

HISAKA

Ball Valve

User's Manual



Request

Be sure to give this User's Manual to the person in charge of handling valves.

HISAKA WORKS, LTD.

Preface

Thank you very much for selecting a HISAKA ball valve. HISAKA ball valves provide high reliability and quality to our customers through our many years of experience and know-how.

This User's Manual summarizes how to use the product in order for you to safely and reliably use your HISAKA ball valve. Be sure to read this User's Manual before using the product. Also, after reading it, be sure to store this User's Manual where it can be referenced at any time.

Unauthorized copying or reprinting of this User's Manual, in part or in full, is prohibited.

The contents of this User's Manual are subject to change without notice.

We have taken all measures to ensure that the contents of this User's Manual are accurate. However, contact us if you discover any suspicious contents or contents missing.

Be aware that HISAKA is not liable regarding the results of your operation.

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Caution for Safety

- In order to safely use the HISAKA ball valve, correct installation / operation and appropriate maintenance are indispensable. Read and thoroughly understand the cautionary notes regarding safety in this User's Manual before performing installation / operation / maintenance.
- The cautionary notes indicated here are for preventing human injury and property damage in advance. Also, in order to indicate the severity of injury or damage and the degree of emergency expected to occur due to incorrect handling, this Manual uses "Warning" and "Caution." As they both indicate important information regarding safety, be sure to obey them.



Warning

- Indicates contents that could lead to death or serious injury in the case of mistaken handling.



Caution

- Indicates contents that could lead to light or moderate injury, or property damage / breakage in the case of mistaken handling.



Warning

- Use the valve within the specified range determined by model for temperature, pressure, and the like.
- In cases of high temperature, high pressure, or dangerous fluids, there is a risk of leakage from the gland part, flange part connecting the body and body cap, piping flange, and the like. Install safety covers and signs and take measures to prevent danger to personnel in the event of a leak.
- If there is a chance of secondary disasters in the event of a leak from the valve (such as when there is electrical equipment nearby), install a safety cover to prevent the liquid from being dispersed.
- If using a dangerous fluid, when performing disassembly / inspection, first consult with an expert technician and take measures such as removing the dangerous fluid and wearing protective equipment appropriate for the fluid, and pay close attention when performing the disassembly / inspection.
- Do not disassemble the spring part of the single-acting actuator. In cases where it absolutely must be disassembled, there is a risk the spring might blow out, so take sufficient safety measures before performing disassembly.



Caution

- When operating the valve, do not touch any of the rotating parts. Also, for an ON-OFF valve, take measures such as installing a safety cover or safety signs as necessary so that a person does not accidentally touch it.
- When handling the valve, be sure to wear protective equipment such as safety goggles, safety gloves, and safety boots to prevent unintended accidents.

Package Opening and Product Confirmation / Storage



Package opening:

When opening the package, do so carefully to avoid accidents or injuries. Also, after opening the package, carefully store the product so as not to damage or lose any parts.

Specifications confirmation:

Confirm that the delivered product matches the order, and use the invoice and casting mark / nameplate, etc., to confirm the model, material, rating, size, quantity, presence of accessories, and the like.

Inquiry

If you have any questions about the specifications of the delivered product, inquire at the contact information listed on the shipping document.

Caution regarding storage

If storing your HISAKA ball valve as-is, follow the following cautionary notes.

1. In order to avoid rust and contamination of foreign material, do not remove the dust-proof caps on the ports until you install the valve to the piping. Also, if installing to the piping, be sure to remove these dust-proof caps.
2. In order to avoid rust, exposure to water, and dust, store the valve indoors.
3. As the valve is shipped either fully open or fully closed, be sure to store it in that condition. Leaving the valve in a half-opened state can cause seat leaks.

Minister-accredited Product Determined by the "High Pressure Gas Safety Act"



Valid period

Minister-accredited products newly manufactured at our factory are all issued an "accredited tester test results sheet" as the "completion inspection." The valid period is three (3) years from the date listed on the aforementioned results sheet.

Products used by customers which were returned to our factory and then passed the test after disassembly inspection are issued an "accredited tester test results sheet" as the "safety inspection."

The valid period is one (1) year from the date listed on the aforementioned results sheet.

Handling of emergency shutoff valves

If using a Minister-accredited product as an emergency shutoff valve, perform the inspection determined for "devices that promptly shutoff supply in the event of a gas leak (emergency shutoff devices, etc.)" in the "example standards" of the "High Pressure Gas Safety Act."

We recommend confirming the following items in daily inspections.

- (1) Perform an operation inspection once or more per month, and confirm that the opening and closing operation is performed smoothly and reliably.
- (2) Perform a seat leak inspection and operation inspection once or more per year, and confirm that the leakage amount does not create a problem in terms of safety, and that the opening and closing operation is performed smoothly and reliably.

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Chapter 1: Cautionary Notes for Usage

1. Specifications



Warning

- The specifications for the valve, including the body pressure rating, body materials, ball materials, and ball seat materials have been selected based on the fluid conditions in use. Avoid use outside the fluid conditions specified when ordering. There is a risk of burns or injuries due to high temperature or leaks of dangerous fluids.
- In cases of high temperature, high pressure, or dangerous fluids, there is a risk of leakage from the gland part, flange part connecting the body and body cap, piping flange, and the like. Install safety covers and signs and take measures to prevent danger to personnel in the event of a leak.
- If there is a chance of secondary disasters in the event of a leak from the valve (such as when there is electrical equipment nearby), install a safety cover to prevent the liquid from being dispersed.
- If the valve is subject to relevant laws such as the "High Pressure Gas Safety Act," regulations, or standards, use the product within that scope.

2. Cautionary notes on usage criteria

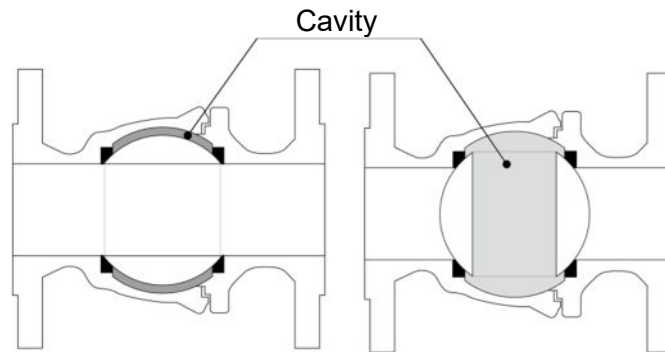
We ask that you use the product within our temperature / pressure rating. Furthermore, if using the product under the following conditions, inquire with HISAKA in advance.

