# Compact Ball Valve Type 27
# Pneumatic Actuated Type AR
# 13-50mm (3/8”-2”)

## User’s Manual

Thank you for choosing our product.
This instruction manual contains important information for safe use of our product, so please be sure to read it before handling the product.
After reading this manual, please be sure to keep it in a place where the user can see it at any time.

ASAHI YUKIZAI CORPORATION

# -SAFETY PRECAUTIONS-

This instruction manual is written on the assumption that the person who handles our products has a basic knowledge of our products, electrical equipment, machinery, control, etc., and it contains technical terms depending on the handling contents.
Please read this manual carefully and fully understand the contents and observe the safety precautions for proper use.

In this manual, the warning, caution, prohibition, and enforcement are categorized together with the symbol to inform the situation and scale of human injury or property damage.
Failure to observe this precaution may result in unexpected failure or damage. Be sure to observe this precaution.

**<WARNING/CAUTION indications>**

| | |
|---|---|
| **Warning** | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. |
| **Caution** | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage. |

**<Prohibited/Forced display>**

| | |
|---|---|
| **Prohibition** | In the handling of the product, it is prohibited to do it in "Do not do it". |
| **Forcing** | In the handling of the product, it is forced by "contents to be carried out without fail". |

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## 1. Our product warranty coverage

Unless otherwise stated in the Contract or Specifications, etc., the warranty for the piping material products (hereinafter referred to as "applicable products") such as valves manufactured or sold by us is as follows.

### Applicable to

This warranty applies only when the product is used in Japan. If you intend to use the product overseas, please contact us.

### Warranty Period

The warranty period is one year after delivery.

### Guaranteed range

In the event of failure or malfunction due to our responsibility during the above warranty period, we will replace or repair the product with a substitute free of charge.
Provided, however, that even within the warranty period, the warranty shall not apply to any of the following cases (charged service).

- ▶ When the storage, operating conditions, precautions, etc. described in the specifications, instruction manual, etc. are not adhered to in the construction, installation, handling, maintenance, etc.
- ▶ Defects, such as the design of the customer's equipment or software, caused by other than the target product.
- ▶ The fault is due to modification or secondary processing of the product by something other than us.
- ▶ In the case of a failure which can be deemed to have been avoided if the periodic inspection described in the instruction manual, etc. or the maintenance or replacement of consumable parts has been performed normally.
- ▶ The component is used for purposes other than the product's intended use.
- ▶ Failure or malfunction due to causes that could not be foreseen by our level of science and technology at the time of shipment.
- ▶ The fault is due to an external factor that is not our responsibility, such as natural disaster or disaster.

### Disclaimer

- ▶ The warranty will not cover secondary damage (damage to equipment, loss of opportunity, loss of profit, etc.) or any other damage caused by the failure of our product.
- ▶ Although we strive to improve the quality and reliability of our products, we do not guarantee their integrity. Especially when using this product for equipment that may infringe human life, body or property, take appropriate safety design measures, etc., with full consideration of problems that may normally occur. We assume no responsibility for such use if we have not obtained our consent in advance in writing of specifications, etc.
- ▶ Please observe the product specifications and precautions when using our products. We shall not assume any responsibility for any damage to the customer caused by the customer's negligence. However, this does not apply to damage caused by a defect in our product.

## 2. Safety Instructions

**Unpacking, Transportation and Storage**

| ⚠ Warning | |
|---|---|
| Prohibition | **Serious injury can result.**<br>▶ When hanging or slinging a valve, pay sufficient attention to safety, and do not enter under the load. |

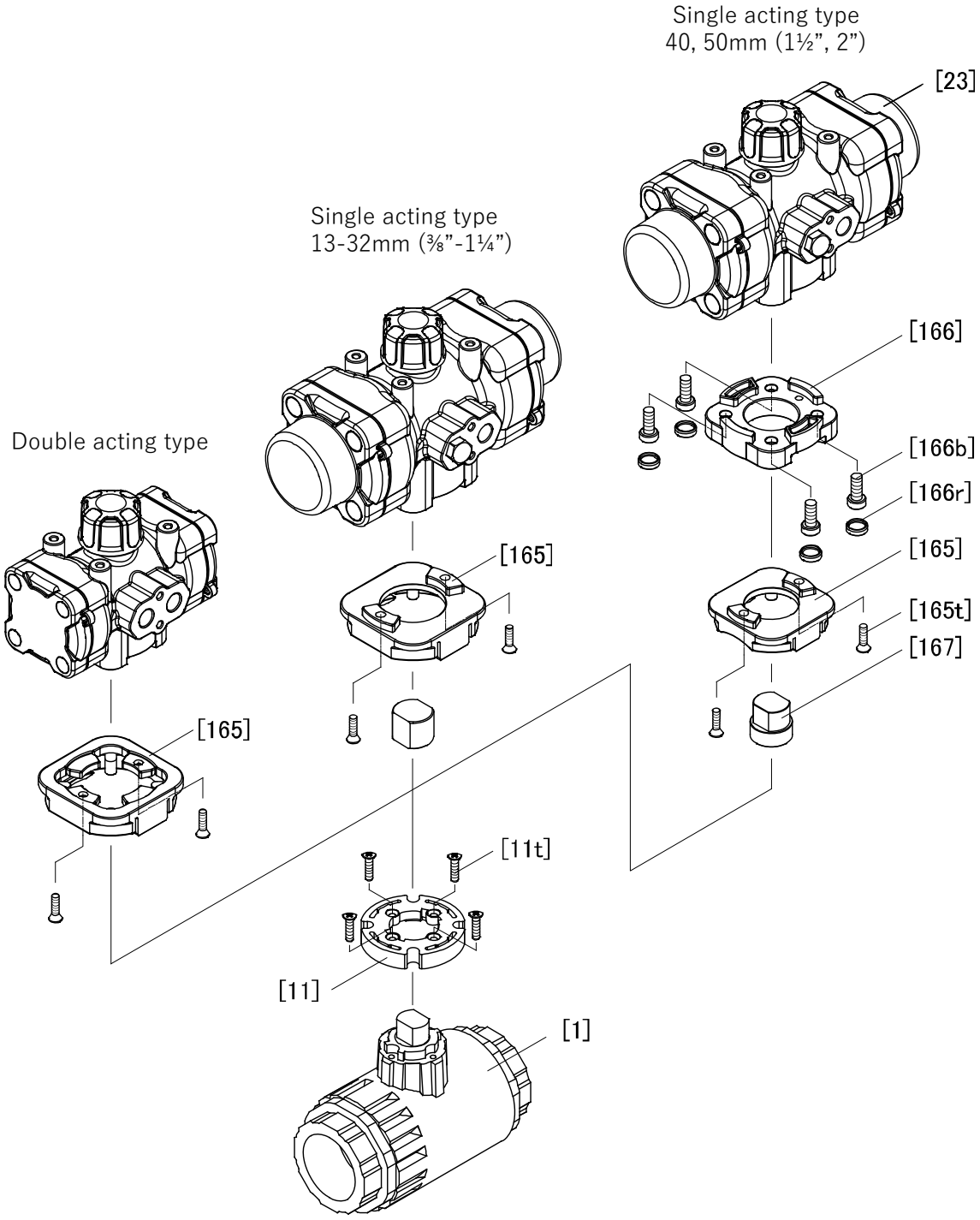
| ⚠ Caution | |
|---|---|
| Prohibition | **The valve can be damaged, or leak.**<br>▶ Do not subject the product to impact by throwing, dropping or hitting.<br>▶ Do not scratch or pierce the product with a sharp object such as a knife or hand hook.<br>▶ Do not pile up cardboard boxes forcefully to prevent the load from collapsing.<br>▶ Avoid contact with coal tar, creosote (a wood preservative), white pesticides, insecticides, paints, etc. |
| Forcing | **The valve can be damaged, or leak.**<br>▶ Keep in cardboard until just before piping, and store indoors (at room temperature) away from direct sunlight. Also, avoid storing the product in places of high temperature. (The strength of cardboard packaging decreases when it gets wet. Be very careful when storing and handling it.)<br>▶ After unpacking, make sure that the product is correct and that it meets the specifications. |

