CKD

# Speed Controller

## SC3R Series
## SC3W Series
## SC3U Series

# INSTRUCTION MANUAL

SM-255628-A/6

- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

# PREFACE

Thank you for purchasing CKD's **"SC3R Series/SC3W Series/SC3U Series" speed controller**.
This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product is intended for users who have basic knowledge about materials, piping, electricity, and mechanisms of pneumatic components. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

# SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370, JFPS 2008 (the latest edition of each standard), the High Pressure Gas Safety Act, the Industrial Safety and Health Act, other safety rules, organization standards, relevant laws and regulations

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

**Thoroughly read and understand this Instruction Manual before using the product.**

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

| | |
|---|---|
| ⚠ **DANGER** | Indicates an imminent hazard. Improper handling will cause death or serious injury to people. |
| ⚠ **WARNING** | Indicates a potential hazard. Improper handling may cause death or serious injury to people. |
| ⚠ **CAUTION** | Indicates a potential hazard. Improper handling may cause injury to people or damage to property. |

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

| | |
|---|---|
|  | Indicates general precautions and tips on using the product. |

# Precautions on Product Use

## ⚠ WARNING

**The product must be handled by a qualified person who has extensive knowledge and experience.**

The product is designed and manufactured as a device or part for general industrial machinery.

**Use the product within the specifications.**

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

**Do not handle the product or remove pipes and devices until confirming safety.**

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air and fluid from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

# Precautions on Design and Selection

## ⚠ WARNING

**Use the product within the specifications.**
Use of the product without the specifications range may result in insufficient performance and safety cannot be guaranteed.

**Do not continuously push and hold down or apply load to the push ring on the push-in fitting.**

- The push-in fitting may lose tube holding capacity.
- When transporting an assembled product, avoid positions which constantly press on the push ring.

## ⚠ CAUTION

**Do not use the product as a stop valve that has no leakage.**
A small amount of leakage is expected even when the needle is in the fully closed position.

**Confirm the product will withstand the working environment..**

- Do not use the product in an environments where functional obstacles could occur.
  Such environments include high temperatures, chemical atmospheres, or where chemical liquids, vibration, moisture, water dripping or gas is present and environments where ozone is generated.
- Do not use the product in a place where it could come in direct contact with coolant or spatter, etc.

**Do not use the product in areas with large vibration or impact.**

**Do not use the product for applications that involve continuous rotation or oscillations , or in which tubes move violently.**
Fittings may be damaged.

**Understand the characteristics of compressed air before designing a pneumatic circuit.**

- The same functions as the mechanical, hydraulic and electrical methods cannot be anticipated if instantaneous stopping and holding are required during an emergency stop.
- Pop-out, air discharge, or leakage due to air compression and expansion may occur.

**M3 and M5 screws are sealed with gaskets.**

**Confirm whether PTFE can be used.**
The sealant contains PTFE (polytetrafluoroethylene resin) powder.

**Do not use the product in circuits where ozone is generated intentionally.**
Ozone resistance is sufficient for naturally generated ambient ozone. Packing deteriorates if ozone levels are high.

**Rubber parts deteriorate and service life is shortened if ultra dry air is used.**

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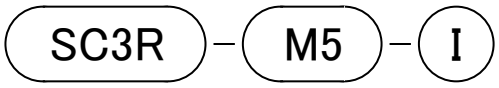
# 1. PRODUCT OVERVIEW

## 1.1 Model Number Indication

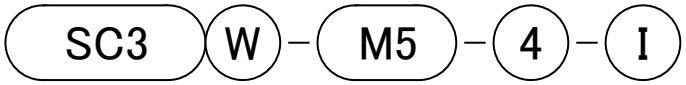
### 1.1.1 SC3R Series




(a) (b)

| (a) Port size | | (b) Option | |
|---|---|---|---|
| M5 | M5 x 0.8 | Blank | Meter-out type |
| 6 | Rc1/8 | I | Meter-in type |
| 8 | Rc1/4 | | |
| 10 | Rc3/8 | | |
| 15 | Rc1/2 | | |

### 1.1.2 SC3W/SC3U Series




(a) (b) (c) (d)

| (a) Piping type | | (b) Port size | | (c) Applicable tube outside diameter | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 3 | 4 | 6 | 8 | 10 | 12 |
| | | | | ø3.2 | ø4 | ø6 | ø8 | ø10 | ø12 |
| W | Elbow type | M3 | M3 x 0.5 | Y | Y | | | | |
| U | Universal type | M5 | M5 x 0.8 | Y | Y | Y | | | |
| | | 6 | R1/8 | | Y | Y | Y | | |
| | | 8 | R1/4 | | | Y | Y | Y | |
| | | 10 | R3/8 | | | Y[Note1] | Y | Y | Y |
| | | 15 | R1/2 | | | | | Y | Y |

| (d) Option [Note 2] | |
|---|---|
| Blank | Meter-out type |
| I | Meter-in type |
| K | Hexagon lock nut |
| O | Low speed type |

Note 1: Applicable tube outside diameter 6 (ø6) for port size 10 (R3/8) can be selected for elbow type only.
Note 2: Options are indicated in alphabetical order.
K can be selected for port size M3 and M5 only.
O can be selected for port size M3 and M5 and only for applicable tube outside diameter 4 (ø4) and 6 (ø6) for port size 6 (R1/8).

# 1.2 Specifications

## 1.2.1 Product specifications

### ■ SC3R Series

| Model no. / Descriptions | | SC3R-M5 | SC3R-6 | SC3R-8 | SC3R-10 | SC3R-15 |
|---|---|---|---|---|---|---|
| Working fluid | | Compressed air | | | | |
| Max. working pressure | MPa | 1.0 | | | | |
| Min. working pressure | MPa | 0.05 | | | | |
| Proof pressure | MPa | 1.5 | | | | |
| Fluid temperature | °C | 5 to 60 (no freezing) Note 2 | | | | |
| Ambient temperature | °C | 0 to 60 (no freezing) | | | | |
| Port size | | M5 | Rc1/8 | Rc1/4 | Rc3/8 | Rc1/2 |
| Weight | g | 14 | 40 | 70 | 110 | 190 |
| Applicable cylinder tube bore size | mm | ø6 to ø16 | ø15 to ø32 | ø20 to ø50 | ø32 to ø75 | ø40 to ø110 |
| Needle rotation | turns | 11 | 14 | 14 | 14 | 16 |
| Free flow | Flow rate Note 1 l/min (ANR) | 80 | 270 | 500 | 1100 | 1600 |
| | Effective cross-sectional area $mm^2$ | 1.2 | 4.0 | 7.5 | 16 | 24 |
| Controlled flow | Flow rate Note 1 l/min (ANR) | 47 | 240 | 470 | 1100 | 1600 |
| | Effective cross-sectional area $mm^2$ | 0.7 | 3.6 | 7.0 | 15 | 24 |

Note 1: This is the flow rate at pressure of 0.5 MPa.
Note 2: Freezing may occur due to adiabatic expansion depending on the air quality (dew point).