- (1) Use soft seat valves either fully open or fully closed. Using them half-opened results in the ball seat being disfigured and can cause leaks or poor performance.
- (2) If there is a temperature change in the fluid, the liquid in the cavity (between the ball and the body - refer to the following page) can cause an abnormal rise in pressure due to thermal expansion, resulting in poor performance or leaks due to disfiguration in the ball seat.
Also, with valves made of cast iron (FC200), be aware that the body may break.

The following are countermeasures.

- a) Put a notch groove in the seat on the side that is the high-pressure side when the valve is closed. However, this method limits the flow direction.
- b) Use a Trunnion-mounted valve.

However, an abnormal rise in pressure can occur in piping outside the valve, causing breakage in the seal materials of the valve. In such a case, countermeasures cannot be taken on the valve, so measures must be taken on the equipment.



- (3) If using liquids that contain slurry, liquids that contain solids, or liquids that solidify, you must investigate poor operation and leaks.
- (4) If using for powder conveyance under the following conditions, then you must investigate poor operation and leaks due to powder consolidation, scratches on friction surfaces, erosion wear on the body and flow channel, and affixation / consolidation.
 - There is humidity in the gas for powder conveyance
 - The valve will be opened or closed while powder is passing through
 - There is a risk of powder consolidation
 - The powder has a high degree of hardness or the powder conveyance has a high flow rate
- (5) Floating type ball valves have a significant change in pressure and can cause leaks under low pressure. For this kind of usage, use a Trunnion-mounted valve.
- (6) If using oxygen, hydrogen peroxide, or solvents, special treatments and selections are necessary. For details, inquire with HISAKA.
- (7) With valves made of cast iron (FC200), the fluid could freeze in the valve during severe winters, breaking the body. If there is a risk of freezing, drain the fluid inside the valve or take measures to remove the influence from the temperature.



Caution

- Do not use cast-iron valves in locations where there is a risk of an abnormal rise in pressure or freezing.

Chapter 2: Installation

1. Selecting an installation location

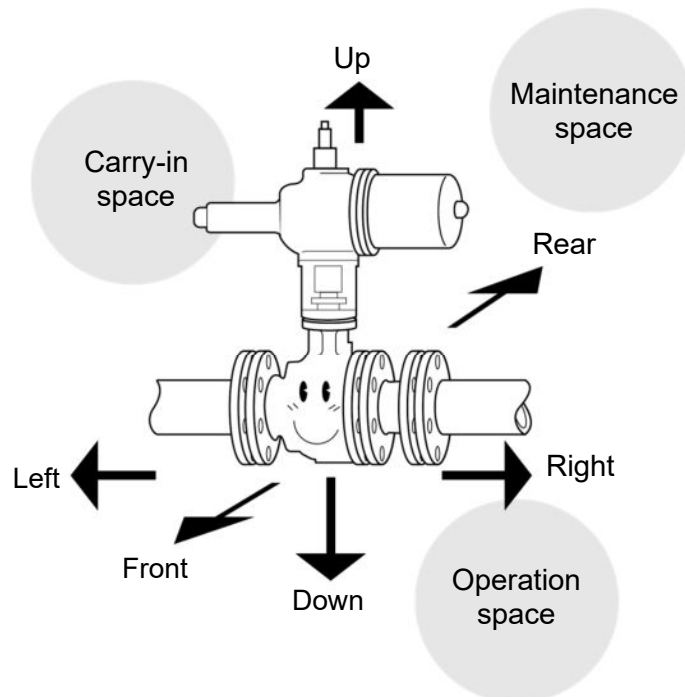
When installing the valve you purchased, keep the following points in mind.

- (1) Ensure enough space around the valve installation space so that operation and maintenance can be performed safely and easily.
- (2) Avoid installing the valve in locations where it could be subject to vibration or forces that impede its functionality.
- (3) Take considerations regarding support for the valve itself and support for the adjacent piping so that the piping is not subject to an excessive burden due to the valve weight and operation.
- (4) If installing in locations where there is a risk of flooding due to rain, being buried due to snow accumulation, or freezing, take the appropriate countermeasures.
- (5) If subject to radiant heat, take countermeasures such as by installing a shielding plate.



Caution

- If the valve is installed facing a corridor or the like, and there is a risk that an outside person may touch the valve or be exposed to the fluid in the event of a leak, take protective measures such as by installing a safety fence or safety cover.



2. Inspection before installing to piping



Warning

- Using the valve in conditions that exceed its temperature or pressure specifications can cause severe accidents due to breakage or leaks. Use the valve within its specifications.

Before installing the valve to the piping, perform the following confirmation / inspection.

- (1) Confirm the prescribed specifications on the casting mark / nameplate, etc.
- (2) Confirm that there is no damage on the valve (body, operating device, accessories, etc.).
- (3) Confirm that there is no damage on the piping flanges.
- (4) Be sure to remove the dust-proof caps on the valve port parts before installing to piping.
- (5) Thoroughly clean away any rust, sand, or other foreign material inside the piping or the piping instruments. Poor cleaning can cause seat leaks or poor operation.
- (6) Confirm that there is no foreign material on the valve interior before installation.
- (7) When installing, take into consideration working space for operation and maintenance.
- (8) Confirm that the support strength of the piping adjacent to the valve installation location is sufficient. The valve weight can cause leaks from the piping flange connections.



Caution

- When handling the valve, be sure to wear protective equipment such as safety goggles, safety gloves, and safety boots to prevent unintended accidents.

When transporting the valve, be cautious of the following points.

- (1) If transporting the valve using a crane, refer to the following page and have a person with slinging qualifications performing pulling in a location that will not affect the valve body or around the piping connection flanges, or the actuator section accessories or air tubing.