**Product Handling**

| ⚠ Warning | |
|---|---|
| **Prohibition** | **Serious injury can result.**<br>▶ Do not disassemble the actuator or valve. |
| **Forcing** | **There is a danger of injury.**<br>▶ If positive pressure gas is used for our resin piping material, a dangerous condition may occur due to the repulsive force peculiar to compressible fluids even if the pressure is the same as the water pressure. Therefore, be sure to take safety measures for the surrounding area, such as covering the piping with protective materials. If you have any questions, please contact us separately.<br>▶ When conducting a pipe leak test after completion of piping construction, be sure to check with water pressure. Contact us in advance if you are unavoidable to test with a gas.<br>▶ Ball-type valves structurally have dead space. Vaporizing fluids such as hydrogen hydroxide ($H_2O_2$) and soda hypochlorite (NaClO) may vaporize in the deadspace and cause an abnormal pressure rise inside the valve. Be very careful. (Gas with abnormal pressure increase due to vaporization is a compressible fluid. Therefore, if a valve should break, fragments will scatter explosively, which is very dangerous.) |

| ⚠Caution | |
|---|---|
| **Prohibition** | **The valve can be damaged, or leak.**<br>▶ Do not step on the valve or place heavy objects on it.<br>▶ Keep away from fire and hot objects.<br>▶ Ball valves are not suitable for fluids containing slurry. (The valve will not operate normally.)<br>▶ Do not use the product in places where it may be submerged.<br>▶ Do not remove the protective plug until just before connecting the air piping.<br>▶ Pay attention to the atmosphere where the valve is installed. Avoid locations where the product is exposed to sea breezes, corrosive gases, chemical liquids, sea water, steam, etc.<br>▶ Do not subject the valve to large vibrations. |
| **Forcing** | **The valve can be damaged, or leak.**<br>▶ Keep the pressure and temperature of the fluid within the allowable range. (The maximum allowable pressure includes water hammer pressure.)<br>▶ Secure sufficient space for maintenance and inspection when piping.<br>▶ Use a valve of suitable material for the operating conditions. (Depending on the type of chemical liquid, the parts may be damaged. Contact us in advance for details.)<br>▶ Use fluids containing crystalline material under conditions that do not recrystallize.<br>▶ Avoid any place where the valve is constantly exposed to splashes of water and dust, or direct sunlight, or protect the valve with a cover or the like to cover the entire area.<br>▶ Do not allow foreign matter, water droplets, or oil to enter the actuator through the air piping or the air intake or exhaust holes. (In areas with a possibility of snow accumulation, snow accumulation on the valve may cause snow melting water to enter through the air piping and intake and exhaust holes of the actuator.)<br>▶ Perform maintenance periodically by referring to "13. Inspection items". Pay particular attention to temperature changes and aging during long-term storage or shutdown or use.<br>▶ When installing a valve, provide an appropriate valve support so that excessive force is not applied to the valve and piping.<br>▶ Always use the product within the indicated product specifications.<br>▶ When using at an ambient temperature of 5° C or less, remove moisture from the operation air to prevent freezing.<br>▶ If the actuator is used in a low-temperature environment, provide a cover to cover the entire actuator to prevent it from freezing, and periodically check the operation status. (Normal operation will be disabled if frozen.)<br>▶ Use clean, dehumidified and dust-free air. However, consult with CKD when using high dry air with a dew point of-40° C or less.<br>▶ Be sure to use the base plate removal jig when removing the actuator. (The base plate may be damaged if other than jigs are used.)<br>▶ If the valve is used at an intermediate position, the mark of the ball opening will remain on the seat (PTFE), and sealing performance may temporarily deteriorate when the valve is fully closed. Therefore, it is recommended to use the valve fully open or closed. |

## 3. Name of each part




| | | | | | |
|---|---|---|---|---|---|
| [1] | Compact ball valve Type 27 | [165] | Base plate | [166b] | Bolt |
| [11] | ISO plate | [165t] | Tapping screw | [166r] | Rubber cap |
| [11t] | Tapping screw | [166] | Connector plate | [167] | Shaft adapter |
| [23] | Actuator | | | | |

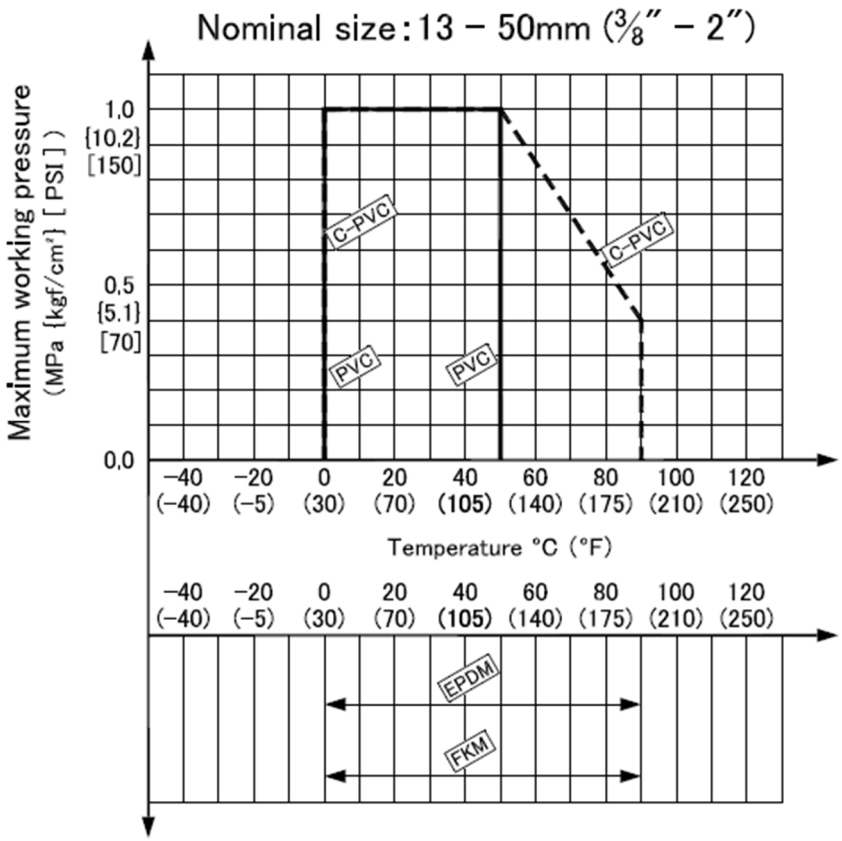
## 4. Product Specifications

### Model number table

| ACTUATION | TYPE | OPERATING SYSTEM | OPERATING SYSTEM | BODY MATERIAL | SEAL MATERIAL | CONNECTION | STANDARD | SIZE | HIGH PURITY SERIES |
|---|---|---|---|---|---|---|---|---|---|
| A | 7B | L | * | * | * | * | * | * * * | * |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| A AUTOMATIC VALVE | 7B TYPE 27 | L TYPE AR | F DOUBLE ACTING<br>G AIR TO OPEN<br>S AIR TO CLOSE | U PVC<br>C C-PVC | E EPDM<br>V FKM | S SOCKET<br>N THREADED | J JIS<br>D DIN<br>A ANSI | 013 13mm<br>015 15mm<br>020 20mm<br>025 25mm<br>032 32mm<br>040 40mm<br>050 50mm | 1 LUBRICANT FREE |

### Relationship between maximum allowable pressure and temperature



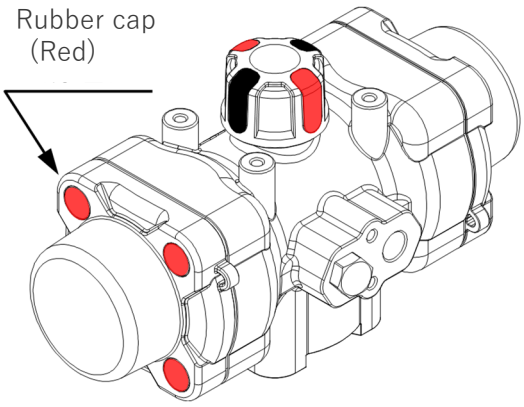
**Actuator**

| Operation | Applicable nominal size (mm) | Actuator Basic model | Air consumed during 0.4MPa (NL/ open/close) | Air supply port size |
|---|---|---|---|---|
| Double action | 13, 15 | AR032DA10SN | 0.3 | Rc 1/8 |
| | 20, 25 | AR032DA11SN | | |
| | 32 | AR040DA20SN | 0.6 | |
| | 40, 50 | AR050DA30SN | 1.3 | Rc 1/4 |
| Air to open | 13～25 | AR040NC20SN | 0.2 | Rc 1/8 |
| | 32 | AR050NC30SN | 0.4 | Rc 1/4 |
| | 40, 50 | AR063NC40SN | 0.8 | |
| Air to shut | 13～25 | AR040NO20SN | 0.2 | Rc 1/8 |
| | 32 | AR050NO30SN | 0.4 | Rc 1/4 |
| | 40, 50 | AR063NO40SN | 0.8 | |

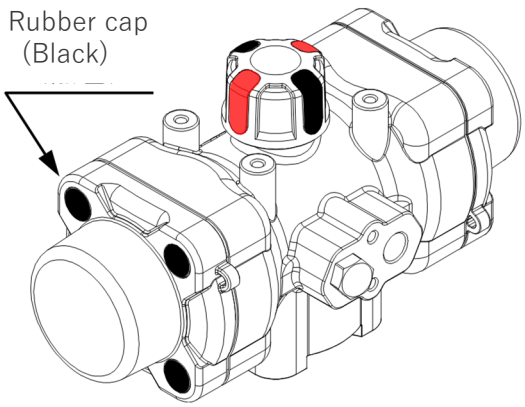
| Operation | Applicable nominal size (mm) | Angle-adjustable area ※1 | Operating pressure range (MPa) | Operating temperature range (°C) |
|---|---|---|---|---|
| Double action<br>Air to open<br>Air to shut | 13～50 | Angle cannot be adjusted. | 0.4～0.7 | -10～60 |

※1 ; Angle adjustment is not available for the product without full opening adjustment mechanism. The valve travel of the product with full-opening adjustment mechanism can be adjusted within the range of 0 to 45 °. For the adjustment method, refer to the "How to adjust the full-opening adjustment mechanism" page.

The color of the rubber cap identifies the return operation and reverse operation as red (standard color) and the direct operation as black.




