

# ACTIVAL™

## Two-Way Valve with Flanged-End Connection (Large-Sized Valve for High Differential Pressure Applications)

### Model VY5609A

#### General

ACTIVAL Model VY5609A application is a series of two-way valves with flanged-end connection for high differential pressure. In combination with the actuator Model MY56X0C, Model VY5609A proportionally controls chilled/hot water and can be used as a pump bypass valve in heating/cooling plant to control pressure.

The valve pressure rating corresponds to ISO PN16.

#### Note:

For details of MY56X0C actuators combined with this Model VY5609A valves, refer to AB-6829: Specifications/Instructions.



#### Features

- Applicable to high differential pressure applications: Water flow is controlled inside the valve to prevent over pressure drop, leading to cavitation erosion resistance. (See Fig. 1.)
- Valve for chilled/hot water applicable to high differential pressure, high Cv value, wide rangeability, and low leakage.
- Easy assembly with the actuator Model MY56X0C and no adjustment required.
- Modified linear flow characteristic.

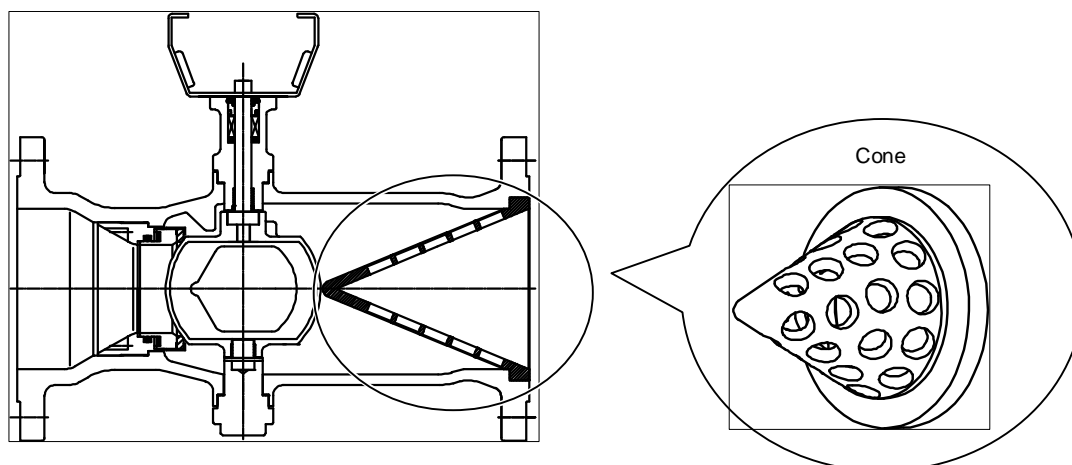


Figure 1. Mechanism of cavitation erosion resistance

## Safety Instructions

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Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual near by for ready reference.

### Usage Restrictions

This product is targeted for general air conditioning. Do not use this product in a situation where human life may be affected. If this product is used in a clean room or a place where reliability or control accuracy is particularly required, please contact Yamatake's sales representative. Yamatake Corporation will not bear any responsibility for the results produced by the operators.

### A WARNING



- This product weighs 25 kg or over (depending on the models). To prevent hazardous accident and severe injury, move or carry the product with enough manpower or using a vehicle.

### A CAUTION

- $\alpha$  • Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
- $\alpha$  • Avoid using the product (valve, actuator to combine with, and other components) in a corrosive gas including oxide gas and explosive gas.
- $\alpha$  • This product must be operated within its rated operating ranges specified in this manual. Failure to comply will cause equipment damage.
- $\alpha$  • This product must be operated under the operating conditions (power, temperature, humidity, vibration, shock, installation position, atmospheric condition, etc) specified in this manual to prevent equipment damage.
- $\alpha$  • Operate the product within the service life, and avoid application that keeps product operating cycle excessively frequent so as not to shorten its service life.
- $\alpha$  • Install the valve in the position as specified in this manual. Excessively tight connection of the valve to a pipe and improper installation position may damage the valve.
- $\alpha$  • After installation, make sure no fluid leaks from the connecting parts of valve and pipes. Incorrect piping may cause fluid leakage.
- $\alpha$  • Do not allow any foreign substance inside the piping. Flush the piping so that no foreign substance remains. Attach a strainer (with 40 or more meshes) in a pipe on the inflow side of the valve to prevent equipment damage.
- $\alpha$  • Do not leave the controlled fluid frozen to prevent equipment damage or fluid leakage.
- $\alpha$  • Do not install the product in a location close to a steam coil or a hot-water coil. High temperature radiation may result in malfunction of the combined actuator.
- $\Sigma$  • Avoid touching the installed valve. When being used to control hot water, it reaches high temperature and may cause burn injury.
- $\Upsilon$  • Do not disassemble the product. Disassembly may result in electrical shock or equipment damage.
- $\alpha$  • Dispose of this product as an industrial waste in accordance with your local regulations. Do not reuse all or part of this product.

Trademark information:

ACTIVAL is a trademark or registered trademark of Yamatake Corporation in Japan or in other countries.