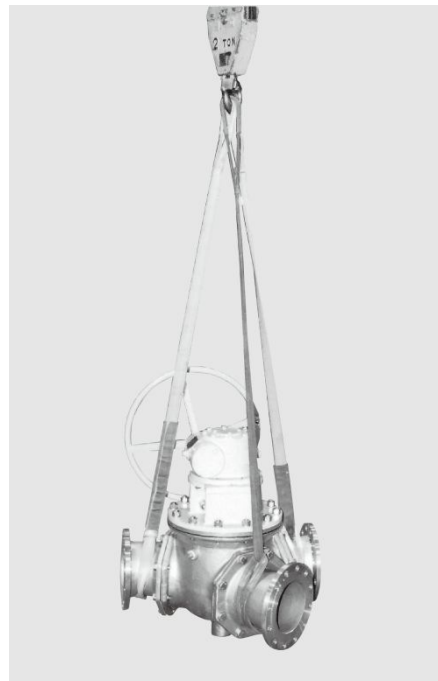
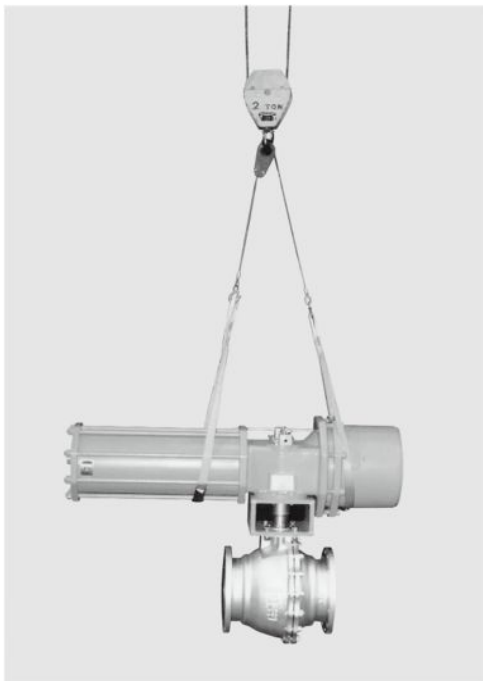
Chapter 2: Installation

- (2) Do not subject the valve to a strong impact. Dropping the valve or hitting it against other objects can damage the piping flanges / body or push the stem too far into the body, causing leaks.



Caution

- When lifting the valve, do not hold the handle. The handle may slip out, causing the valve to drop and resulting in injuries.



3. Piping installation <Installation work>

When performing work to install the valve to the piping, pay attention to the following items.

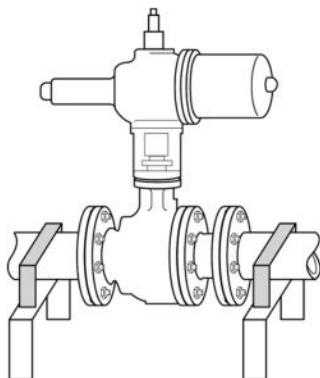


Caution

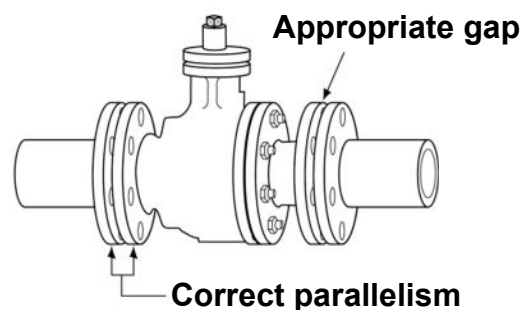
- When handling the valve, be sure to wear protective equipment such as safety goggles, safety gloves, and safety boots to prevent unintended accidents.
- When performing piping work, do not use the valve, actuator (including the accessories such as the solenoid valve), handle, or the like as footing. Not only can it damage the part, but it can cause you to slip and be injured.

- (1) Confirm that the dust-proof caps on the valve ports have been removed.
- (2) Confirm that the valve, piping interior, and piping device interior have been cleaned and are free of rust, sand, and other foreign material before installing the valve.
- (3) Consider the space for operation and maintenance when performing installation.
- (4) Use gaskets that comply with the standards, and to avoid damaging the flange surfaces, perform tightening with even force, alternating diagonally to avoid uneven tightening. Uneven tightening can result in leaks or gasket damage.

Furthermore, for jacketed valves, the valve port size and the piping flange size vary, so confirm the catalog / delivery specification sheets and use an appropriate gasket.

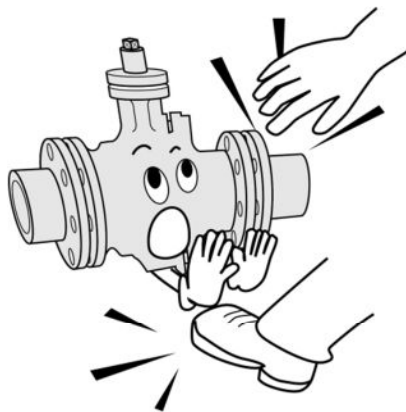


Piping support

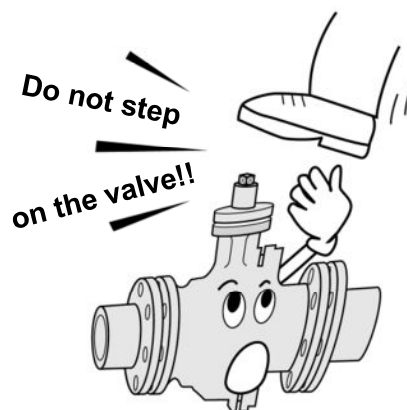


Chapter 2: Installation

- (5) Perform piping so that there is not excessive piping stress. Excessive piping stress can cause poor operation, leaks, and valve damage.
- (6) Confirm that the piping support adjacent to the valve installation location is sufficient for the valve weight.
- (7) For screw end valves, use a wrench or the like to assuredly screw the square part of the body tip into the piping. Furthermore, if using a seal tape or liquid sealant, be sufficiently cautious to prevent cut edges or liquid sealant from entering the piping.
- (8) After completing piping installation, confirm that the valve and the centers of piping on both ends are in the accurate locations. Uneven piping not only puts inappropriate stress on the valve, but also causes leaks from the surface connecting to the piping (the gasket).
- (9) Confirm that the dimensions between the piping flanges are sufficient for the sum of the valve face-to-face dimensions and the gasket thickness.
- (10) For the bolts and nuts for the piping flanges, use items that meet the flange standards. Inappropriate bolts and nuts can cause leaks.
- (11) For the piping flange gaskets, use new products with materials, shapes, and dimensions that meet the fluid properties and temperature / pressure conditions. Gasket failure can cause the liquid to leak.
- (12) While flushing the piping, fully open the valve, and do not perform an opening or closing operation. Welding sparks or foreign material may damage the valve seat.
- (13) Ensure enough space to re-tighten the gland packing.