Double action, Air to open




Air to shut

**Standard option**

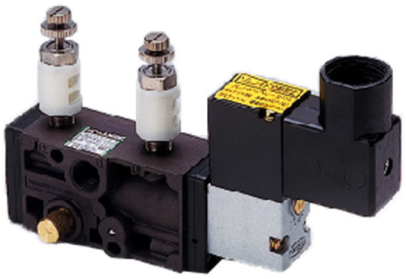
| Option name | Objectives and specifications | Applicable nominal size |
|---|---|---|
| Solenoid valve | ・Controls opening and closing of valves<br>・Possible to retrofit<br>・Silencer with throttle valve at exhaust port provided as standard<br>・Built-in bypass valve | 13～50mm |
| Filter-regulator | ・Adjust the pressure of the operation air<br>・ Only with solenoid valve can be retrofitted (single mounting is not possible) | 13～50mm |
| Speed controller | ・Adjust the actuator operation time.<br>・Possible to retrofit<br>・Meter-out system | 13～50mm |
| Bypass valve | ・Used for manual operation of return movement<br>・Retrofit possible only without solenoid valve<br>・Built-in speed controller | 13～50mm |
| Limit switch box | ・Detects open/close status of valve | 13～50mm |
| Full opening adjustment mechanism | ・Can be set to any opening in the range of 0 to 45° | 13～50mm |

**Solenoid Valve**

| Operation | SIZE (mm) | Model code | Power consumption |
|---|---|---|---|
| Double action<br>Air to open<br>Air to shut | 13～50 | 4N3S102K-W□-G31193 | AC:6VA<br>DC:5.5W |

| Operation | Piping port size | Effective area | Additional functions |
|---|---|---|---|
| Double action<br>Air to open<br>Air to shut | Rc1/4 | 10mm$^2$ or higher | ・Built-in bypass valve<br>・Installation of silencer with throttle valve<br>(used as speed controller) |

## 4N3S102K-W□-G31193



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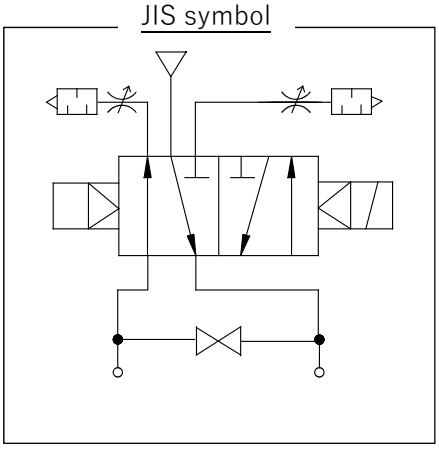
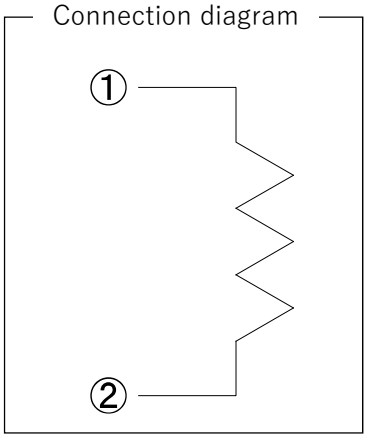
| Text entry | Degree of protection |
|---|---|
| **1** | 100VAC 50/60Hz |
| **(2)** | 110VAC 50/60Hz |
| **3** | 200VAC 50/60Hz |
| **(4)** | 220VAC 50/60Hz |
| **5** | 24VDC |
| **(6)** | 48VDC |
| **(7)** | 100VDC |
| **(8)** | 125VDC |
| **(9)** | 110VDC |

(　) Appended text is a special item.

JIS symbol



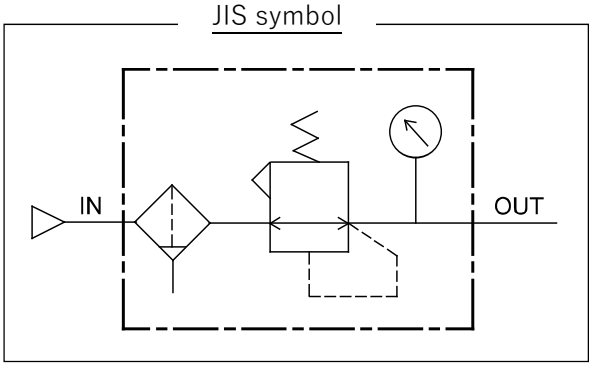
Connection diagram



## Filter regulator

| Operation | Nominal size (mm) | Model code | Piping port size | Element filtration rate |
|---|---|---|---|---|
| Double action<br>Air to open<br>Air to shut | 13～50 | ARU2-02-8A-G | Rc 1/4 | 5μm |

JIS symbol

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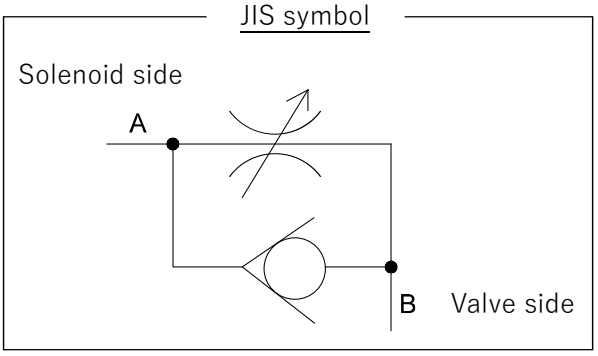
## Speed controller

| Operation | Conformity Nominal size (mm) | Actuator Basic model | Connection Diameter | Model code | Application Tube Outside diameter (mm) | Needle Revolution speed |
|---|---|---|---|---|---|---|
| Double action | 13, 15 | AR032DA10SN | Rc 1/8 | AS2201FG-01-06A | φ6 | 11 rotations |
| | 20, 25 | AR032DA11SN | | | | |
| | 32 | AR040DA20SN | | | | |
| Air to open<br>Air to shut | 13～25 | AR040NC20SN<br>AR040NO20SN | | | | |
| Double action | 40, 50 | AR050DA30SN | Rc 1/4 | AS2201FG-02-06A | φ6 | 11 rotations |
| Air to open<br>Air to shut | 32 | AR050NC30SN<br>AR050NO30SN | | | | |
| | 40, 50 | AR063NC40SN<br>AR063NO40SN | | | | |

JIS symbol



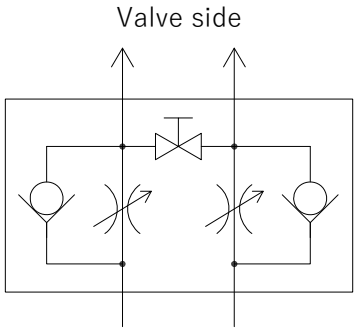

* The photo is an image

**Bypass valve**

| Action | Applicable nominal size (mm) | Air supply port size | Model code |
|---|---|---|---|
| Double acting | 13～50 | Rc1/4 | BPSC-08A |

▶ Bypass valve is for double acting only. Cannot be used for air to open and air to close.

JIS symbol




* The photo is an image

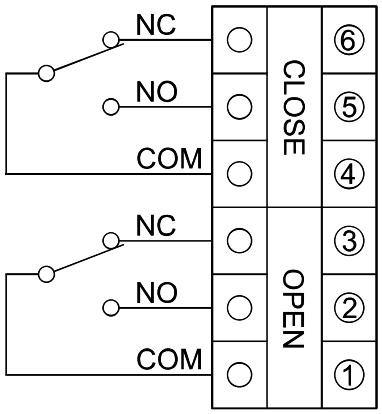
**Limit switch box**

| Action | Applicable nominal size (mm) | Model code | Switch contact | Protection grade | Rated voltage | Max. current |
|---|---|---|---|---|---|---|
| Double acting<br>Air to open<br>Air to close | 13～50 | CFC-6301 | Silver contact | IP67<br>(IEC529) | 250VAC | 10A |
| | | | | | 24VDC | 2.5A |
| | | CFC-6302 | Gold contact<br>(Micro load) | IP67<br>(IEC529) | 250VAC | 0.1A |
| | | | | | 24VDC | 0.1A |

**Internal circuit**

Double acting and air to open
: Fully closed
Air to close: Fully open

Double acting and air to open
: Fully open
Air to close: Fully closed




1) The circuit diagram shows the intermediate position.
2) When fully open and fully closed, ①-② or ④-⑤ (COM and NO) are turned ON.