## ■ SC3W Series

| Model no. / Descriptions | | SC3W-M3 | | SC3W-M5 | | | SC3W-6 | | | SC3W-8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Applicable tube outside diameter mm | | ø3.2 | ø4 | ø3.2 | ø4 | ø6 | ø4 | ø6 | ø8 | ø6 | ø8 | ø10 |
| Working fluid | | Compressed air | | | | | | | | | | |
| Max. working pressure MPa | | 1.0 | | | | | | | | | | |
| Min. working pressure MPa | | 0.05 | | | | | | | | | | |
| Proof pressure MPa | | 1.5 | | | | | | | | | | |
| Fluid temperature °C | | 5 to 60 (no freezing) Note 2 | | | | | | | | | | |
| Ambient temperature °C | | 0 to 60 (no freezing) | | | | | | | | | | |
| Port size | | M3 | | M5 | | | R1/8 | | | R1/4 | | |
| Weight g | | 4.9 | 5.7 | 7.9 | 8.8 | 9.6 | 25 | 26 | 27 | 50 | 51 | 54 |
| Needle rotation turns | | 10 (14) or more | | 10 (16) or more | | | 10 (15) or more | | | 13 or more | | |
| Free flow | Flow rate Note 1 l/min (ANR) | 27 (20) | | 87 (80) | | | 210 (210) | 270 (270) | 270 | 470 | 500 | 530 |
| | Effective cross-sectional area $mm^2$ | 0.4 (0.3) | | 1.3 (1.2) | | | 3.2 (3.2) | 4.0 (4.0) | 4.0 | 7.0 | 7.5 | 8.0 |
| Controlled flow | Flow rate Note 1 l/min (ANR) | 20 (5.9) | | 80 (6.7) | | | 190 (13) | 240 (13) | 240 | 430 | 470 | 470 |
| | Effective cross-sectional area $mm^2$ | 0.3 (0.08) | | 1.2 (0.1) | | | 2.8 (0.2) | 3.6 (0.2) | 3.6 | 6.5 | 7.0 | 7.0 |

| Model no. / Descriptions | | SC3W-10 | | | | SC3W-15 | |
|---|---|---|---|---|---|---|---|
| Applicable tube outside diameter mm | | ø6 | ø8 | ø10 | ø12 | ø10 | ø12 |
| Working fluid | | Compressed air | | | | | |
| Max. working pressure MPa | | 1.0 | | | | | |
| Min. working pressure MPa | | 0.05 | | | | | |
| Proof pressure MPa | | 1.5 | | | | | |
| Fluid temperature °C | | 5 to 60 (no freezing) Note 2 | | | | | |
| Ambient temperature °C | | 0 to 60 (no freezing) | | | | | |
| Port size | | R3/8 | | | | R1/2 | |
| Weight g | | 64 | 75 | 78 | 81 | 134 | 138 |
| Needle rotation turns | | 13 or more | | | | 14 or more | |
| Free flow | Flow rate Note 1 l/min (ANR) | 650 | 1000 | 1100 | | 1500 | 1600 |
| | Effective cross-sectional area $mm^2$ | 10 | 15 | 16 | | 22 | 24 |
| Controlled flow | Flow rate Note 1 l/min (ANR) | 650 | 930 | 1000 | | 1500 | 1600 |
| | Effective cross-sectional area $mm^2$ | 10 | 14 | 15 | | 22 | 24 |

Note 1: This is the flow rate at pressure of 0.5 MPa.
Values in ( ) are for the low speed type.
Note 2: Freezing may occur due to adiabatic expansion depending on the air quality (dew point).

## ■ SC3U Series

| Model no. / Descriptions | | SC3U-M3 | | SC3U-M5 | | | SC3U-6 | | | SC3U-8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Applicable tube outside diameter mm | | ø3.2 | ø4 | ø3.2 | ø4 | ø6 | ø4 | ø6 | ø8 | ø6 | ø8 | ø10 |
| Working fluid | | Compressed air | | | | | | | | | | |
| Max. working pressure MPa | | 1.0 | | | | | | | | | | |
| Min. working pressure MPa | | 0.05 | | | | | | | | | | |
| Proof pressure MPa | | 1.5 | | | | | | | | | | |
| Fluid temperature °C | | 5 to 60 (no freezing) Note 2 | | | | | | | | | | |
| Ambient temperature °C | | 0 to 60 (no freezing) | | | | | | | | | | |
| Port size | | M3 | | M5 | | | R1/8 | | | R1/4 | | |
| Weight g | | 6.3 | 7.2 | 10 | 11 | 12 | 24 | 26 | 27 | 52 | 54 | 57 |
| Needle rotation turns | | 10 (14) or more | | 10 (16) or more | | | 10 (15) or more | | 10 or more | 13 or more | | |
| Free flow | Flow rate Note 1 l/min (ANR) | 31 (24) | | 95 (95) | | 105 (95) | 215 (215) | 270 (245) | 270 | 475 | 510 | 540 |
| | Effective cross-sectional area $mm^2$ | 0.45 (0.35) | | 1.4 (1.4) | | 1.6 (1.4) | 3.2 (3.2) | 4 (3.7) | 4 | 7 | 7.5 | 8 |
| Controlled flow | Flow rate Note 1 l/min (ANR) | 34 (5.4) | | 95 (9.5) | | | 190 (17) | 260 (17) | 260 | 440 | 475 | |
| | Effective cross-sectional area $mm^2$ | 0.5 (0.08) | | 1.4 (0.14) | | | 2.8 (0.25) | 3.8 (0.25) | 3.8 | 6.5 | 7 | |