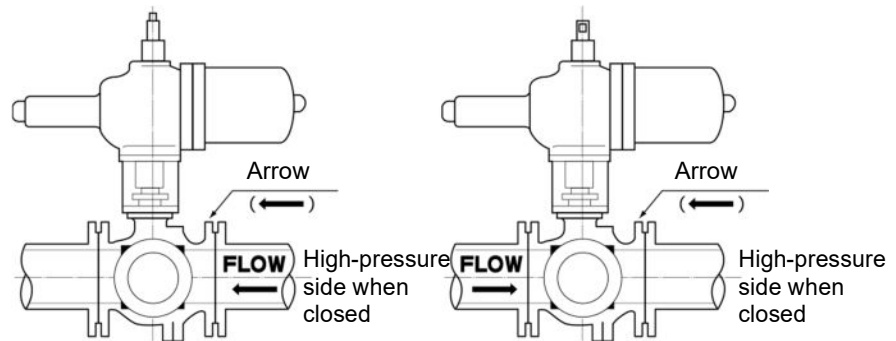
**Be careful not to drop the valve
or get your fingers caught!!**



<Installation method>

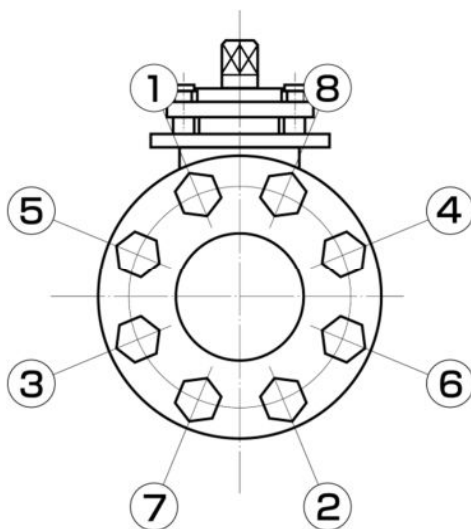
Use the following procedure when installing the valve to the piping.

- (1) If a high-pressure side when the valve is closed is specified, use the flow direction of the arrow indicated by the nameplate / engraving / seal / casting mark on the valve as the high-pressure side.

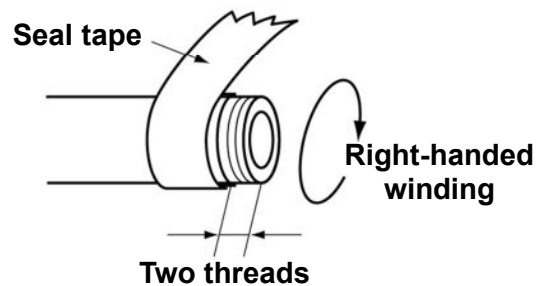


Arrow and high pressure side

- (2) Insert the valve and the gasket into the piping, then temporarily assembly the bolts / nuts for the piping flange connection.
- (3) Ensure that the piping connection gasket does not stick out from the valve port.
- (4) Assuredly tighten the piping flange bolts / nuts with even force, alternating diagonally to avoid uneven tightening.
- (5) When installation to the piping is complete, confirm that there is no looseness in the bolts / nuts or leaks.



Piping flange tightening order



Seal tape winding

- (6) To connect air tubing for the ON-OFF valve, use the following order: air source, filter, regulator, oiler, solenoid valve, speed controller, actuator.
 - * Perform installation so that the filter, filter regulator, and oiler are vertical.
- (7) Normally, an oiler is not required. If installing an oiler, use an appropriate amount of turbine oil type 1 (ISO VG32) as the oil. Do not use spindle oil or the like.
- (8) Use a liquid sealant or seal tape to completely seal the screw connection of the air device. Furthermore, do not apply the liquid sealant to or wrap the seal tape around the tip of the screw, to prevent it from getting into the air tubing or air device.
- (9) First confirm if the valve will be open or will be closed when the solenoid valve is energized before connecting the air tubing between the solenoid valve and the actuator.
- (10) Select an air device in consideration of the device's temperature rating and the ambient temperature of the usage location. Do not use the device in excess of its temperature rating.
- (11) Regarding electric devices such as the limit switch and solenoid valve, you must use different devices, such as explosion-proof or weather-proof types, depending on the location of use. Confirm their specifications before use.
- (12) If using electric devices such as the solenoid valve, be sure to confirm the voltage to be used. Using the incorrect voltage will damage the coil. Furthermore, wiring must be performed by an electrician.



Caution

- Wiring for electric devices must be performed by an electrician. Furthermore, as there is a risk of electric shocks, be sure to check that the power is off before performing wiring.
- Be sure to ground (earth) electric devices and take measures to prevent electric shocks.

Chapter 3: Operation

1. Operating

1-1. Manual valve

- (1) For a two-way valve, generally, the stem revolves 90 degrees from fully opened to fully closed. The handle is turned clockwise to close the valve and counterclockwise to open the valve. However, some valves operate in the opposite way. Confirm the turning direction according to the specifications before operating the valve. The open/closed position can be confirmed using the direction of the 2-faced stem.
(For a 4-faced stem, check the groove position on the top of the stem.)
- (2) Always use the valve fully opened or fully closed. For a 3-way valve, align the ball port position and the body port position.
A standard ball valve cannot be used for flow rate control. The main purpose of a ball valve is to stop the fluid in the piping or let it flow. If a soft seat valve is left for a long period of time in a half-open state, the ball seat may be disfigured, leading to leaks.
- (3) Be sure to manually operate the valve using the specified handle. Using unnecessary extensions or a pipe wrench or the like to apply excessive force may damage the handle, cause injuries if it slips out, or damage, disfigure, or misalign the stem. Use the specified handle and operate the valve with a steady stance.



Caution

- When operating the valve, do not touch any of the rotating parts.
- When handling the valve, be sure to wear protective equipment such as safety goggles, safety gloves, and safety boots to prevent unintended accidents.

1-2. ON-OFF valve

- (1) The standard operating pressure of the pneumatic actuator is 0.39 MPa (4 kgf/cm²G). While the maximum operating pressure is 0.69 MPa (7 kgf/cm²G), use the operating pressure designated in your request spec.
- (2) For the supplied air, be sure to use a filter and supply dehumidified, filtered air. Particularly in cold areas subject to freezing, pay attention to the dehumidification of supplied air. Freezing air can cause malfunctions or damage to the air devices.
- (3) Periodically remove the filter drainage.
- (4) As the actuator uses lubricant, an oiler is not required for normal usage.
- (5) Periodically perform inspections.



Warning

- Do not use the pneumatic actuator at or above its maximum operating pressure of 0.69 MPa (7 kgf/cm²G). The drive section may be damaged, causing a major accident.

1-3. Manually operating the ON-OFF valve

1. Double-acting type (AD / TD / AR type)

- (1) If the solenoid valve has a manual switch:
If there is supplied air pressure, use the manual switch of the solenoid valve to open and close the valve. If there is no supplied air pressure, supply air to the air tubing and then perform the operation.
- (2) If there is a bypass valve
Open the bypass valve, then use the dedicated manual operating handle (optional) to operate the connection with the valve. After manual operation, remove the handle and be sure to close the bypass valve.

