



Flow Control Equipment Precautions 1

Be sure to read this before handling products.

Design/Selection

Warning

1. Confirm the specifications.

Products represented in this catalog are designed only for use in compressed air systems (including vacuum).

Do not operate at pressures, temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

We do not guarantee against any damage if the product is used outside of the specification range.

2. Products mentioned in this catalog are not designed for use as stop valves with zero air leakage.

A certain amount of leakage is allowed in the products' specifications. Tightening the needle to reduce leakage to zero may result in equipment damage.

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

Doing so may cause human injury and/or an accident.

4. The flow rate characteristics for each product are representative values.

The flow rate characteristics are characteristics of each individual product. Actual values may differ depending on the piping, circuitry, pressure conditions, etc. Also, depending on product specifications, there may be variations in the zero needle rotations position of the flow rate characteristics.

5. Sonic conductance (C) and critical pressure ratio (b) values for products are representative values.

For controlled flow direction values the needle is fully open. For free flow direction values the needle is fully closed.

6. Check if PTFE can be used in the application.

PTFE powder (Polytetrafluoroethylene resin) is included in the seal material of the male thread type piping taper thread. Confirm that the use of it will not cause any adverse effects on the system.

7. Speed controllers are designed to control the speed of the actuator.

When it is used for adjusting the flow rate of the air blow, use a restrictor without a check valve function (X214 or X21).

Mounting

Warning

1. Operation manual

Install the product and operate it only after reading the operation manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance and inspection.

3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications.

4. Screw the R screw into the Rc thread and the NPT screw into the NPT thread.

Mounting

Warning

5. Confirm that the lock nut is tightened.

A loose lock nut may cause speed changes in the actuator.

6. Check the degree of rotation of the needle valve.

Products mentioned in this catalog are retainer types, so the needle is not removed completely. Over rotation will cause damage.

7. Do not use tools, such as pliers, to rotate the knob.

This can cause the idle rotation of the knob or damage.

8. Confirm the air flow direction.

Mounting backwards is dangerous because the speed adjustment needle will not work, and the actuator may lurch suddenly.

9. Adjust the needle by opening the needle slowly after having closed it completely.

Loose needle valves may cause unexpected sudden actuator extension. When a needle valve is turned clockwise, it is closed and cylinder speed decreases. When a needle valve is turned counterclockwise, it is open and cylinder speed increases.

10. Do not apply excessive force or shock to the body or fittings with an impact tool.

This can cause damage or air leakage.

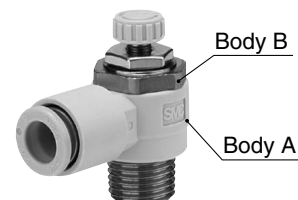
11. Refer to the Fittings and Tubing Precautions (pages 52 to 56) for handling One-touch fittings.

12. Tubing O.D. $\varnothing 2$

Tubing other than that from SMC cannot be used because it may result in the inability to connect the tube, air leakage after connecting the tube, or disconnection of the tube.

13. To install/remove flow control equipment, use an appropriate wrench to tighten/loosen the supplied nut on body B as close to the thread as possible.

Do not apply torque at other points, as the product may be damaged. Rotate body A manually for positioning after installation.



14. Do not use body A and universal type fittings for applications involving continuous rotation.

Body A and the fitting section may be damaged.



Flow Control Equipment Precautions 2

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Mounting

⚠ Caution

1. Tightening the threaded portion of the connection thread M3, M5, 10-32 UNF

1) M3

First, tighten it by hand, then give it an additional 1/4 turn with a wrench. The reference value for the tightening torque is 0.4 to 0.5 N·m.

* AS12□1F-M3-02 should be given an approx. 1/6 turn after tightening by hand (reference value: 0.4 to 0.5 N·m).

2) M5 and 10-32UNF

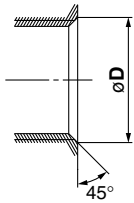
First, tighten it by hand, then give it an additional 1/6 turn to 1/4 turn with a wrench. The reference value for the tightening torque is 1 to 1.5 N·m.

