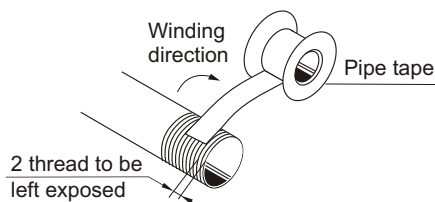


Piping

1 Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.



2 Wrapping of pipe tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if pipe tape is used, leave 1 thread ridge exposed at the end of the threads.

3 Closed center and double check valve types

For closed center or double check valve types, check the piping to prevent air leakage from the piping between the valve and the cylinder.

4 Connection of fittings

When screwing fittings into valves, tighten as follows.

1) M3

After tightening the fitting by hand, use a wrench to tighten the fitting an additional approximately 1/4 turn. As a reference value, tightening torque is 0.3 to 0.5 N·m.

2) M5, M6, 10-32UNF

After tightening the fitting by hand, use a wrench to tighten the fitting an additional approximately 1/6 to 1/4 turn. As a reference value, tightening torque is 1.5 to 2 N·m.

Note) If tightened excessively, the thread of the product may break or the gasket may deform. If tightened insufficiently, the thread of the product may become loose. In either case, air leakage can occur.

3) PT

Tighten with the proper torque shown below.

Tightening Torque for Piping

Connection thread	Proper tightening torque (N·m)
M3	0.3~0.5 (3~5)
M5	1.5~2 (15~20)
PT 1/8	7~9 (70~90)
PT 1/4	12~14 (120~140)
PT 3/8	22~24 (220~240)
PT 1/2	28~30 (280~300)

5 Piping to products

When piping to a product, refer to the operation manual to avoid mistakes regarding the supply port, etc.

Compressed air

1 When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment.

2 Install an air filter

Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 μ m or smaller.

3 Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.

Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

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

If excessive carbon dust is generated by the compressor, it may adhere to the inside of a valve and cause it to malfunction.

Lubrication

1 All valves have been lubricated for life by the manufacturer and therefore, do not require lubrication while in service.

2 If a lubricant is used in the system, use class 1 turbine oil (no additive), ISO VG32.

Once a lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

If turbine oil is used, refer to the Material Safety Data Sheet (MSDS) of the oil.

Mounting

Taking safety into the consideration, the piping system should always be mounted that disassembling and assembling can be carried easily.

Single acting valves can be mounted in any direction, but in the case of double solenoid valve and 3 position valve in a place subjected to vibration, spool valve should be aligned perpendicular to the vibration. (Never use in a vibration condition of more than 5 G.)

Manual override

When the manual override is operated, connected equipment will be actuated.

Operate after safety is confirmed.

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 condition of the secondary load, it should be energized until the cylinder reaches the stroke end position, since there is a possibility of malfunction.

Environment

- ❶ Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.
- ❷ Do not use in an environment where flammable gas or explosive gas exists. Usage may cause a fire or explosion. The products do not have an explosion proof construction.
- ❸ Do not use in a place subject to heavy vibration and/or shock.
- ❹ The valve should not be exposed to prolonged sunlight. Use a protective cover.
- ❺ Remove any sources of excessive heat.
- ❻ If it is used in an environment where there is possible contact with oil, weld spatter, etc., exercise preventive measures.

Formula of flow rate (Air in the state of temperature 20°C)

$P_1 + 0.1013 < 1.89 (P_2 + 0.1013)$ Subsonic flow

$$Q = 226S \sqrt{\Delta P (P_2 + 0.1013)}$$

$P_1 + 0.1013 \geq 1.89 (P_2 + 0.1013)$ Sonic flow

$$Q = 113S (P_1 + 0.1013)$$

Q : Air flow rate [l/min(ANR)]

S : Effective area [mm²]

ΔP : Pressure drop $P_1 - P_2$ [MPa]

P : Upstream pressure [MPa]

P : Downstream pressure [MPa]