* The photo is an image

## 5. Piping method

| ⚠ Warning | |
|---|---|
| Prohibition | **Serious injury can result.**<br>▶ When hanging or slinging a valve, pay sufficient attention to safety, and do not enter under the load. |
| Forcing | **Serious injury can result.**<br>▶ Be sure to perform safety inspections of the machine tool and power tool beforehand.<br>▶ Wear appropriate protective equipment according to the type of work being performed.<br>**The valve can be damaged, or leak.**<br>▶ When installing the product, make sure that no excessive stress such as tension, compression, bending or impact is applied to the piping or valve.<br>▶ When connecting a resin valve to metal piping, be careful not to apply piping stress to the resin valve. |

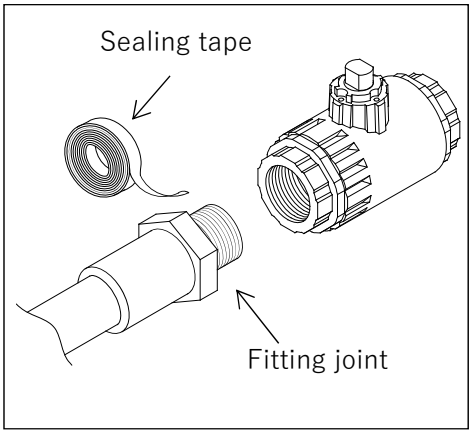
**Threaded end**

| ⚠ Caution | |
|---|---|
| Prohibition | **The valve can be damaged, or leak.**<br>▶ Do not overtighten the screws at the joints.<br>▶ Do not use a pipe wrench to tighten the cap nut.<br>▶ Make sure that the screws at the joints are made of resin.<br>▶ Use sealing tape for the sealing material of the screw-in part. If liquid sealant or liquid gasket is used, stress cracking (environmental stress cracking) may occur. |

Preparations ▶ Sealing tape ▶ Spanner or motor wrench

**[Procedure]**

**1)** Wrap sealing tape around the male thread of the fitting, leaving approximately 3mm at the end.
**2)** Tighten the male thread of the fitting and the female thread of the valve until they are hand tight.
**3)** Screw 1/2 to 1 turn with a spanner or motor wrench to avoid scratching.



**Socket end (adhesive)**

| ⚠ Warning | |
|---|---|
| **Prohibition** | **Serious injury can result.**<br>▶ When using adhesives, ventilate thoroughly, prohibit the use of fire in the surroundings, and do not inhale odors directly. |
| **Forcing** | **There is a danger of injury.**<br>▶ If the adhesive adheres to the skin, remove it immediately.<br>▶ If you feel worse or feel unusual when using the adhesive, promptly seek a doctor's diagnosis and take appropriate action. |

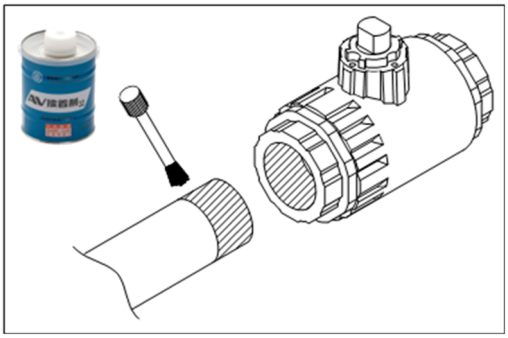
| ⚠ Caution | |
|---|---|
| **Prohibition** | **The valve can be damaged, or leak.**<br>▶ Never strike the pipe to insert it, as this may damage it. |
| **Forcing** | **The valve can be damaged, or leak.**<br>▶ Be careful when constructing under low temperature, as solvent vapor is less likely to evaporate and tends to remain.<br>▶ After piping, open both ends of the pipe and use a blower (low-pressure type) to ventilate to remove the solvent vapor.<br>▶ Do not apply too much adhesive. Excessive adhesive will flow into the valve.<br>▶ Use "**ASAHI AV Cement**" depending on the material.<br>▶ Perform the water flow test after 24 hours or more have elapsed after completion of bonding. |

| Preparations | ▶ ASAHI AV Cement | ▶ Waste cloth |
|---|---|---|

**[Procedure]**

**1)** Clean the valve socket with a waste cloth.

**2)** Apply adhesive evenly to the valve receptacle and pipe opening.



| ⚠ Caution | |
|---|---|
| **Prohibition** | **The valve can be damaged or damaged.**<br>▶ Do not apply more adhesive than is necessary.<br>(Solvent cracks may occur, resulting in damage.) |

Amount of adhesive used (reference)

| SIZE (mm) | 13 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Amount used (g) | 0.8 | 1.0 | 1.3 | 2.0 | 2.4 | 3.5 | 4.8 |

**3)** After applying the adhesive, quickly insert the pipe into the valve socket and hold for at least 60 seconds.

**4)** Wipe off any excess adhesive.

## 6. Support installation method

| ⚠Caution | |
|---|---|
| Prohibition | **The valve can be damaged, or leak.**<br>▶ Do not over-tighten when supporting piping with a U-band, etc. |

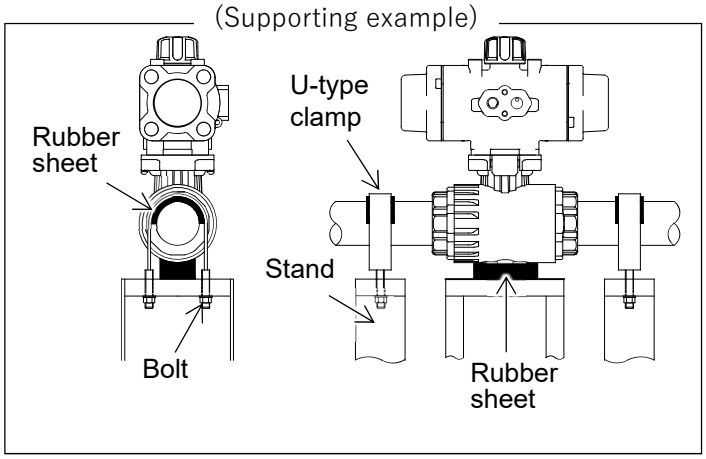
Preparations ▶ Wrench ▶ U-band (with screws) ▶ rubber-sheet

**Horizontal piping**

**[Procedure]**

**1)** Lay a rubber sheet on the lower part of the valve and support it with the frame.
**2)** Lay a rubber sheet on the top of the pipe and secure it with the U-band.

(Supporting example)

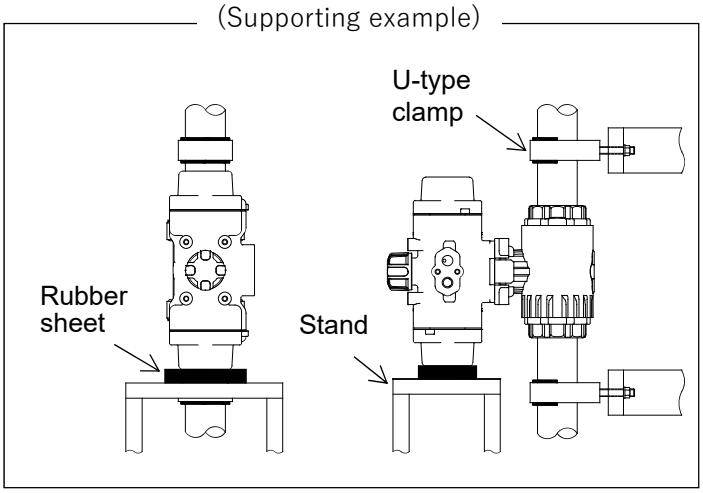



**Vertical piping**

**[Procedure]**

**1)** Lay a rubber sheet on the actuator part and support it with the frame.
**2)** Lay a rubber sheet on the top of the pipe and secure it with the U-band.

(Supporting example)




With the conditions that do not require the support of the actuator section
The nominal sizes are as follows.

a) Actuator specifications
- No option
- With standard speed controller
- With standard limit switch box

b) SIZE (mm)

| Operation | 13 | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| Double action | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Air to open and Air to shut | ○ | ○ | ○ | ○ | | | |

## 7. Air piping method

| ⚠Caution | |
|---|---|
| Prohibition | **Serious injury can result.**<br>▶ Do not remove the protective plug until just before connecting the air piping.<br>**The valve can be damaged, or leak.**<br>▶ Do not over-tighten the fitting for air piping. |
| Forcing | **The valve can be damaged, or leak.**<br>▶ Check the connection location, air piping size, and screw type from the approval drawing of the product, and then connect the air piping.<br>▶ Use clean, dehumidified and dust-free air. Consult with CKD when using high dry air with a dew point of-40° C or less.<br>▶ When using at an ambient temperature of 5° C or less, remove moisture from the operation air to prevent freezing.<br>▶ When using steel pipes for air piping, use the inner surface of the pipe treated with anti-rust treatment.<br>▶ Flush the inside of the air piping thoroughly before connecting the air piping.<br>▶ When connecting the air piping, be careful that foreign matter, such as sealant, does not enter the piping.<br>▶ Be sure to remove burrs on the threads of the pipe fittings.<br>(This may cause galling or air leakage.) |

**Without option or with speed controller**

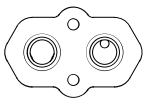
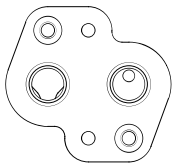
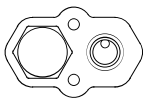
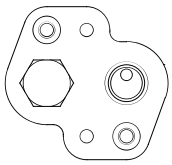
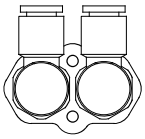
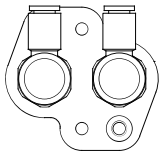
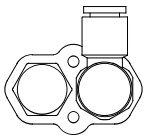
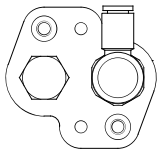
| | |
|---|---|
| Preparations | ▶ Metal or tube for air piping ▶ Metal fittings or tube fittings<br>▶ Wrench ▶ Sealing tape |

[**Procedure**]

**1)** Wrap sealing tape around the male thread of the fitting, leaving approximately 3mm at the end.
**2)** Tighten the fitting to the piping port of the actuator with a fitting.
**3)** Screw the fitting in one turn with a wrench.