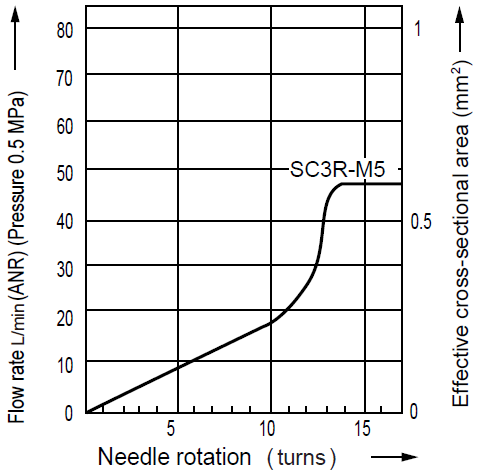
| Model no. / Descriptions | | SC3U-10 | | | SC3U-15 | |
|---|---|---|---|---|---|---|
| Applicable tube outside diameter mm | | ø8 | ø10 | ø12 | ø10 | ø12 |
| Working fluid | | Compressed air | | | | |
| Max. working pressure MPa | | 1.0 | | | | |
| Min. working pressure MPa | | 0.05 | | | | |
| Proof pressure MPa | | 1.5 | | | | |
| Fluid temperature °C | | 5 to 60 (no freezing) Note 2 | | | | |
| Ambient temperature °C | | 0 to 60 (no freezing) | | | | |
| Port size | | R3/8 | | | R1/2 | |
| Weight g | | 83 | 85 | 87 | 140 | 143 |
| Needle rotation turns | | 13 or more | | | 14 or more | |
| Free flow | Flow rate Note 1 l/min (ANR) | 985 | 1090 | | 1500 | 1630 |
| | Effective cross-sectional area $mm^2$ | 14.5 | 16 | | 22 | 24 |
| Controlled flow | Flow rate Note 1 l/min (ANR) | 950 | 1150 | 1220 | 1500 | 1630 |
| | Effective cross-sectional area $mm^2$ | 14 | 17 | 18 | 22 | 24 |

Note 1: This is the flow rate at pressure of 0.5 MPa.
Values in ( ) are for the low speed type.
Note 2: Freezing may occur due to adiabatic expansion depending on the air quality (dew point).

