



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/IEC¹⁾, 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 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	
	Pilot pressure range	-100 kPa to 0.7
Ambient and fluid temperature [°C] ^{Note 1)}	0.25 to 0.7	
	-10 to 50 (No freezing)	
Manual override	Non-locking push type	
Flow characteristics	Refer to catalogue	
Response time	Refer to 3.12	
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	
Pilot exhaust type	Internal pilot	Common exhaust
	External pilot	
Lubrication	Not required	

2 Specifications - continued

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

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 67 ms)
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
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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)
	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
Sheath	Rubber: EPDM
	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.

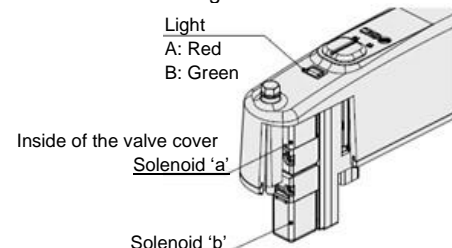


Figure 1. Valve cover cut away.

2 Specifications - continued

2.7 Pneumatic symbol

Refer to catalogue.

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.
- 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.

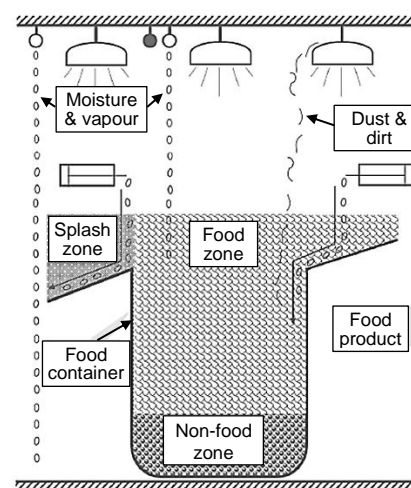


Figure 2.

- 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 Installation - continued

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

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.

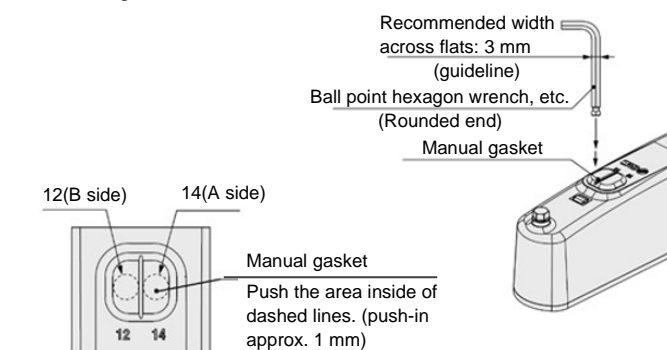


Figure 3.

3.7 Mounting

3.7.1 Mounting leg

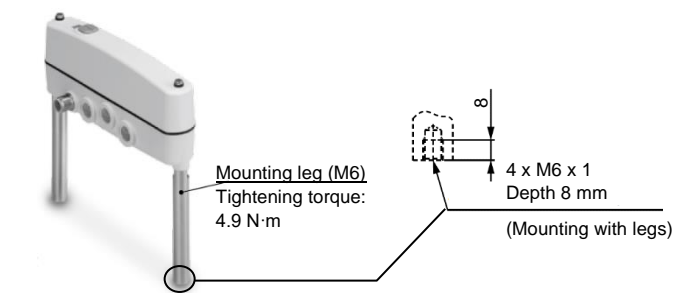


Figure 4.

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.

3 Installation - continued

- 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.

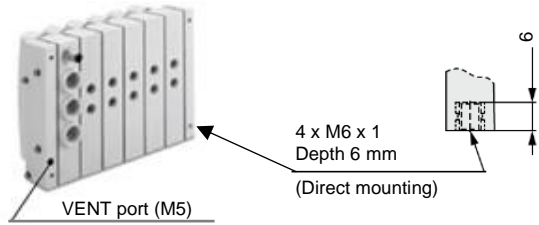


Figure 5.

3.7.4 Valve / cover mounting



Caution

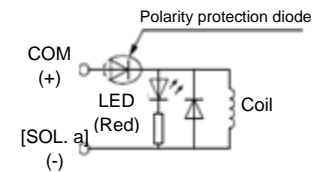
Refer to Maintenance section.