| ⚠Caution | |
|---|---|
| **Prohibition** | **The valve can be damaged, or leak.**<br>▶ Do not overtighten the fittings. |

**4)** Attach metal or tube tubes for air piping.

| With or without options | Double action | | Air to open/Air to shut | |
|---|---|---|---|---|
| | AR032DA10SN<br>AR032DA11SN<br>AR040DA20SN | AR050DA30SN | AR040NC20SN<br>AR040NO20SN | AR050NC30SN<br>AR050NO30SN<br>AR063NC40SN<br>AR063NO40SN |
| No option |  |  |  |  |
| With speed controller |  |  |  |  |

**With solenoid valve and Filter regulator**

| ⚠Caution | |
|---|---|
| **Forcing** | **The valve can be damaged, or leak.**<br>▶ Set the secondary pressure of the filter regulator according to the equipment specifications.<br>(Otherwise, malfunction or failure may result.)<br>▶ Regularly drain the drain from the filter regulator. |

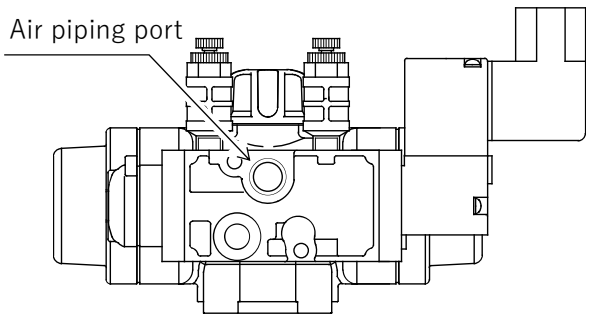
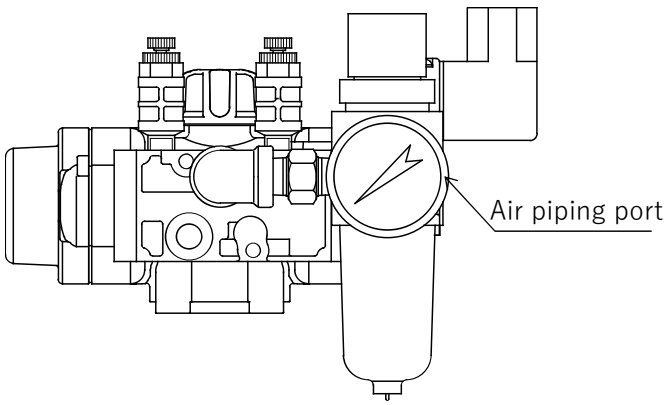
| Preparations | ▶ Metal or tube for air piping ▶ Metal fittings or tube fittings<br>▶ Wrench ▶ Sealing tape |
|---|---|

[**Procedure**]

**1)** Wrap sealing tape around the male thread of the fitting, leaving approximately 3mm at the end.
**2)** Tighten the fitting to the air piping port (see the figure below).
**3)** Screw the fitting in one turn with a wrench.

| ⚠Caution | |
|---|---|
| **Prohibition** | **The valve can be damaged, or leak.**<br>▶ Do not overtighten the fittings. |

**4)** Attach metal or tube tubes for air piping.

| With solenoid valve | Solenoid valve + Filter regulator |
|---|---|
|  |  |

## 8. Limit switch wiring method

<CFC-6301, CFC-6302>

| Warning | |
|---|---|
| Prohibition | **Serious injury can result.**<br>▶ Do not connect or separate lines to the limit switch in the power supply status.<br>(electric shock or sudden start of the machine) |

| Caution | |
|---|---|
| Prohibition | **If rainwater gets into the watch, it may break down..**<br>▶ Do not leave or use with the cover open.<br>(Water or dust may penetrate and cause operation failure.) |
| Forcing | **If rainwater gets into the watch, it may break down.**<br>▶ Securely attach the cover. |

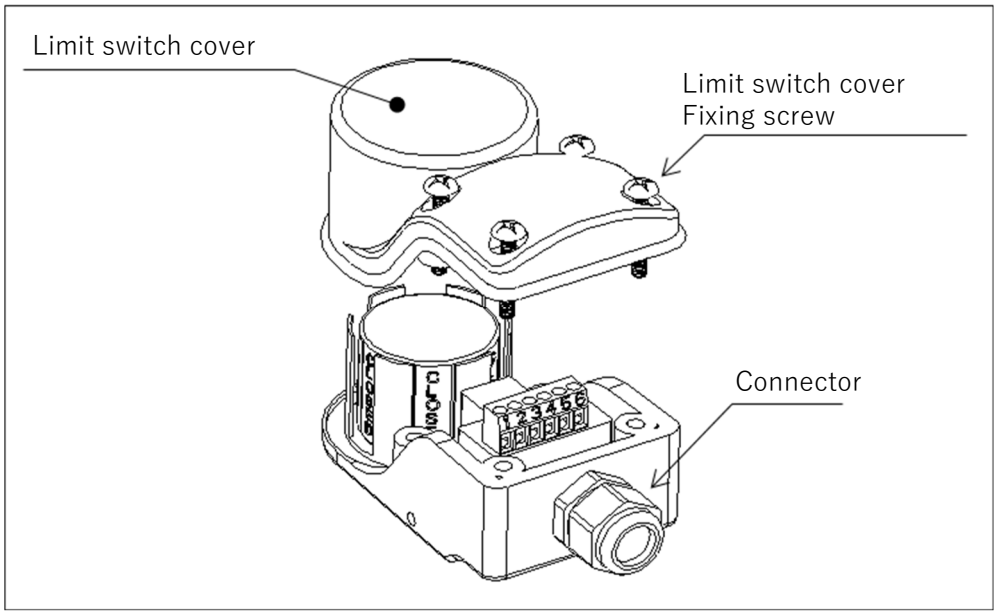
| | | |
|---|---|---|
| Preparations | ▶ Phillips screwdriver | ▶ Wire stripper |
| | ▶ Flat-blade screwdriver | ▶ Connector (G1/2) |

**[Procedure]**

**1)** Loosen the four screws holding the limit switch cover with a Phillips screwdriver and remove the cover.
(The screws are structured so that they do not come off the cover.)
**2)** Remove the resin protective cover.
**3)** Pass the cable through the connector.
**4)** Peel off the outer skin of the cable with a wire stripper.
**5)** Connect the end of the cable to the terminal screw using a flathead screwdriver according to the internal circuit diagram shown in "Limit switch specifications".

| ⚠Caution | |
|---|---|
| **Forcing** | **Serious injury can result.**<br>▶ Tighten the screws securely. (There is a risk of electric shock.) |

**6)** Tighten the four screws holding the limit switch cover with a Phillips screwdriver to attach the cover.
**7)** Tighten the cable with the connector.



## 9. Solenoid valve connection method

| ⚠Caution | |
|---|---|
| Forcing | **Serious injury can result.**<br>▶ Do not connect or separate lines to the solenoid valves in the power supply status. Doing so may result in electric shock or sudden machine start.<br>**Doing so may cause malfunction.**<br>▶ Confirm that the power supply voltage indicated on the solenoid valve matches the voltage to be wired. |

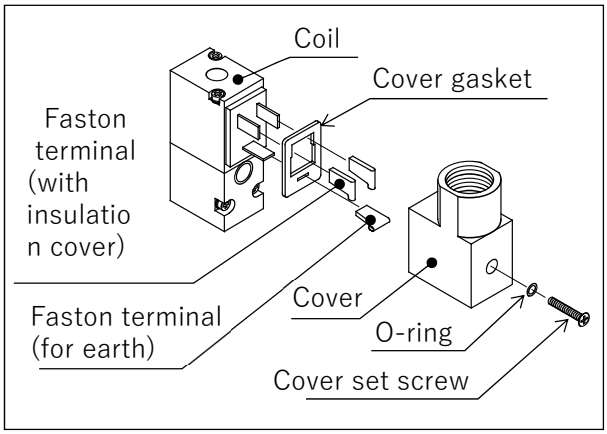
| Preparations | ▶ Phillips screwdriver ▶ Terminal crimping tool<br>▶ Wire stripper ▶ Connector (G1/2) |
|---|---|

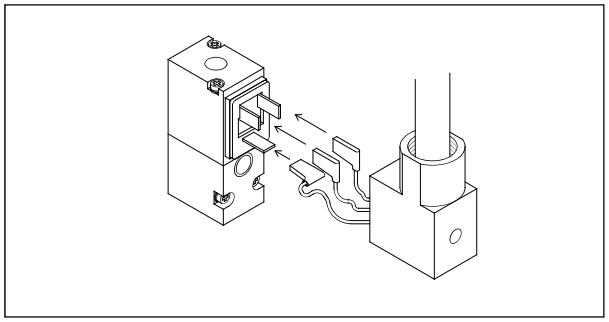
**[Procedure]**

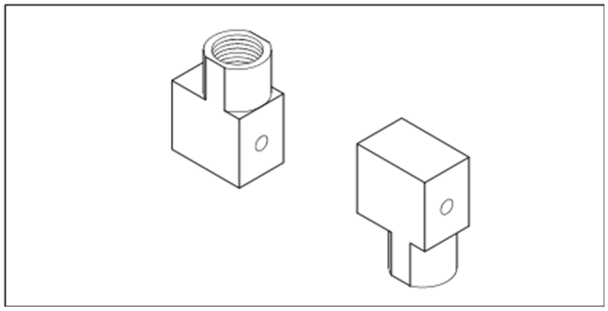
**1)** Loosen the cover setscrew with a Phillips screwdriver and remove the cover.

| ⚠Caution | |
|---|---|
| **Forcing** | **Serious injury can result.**<br>▶ Do not lose the O-ring. (There is a risk of electric leakage or electric shock.) |

**2)** Pull out the Faston terminal and insulation cover inserted in the coil side.
※The grounding terminal is not provided with an insulation cover.
**3)** Pass the cables in the order of the connector and cover.
**4)** Peel off the outer skin of the cable with a wire stripper.
**5)** Pass the lead wire through the insulation cover.
**6)** Attach the Faston terminal to the lead wire with a terminal crimping tool.
**7)** Insert the Faston terminal into the coil side terminal and put the insulation cover on.
(For DC power, there is no polarity.)
**8)** Tighten the cover setscrew with a Phillips screwdriver to attach the cover.
(The cover can be attached with the wiring outlet at either the top or bottom.)
**9)** Tighten the cable with the connector.