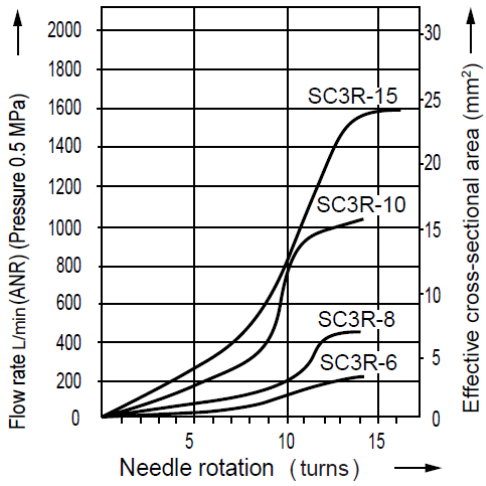
## 1.2.2 Flow characteristics

### ■ SC3R Series

<Port size: M5)>

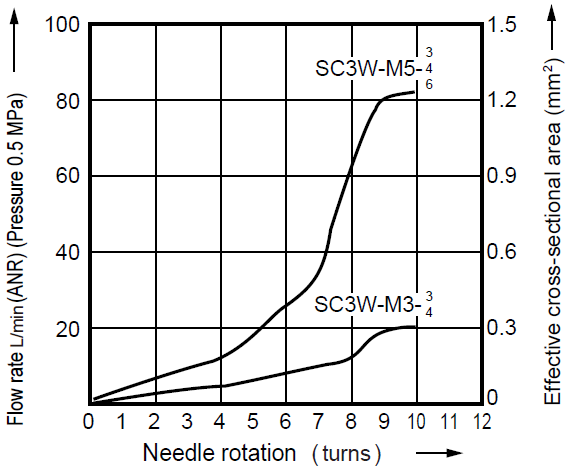


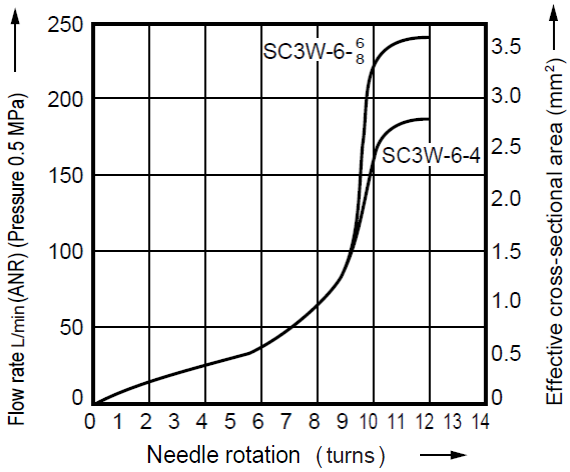

<Port size: Rc1/8, Rc1/4, Rc3/8, Rc1/2)>



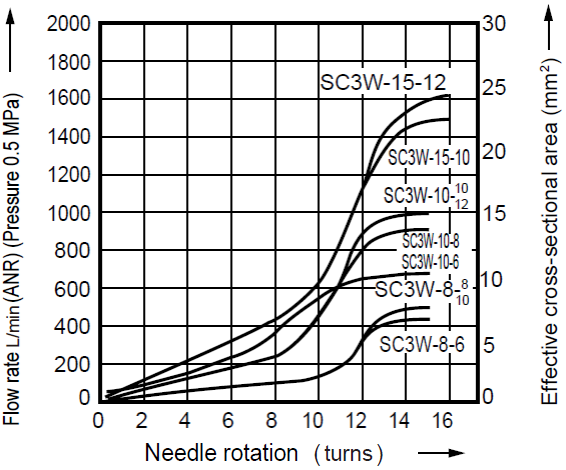

### ■ SC3W Series

<Standard type (port size: R1/8)>

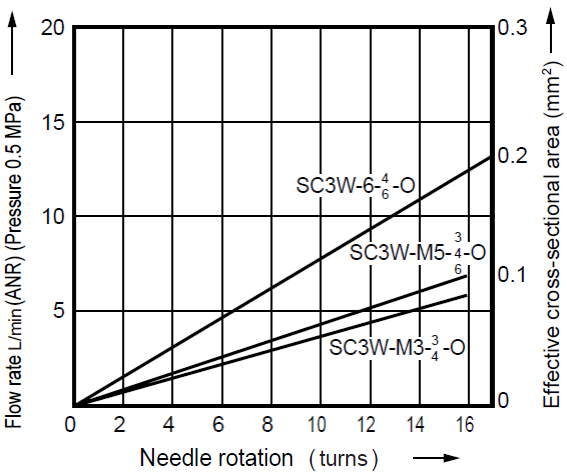



<Standard type (port size: R1/4, R3/8, R1/2)>

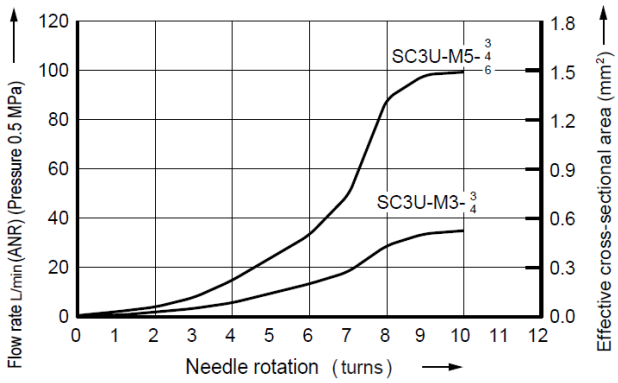



<Low speed type>

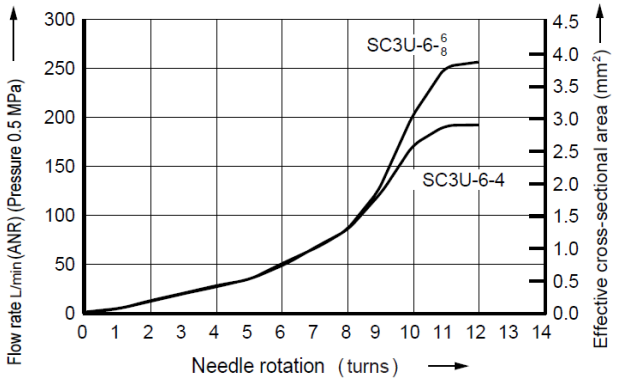


## ■ SC3U Series

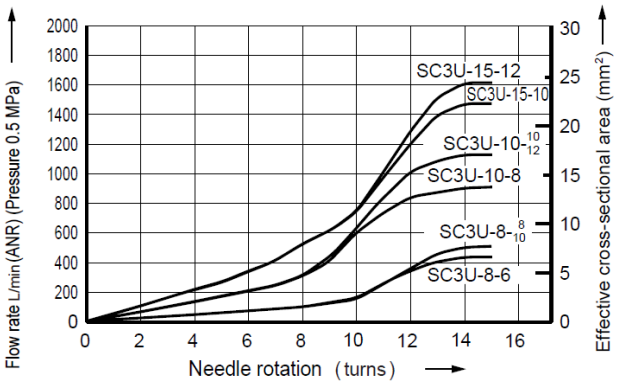
<Standard type (port size: M3, M5)>



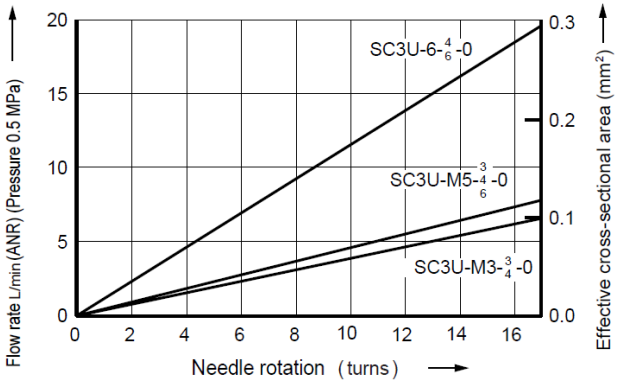

<Standard type (port size: R1/8)>




<Standard type (port size: R1/4, R3/8, R1/2)>

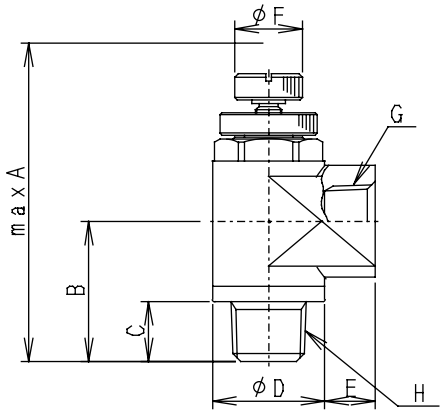



<Low speed type>



# 1.3 Dimensions

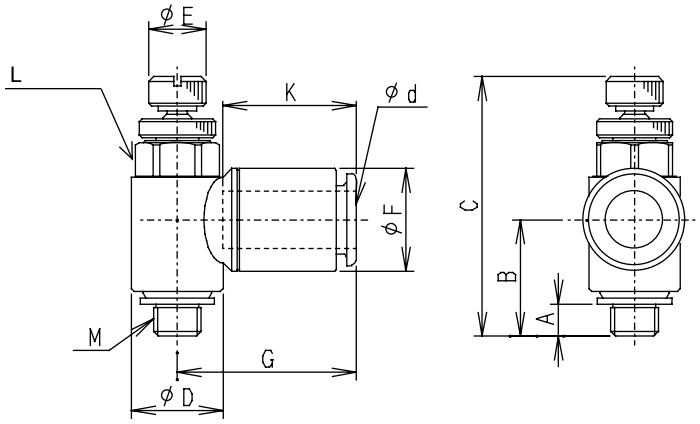
## 1.3.1 SC3R Series




| Model no. | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| SC3R-M5 | 33.4 | 13.5 | 4.0 | 10.0 | 4.7 | 6 | M5 x 0.8 | M5 x 0.8 |
| SC3R-6 | 42.5 | 18.8 | 7.7 | 15.0 | 6.7 | 9 | Rc1/8 | R1/8 |
| SC3R-8 | 51.2 | 23.2 | 10.7 | 19.0 | 9.4 | 12 | Rc1/4 | R1/4 |
| SC3R-10 | 60.2 | 27.0 | 11.7 | 22.5 | 10.0 | 14 | Rc3/8 | R3/8 |
| SC3R-15 | 66.7 | 30.0 | 14.7 | 27.0 | 13.7 | 16 | Rc1/2 | R1/2 |

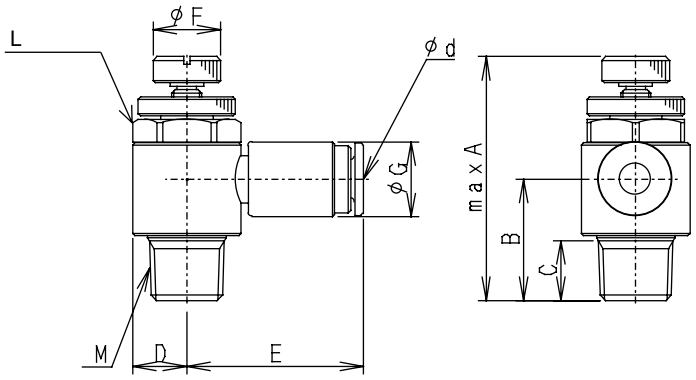
## 1.3.2 SC3W Series

### ■ SC3W-M3/M5-☐ (Standard type and low speed type have same dimensions)




| Model no. | ød (applicable tube outside diameter) | M | A | B | C | | D | E | F | G | K (tube insertion length) | L (across flats of hexagon) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MAX | MIN | | | | | | |
| SC3W-M3-3 | ø3.2 | M3 x 0.5 | 2.4 | 11.4 | 27.6 | 25.1 | 7.4 | 5 | 7.5 | 15.5 | 11.7 | 7 |
| SC3W-M3-4 | ø4 | | 2.4 | 11.4 | 27.6 | 25.1 | 7.4 | 5 | 8.8 | 16.6 | 12.9 | 7 |
| SC3W-M5-3 | ø3.2 | M5 x 0.8 | 3.4 | 12.4 | 30.2 | 27.2 | 9.6 | 6 | 7.5 | 16.0 | 11.7 | 8 |
| SC3W-M5-4 | ø4 | | 3.4 | 12.4 | 30.2 | 27.2 | 9.6 | 6 | 8.8 | 17.2 | 12.9 | 8 |
| SC3W-M5-6 | ø6 | | 3.4 | 12.4 | 30.2 | 27.2 | 9.6 | 6 | 10.8 | 18.8 | 14.0 | 9 |

