of the hexagon bolts with flange is recommended at 3 month internals, to satisfy IP69K. If washer seals become or are observed as damaged, then they should be replaced.
- When disassembling by removing the hexagon bolt with flange, make sure that there is no moisture on the outer surface of the product. If the product is disassembled or assembled with moisture attached, moisture may enter the inside of the manifold and cause damage.
- Make sure that the washers are in good condition, in position and assembled when tightening the hexagon bolt with flange.

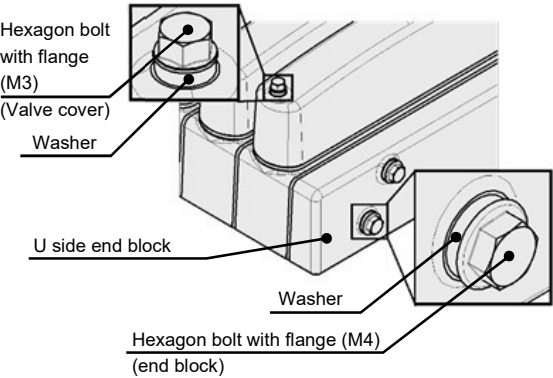


Figure 14.

Caution

- Ensure gaskets are in good condition, not deformed and are dust and debris free.
- When mounting valves ensure gaskets are present, aligned and securely in place and tighten screws to a torque as per Table 12.

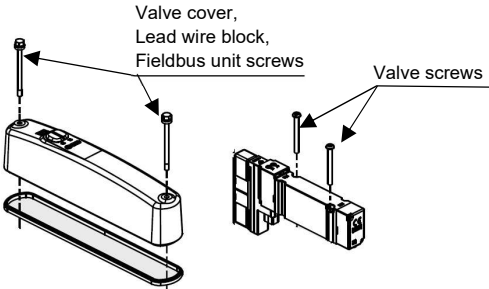


Figure 15.

Parts / component	Thread size	Tightening torque [N·m]
Fieldbus unit cover	M3	0.8
Valve/valve cover		
U side end block	M4	1.4

Table 12.

6.2 Cleaning

Check product materials in Specification section, table 5, and ensure compatibility with any chemicals used in the cleaning solution.

6.3 Replacement parts

- Refer to the table below for tightening torque of the screws when replacing the pilot valve.

Pilot valve	Thread size	Tightening torque [N·m]
V112	M2	0.15

Table 13.

6 Maintenance - continued

Caution

- The coil specification and voltage (including light/surge voltage suppressor) cannot be changed by changing the pilot valve.
- When selecting the standard coil type, it is not possible to change to the power-saving circuit type.

7 Limitations of Use

Warning

The system designer should determine the effect of the possible failure modes of the product on the system.

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

Warning

7.2 Effect of energy loss on valve switching

	Single solenoid	Double solenoid	3 Position	4-Position dual 3-port
Air supply present, electrical supply cut	Spool returns to the OFF position by air force	Spool stops moving after electricity cut (Position cannot be defined)	Spool returns to OFF position by spring force	Spools return to OFF position by air force
Electrical supply present, air supply cut	Spool stops moving after air pressure cut (Position cannot be defined)	Spool stops moving after air pressure cut (Position cannot be defined)	Spool returns to OFF position by spring force	Spool stops moving after air pressure cut (Position cannot be defined)

Table 14.

7.3 Intermediate stopping

Refer to Handling Precautions for 3/4/5 port Solenoid Valves.

7.4 Holding of pressure

Since valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a pressure vessel.

7.5 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.

7.6 Safety relays or PLC

If a safe output from a safety relay or PLC is used to operate this valve, ensure that any output test pulse duration is shorter than 1ms to avoid the valve solenoid responding.

Caution

7.7 Leakage voltage

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes ≤3% of the rated voltage across the valve.

7.8 Low temperature operation

Unless otherwise indicated in the specifications for each valve, operation is possible to -10°C, but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

7.9 Momentary energization

If a double solenoid valve is operated with momentary energization, it should be energized for at least 0.1 second. However, depending on the secondary load conditions, it should be energized until the cylinder reaches the stroke end position, as there is a possibility of malfunction otherwise.

7 Limitations of Use - continued

7.10 EMC restrictions

7.10.1 Class and group description

- This product is group 1, class A equipment according to EN55011.
- Group 1 equipment does not intentionally generate radio-frequency energy in the range 9kHz to 400 GHz.
- Class A equipment is equipment suitable for use in all locations other than those allocated in residential environments and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
- This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

7.10.2 Cable length to connect

The cable to connect the product shall be less than or equal to 30m.

7.10.3 Connecting the power supply

This product is not intended to be directly connected to any DC Distribution network.

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 : [https:// www.smcworld.com](https://www.smcworld.com) (Global) [https:// www.smc.eu](https://www.smc.eu) (Europe)
SMC Corporation, 1-5-5, Kyobashi, Chuo-ku, Tokyo 104-0031, JAPAN
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