* Excessive tightening may damage the thread portion or deform the gasket and cause air leakage.

If the screw is too shallowly screwed in, it may come loose or air may leak.

2. Chamfered female thread size of the connection thread M3, M5, 10-32UNF

In compliance with ISO16030 Standards (air pressure fluid dynamics – connection – ports and stud ends), the chamfered thread sizes shown below are recommended.



| Female thread size | Chamfer dimension øD (Recommended value) |
|--------------------|--|
| M3 | 3.1 to 3.4 |
| M5 | 5.1 to 5.4 |
| 10-32UNF | 5.0 to 5.3 |

3. The proper tightening torques for hexagon lock nuts are shown in the table below. For standard installation, turn 15 to 30° using a tool, after fastening by hand.

Pay attention not to over tighten the product. Check the dimensions for each product for the width across flats.

| Body size | Proper tightening torque (N·m) | Lock nut width across flats |
|-----------|--------------------------------|-----------------------------|
| M3 | 0.07 | 5 ^{*1} |
| M5 | 0.3 ^{*2} | 7 ^{*1} |
| 1/8 | 1 ^{*3} | 10 ^{*4} |
| 1/4 | 1.2 ^{*3} | 12 ^{*5} |
| 3/8 | 2 | 14 |
| 1/2 | 6 | 17 |

*1 4.5 for AS12□1F-M3-02, AS12□1F-M5-02, and AS1200-M3

*2 0.07 N·m for AS12□1F-M5-02, AS1□□1FM, AS12□0M, and ASD230FM

*3 2 N·m for AS22□1FE-01 and AS22□1FE-02

*4 9 for AS2001F-□-3 and 12 for AS22□1FE-01

*5 14 for AS22□1FE-02

UNI Thread Type

Mounting

⚠ Caution

1. First, tighten the threaded portion by hand, then use a suitable wrench to tighten the hexagonal portion of the body further at the appropriate wrench tightening angle shown below. As a reference value for the tightening torque, refer to the table below.

Connection Female Thread: Rc, NPT, NPTF

| Nominal size of UNI thread | Approx. wrench tightening angle after tightened by hand deg | Proper tightening torque (N·m) |
|----------------------------|---|--------------------------------|
| 1/8 | 30 to 60 | 3 to 5 |
| 1/4 | 30 to 60 | 8 to 12 |
| 3/8 | 15 to 45 | 14 to 16 |
| 1/2 | 15 to 30 | 20 to 22 |

Connection Female Thread: G

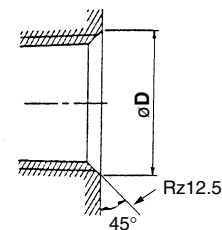
| Nominal size of UNI thread | Approx. wrench tightening angle after tightened by hand deg | Proper tightening torque (N·m) |
|----------------------------|---|--------------------------------|
| 1/8 | 30 to 45 | 3 to 4 |
| 1/4 | 15 to 30 | 4 to 5 |
| 3/8 | 15 to 30 | 8 to 9 |
| 1/2 | 15 to 30 | 14 to 15 |

2. The gasket can be reused up to 6 to 10 times. It can be replaced easily when it has sustained damage. A broken gasket can be removed by holding it and then turning it in the same direction as loosening the thread. If the gasket is difficult to remove, cut it with nippers, etc. In such a case, use caution not to scratch the seat face because the seat face of the fitting's 45° gasket is the sealing face.

3. Other precautions on handling, etc., are the same as those for One-touch fittings.

Chamfered area for female threads (Recommended value)

By chamfering as shown in the following table, machining of threads is easier and effective for burr prevention.



| Nominal thread size | Chamfer dimension øD (Recommended value) | | | | | |
|---------------------|--|------|------|------|-----------|------|
| | G | | Rc | | NPT, NPTF | |
| | min | max | min | max | min | max |
| 1/16 | — | — | — | — | 8.2 | 8.4 |
| 1/8 | 10.2 | 10.6 | 10.2 | 10.4 | 10.5 | 10.7 |
| 1/4 | 13.6 | 14.0 | 13.6 | 13.8 | 14.1 | 14.3 |
| 3/8 | 17.1 | 17.5 | 17.1 | 17.3 | 17.4 | 17.6 |
| 1/2 | 21.4 | 21.8 | 21.4 | 21.6 | 21.7 | 21.9 |