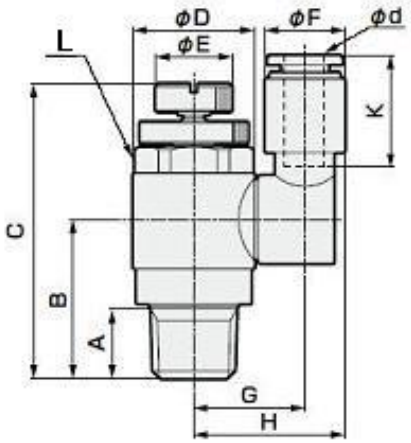
### ■ SC3W-6/8/10/15-☐ (Standard type and low speed type have same dimensions)

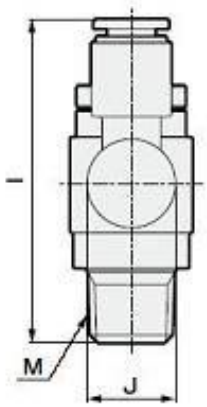


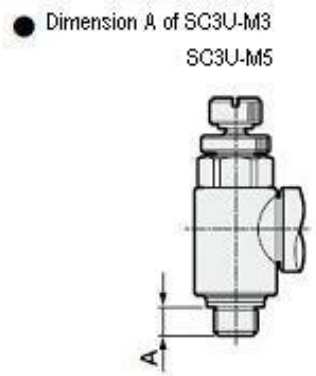

| Model no. | ød (applicable tube outside diameter) | M | A | B | C | D | E | F | G | L (across flats of hexagon) |
|---|---|---|---|---|---|---|---|---|---|---|
| SC3W-6-4 | ø4 | R1/8 | 38.4 | 16.2 | 8 | 7.3 | 23.1 | 9 | 10.0 | 13 |
| SC3W-6-6 | ø6 | | 38.4 | 15.7 | 8 | 7.3 | 24.1 | 9 | 12.5 | 13 |
| SC3W-6-8 | ø8 | | 38.4 | 15.4 | 8 | 7.3 | 25.3 | 9 | 14.5 | 13 |
| SC3W-8-6 | ø6 | R1/4 | 51.2 | 24.9 | 11 | 9.5 | 26.7 | 12 | 13.8 | 17 |
| SC3W-8-8 | ø8 | | 51.2 | 24.9 | 11 | 9.5 | 27.7 | 12 | 16.3 | 17 |
| SC3W-8-10 | ø10 | | 51.2 | 23.9 | 11 | 9.5 | 30.5 | 12 | 19.3 | 17 |
| SC3W-10-6 | ø6 | R3/8 | 52.4 | 23.1 | 12 | 11.3 | 28.3 | 14 | 12.5 | 19 |
| SC3W-10-8 | ø8 | | 60.2 | 29.8 | 12 | 11.3 | 29.4 | 14 | 16.3 | 19 |
| SC3W-10-10 | ø10 | | 60.2 | 30.0 | 12 | 11.3 | 32.2 | 14 | 19.3 | 19 |
| SC3W-10-12 | ø12 | | 60.2 | 29.3 | 12 | 11.3 | 35.4 | 14 | 21.3 | 19 |
| SC3W-15-10 | ø10 | R1/2 | 66.7 | 33.8 | 15 | 13.5 | 34.5 | 16 | 19.3 | 24 |
| SC3W-15-12 | ø12 | | 66.7 | 33.8 | 15 | 13.5 | 37.7 | 16 | 21.3 | 24 |