- (3) If there is no solenoid valve manual switch or bypass valve
If there is supplied air pressure, shut off the supplied air to the actuator, remove the 2 air connection ports of the actuator, then use the dedicated manual operating handle (optional) to operate the connection with the valve. After manual operation, remove the handle. However, operation cannot be performed for a TD7 / TD8 model. A separate actuator with manual operation is available. Specify if necessary when submitting your request spec.

2. Single-acting type (AS / TS type)

The interior of the single-acting type contains a spring and is dangerous. Do not operate it manually. A separate single-acting actuator (TSH type, TSM type, TSW type) with manual operation is available. Specify if necessary when submitting your request spec.



Caution

- When handling the valve or actuator, be sure to wear protective equipment such as safety goggles, safety gloves, and safety boots to prevent unintended accidents.
- When operating the valve, do not touch any of the rotating parts. Also, for an ON-OFF valve, take measures such as installing a safety cover or safety signs as necessary so that a person does not accidentally touch it.
- When manually operating an ON-OFF valve, be careful not to drop the operating handle and cause an injury.
- The interior of the single-acting type contains a spring and is dangerous. Do not operate it manually.

2. Test operation

2-1. Manual valve

- (1) When performing pressure rating examinations for the piping and valve, be sure to put the valve in a half-opened state then confirm that there is no leaking from the gland part and flange part connecting the body and body cap. If performed with the valve closed, the gland part / gasket part may not receive the necessary inspection pressure, or an excessive load may be applied to the ball seat, causing seat leakage.
Furthermore, do not leave the valve in the half-opened state for a long period of time.
- (2) The gland bolts may have become loosened due to temperature changes from when the valve was delivered until test operating. If you discover a leak from the gland packing due to looseness of the gland bolts, drain the internal pressure of the valve and then retighten the bolts with even force, alternating diagonally. Be careful not to over-tighten the bolts. Over-tightening the bolts reduces the packing flexibility, ultimately reducing the seal performance. If retightening the bolts does not solve the leak, replace the gland packing with a new one.
- (3) If you discover a leak from the flange part connecting the body and body cap or piping flange gasket, retighten the bolts / nuts of the flange part alternating diagonally.
To perform the retightening safely, use a closed-end wrench.
- (4) Dirt, rust, or the like in the piping can damage the ball seat and cause seat leaks. Thoroughly clean the piping interior before operating the valve.



Warning

- If you discover a fluid leak from the valve, do not approach the valve until safety has been confirmed. Depending on the properties of the fluid, it can cause injuries or serious accidents.
- When removing the valve or replacing the gland packing, first confirm that the pressure inside the piping has dropped to atmospheric pressure before performing work. With a ball valve, there may be pressurized fluid remaining in the cavity parts, so either turn the valve to its half-opened state and then confirm the pressure, or open and close the valve several times and then confirm the pressure. There is a risk of injury due to the fluid being sprayed.



Caution

- When replacing the packing or gasket, first confirm that the pressure inside the piping has dropped to atmospheric pressure, and for dangerous fluids, after turning the valve to its half-opened state and cleaning the piping interior, thoroughly drain the valve and piping before performing replacement.

2-2. ON-OFF valve

- (1) Confirm that solenoid valve voltage matches the prescribed specifications.
- (2) Confirm that the supplied air pressure is the prescribed pressure (standard: 0.39 MPa (4 kgf/cm²G)).
- (3) Confirm that there are no leaks in the air tubing system from the compressor to the actuator. (Applying soapy water, a foaming agent, or the like can help you easily discover any leaks.)
- (4) Before supplying air pressure and beginning operation, confirm the following items.
 - 1) Double-acting type (AD / TD type)
With the actuator prescribed operating pressure at a standard of 0.39 MPa (4 kgf/cm²G), start at 50% (0.20 MPa (2 kgf/cm²G)) and gradually raise the operating pressure to about 80% (0.31 MPa (3.2 kgf/cm²G)) and confirm that the valve operates smoothly.
 - 2) Single-acting type (AS / TS type)
Gradually raise the actuator operating pressure from 0.29 MPa (3 kgf/cm²G)) to about 0.35 MPa (3.6 kgf/cm²G) and confirm that the valve operates smoothly.
- (5) Operate with the prescribed pressure and confirm there are no abnormalities.



Caution

- The single-acting type is equipped with a spring in the interior and is dangerous. Do not perform manual operation.

Chapter 4: Maintenance

The following chapter explains maintenance and inspections for the ball valve. Perform inspections following the procedure below in order for the ball valve to maintain its intended functionality, as well as to prevent accidents and quickly detect any issues.

1. Inspection

There are daily inspections and periodic inspections (disassembly inspections). Perform each one following the procedures below.

1-1. Daily inspections

Daily inspections are required in order to maintain the device in a safe and proper status. Perform daily inspections following the procedure below.

<Inspection item>

(1) Inspections for leaks

- 1) Leaks from the gland part
- 2) Leaks from the piping flange connection and flange part connecting the body and body cap
- 3) Leaks from the valve body surface
- 4) Leaks from the air tubing and air device
- 5) If the tank liquid surface of the equipment has dropped abnormally
- 6) If the tank liquid surface of the equipment has risen abnormally or is overflowing
- 7) If there is a seat leak from the valve attached to the piping end

(2) Inspections for abnormal sounds

- 1) From vibration of the valve itself and the piping
- 2) From loosened bolts
- 3) From the air tubing
- 4) From the solenoid valve

(3) Other inspections

- 1) If the valve operating position is normal
- 2) If the valve and piping are tightened sufficiently
- 3) If the actuator is operating smoothly
- 4) If the limit switch is operating properly
- 5) If the pressure settings of the regulator are correct
- 6) If the air filter drainage has accumulated above the full line



Caution

- Perform the gland part inspection as a daily inspection, and confirm there are no leaks and no looseness in the gland bolts.
- Confirm the valve operation as a daily inspection, and confirm there is no poor performance.
- Confirm that there is no abnormal noise or vibration during operation.
- When operating the valve, do not touch any of the rotating parts. Carelessly touching it can cause your hands or fingers to be caught, resulting in injury.

If any of the aforementioned problems occur, fix them using the procedures below.

(1) Leaks

* When performing retightening to fix leaks, first drain the pressure from the piping and then perform retightening. Then, pressurize the piping and confirm there is no leak.