## 10. Commissioning method

**Air Operation**

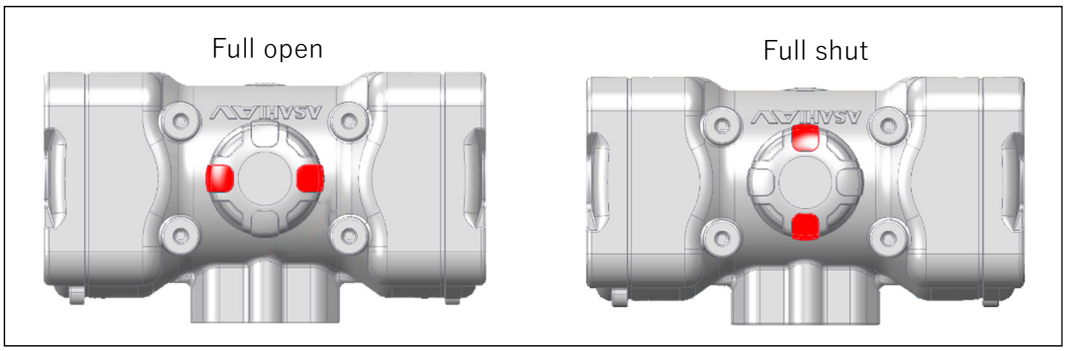
| Warning | |
|---|---|
| **Forcing** | **Doing so may cause malfunction.**<br>▶ Check that the spanner for manual operation is not mated with the upper output shaft of the actuator. |

| Caution | |
|---|---|
| **Forcing** | **The valve can be damaged or leak.**<br>▶ Always use the product within the indicated product specifications. |

**[Procedure]**

**1)** Supplies air to the air piping port.
**2)** Check that the air supply side and the display position match.
**3)** Stop the air supply.

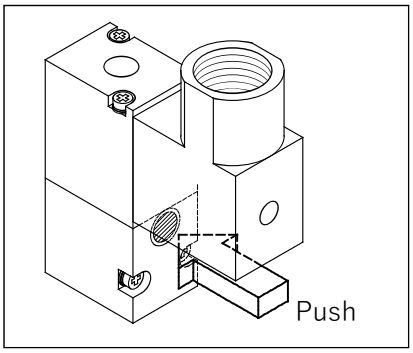
Full open and full shut Indication




**<For models with solenoid valve>**

**[Procedure]**

**1)** Supplies air to the solenoid valve.
**2)** Check that the operation shown in the table below is achieved by pressing the pushbutton below the solenoid valve terminal cover (see the figure below) with your finger.
**3)** Confirm that the operation shown in the table below is achieved by energizing or de-energizing the solenoid valve.
**4)** Turn off the power to the solenoid valve.
**5)** Stops air supply to the solenoid valve.




| Push button | Power supply | Double action /Air to open | Air to shut |
|---|---|---|---|
| Press | Energizing | Valve fully open | Valve fully closed |
| Do not press | De-energizing | Valve fully closed | Valve fully open |

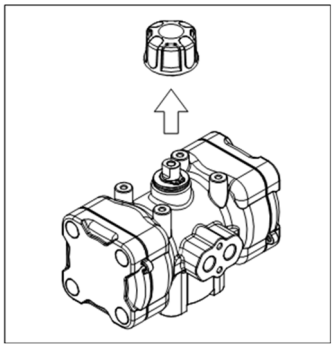
**Manual Operation (Double acting only)**

| ⚠ Warning | |
|---|---|
| Prohibition | **Serious injury can result.**<br>▶ Do not supply air during manual operation. (Risk of injury) |

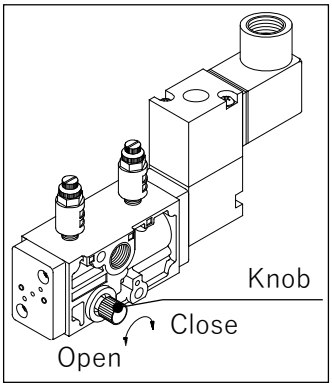
| ⚠ Caution | |
|---|---|
| Prohibition | **The valve can be damaged or leak.**<br>▶ Do not forcibly rotate the wrench further from the fully opened or closed position. (It will malfunction.) |

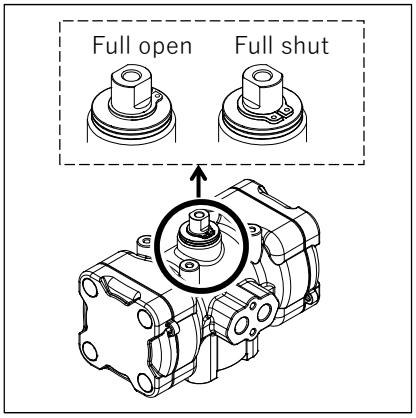
Preparations ▶ Wrench

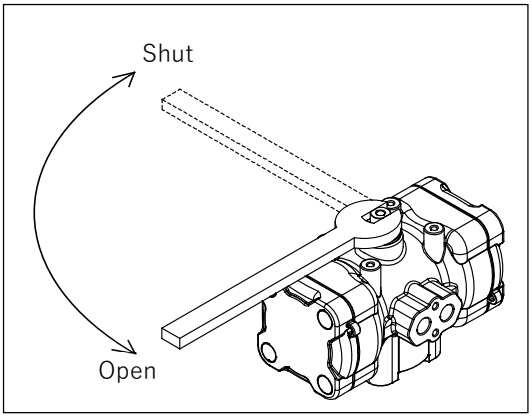
**[Procedure]**



**1)** Close the main valve of the operation air and turn off the power of the solenoid valve.
**2)** Turn the knob of the bypass valve counterclockwise to exhaust the air in the actuator.
**3)** Check the orientation of the indicator before manual operation (fully open or fully closed), and then pull the indicator on the upper output shaft of the actuator to remove it.
**4)** Engage the spanner with the upper output shaft of the actuator and open/close the actuator while checking the direction of the output shaft. (The output shaft is fully open when the width across flats is parallel to the piping direction.)
**5)** Return to the condition before manual operation (fully open or fully closed) and remove the wrench from the upper output shaft of the actuator.
**6)** Mate the indicator onto the upper output shaft.
**7)** Close the bypass valve by turning the knob of the bypass valve clockwise.
**8)** Open the main valve of the operation air to supply air to the solenoid valve.



**How to adjust open/close speed**

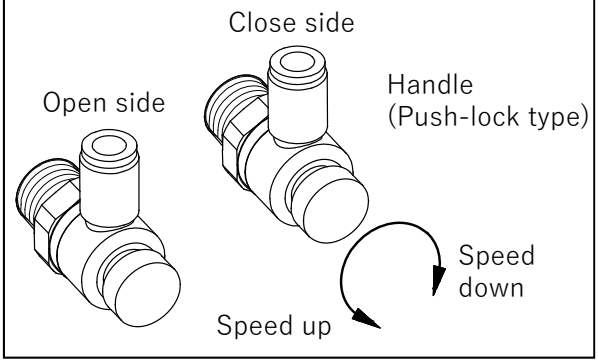
| ⚠Caution | |
|---|---|
| **Prohibition** | **Otherwise, parts may be damaged.**<br>▶ Do not use excessive force to tighten the speed controller handle (adjustment knob) or lock nut. (risk of damage) |
| **Forcing** | **Serious injury can result.**<br>▶ Be sure to lock the speed controller handle (adjustment knob) after adjustment. |

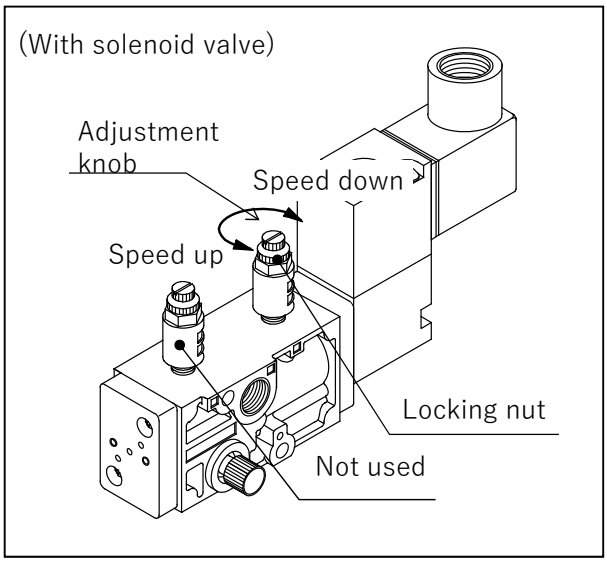
<**Double acting**>

[**Procedure**]