## 1.3.3 SC3U Series

### ■ SC3U-☐-☐ (Standard type and low speed type have same dimensions)



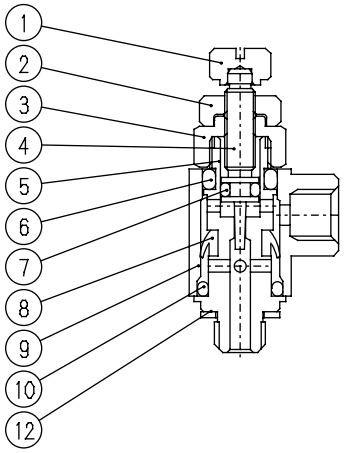



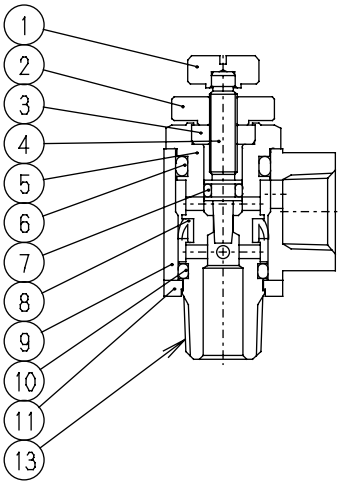




| Model no. | ød (applicable tube outside diameter) | M | A | B | C | | D | E | F | G | H | I | J | K (tube insertion length) | L (across flats of hexagon) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | MAX | MIN | | | | | | | | | |
| SC3U-M3-3 | ø3.2 | M3 x 0.5 | 2.4 | 11.4 | 28.5 | 26 | 7.4 | 5 | 8.5 | 10 | 14.3 | 28.9 | 9.8 | 12.5 | 7 |
| SC3U-M3-4 | ø4 | | | | | | | | 10 | | 15 | 32.5 | | 16 | |
| SC3U-M5-3 | ø3.2 | M5 x 0.8 | 3.4 | 12.4 | 30.8 | 27.8 | 9.6 | 6 | 8.5 | 11.1 | 15.4 | 30 | 9.8 | 12.5 | 8 |
| SC3U-M5-4 | ø4 | | | | | | | | 10 | | 16.1 | 33.5 | | 16 | |
| SC3U-M5-6 | ø6 | | | | | | | | 12.5 | 12.1 | 18.4 | 35 | | 17.5 | |
| SC3U-6-4 | ø4 | R1/8 | 8 | 15.4 | 39.2 | 33.4 | 14.5 | 9 | 10 | 14.5 | 19.5 | 39 | 13 | 16 | 13 |
| SC3U-6-6 | ø6 | | | | | | | | 12.5 | 14.6 | 20.8 | 40.5 | | 17.5 | |
| SC3U-6-8 | ø8 | | | | | | | | 14.5 | 15.6 | 22.8 | 42 | | 19 | |
| SC3U-8-6 | ø6 | R1/4 | 11 | 24.9 | 51.2 | 46.1 | 19 | 12 | 12.5 | 17.3 | 23.6 | 50.5 | 13.8 | 17.5 | 17 |
| SC3U-8-8 | ø8 | | | | | | | | 14.5 | 17.8 | 25.1 | 52 | | 19 | |
| SC3U-8-10 | ø10 | | | | | | | | 17.5 | 19.3 | 28.1 | 55.5 | | 21.5 | |
| SC3U-10-8 | ø8 | R3/8 | 12 | 29.8 | 60.2 | 53.1 | 22.5 | 14 | 14.5 | 19.6 | 26.8 | 57.9 | 16.7 | 19 | 19 |
| SC3U-10-10 | ø10 | | | | | | | | 17.5 | 21.1 | 29.8 | 60.9 | | 21.5 | |
| SC3U-10-12 | ø12 | | | | | | | | 20 | 22.3 | 32.3 | 63.2 | | 23 | |
| SC3U-15-10 | ø10 | R1/2 | 15 | 33.8 | 66.7 | 59.1 | 27 | 16 | 17.5 | 23.3 | 32.1 | 65.9 | 18.8 | 21.5 | 24 |
| SC3U-15-12 | ø12 | | | | | | | | 20 | 24.5 | 34.5 | 68.2 | | 23 | |

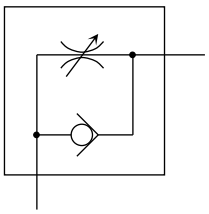
# 1.4 Internal Structure

## 1.4.1 SC3R Series




JIS symbol for Meter-out

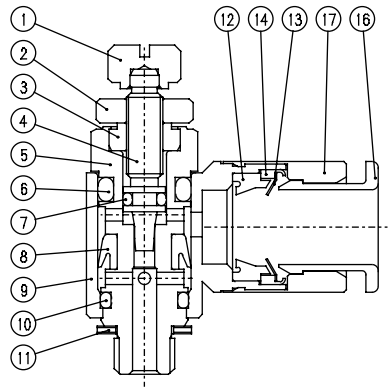


| No. | Part name | Material | No. | Part name | Material |
|---|---|---|---|---|---|
| 1 | Knob | Brass | 8 | Packing | HNBR |
| 2 | Lock nut | Brass | 9 | Rotor | Zinc die-casting (brass) |
| 3 | Gland nut | Brass | 10 | O-ring | NBR |
| 4 | Needle | Stainless steel | 11 | Stop ring | Polybutylene terephthalate resin |
| 5 | Rotary shaft | Brass | 12 | M5 packing | NBR |
| 6 | O-ring | NBR | 13 | Seal material | Fluorinated resin |
| 7 | O-ring | NBR | | | |

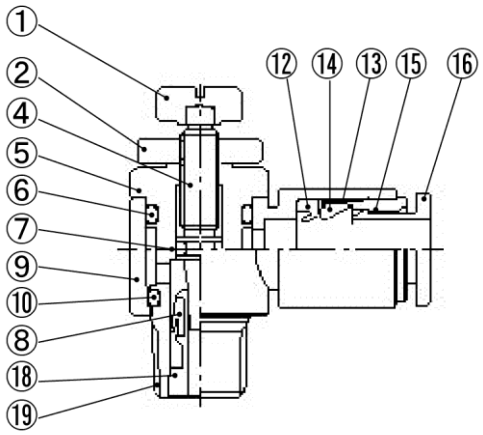
* Materials in ( ) are for SC3R-M5.
* All brass parts are electroless nickel plated.