1) Leaks from the gland part

If you discover a leak from the gland part, first retighten the gland bolts with even force, alternating diagonally. In this case, be careful not to overtighten the bolts. Overtightening can increase the valve torque, causing poor performance. If retightening the bolts does not stop the leak, refer to the periodic inspection section and replace the gland packing with a new one.

2) Leaks from the piping flange connection and flange part connecting the body and body cap

If you discover a leak from the piping flange connection or flange part connecting the body and body cap, retighten the flange bolts /nuts with even force, alternating diagonally.

If retightening the bolts / nuts does not stop the leak, replace the gasket / packing with a new one.

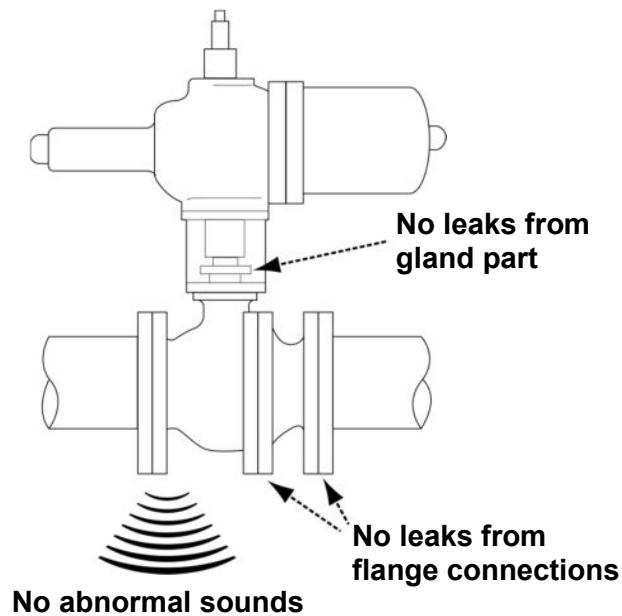
3) Leaks from the valve body surface

If you discover a leak from the valve body surface, have an expert in welding repair or the like make emergency repairs and replace the valve with a new one as soon as possible.



Warning

- If there is pressure inside the piping or inside the valve, do not loosen the gland bolts. Loosening them could, depending on the model, cause fluid to be sprayed out or the gland packing or stem to blow out, causing a serious accident.
- If the product is made of cast-iron, then the fluid could freeze in the valve during severe winters, breaking the body. If there is a risk of freezing, drain the fluid inside the valve or take measures to remove the influence from the temperature. Furthermore, do not use cast-iron valves in locations where there is a risk of freezing. Cast-iron valves are marked with "FC20" or "FC200" on the valve body to indicate their material.



- 4) Leaks from the air tubing and air device
If you discover a leak from the air tubing or air device, apply soapy water, a foaming agent, or the like to identify the leaking position. If the leaking position is a connecting section of the air tubing, use the appropriate tools and appropriate force to retighten the connection. If the leak is from the air tubing itself, replace that spot with new piping. If the leak is from the device, contact the device manufacturer and consult with them before taking appropriate measures.
- 5) If the tank liquid surface of the equipment has dropped abnormally
If the tank liquid surface has dropped abnormally, investigate the cause. If there are no other causes found, a leak from the valve is likely. If a leak from the valve is likely, the valve seat must be replaced. Refer to the periodic inspection section below and replace the valve seat.
- 6) If the tank liquid surface of the equipment has risen abnormally or is overflowing
If the tank liquid surface has risen abnormally or is overflowing, investigate the cause. If there are no other causes found, a leak from the valve is likely. If a leak from the valve is likely, the valve seat must be replaced. Refer to the periodic inspection section below and replace the valve seat.
- 7) If there is a seat leak from the valve attached to the piping end
If you discover a valve leak at the piping end, the valve seat must be replaced. Refer to the periodic inspection section below and replace the valve seat.

(2) Abnormal sounds

- 1) From vibration of the valve itself and the piping
Call a piping technician to handle any abnormal sounds occurring from vibration of the valve itself or the piping.
- 2) From loosened bolts
If there are any abnormal sounds from looseness in the bolts, immediately use the appropriate tool to retighten the bolts with even force, alternating diagonally.
- 3) From the air tubing
If there is a sound of leaking air, refer to the sections above and stop the leak. If there are any abnormal sounds other than leaks, call a piping technician to handle the abnormal sounds.

- 4) From the solenoid valve
If there is abnormal sound occurring from the solenoid valve, it could be incorrect voltage or poor model selection. However, simplistic responses can result in electric shocks and short circuits. Be sure to call an electrician to handle it.

(3) Other

- 1) If the valve operating position is normal
Confirm that the valve is operating in the fully opened or fully closed state. Leaving the valve in the half-opened state for a long period of time can disfigure the ball seat, causing leaks.
- 2) If the valve and piping are tightened sufficiently
Confirm the tightening status of the valve and piping, and if there is any looseness, immediately retighten the bolts / nuts with even force, alternating diagonally. Also, call a piping technician to investigate and remove the cause of the looseness.
- 3) If the actuator is operating smoothly
For an ON-OFF valve, confirm that the actuator is operating smoothly. If there is a problem, call a piping technician, determine if it is a valve problem or an actuator problem, and take the necessary measures.
- 4) If the limit switch is operating properly
Confirm that the limit switch is operating properly. If there is a problem, determine if it is with the striker or the limit switch itself, then take measures such as adjusting the position of the striker and retightening the installation bolts. For problems with the limit switch itself or electrical problems, call an electrician to handle it.
- 5) If the pressure settings of the regulator are correct
Confirm the pressure setting of the regulator for the actuator. Inappropriate settings can cause poor performance. If the settings are not correct, use the adjustment knob on the regulator to set the proper value. If you do not know how to perform settings, call a piping expert to handle it.
Furthermore, for a regulator with a pressure gauge, we recommend using a marker or the like to indicate the set pressure. The secondary pressure also slightly fluctuates when there is primary pressure fluctuation. Therefore, set somewhat high pressure.

- 6) If the air filter drainage has accumulated above the full line
If the air filter drainage accumulates above the full line, the filter will not be able to fulfill its role, so be sure to remove the drainage. Also, after removing the drainage, be sure to tighten the drainage removal valve.

1-2. Periodic inspections

Periodically perform disassembly inspection in order to discover wear of the ball and stem, corrosion of the body and body cap interiors, and wear of the screws.

Normally, replace the packings, gaskets, and ball seats as consumable parts during periodic inspection. Furthermore, as the delivery dates for consumable parts vary depending on the valve model, inquire in advance.