Flow Control Equipment Precautions 3

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With Sealant Type Piping

⚠ Caution

1. First, tighten the fitting by hand, then use a suitable wrench to tighten the hexagonal portion of the body a further two or three turns. For the reference value for the tightening torque, refer to the table below. Check the dimensions of each product for the width across flats.

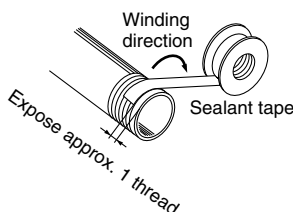
| Connection thread size (R, NPT) | [Reference value] Tightening torque N·m |
|------------------------------------|--|
| 1/8 | 3 to 5 |
| 1/4 | 8 to 12 |
| 3/8 | 15 to 20 |
| 1/2 | 20 to 25 |

2. If the fitting is tightened with excessive torque, a large amount of sealant will seep out. Remove the excess sealant.
3. Insufficient tightening may loosen the threads or cause air leakage.
4. For reuse
 - 1) Normally, fittings with a sealant can be reused up to 2 to 3 times.
 - 2) To prevent air leakage through the sealant, remove any loose sealant stuck to the fitting by blowing air over the threaded portion.
 - 3) If the sealant no longer provides effective sealing, wind sealant tape over the sealant before reusing. Do not use any form other than the tape type of sealant.
5. Once the fitting has been tightened, backing it out to its original position often causes the sealant to become defective. Air leakage will occur.

Piping

⚠ Caution

1. Refer to the Fittings and Tubing Precautions (pages 52 to 56) for handling One-touch fittings.
2. 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.
3. Winding of sealant 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 sealant tape is used, leave 1 thread ridge exposed at the end of the threads.



Air Supply

⚠ Warning

1. Type of fluids

Be sure to use compressed air for the fluid.

2. When there is a large amount of drainage

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

3. Drain flushing

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. This causes the malfunction of pneumatic equipment.

If the drain bowl is difficult to check and remove, the installation of a drain bowl with an auto drain option is recommended.

For compressed air quality, refer to the Best Pneumatics No. 6 catalog.

4. Use clean air.

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

⚠ Caution

1. Install an air filter.

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

2. 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 the malfunction of pneumatic equipment, such as flow control equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

3. Ensure that the fluid and ambient temperatures are within the specified range.

If the fluid temperature is 5°C or less, the moisture in the circuit could freeze, causing damage to the seals or leading to equipment malfunction. Therefore, take appropriate measures to prevent freezing.

For compressed air quality, refer to the Best Pneumatics No. 6 catalog.



Flow Control Equipment Precautions 4

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Operating Environment

Warning

1. **Do not use in an atmosphere containing corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.**

Refer to each construction drawing for information on the materials of flow control equipment.

2. **Do not expose the product to direct sunlight for an extended period of time.**
3. **Do not use in a place subject to heavy vibration and/or shock.**
4. **Do not mount the product in locations where it is exposed to radiant heat.**
5. **Using a flat head screwdriver adjustable type tamper proof speed controller in locations where vibrations or impacts occur could lead to the loosening of the needle. So, please use a hexagon lock nut adjustable type speed controller.**

For reference, SMC has conducted vibration tests in 25G for 200 operations, and we have confirmed no loosening of the needle.

Maintenance

Warning

1. **Perform maintenance and inspection according to the procedures indicated in the operation manual.**

If handled improperly, malfunction or damage of machinery and equipment may occur.

2. **Maintenance work**

If handled improperly, compressed air can be dangerous. Assembly, handling, repair, and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.

3. **Drain flushing**

Remove drainage from air filters regularly.

4. **Removal of equipment, and supply/exhaust of compressed air**

Before components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent sudden movement.