## 1.4.2 SC3W Series

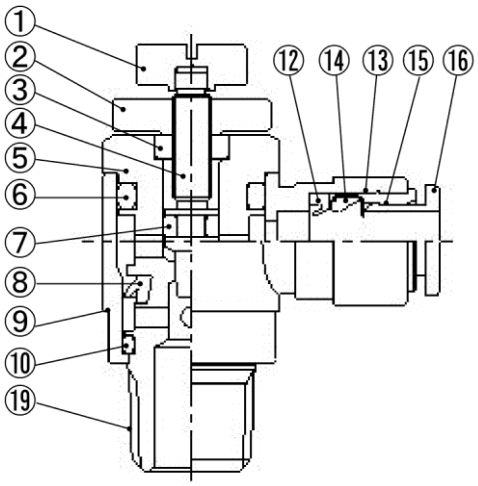
### ■ Port size: M3, M5



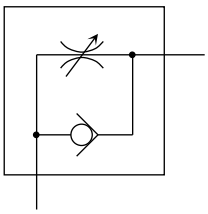

### ■ Port size: R1/8, R3/8 (ø6 only)




### ■ Port size: R1/4, R3/8 (other than ø6), R1/2



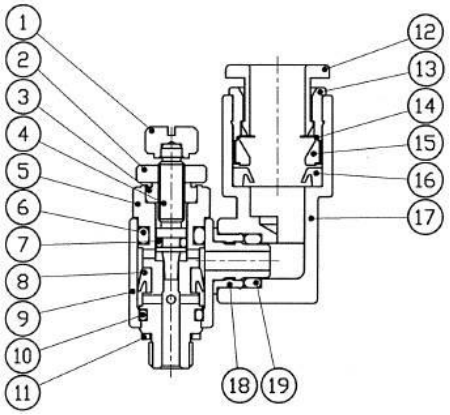

JIS symbol for Meter-out



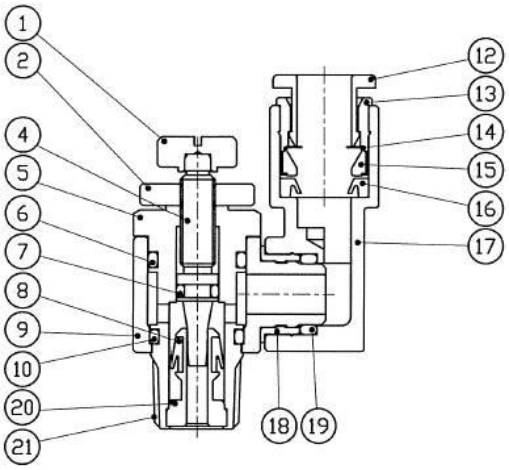
| No. | Part name | Material | No. | Part name | Material | |
|---|---|---|---|---|---|---|
| 1 | Knob | Brass (electroless nickel plating) | 12 | Packing | NBR | |
| 2 | Lock nut | Brass (electroless nickel plating) | 13 | Chuck | Stainless steel | |
| 3 | Gland nut | Brass (electroless nickel plating) | 14 | Chuck holder | M3, M5 | Brass (electroless nickel plating) |
| 4 | Needle | Stainless steel | | | | |
| 5 | Rotary shaft | Brass (electroless nickel plating) (M3: Stainless steel) | | | R1/8 to R1/2 | Polyethersulfone |
| 6 | O-ring | NBR | 15 | Outer ring | Brass (electroless nickel plating) | |
| 7 | O-ring | NBR | 16 | Push ring | Polybutylene terephthalate (UL94V-0) | |
| 8 | Packing | HNBR | | | | |
| 9 | Rotor | Polybutylene terephthalate (UL94V-0) | 17 | Fitting body | Brass (electroless nickel plating) | |
| | | | 18 | Check part | Brass (electroless nickel plating) | |
| 10 | O-ring | NBR | 19 | Seal material | Fluorinated resin | |
| 11 | Gasket | Iron + NBR (Gasket used only in M5) | | | | |

## 1.4.3 SC3U Series

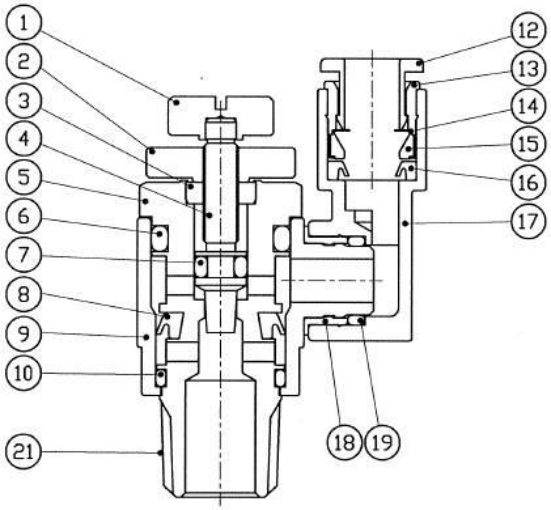
### ■ Port size: M3, M5



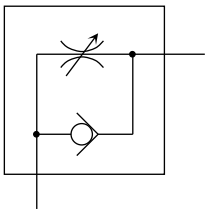

### ■ Port size: R1/8




### ■ Port size: R1/4, R3/8, R1/2




JIS symbol for Meter-out



| No. | Part name | Material | No. | Part name | Material |
|---|---|---|---|---|---|
| 1 | Knob | Brass (electroless nickel plating) | 11 | Gasket | Stainless steel + NBR |
| 2 | Lock nut | Brass (electroless nickel plating) | 12 | Push ring | Polybutylene terephthalate (UL94V-0) |
| 3 | Gland nut | Brass (electroless nickel plating) | 13 | Outer ring | Brass (electroless nickel plating) |
| 4 | Needle | Stainless steel | 14 | Chuck | Stainless steel |
| 5 | Rotary shaft | Brass (electroless nickel plating) (M3: Stainless steel) | 15 | Chuck holder | Polyethersulfone (applicable tube outside diameter ø3.2: Brass) |
| 6 | O-ring | NBR | 16 | Packing | NBR |
| 7 | O-ring | NBR | 17 | Fitting body | Polybutylene terephthalate (UL94V-0) |
| 8 | Packing | HNBR | 18 | Stopper | Brass (electroless nickel plating) |
| 9 | Rotor | Polybutylene terephthalate (UL94V-0) | 19 | O-ring | NBR |
| 10 | O-ring | NBR | 20 | Check part | Brass (electroless nickel plating) |
| | | | 21 | Seal material | Fluorinated resin |

# 2. INSTALLATION

## 2.1 Environment

Do not use the product in an environment where:
- Ambient temperature is outside the range of 0°C to 60°C
- The air freezes
- Water drop or cutting oil can splash onto the product
- Condensation may occur due to high humidity and temperature change
- Atmosphere contains corrosive gas, fluids, or chemicals
- It is subject to strong vibrations or shocks
- Atmosphere contains a lot of dust
- Spatter can splash onto the product
- It is exposed to direct sunlight, rain, wind, or water
- Ozone is produced

Store the product where the temperature does not exceed 40°C and it is not exposed to high temperature, high humidity, or direct sunlight

## 2.2 Unpacking

**⚠ CAUTION**

**Do not open the packing of the product until just before piping.**
Foreign matters may enter the product and cause a failure or malfunction.

- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.

# 2.3 Mounting

**⚠ WARNING**

**Install the product according to the flow direction.**
If the product is installed against the direction of flow, the speed control will not work properly and the actuator may pop out.

- The product can be rotated and installed in any orientation but must not be used in applications that involve constant turning and swaying.
- In the SC3U series, Do not apply load other than what is required for rotating onto the rotor and fitting connection.

## 2.3.1 Tightening torque

- The purpose is to prevent air leakage and damage to threads. Tight by hand first to ensure that threads are not damaged, then use a tool.
- Check that the tool's hexagon face and wrench are the correct size.

[Reference value]

| Port thread | Tightening torque N·m |
|---|---|
| M3 | 0.3 to 0.6 |
| M5 | 1.0 to 1.5 |
| Rc1/8 | 3 to 5 |
| Rc1/4 | 6 to 8 |
| Rc3/8 | 13 to 15 |
| Rc1/2 | 16 to 18 |

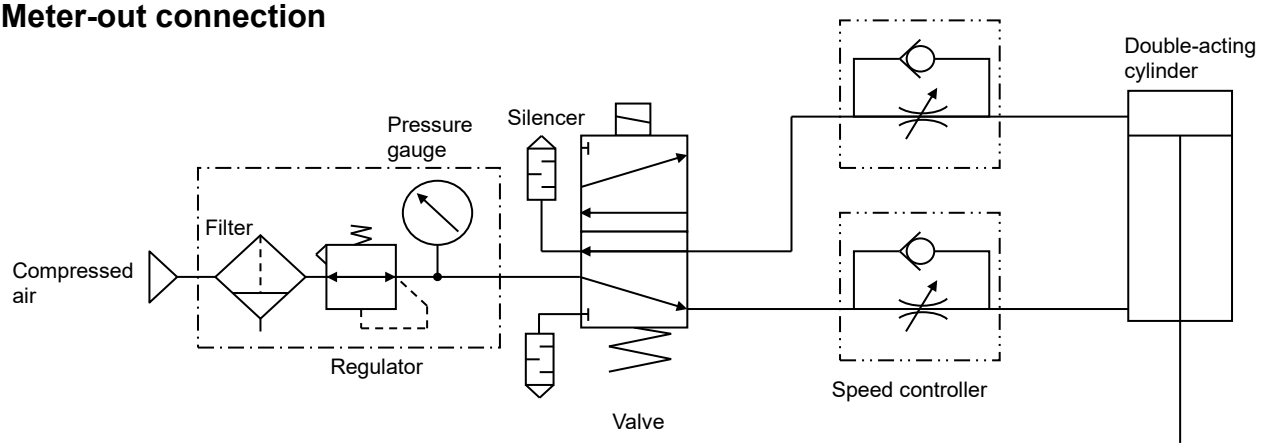
* The above values apply when partner threads are JIS B 0203 piping tapered female threads (material C3604BD).

