SX10-TFS0001

Installation and Maintenance Manual

High Speed 2 Port Solenoid Valve

Series SX10

CE

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 "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

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

⚠ 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 can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet 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 personnel.
- **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
  1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
  2) 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.
  3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
  1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
  2) 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.
  3) 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 μm.

2 Specifications

Refer to the operation manual for this product.

2.1 Specifications

Flow rate (L/min)[at 0.25 MPa]		50				100			
Power consumption (W)		80	40	10	4	80	40	10	4
Type of actuation		2-position 2 port N.C. , Air return							
Seal type		Metal poppet seal							
Valve width (mm)		9							
Fluid		Air							
Min. operation pressure (MPa)		0.15							
Coil resistance valve(Ω)		7.2	14.4	58	144	7.2	14.4	58	144
Max. operating pressure (MPa)[at 24VDC]		0.7	0.7	0.7	0.6	0.7	0.7	0.6	0.4
Ambient and fluid temperature (°C)		-10 to 50 (No freezing)							
Lubrication		Not required							
Mounting orientation		Unrestricted							
Impact / Vibration resistance (m/s2)		300/50							
Enclosure		Dustproof							
Electrical entry		Grommet							
Weight (g)	Screw mount type	27							
	Quick disconnect type	29							

Table 1

Flow rate (L/min)[at 0.25 MPa]		150			
Power consumption (W)		80	40	10	4
Type of actuation		2-position 2 port N.C. , Air return			
Seal type		Metal poppet seal			
Valve width (mm)		9			
Fluid		Air only			
Min. operation pressure (MPa)		0.15			
Coil resistance valve(Ω)		7.2	14.4	58	144
Max. operating pressure (MPa)[at 24VDC]		0.7	0.7	0.4	0.25
Ambient and fluid temperature (°C)		-10 to 50 (No freezing)			
Lubrication		Not required			
Mounting orientation		Unrestricted			
Impact / Vibration resistance (m/s2)		300/50			
Enclosure		Dustproof			
Electrical entry		Grommet			
Weight (g)	Screw mount type	27			
	Quick disconnect type	29			

Table 2

2.2 Characteristics

Flow rate(L/min) [at 0.25MPa]		50				100			
Power consumption (W)		80	40	10	4	80	40	10	4
Flow-rate Characteristics	C [dm3/(s/bar)]	0.24				0.47			
	b	0.24				0.28			
	Cv	0.06				0.12			
Response time (ms) [at 0.25MPa]	ON	0.45	0.55	0.9	1.25	0.55	0.7	1.1	1.7
	OFF	0.4	0.4	0.4	0.4	0.55	0.55	0.55	0.55
Max. operating frequency(Hz) [at 0.25MPa]		1,200	1,000	550	350	650	550	300	200

Table 3

Flow rate(L/min) [at 0.25MPa]		150			
Power consumption (W)		80	40	10	4
Flow-rate Characteristics	C [dm3/(s/bar)]	0.70			
	b	0.21			
	Cv	0.17			
Response time (ms) [at 0.25MPa]	ON	0.6	0.8	1.35	2.75
	OFF	0.75	0.75	0.75	0.75
Max. operating frequency(Hz) [at 0.25MPa]		600	500	250	150

Table 4

Note1) 24VDC. Duty ratio 1:1
80W: Current needs to be limited by using an energy saving driver circuit.
40W: Current needs to be limited by using an energy saving driver circuit.
10W: Energizing time is one second at a maximum. Please consult with SMC for continuous energization
4W: Continuous energization is possible.
Note2) The response time and maximum operating frequency are not guaranteed. (Actual values based on SMC test conditions)

2 Specifications (Continued)

2.3 Pressure/Flow-rate Characteristics (Without filter)

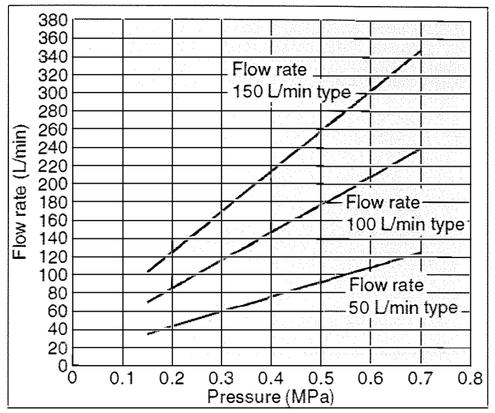

Figure 1

2.4 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.