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)

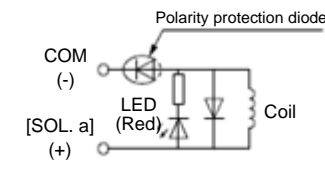
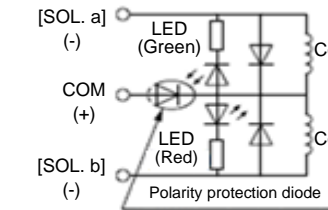


Figure 6.

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)

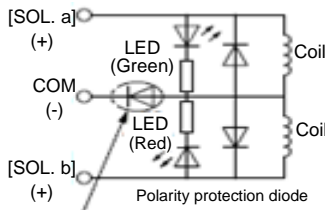


Figure 7.

3.8.2 Non-polar type

With light / surge voltage suppressor (□U)

Single solenoid

Double solenoid

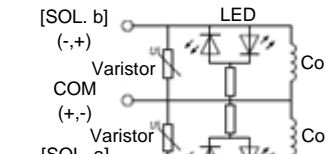
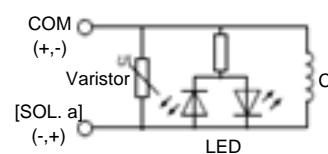


Figure 8.

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 67 ms at 24 VDC).

3 Installation - continued

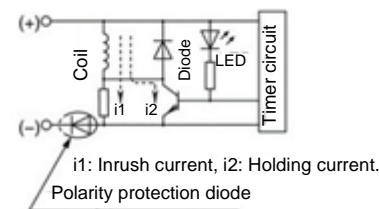


Figure 9.

- 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.

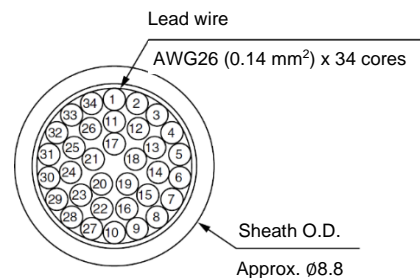


Figure 10.

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

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

Positive common Negative common
Figure 11.

3 Installation - continued

3.9.2 M12 single sub-plate type

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

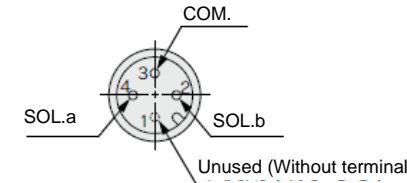


Figure 12. Sub-plate pin arrangement (no numeric indication)

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

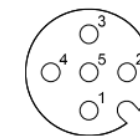


Figure 13.

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.

Cable length [m]	Phoenix contact product number	Phoenix contact order number	Note
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 10. 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

3 Installation - continued

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.
- 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 intervals, 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.

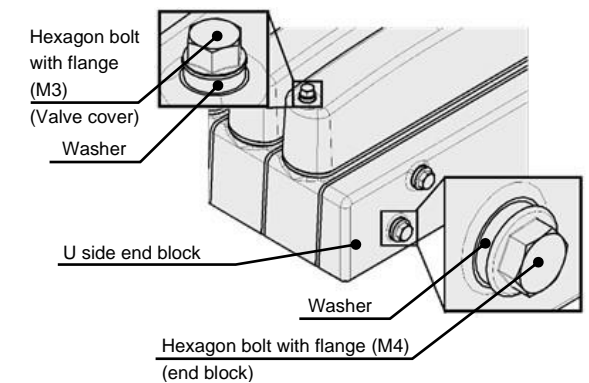


Figure 14.

6 Maintenance - continued

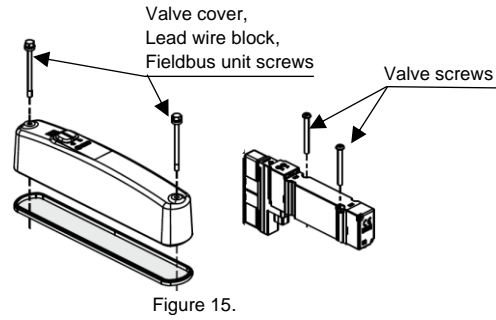


Figure 15.

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.

7 Limitations of Use

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

7.2 Leakage voltage

⚠ Caution

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

7.3 Low temperature operation

⚠ Caution

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.

7.4 Intermediate stopping

⚠ Warning

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

7.5 Holding of pressure

⚠ Warning

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

7.6 Safety relays or PLC

⚠ Warning

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 1 ms to avoid the valve solenoid responding.

7.7 Momentary energization

⚠ Caution

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.

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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