**1)** Supplies air to the solenoid valve.
**2)** Unlock the handles (adjustment knobs) of both open and close speed controllers.
・For model AS2201FG, grasp the handle with your fingers and pull up.
・For models with a solenoid valve, hold the adjusting knob with your finger and loosen the lock nut with a spanner.
**3)** Turn both open and close handles (adjustment knob) clockwise until they do not turn.
**4)** Open the solenoid valve by energizing it.
**5)** Turn the handle (adjustment knob) of the open-side speed controller counterclockwise little by little.
**6)** Turn off the power to the solenoid valve and close it.
**7)** Turn the handle (adjustment knob) of the closing speed controller counterclockwise little by little.
**8)** Repeat steps 4) to 7) to set the opening/closing speed to the desired one.
**9)** Lock the handles (adjustment knobs) of both open and close speed controllers.
・For model AS2201FG, push the handle with your fingers.
・For models with a solenoid valve, hold the adjusting knob with your finger and fix the lock nut with a spanner.

**AS2201FG)**



**<Air to open/Air to shut>**

The direction in which the speed can be adjusted differs depending on the operating model.

| Actuation type | Speed at which it opened | Speed at which it closes |
|---|---|---|
| Air to open | X Cannot be adjusted | ○Can be adjusted |
| Air to shut | ○Can be adjusted | X Cannot be adjusted |

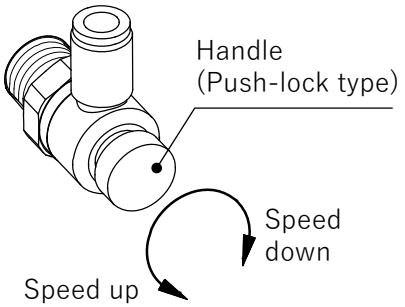
**[Procedure]**

**1)** Supplies air to the solenoid valve.
**2)** Unlock the handle (adjustment knob) of the speed controller.
- For model AS2201FG, grasp the handle with your fingers and pull up.
- For models with a solenoid valve, hold the adjusting knob with your finger and loosen the lock nut with a spanner.

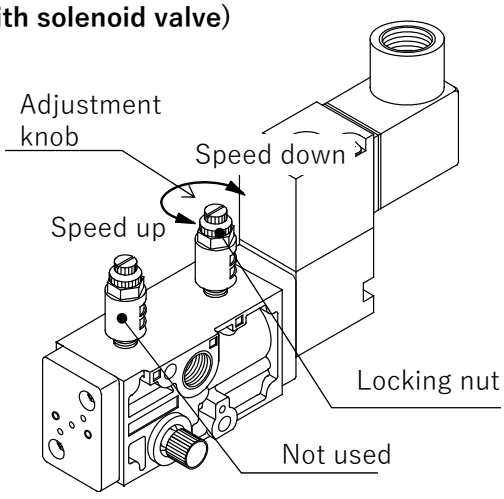
**3)** Turn the handle (adjustment knob) clockwise until it does not turn.
**4)** Energize the solenoid valve
- Air to open is fully open.
- Air to shut is fully closed.

**5)** Turn off the solenoid valve after the valve is activated.
**6)** Turn the handle (adjustment knob) of the speed controller counterclockwise little by little.
**7)** Repeat steps 4) to 6) to adjust the speed to the desired speed.
**8)** Lock the speed controller handle (adjustment knob).
- For model AS2201FG, push the handle with your fingers.
- For models with a solenoid valve, hold the adjusting knob with your finger and fix the lock nut with a spanner.

**(AS2201FG)**




**(With solenoid valve)**



**How to adjust the full-opening adjustment mechanism**

Preparations ▶ Wrench

[**Procedure**]

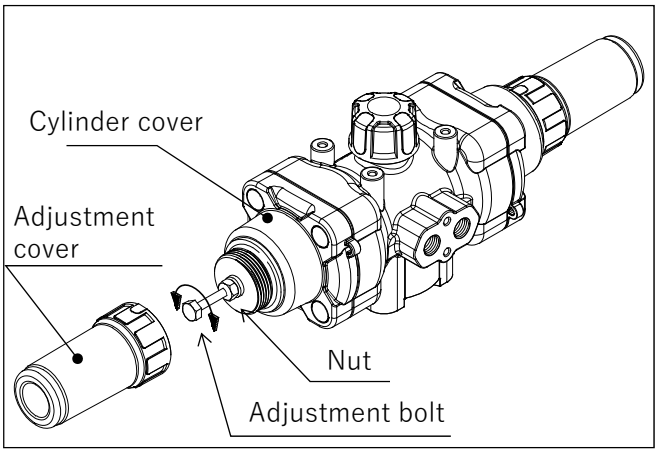
**1)** Remove both left and right full-opening adjustment covers from the cylinder cover by turning them counterclockwise by hand.
**2)** Loosen both hexagon nuts with a wrench, and turn both hexagon bolts counterclockwise about 5 turns with a wrench.
**3)** After supplying air to the open side of the actuator, turn both hexagon head bolts clockwise 1/2 to 1 turn with a wrench to confirm that the hexagon head bolt can be turned.
**4)** With air supplied, turn both the hexagon head bolts clockwise with a spanner and stop turning when the hexagon bolt no longer turns.

| ⚠ Warning | |
|---|---|
| **Prohibition** | **Risk of injury due to breakage**<br>▶ Do not turn the hexagon head bolt forcibly. |

**5)** Exhaust air from the actuator.
**6)** Refer to the "Adjustment Angle and Hex Bolt Rotation Number (Reference)" in the table below and check the Hex Bolt Rotation Number that matches the angle you want to adjust.
**7)** Turn the hexagon head bolt clockwise with a wrench to the number of revolutions confirmed with one of the bolts. Turn the hexagon nut clockwise with a wrench and fix the hexagon bolt with tightening torque. (Keep the other hex bolt.)
**8)** Air is supplied to the open side of the actuator.
**9)** Turn the hexagon head bolt clockwise with a wrench to stop turning it when the hexagon bolt no longer turns. Then, turn the hexagon nut clockwise with a wrench to fix the hexagon bolt with tightening torque.

| ⚠ Warning | |
|---|---|
| **Prohibition** | **Risk of injury due to breakage**<br>▶ Do not turn the hexagon head bolt forcibly. |

**10)** Exhaust air from the actuator.
**11)** Attach both left and right full-opening adjustment covers to the cylinder cover by turning them clockwise by hand.




Adjustment angle and number of revolutions of hexagon head bolt (reference) Unit; Rotate

| Adjustment angle / Model | 5° | 10° | 15° | 20° | 25° | 30° | 35° | 40° | 45° | Hexagon nut tightening torque N-m {kgf-cm} |
|---|---|---|---|---|---|---|---|---|---|---|
| AR040□□□□SN | 1 | 2+¼ | 3+¼ | 4+¼ | 5+½ | 6+½ | 7+¾ | 8+¾ | 9+¾ | 3.0 {30.6} |
| AR050□□30SN | 1 | 2 | 3+¼ | 4+¼ | 5+¼ | 6+¼ | 7+¼ | 8+½ | 9+½ | 5.2 {53.0} |
| AR063□□40SN | 1+¼ | 2+¼ | 3+¼ | 4+½ | 5+½ | 6+¾ | 7+¾ | 9 | 10 | 12.5 {127.5} |

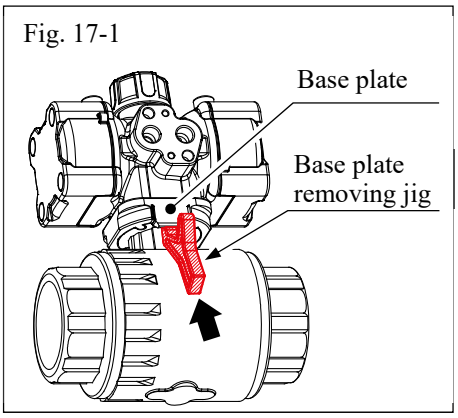
## 11. How to remove the actuator

| ⚠Caution | |
|---|---|
| Prohibition | **The valve can be damaged or leak.**<br>▶ When removing the base plate [165] from the valve, do not apply excessive force to the base plate removal jig to forcibly spread the claw part. (The claw part may be damaged.)<br>▶ Do not replace or remove the base plate excessively. (The claw part of the base plate may be damaged by fatigue.)<br>▶ For Air to open and forward operation, a metal fitting (shaft adapter) is provided between the valve and the actuator. Be careful not to pop out or drop the shaft adapter when removing the base plate from the valve.<br>▶ Be careful not to apply excessive load to the piping and valves when installing or removing the base plate. |
| Forcing | **The valve can be damaged or leak.**<br>▶ Be sure to use the base plate removal jig when removing the actuator. (The base plate [165] may be damaged if other than the jig is used.) |

