Doc. No.SX10-OMR0002

Operation Manual

High Speed 2 Port Valve

PRODUCT NAME

SX10 Series

MODEL/ Series

SMC Corporation

Contents

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)[*1)], 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 10218-1992: Manipulating industrial robots -Safety.
etc.

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

1. The compatibility of the product is the responsibility of the person who designs the equipment 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.

2. Only personnel with appropriate training should operate 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.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1.The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2.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.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4.Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Safety Instructions

⚠ Caution

1.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.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1.The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

Compliance Requirements

1. **The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.**
2. **The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.**

SX10 Series

Precautions 1

Be sure to read this before handling.

Design/Selection

⚠Warning

1. Review the specifications.

The product is designed for use only in compressed air systems. Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications shown in the catalog.)

Please contact SMC if using for fluids other than compressed air. We do not guarantee against any damage if the product is used outside of the specification range.

2. Ventilation

Provide ventilation when using a valve in a confined area, such as in a closed control panel. For example, install a ventilation opening, etc. in order to prevent pressure from increasing inside of the confined area and to release the heat generated by the valve.

3. Disassembly and modification is prohibited.

Do not disassemble the product or make any modifications, including additional machining.

This may cause human injury and/or an accident.

4. Air quality

Use clean air.

Do not use compressed air that contains chemicals, synthetic oils, including organic solvents, salt or corrosive gases, etc., as it may cause damage or malfunction.

For detailed information regarding the quality of the compressed air described above, refer to SMC's "Air Cleaning Systems".

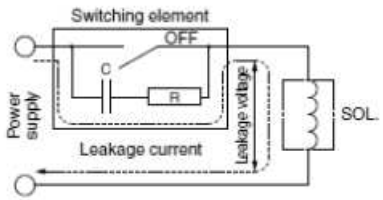
5. Ambient environment

Use within the operable ambient temperature range. After confirming the compatibility of the product's component materials with the ambient environment, operate such that fluid does not adhere to the product's exterior surfaces.

6. Countermeasures against static electricity

Take measures to prevent static electricity since some fluids can cause static electricity.

⚠Caution



1. Leakage voltage

When a resistor and a switching element are used in parallel or C-R device (surge voltage suppressor) is used for the protection of the switching device, note that leakage voltage will increase because earth leakage current passes through the resistor and C-R device. The suppressor residual leakage voltage should be 0.2 VDC or less.

2. Low temperature operation

When using the valve in a low temperature condition, take appropriate measures to avoid freezing of the drainage, moisture, etc. at low temperatures. Unless specified, the valve can be used down to -10°C.

3. Mounting orientation

Mounting orientation is not specified.

Mounting

⚠Warning

1. Operation Manual (this copy)

Install and operate only after reading the operation manual carefully and understanding the contents.

Keep the manual handy, so that it can be referred to as necessary.

2. Maintenance space

When installing the products, allow access for maintenance.

3. Observe the tightening torque for screws.

Tighten the screws to the recommended torque, when mounting the product.

4. If air leakage increases or equipment does not operate properly, STOP operation.

After installation and maintenance, apply air and power supplies to the equipment and perform appropriate functional and leakage inspections to make sure the equipment is mounted properly.

5. Painting and coating

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

Please consult with SMC before applying paint to resinous parts, as this may have an adverse effect due to the solvent in the paint.

6. Do not apply external force to the coil section.

7. Do not warm the coil assembly with a heat insulator, etc.

Use tape, heaters, etc., for freeze prevention on the piping and body only. Heating the coil may burn it out.

8. When there is a vibration source close to the product, take anti-vibration measures.

Wiring

⚠Caution

1. Polarity.

Valves of this series can be either polarity.

2. External force applied to the lead wire

Excessive force to the lead wire may cause a broken wire. Make sure that no excessive force larger than 15 N is applied to the lead wires.

SX10 Series

Precautions 2

Be sure to read this before handling.

Lubrication

⚠Warning

1. Lubrication

Do not supply oil.

Air Supply

⚠Warning

1. Type of fluids

Please consult with SMC when using the product in applications other than compressed air.

2. Large amount of condensate

Compressed air containing a large amount of condensate can cause malfunction of pneumatic equipment. An air dryer or water droplet separator should be installed upstream from filters.

3. Draining control

If condensate in the drain bowl is not emptied on a regular basis, the condensate will overflow and enter the compressed air lines. This will cause a malfunction of pneumatic equipment. If the drain bowl is difficult to check or remove, installation of a drain bowl with an auto drain option is recommended.

4. Use clean air.

Do not use compressed air that contains chemicals, synthetic oils, including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

For detailed information regarding the quality of the compressed air described above, refer to SMC's "Air Cleaning Systems".

⚠Caution

1. If ultra dry air is used as a fluid, the lubrication characteristics of the equipment will deteriorate and this can affect the reliability (life) of the product. Contact SMC beforehand, if using ultra dry air.