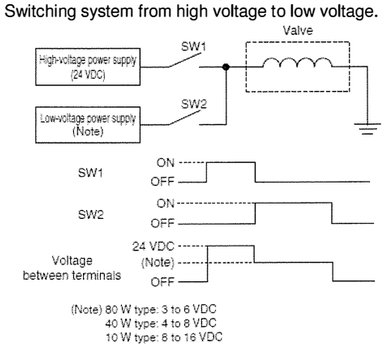

Figure 2

2. High speed switching control of high voltage by PWM control*.
(*:PWM control circuit not currently available.)

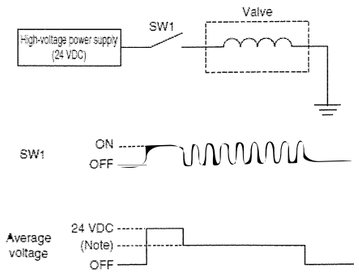

Figure 3

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2 Specifications (Continued)

2.5 Lead Wire Connection

⚠ Caution

Connect the lead wires as specified.

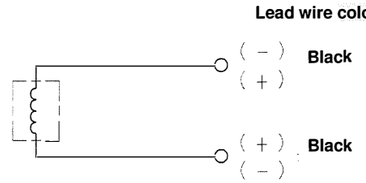


Figure 4

2.6 Symbol

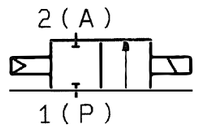


Figure 5

3 Installation

3.1 Installation

⚠ Warning

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

3.2 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 labelled 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.

3 Installation (Continued)

3.3 Piping

⚠ Caution

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

2. Tighten fittings to their specified tightening torque.

- Mount valve on manifold ensuring gasket is present.
- Valve mounting screws to be tightened to the specified tightening torque as shown in Fig.6

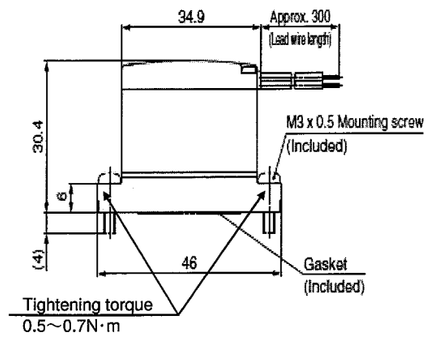
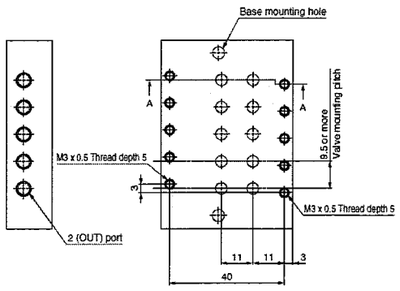
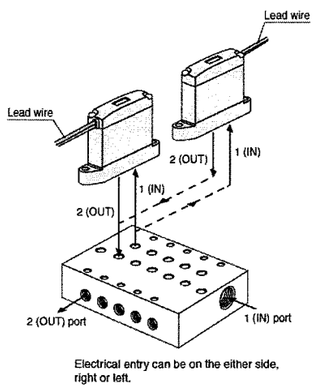


Figure 6

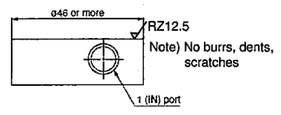
3.4 Manifold base recommended dimensions

SX11-□G





Electrical entry can be on the either side, right or left.



Sectional view A-A (2:1)