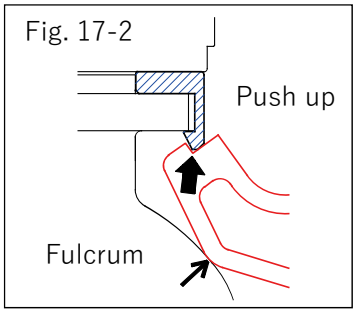
| Preparations | ▶ Base plate removal jig (sold separately)  |
|---|---|

<Removal>

[Procedure]

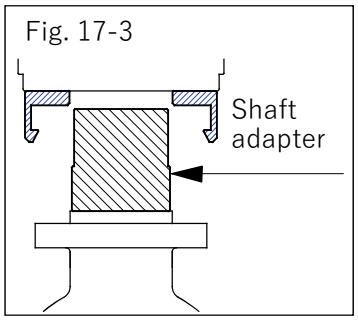



1) Sets the pressure in the piping to zero.
2) Close the main valve of the operation air to exhaust the air in the actuator.
3) Remove the air piping.
4) Align the end of the base plate removal jig with the center of one claw of the base plate [165]. (See Fig. 17-1.)
5) With the side face of the valve as a fulcrum, push up the base plate claw. Move the removal jig to remove the hook from the valve body. (See Fig. 17-2.)
6) Remove the hook of the other claw from the valve body as shown in steps 4) to 5).
7) When both claws are disengaged, lift the actuator vertically and disconnect it from the valve. (See Fig. 17-3.)




<Installation>

[Procedure]




1) Check that the actuator position indication is aligned with the stem of the valve and the shaft adapter.
2) Check the mating position of the top flange and base plate of the valve.
3) Push in while visually checking until the claw part of the base plate is securely hooked on the top flange.

## 12. Inspection item

| ⚠Caution | |
|---|---|
| **Forcing** | **Fluid may leak from the valve or the actuator may fail.**<br>▶ Maintenance should be performed every 3 to 6 months as a guide in order to keep the watch in normal condition and use it for a long time. Pay particular attention to temperature changes and aging during long-term storage or shutdown or use.<br>**There is a danger of injury.**<br>▶ When removing the valve from the piping when replacing the valve or parts, completely remove the fluid from the piping before starting work.<br>▶ If any trouble is found, take the appropriate action referring to **"14. Cause of trouble and remedy"**. |

**Daily inspection**

| Inspection items and inspection methods | Guideline of judgment | Check point | Treatment method |
|---|---|---|---|
| External leakage (visual inspection) | No leakage | [Socket end] Adhesive construction section | Remove the valve from the piping and retry the bonding process. (Ref: 6. Piping method [Socket end]) |
| | | [Threaded end] Threaded connection | Remove the valve from the piping and screw the valve in again. (Ref: 6. Piping method [Threaded end) |
| | | Surface of the entire valve | Remove the valve from the pipe and replace the valve. |
| Abnormal noise (hearing) | No abnormal noise | Valves and actuators | Remove the valve from the pipe and replace the valve or actuator. |
| | | Piping around the valve | Reconfirm the conditions of use (Ref: 2. Safety Instructions) |

**Periodic inspection**

**●Guideline for the inspection cycle: 3 months**

| Inspection items and inspection methods | Guideline of judgment | Check point | Remedy for malfunctions |
|---|---|---|---|
| Vibration (palpation) | No different from other parts | Valves and actuators | Recheck the operating conditions and remove the source of vibration. (Ref: 2. Safety Instructions) |
| | | | Remove the valve from the pipe and replace the valve or actuator. |
| | | Piping around the valve | Recheck the operating conditions and remove the source of vibration. (Ref: 2. Safety Instructions) |

**●Guideline of the inspection cycle: 6 months**

| Inspection items and inspection methods | Guideline of judgment | Check point | Remedy for malfunctions |
|---|---|---|---|
| Water-intrusion (visual inspection) | No intrusion | Inside the actuator | Replace the actuator |
| Corrosion or rust (visual inspection) | No corrosion or rust | Appearance of the product and in the actuator | Remove the valve from the pipe and replace the valve or actuator. |
| Product damage | No scratches, cracks, or deformation | Appearance of the product | Remove the valve from the pipe and replace the valve or actuator. |

## 13. Cause of malfunction and remedy

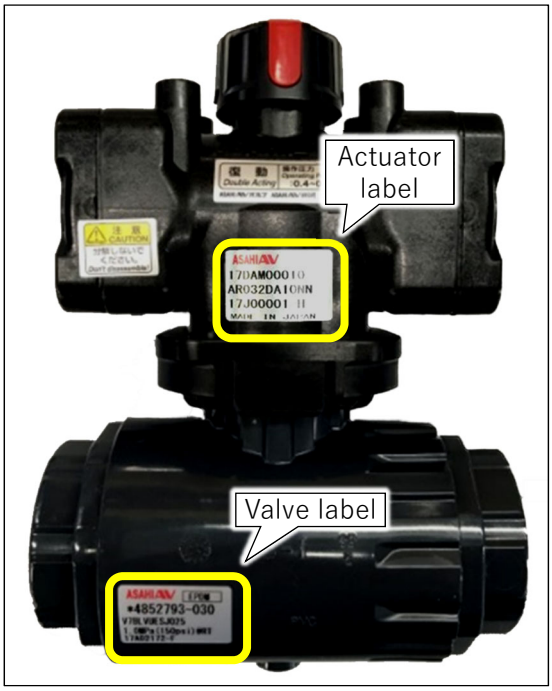
| ⚠Caution | |
|---|---|
| Forcing | **You may be electrocuted or injured.**<br>▶ If any malfunction is found, immediately stop using the product and take appropriate action.<br>▶ When removing the valve from the piping when replacing the valve or parts, completely remove the fluid from the piping before starting work. |

| Failure phenomenon | Possible cause | Measures and measures |
|---|---|---|
| The lever handle (wrench) does not turn (cannot turn) during manual operation. | The valve is already fully open (or fully closed). | Rotate the manual handle in the reverse direction<br>(Ref. 10. Commissioning method) |
| | Air is supplied to the actuator. | Tighten the air source valve and open the bypass valve. |
| | Foreign matter caught in valve | Remove the valve from the piping to remove foreign matter. |
| | Piping stress is applied to the valve. | Remove the piping stress |
| | The torque of the valve has increased due to the effects of the fluid (temperature, components, pressure, etc.) | Reconfirm the conditions of use<br>(Ref: 2. Safety Instructions) |
| Do not open or close by air operation. | The solenoid valve is turned off. | Turn on the power. |
| | Connection to the solenoid valve is disconnected. | Check the wiring condition again<br>(Ref: 9. How to connect limit switch) |
| | Air is not supplied | Supply air. |
| | The power voltage of the solenoid valve is different. | Check the voltage with a tester and set the correct voltage. |
| | Solenoid valve voltage is low | Check the voltage with a tester and set the correct voltage. |
| | The bypass valve is open. | Close the bypass valve by turning the knob clockwise. |
| | The speed controller adjustment knob is turned all the way to the right. | Turn the speed controller knob to the left.<br>(Ref. 10. Commissioning method) |
| | Foreign matter caught in valve | Remove the valve from the piping and remove any foreign matter.<br>(Ref: 6. Mounting method) |
| | Valve torque is increasing due to piping stress. | Remove the valve from the piping and remove the piping stress.<br>(Refer to "5. Optional Connection Method") |
| | Torque is increasing due to effects of fluid (temperature, components, pressure) | Check the operating conditions.<br>(Ref: 4. Product Specifications) |

| Failure phenomenon | Possible cause | Measures and measures |
|---|---|---|
| Fluid leaks even when fully closed | Sheet is worn | Replace seat (Ref. 11. Test Run) |
| | Scratches on disc, sheet or body | Replace applicable parts (Ref. 11. Test Run) |
| | Foreign matter caught in valve | Open and close several times to allow foreign matter to flow out (Ref: 10. Solenoid valve connection method) |
| Fluid leaks from valve | O-ring is damaged or worn. | Replace the O-ring (Ref. 11. Test Run) |
| | O-ring protrudes from the groove. | Replace the O-ring (Ref. 11. Test Run) |
| | O-ring fold surface (or fixed surface) is damaged or worn. | Replace applicable parts (Ref. 11. Test Run) |
| Actuator is operating, but valve is not open or closed | Damaged stem or shaft adapter | Replace stem or shaft adapter (Ref. 11. Test Run) |
| | Fitting surface of stem and ball is damaged. | Replace applicable parts (Ref. 11. Test Run) |

**How to query for faults or replacements**

| ⚠Caution | |
|---|---|
| **Forcing** | ▶ If the problem is not improved or parts replacement is required after taking measures or corrective actions, check the label information on the actuator and valve and contact us. |



## 14. Disposal method of residual materials and waste materials

| ⚠Warning | |
|---|---|
| Forcing | **When burnt, toxic gas is generated.**<br>▶ When disposing of the product or parts, please dispose of them according to the guidelines of each local authority by a professional disposal company. |

## Inquiries

Contact the nearest dealer, our sales office, or our web website for inquiries about this product.

**[User's Manual]**

Compact ball valve Type 27 Pneumatic actuated Type AR
13～50mm

https://www.asahi-yukizai.co.jp/en

Please note that the content of this manual is subject to change without notice. **March 2024**