For disassembly and assembly of the valve, refer to the separate **Disassembly and Assembly Procedure** by model.

If performing removal from the piping or valve disassembly, use markers or the like to indicate matching parts, to improve convenience during reassembly / attachment to piping.



Warning

- For valves using dangerous fluids, first consult with a technician familiar with dangerous fluids and then clean the valve while it is still attached to the piping. Furthermore, before disassembling the valve, put it in the half-opened state and remove any remaining dangerous fluid and clean it.
- If performing disassembly for a valve that was used for a dangerous fluid such as a combustible gas or poison gas, do so outside, in a location away from fire and with good ventilation, and while wearing the appropriate protective gear. Failing to thoroughly carry out safety procedures can result in any remaining pressure causing injuries, explosions, or fires.
- Do not disassemble spring-loaded parts, such as an AS / TS single-acting actuator. If you absolutely must perform disassembly, there is a risk the spring will blow out, so take sufficient safety measures before disassembly.
- If removing the ball valve from the equipment, first confirm that there will be no problem with the equipment and it is safe even if the valve is removed.

<Request regarding inspection content recording>

We recommend that when you perform periodic inspection, you record the inspection contents regarding the following items. Records of inspection contents are helpful in various situations, such as predicting the product service life, responding to trouble, and confirming the replacement of consumable parts.

- * Refer to the **valve removal section** and the separate **Disassembly and Assembly Procedure** before performing disassembly inspections and record the items required for post-inspection assembly.
- * Operate the valve before disassembly and confirm whether there are any abnormalities.

<Inspection items>

(1) **Appearance inspection**

Confirm that there is no nick, damage, breakage, or corrosion on the body, body cap, stem, ball, ball seat, bolts / nuts of the flange part connecting the body and body cap, and air tubing. Also, confirm any deterioration of the painted parts.

(2) **Scratch inspection of the ball**

Confirm that there are no scratches or the like on the ball that could cause a seat leak.

(3) **Scratch inspection of the stem**

Confirm that there are no scratches on the stem.

(4) **Inspection for traces of leaks from the body**

Confirm that there are no traces of leaks that occurred from the body, body cap connection, or body surface.

(5) **Inspection for traces of leaks from the gland part**

Confirm that there are no traces of leaks that occurred from gland part.

(6) Confirmation of scratches on the seat

Confirm that there is no deterioration such as scratches or corrosion that could cause seat leaks in the ball seat and seat mounting parts of the body and body cap. If there are any abnormalities, replace the part or the valve.

(7) Confirmation of scales in the body interior

Confirm that scales have not been attached / deposited in the body or the like. If scales have been attached, remove them.

(8) Confirmation of scratches, corrosion of the body and gland part interior

Confirm that there is no deterioration such as scratches or corrosion that could cause gland leaks in the body and gland part interior. If there are any abnormalities, replace the valve.

(9) Confirmation of scratches, corrosion of the flange part connecting the body and body cap

Confirm that there is no deterioration such as scratches or corrosion that could cause leaks in the gasket surface of the flange part connecting the body and body cap. If there are any abnormalities, replace the valve.

(10) Confirmation of scratches, corrosion of the piping flange

Confirm that there is no deterioration such as scratches or corrosion that could cause leaks in the gasket surface of the piping flange. If there are any abnormalities, replace the valve.



Caution

- Properly dispose of old parts from valve disassembly or maintenance as industrial waste. Simply burning them or throwing them away can cause environmental pollution.
- To dispose of fluororesin parts, do not burn them. Dispose of them as non-combustible material. Burning fluororesin creates noxious gas.

2. Removal

This chapter explains how to remove the valve from the equipment. If removing the valve from the equipment, such as for periodic inspection, refer to the following cautionary notes.

<Cautionary notes>

- (1) Ensure the space necessary for removal.
- (2) Confirm that there will be no problem with the equipment even if the valve is removed.
- (3) Block the flow inside the piping and be sure to drain the processing pressure before performing disassembly.
- (4) First confirm that the temperature near the valve has returned to room temperature before performing removal.
- (5) When removing the valve, put matching marks on each part, such as the piping connection flange, air tubing connection, and electrical wiring connection, to allow for reassembly.
- (6) When removing the valve, be sure to use a closed-end wrench for safety.
- (7) If using a crane to remove the valve from the equipment, remove all the piping connection bolts to avoid applying excessive force.

<Removing the valve>

- (1) **Install piping support.**
Install piping support as necessary.
- (2) **Stop the fluid, drain the pressure, and drain the remaining fluid.**
Confirm that the fluid is not flowing in the piping and that pressure is not applied. If there is pressure applied, stop the flow of the fluid and drain the pressure. After that, drain any remaining fluid.



Caution

- Removing the valve while pressure is still present in the piping is extremely dangerous.
- If removing the valve from the equipment, be sure to confirm that there is no pressure in the piping, that the fluid is not flowing, and that there is no remaining fluid.
- For dangerous fluids, call a technician to handle the fluid draining method and handling.

(3) Removal of the electrical wiring

After cutting off the power supply to electric devices attached to the valve, remove the wiring.

Before removing the wiring, put matching marks and wire numbers on the device and wires for convenience during reassembly.

Take measures to insulate the removed wires, such as plastic tape, to prevent electrical shocks and short circuits.

(4) Removal of the air tubing

After using a stop valve or the like to cut off supply of air to the valve instrumentation, remove the air tubing.

Before removing the air tubing, put matching marks and numbers on the device and piping for convenience during reassembly.

Seal the removed device / piping using dust-proof caps or plastic tape to prevent dirt from contaminating them.

(5) Removal from the piping

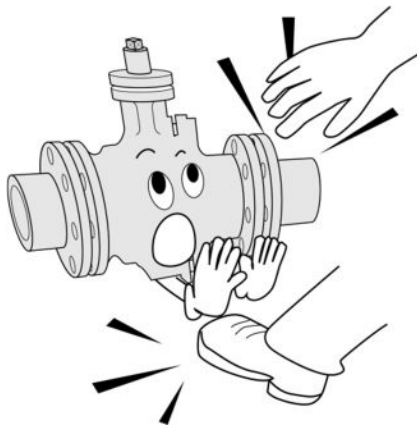
Use a sling or the like as necessary and affix the valve.

Then, loosen and remove the bolts / nuts affixing the flange, and remove the valve.