# 2.4 Piping

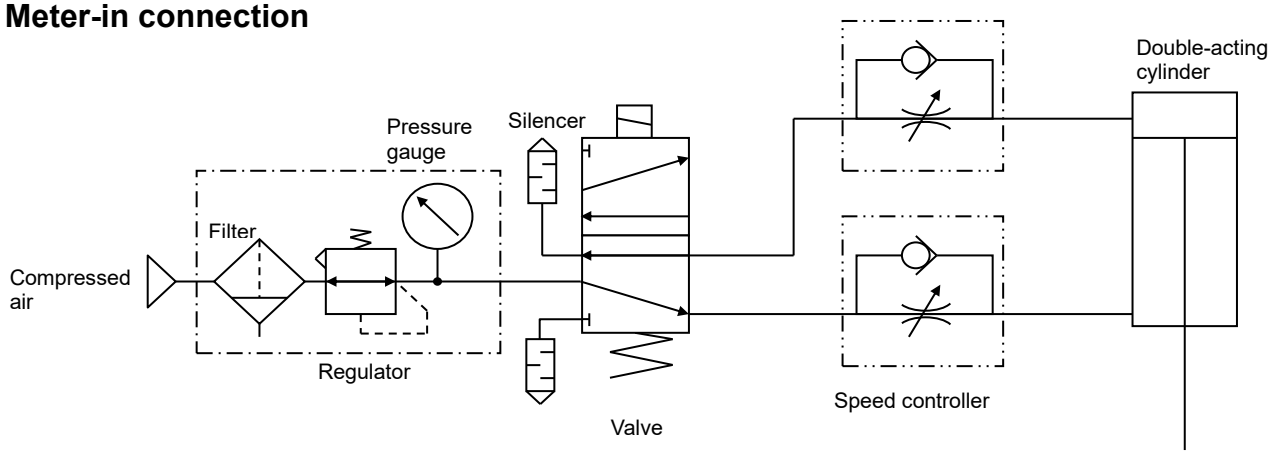
## 2.4.1 Basic Circuit

The figures below show the basic circuit diagrams of the speed controller.

### ■ Meter-out connection




### ■ Meter-in connection



## 2.4.2 Piping

**⚠ WARNING**

**Stop supplying air and make sure that there is no residual pressure before replacing fittings and tubes.**

**Insert the tube into the fitting until it firmly rests on the tube end and make sure that the tube does not come off before use.**

**⚠ CAUTION**

**Do not apply torsion, tension, and moment load to the fitting and the tube.**

If the tubes can move around when come off, bind the tubes or use a safety cover.

### ■ Flushing

Flush the pipes/tubes just before connecting the product to the pneumatic components.

### ■ Tubes and plugs

- Use tubes and plastic plugs (GWP/GWJP Series) manufactured by CKD. Do not use a metallic plug since it may cause failures.
- When using tubes other than CKD, use tubes outside diameter tolerance as specified below and hardness of 92° or more.

  Nylon tube between ±0.1 mm

  Polyurethane tube between +0.1 mm and −0.15 mm

  Using a tube that does not satisfy the specified outside diameter tolerance and hardness may cause the tube to come off easily due to a drop in the chucking force or make it difficult to insert the tube.

### ■ Tube cutting

Use a tube cutter to cut the tube at a right angle.

### ■ Minimum allowable bending radius of tubes

For the minimum allowable bending radius of the tube, refer to the table below. Observe the minimum allowable bending radius when installing the product to prevent the tube from being bent at a sharp angle.

| Model no. / Tube outside diameter | Minimum allowable bending radius (mm) | | | |
|---|---|---|---|---|
| | FH-3224 | F-15□□ | U-95□□ | NU-□□ |
| ø3.2 | Approx. 21 | Approx. 10 | 7 | - |
| ø4 | - | Approx. 10 | 10 | 12 |
| ø6 | - | Approx. 20 | 20 | 26 |
| ø8 | - | Approx. 30 | 30 | 36 |
| ø10 | - | Approx. 40 | 40 | 42 |
| ø12 | - | Approx. 55 | 50 | 52 |

# 3. USAGE

## 3.1 Safety Instructions

**⚠ WARNING**

**Use the product within the specifications.**

**Control the speed by gradually turning the needle from the fully closed position.**
Turning the needle counterclockwise will lift the needle to an open position.

- The product is designed for compressed air. Do not use other fluids.
- Install the product so that the tube does not become worn or damaged. Otherwise, the tube can become crushed or ruptured.
- When supplying compressed air for the first time after piping is complete, make sure that there is no air leakage at the joints. Also, do not apply high pressure suddenly.
- The product is provided with a needle retaining mechanism and the needle can only be turned up to the number of needle rotations specified for each model. Do not turn the needle more than the specified number to avoid damage to the needle.
- Since the product is intended for use with compressed air, a small amount of leakage to internal and external parts that do not affect product performance is permitted.
- Since a small amount of leakage is expected even when the needle is in the fully closed position, do not use the product as a stop valve.
- Do not continuously push and hold down or apply load to the push ring on the push-in fitting.
- Check that the lock nut is not loose. Actuator speed cannot controlled if the lock nut is loose.
- For the lock nut recommended tightening torque, refer to the table below. Be careful not to damage the nut by over-tightening it.

**Lock nut recommended tightening torque**

| Screw size | Tightening torque (N·m) |
|---|---|
| M3 | 0.1 |
| M5 | 0.3 |
| 1/8 | 0.8 |
| 1/4 | 1.4 |
| 3/8 | 2.5 |
| 1/2 | 4.0 |

# 4. WARRANTY PROVISIONS

## 4.1 Warranty Conditions

### ■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

### ■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

### ■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

## 4.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.