2. Install air filters.

Install air filters close to valves on the upstream side.

It is strongly recommended to use a filter with a filtration rating of 0.01 μm or less. Be careful to prevent the supply pressure to the valve from decreasing.

3. Take appropriate measures to ensure air quality, such as by providing an after cooler, air dryer, or water separator.

Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an after cooler or water separator.

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

When the amount of carbon particles generated from the compressor is excessive, they will stick inside of the valve, and may cause malfunction or internal leakage.

Refer to SMC's Best Pneumatics catalog for further details on compressed air quality.

Operating environment

⚠Warning

1. Do not use in an environment where corrosive gases, chemicals, sea water, water or steam are present.

2. Do not use in an atmosphere containing flammable or explosive gases. Fire or an explosion can result. The product is not designed to be explosion proof.

3. Do not operate in a location subject to vibration or impact.

4. The valve should not be exposed to prolonged sunlight. Use a protective cover, if necessary.

5. Shield the product from radiated heat generated by nearby heat sources.

6. Employ suitable protective measures in locations where there is contact with oil and welding spatters, etc.

7. When the solenoid valve is mounted onto a control panel and energizing time is long, take measures against radiation in order to keep the valve temperature within the specified range.

Maintenance

⚠Warning

1. Maintenance should be performed according to the procedure indicated in the Operation Manual (this copy).

Improper handling may cause an injury, damage and/or malfunction of equipment and machinery.

2. Low frequency operation

Operate valves at least once every 30 days to prevent malfunction. (Refer to the precautions for "Air Supply" and follow the instructions)

3. Removal of product

Valves will reach high temperatures after operation. Confirm that the valve temperature has lowered sufficiently, before removing the product. If touched inadvertently, there is a danger of being burnt.

1. Shut off the fluid supply and release the fluid pressure in the system.
2. Shut off the power supply.
3. Remove the product.

⚠Caution

1. Discharging condensate

Exhaust the drainage from an air filter periodically.

2. Filter

1. Make sure that the filer is not clogged.
2. Replace filter elements after a year of use, or earlier if the pressure drop reaches 0.1MPa.

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.

SX10 Series

Precautions 3

Be sure to read before using.

Precautions

⚠Warning

1. Valves will reach high temperatures during operation.

Use caution, as there is a danger of being burnt if a valve is touched directly.

Continuous Energization (24 VDC)

⚠Caution

1. Power consumption 80 W specification: Not possible

When operating with an energy saving driver, continuous energization with the holding voltage of 3 to 6 VDC is possible.

2. Power consumption 40 W specification: Not possible

When operating with an energy saving driver, continuous energization with the holding voltage of 4 to 8 VDC is possible.

3. Power consumption 10 W specification: Please consult with SMC.

When operating with an energy saving driver, continuous energization with the holding voltage of 8 to 16 VDC is possible.

4. Power consumption 4W specification: Possible

Energizing Time and Non-Energizing Time (Without using an energy saving driver)

⚠Caution

1. Non-energized time (OFF) must be set longer than the energized time (ON).
2. For use with voltages other than 24 VDC, please consult with SMC and provide the operating condition information of pressure, voltage, energizing time and non-energizing time.

Others

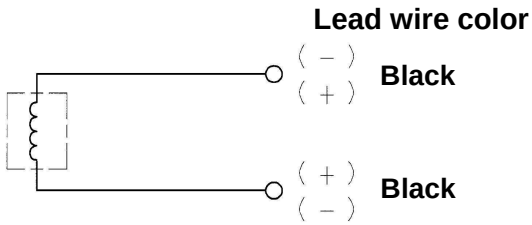
⚠Caution

1. If the valve is energized without air supply, the coil may be burned. Make sure to supply pressure to the valve when energizing.
2. Please contact SMC for the product usage with a voltage exceeding 75 VDC. Standard required by CE mark is different.

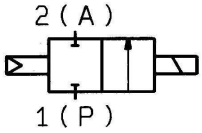
Lead Wire Connection

⚠Caution

Connect the lead wires to those specified.



Symbol



Wiring

⚠Caution

1. Use electrical circuits which do not generate chattering in their contacts.
2. Keep the voltage at +24 VDC, +/-5%.
3. Driving circuit
   Circuit and elements used for the output will significantly influence the product performance. Heat generation, response characteristics, etc. need to be examined before using.
4. Using a surge voltage suppressor such as diode and surge absorber for the electric circuit may cause malfunction, such as delay in response, abnormal heat generation or burn out of the coil. Please consult with SMC when using it.