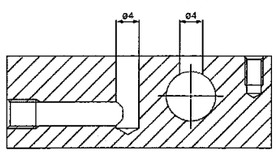


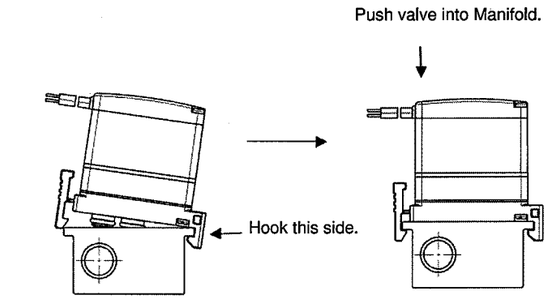
Figure 7

3 Installation (Continued)

3.5 Valve mounting procedure

⚠ Caution

Installation



Remove

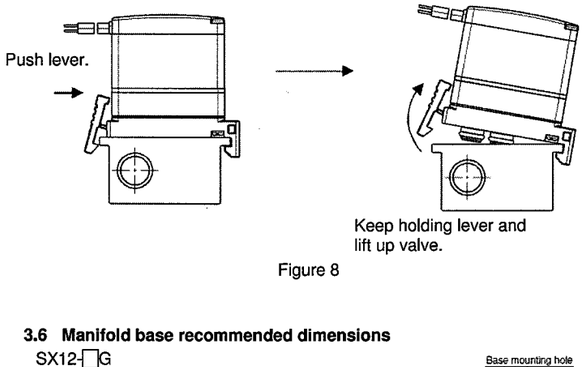
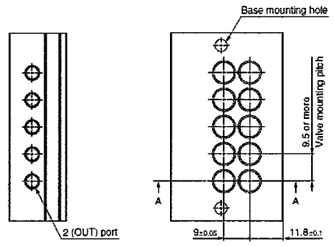
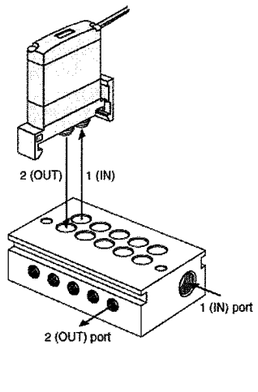


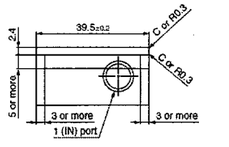
Figure 8

3.6 Manifold base recommended dimensions

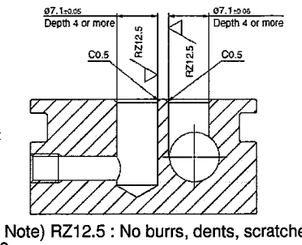
SX12-□G







Sectional view A-A (2:1)



Note) RZ12.5 : No burrs, dents, scratches.

Figure 9

3 Installation (Continued)

3.7 Wiring

⚠ Caution

1. Polarity.
Valves of this series are non polar.

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.

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

4. Keep the nominal voltage at +24 VDC, +/-5%.

5. 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.

6. 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

3.8 Lubrication

⚠ Caution

Lubrication can cause response delay. Operate the product without lubrication.

3.9 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.

⚠ 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.

3 Installation (Continued)

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.

3.10 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.

4 Maintenance

4.1 General Maintenance

⚠ Warning

1. 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.)

2. 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. Allow time for valves to cool.
4. 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.

5 Limitations of Use

5.1 Caution on Design

⚠ 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 Sect.2)
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

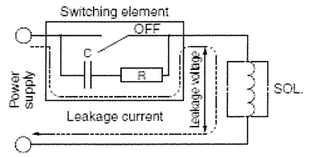


Figure 8

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.

5.2 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.

5 Limitations of Use (Continued)

5.3 Continuous Energization (24VDC)

⚠ 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

5.4 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.

5.5 Other

⚠ 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.

6 Contacts

AUSTRIA	(43) 2262 62280-0	**LATVIA**	(371) 781 77 00
BELGIUM	(32) 3 355 1464	**LITHUANIA**	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	**NETHERLANDS**	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	**NORWAY**	(47) 67 12 90 20
DENMARK	(45) 7025 2900	**POLAND**	(48) 22 211 9600
ESTONIA	(372) 651 0370	**PORTUGAL**	(351) 21 471 1880
FINLAND	(358) 207 513513	**ROMANIA**	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	**SLOVAKIA**	(421) 2 444 56725
GERMANY	(49) 6103 4020	**SLOVENIA**	(386) 73 885 412
GREECE	(30) 210 271 7265	**SPAIN**	(34) 945 184 100
HUNGARY	(36) 23 511 390	**SWEDEN**	(46) 8 603 1200
IRELAND	(353) 1 403 9000	**SWITZERLAND**	(41) 52 396 3131
ITALY	(39) 02 92711	**UNITED KINGDOM**	(44) 1908 563888

SMC Corporation

URL : http// www.smcworld.com (Global) http// www.smceu.com (Europe)

Specifications are subject to change without prior notice from the manufacturer.