Caution

- Wiring work must be performed by a qualified electrician in accordance with electrical equipment technical standards.
- Avoid performing wiring work on rainy days or when the humidity is high. Moisture getting into connectors or the terminal box can result in short circuits or rust.
- Be careful not to lose the screws for affixing accessories or the seal packing. When tightening the affixing screws, confirm the mounting of the seal packing (gasket) then tighten the screws with even torque to avoid uneven tightening.
- Assuredly perform tightening for the cable screws and seal of the conduit tubes, and ensure that moisture does not get inside.
- When removing the valve from the piping, never insert your hand or foot under the valve body or between flanges. Doing so can cause you to lose your fingers or injury your leg.



**Be careful not to drop the valve
or get your fingers caught!!**

Chapter 5: Troubleshooting

Phenomenon	Cause	Countermeasures
The fluid does not flow	Valve was installed without removing the dust-proof cap	Remove the valve from the piping and remove the dust-proof cap, then install on the piping
Seat leaks	Scratches on the ball seat due to foreign material	Replace the ball seat then perform cleaning and flushing and attach the valve
	The valve was used while half-opened, disfiguring the ball seat	Replace the ball seat Caution: Using the valve while half-opened causes ball seat disfiguration. Do not use the valve half-opened.
	Ball seat disfiguration due to a rise in internal pressure	(1)Change the process so that the fluid temperature does not change (2)Replace with a 1-way valve or a Trunnion-mounted valve (3)Replace the ball seat
	Ball seat disfiguration due to abnormal rise of pressure in the piping	Countermeasures cannot be taken for the valve, so take countermeasures on the equipment
	A 1-way valve was installed with the wrong direction	Confirm the flowing direction and the pressurized direction when the valve is closed, then reinstall the valve
	Poor selection of ball seat material	(1)Confirm specifications (2)Replace the ball seat or the valve
Leak from the body gasket	Looseness of the connecting flange bolts / nuts	Retighten them with even force, alternating diagonally
	Looseness of the flange bolts / nuts connecting to the valve due to piping stress	(1)Install piping support so that piping stress is not applied to the valve (2)Retighten them with even force, alternating diagonally
	Leak due to rise in internal pressure	Replace with a 1-way valve or a Trunnion-mounted valve
Leak from the valve gland part	Looseness of the gland bolts	Retighten them with even force, alternating diagonally
	Wear on the gland packing	Replace the gland packing
	Leak due to rise in internal pressure	Replace with a 1-way valve or a Trunnion-mounted valve
	Gland packing disfiguration due to a heat cycle, etc.	(1)Review the gland packing material and replace the packing (2)Replace with a valve with an O-ring for the gland

Chapter 5: Troubleshooting

Phenomenon	Cause	Countermeasures
Poor operation	Insufficient supply pressure or air capacity	(1)Ensure the required supply pressure (2)Install an air header as necessary
	Foreign material inside the valve	Replace the ball seat, then perform cleaning and flushing and install the valve
	Ball seat wear	(1)Replace the ball seat (2)Replace with a metal touch ball valve
	Powder consolidation or adherence (if using powder)	(1)Replace the ball seat (2)Review the size of the actuator
	Compressor abnormality	Inspect the compressor
	Air tubing clogging or breaking	Repair the air tubing
	Failure of the filter regulator	(1)Remove the drainage (2)Replace the filter regulator
	Over-restriction of the speed controller	Adjust the speed controller
	Wear of the piston O-ring of the actuator	Replace the O-ring
	The bypass valve is open	Close the bypass valve
	A dust-proof cap is attached to the exhaust port of the solenoid valve	Remove the dust-proof cap
	The air tubing is clogged by seal tape	Repair the clogged portion of the air tubing
Corrosion		Replace with a valve of the appropriate material
The solenoid valve does not operate properly	Coil disfiguration due to over-screwing of the conduit tube	Replace the solenoid valve
	Spool disfiguration due to over-screwing of the ring joint	Replace the solenoid valve
	Coil burnout or poor operation due to incorrect voltage	(1)Confirm the voltage (2)Confirm the specifications of the solenoid valve
	Humming of the solenoid valve due to incorrect voltage	(3)Replace the solenoid valve

Phenomenon	Cause	Countermeasures
The solenoid valve does not operate properly	Manual switch in the wrong position	Return the manual switch to the correct position
	Wiring mistake, short-circuit inside the solenoid valve	Confirm the wiring and make repairs
	Air tubing mistake	Confirm the air tubing and make repairs
	Foreign material such as seal tape	(1)Remove the foreign material (2)Replace the solenoid valve
	Moisture such as rainwater inside the solenoid valve	(1)Use a weather-proof solenoid valve (2)Confirm the wiring connections, such as wire connectors and conduit tubes, and make repairs
	Abnormal exhaust from the solenoid valve	Confirm the status of the bypass valve and make repairs
	The pilot port is clogged	Open up the pilot port
The limit switch does not operate properly	Wiring mistake, short-circuit inside the limit switch	Confirm the wiring and make repairs
	Disconnection	
	Misalignment of the striker installation location, looseness in screws	(1)Readjust the installation position of the striker (2)Retighten the installation bolts of the striker
The proximity switch does not always operate	Misalignment of the detection distance	Readjust the installation position of the proximity switch
	Wiring mistake	Confirm the wiring and make repairs
	Disconnection	

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HISAKA WORKS, LTD.

■ **Valve Division**

Sales Department

Osaka Sales Section

Seiwa Umeda Bldg. 20th Floor, 2-12-7, Sonezaki, Kita-ku, Osaka-shi,
Osaka, 530-0057, Japan

TEL: +81-6-6363-0050

FAX: +81-6-6363-0162

E-mail: valve_info@hisaka.co.jp

URL: <http://www.hisaka.co.jp>

Overseas Operations

2-1-48, Higashi-konoike-cho, Higashi-osaka-shi, Osaka, 578-0973,
Japan

TEL: +81-72-966-9651

FAX: +81-72-966-9652

Tokyo Branch Office

Kyobashi OM Bldg. 2nd Floor, 1-19-8 Kyobashi, Chuo-ku, Tokyo
104-0031 Japan

TEL: +81-3-5250-0770

FAX: +81-3-3562-2759

Nagoya Branch Office

Fujifilm Nagoya Bldg. 12th Floor, 1-12-17 Sakae, Naka-ku, Nagoya City,
Aichi 460-0008 Japan

TEL: +81-52-217-2493

FAX: +81-52-217-2494

Kitakyushu Branch Office

Meiji Yasuda Seimei Kokura Bldg. 12th Floor, 9-1 Konyamachi,
Kokurakita-ku, Kitakyushu City, 802-0081 Japan

TEL: +81-93-531-1151

FAX: +81-93-531-1152