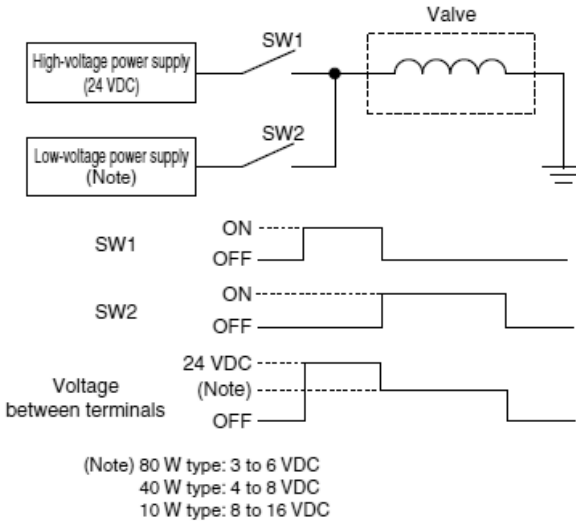
Use elements that are resistant to the surge voltage specified below for the output.
Surge voltage: 300 V

Precautions 4

Be sure to read before using.

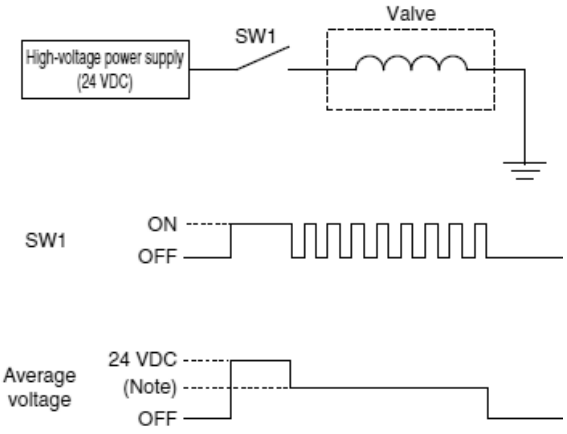
Control Method (Operation example with an energy saving driver circuit)

1. Control with 2 power supplies, starting power supply and holding power supply
   Switching system from high voltage to low voltage



(Note) 80 W type: 3 to 6 VDC
40 W type: 4 to 8 VDC
10 W type: 8 to 16 VDC

2. High speed switching control of high voltage by PWM control



Troubleshooting

If any failure is found during operation, please check and take measures in accordance with the procedure below.

Phenomenon		Possible causes	Countermeasure
Operation failure	Flow does not start.	Non-conformance of electric system - Incorrect wiring - Fuse blown out, lead wire broken	Check each part and take corrective actions for the failed part.
		Voltage drop	Check the supply voltage. Take corrective actions if voltage drop is confirmed. Keep the voltage at +24 VDC, +/-5%.
		Supply pressure is too high.	Check if the supply pressure is out of the specification range.
	Coil is damaged.	Energizing time is too long.	Check if the energization conditions are out of the specification range. This product has a limitation for the energization time. (See page 6)
		Usage of a surge voltage suppressor	When a protective circuit, such as diode and surge absorber is used, the coil may reach an abnormally high temperature and burn. Use a circuit and elements that are resistant to surge voltage. (See page 6)
		Fluid temperature and ambient temperature are too high.	Check that the fluid temperature and the ambient temperature are within the specification range. When valves are mounted next to each other, keep a distance of at least 0.5 mm between the valves.
	The valve does not close.	Air piping is connected in the reverse direction.	Connect the piping so that 1 (N) port is on the upstream side.
		Foreign matter enters or becomes lodged in piping.	Clean the supply air by using filters. (Recommended filtration rating: 0.01 μm)
		Residual voltage is too high.	Check the residual voltage. The suppressor residual voltage should be 0.2 VDC or less.
		Downstream side flow of the valve is restricted.	When flow on the downstream side is restricted, the valve may not close due to back pressure. Adjust the piping.
Air leakage	Find and check the air leakage point. Air leakage between the valve and base	The mounting screws are loose.	Tighten the mounting screws. Tightening torque: 0.5 to 0.7 Nm
		Interface gasket is wedged.	Check that the interface gasket is mounted correctly. Check that there is no abnormality with the O-ring such as twisting and/or damage.
	Air leakage from 2 (OUT) port	Foreign matter is trapped at the seating surface of the valve element, causing an increase in the internal leakage.	Replace the valve. Clean the supply air by using filters. (Recommended filtration rating: 0.01 μm)

Troubleshooting

Response failure (Operates but has a delay in response.)	Delay in ON response	Voltage drop	Check the supply voltage. Take corrective actions if voltage drop is confirmed. Keep the voltage at +24 VDC, +/-5%.
		Supply pressure is too high.	Check if the supply pressure is out of the specification range.
	Delay in OFF response	Usage of a surge voltage suppressor	When a protective circuit, such as diode and surge absorber is used, it may cause a delay in OFF response. Use a circuit and elements that are resistant to surge voltage. (See page 6)
		Downstream side flow of the valve is restricted.	When flow on the downstream side is restricted, OFF response may cause delay due to back pressure. Adjust the piping.

Revision history

SMC Corporation

4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN
Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362
URL http://www.smcworld.com

No.SX10-OMR0002