## Model Numbers

Base model number	Rating/material (applicable fluid)	—	Size / Cv value	Description
VY560				Flanged two-way valve for high differential pressure application
	9			ISO PN16 / DIN GG20 (for chilled/hot water) with cavitation erosion resistant mechanism
		A		Valve (no actuator combined)
			0101	DN100 / 145 in Cv value
			0121	DN125 / 234 in Cv value
			0151	DN150 / 350 in Cv value

## Specifications

Item	Specification			
Model	Two-way valve with flanged-end connection (proportional control)			
Applicable actuator	MY56X0C			
Body pressure rating	ISO PN16			
Size, Cv, close-off rating	Model number	Nominal size	Cv	Close-off ratings
	VY5609A0101	DN100 (4")	145	0.5 MPa
	VY5609A0121	DN125 (5")	234	0.5 MPa
	VY5609A0151	DN150 (6")	350	0.5 MPa
Materials	Body	Cast iron (DIN GG20)		
	Seat ring	Heat-resistant PTFE		
	Plug,	Stainless steel (JIS SCS13A)		
	Stem	Stainless steel (JIS SUS303)		
	Cone	Cast iron (JIS SCPH2)		
	O ring	EPDM		
	Gland packing	Inorganic fiber		
	Gasket	Non-asbestos joint sheet		
	Yoke	Steel plate		
Paint	Gray (equivalent to Munsell M5B 4/1)			
End connection	Flanged-end connection, raised face (RF) flange			
Applicable fluid	Chilled/hot water			
Allowable fluid temperature	0 °C to 130 °C (non-condensing)			
Flow characteristics	Modified linear			
Rangeability	100 : 1			
Seat leakage	0.01 % of rated Cv value			
Installation orientation	Installable to horizontal or vertical piping			
Accessories	4 hexagon bolts with washers (M6 × 14)			
	Yoke			
	Thermal insulation sheet			

### Notes

- \* DN: Deutsches Institut für Normung
- \* JIS: Japanese Industrial Standards

### Dimensions and Maintenance Clearance

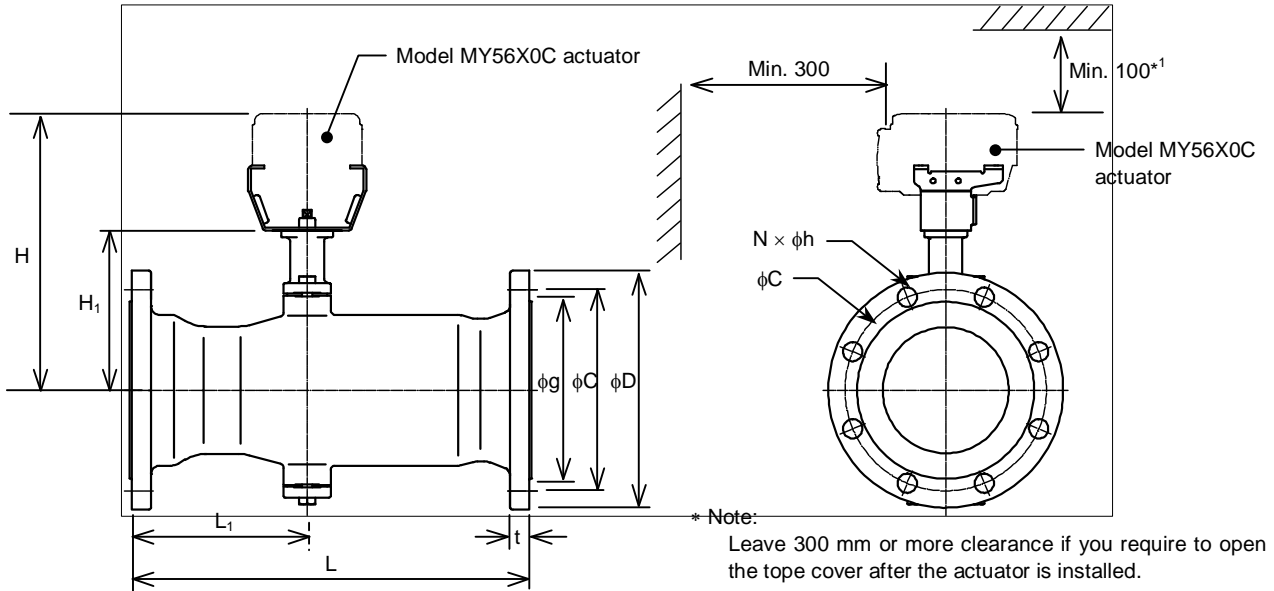


Figure 2. Dimensions and maintenance clearance (mm): Valve assembled with the actuator

Table 1. Dimensions (mm)

Valve size (DN)	H	H <sub>1</sub>	L	L <sub>1</sub>	t	φC	φD	φg	φh	N	Weight (kg)*
100	283	145	350	163	24	180	220	156	19	8	26
125	309.5	171.5	400	169	26	210	250	184	19	8	35
150	318	180	480	212	26	240	285	211	23	8	47

\* Note: Weight of the actuator to assemble is not included.

### Parts Identification

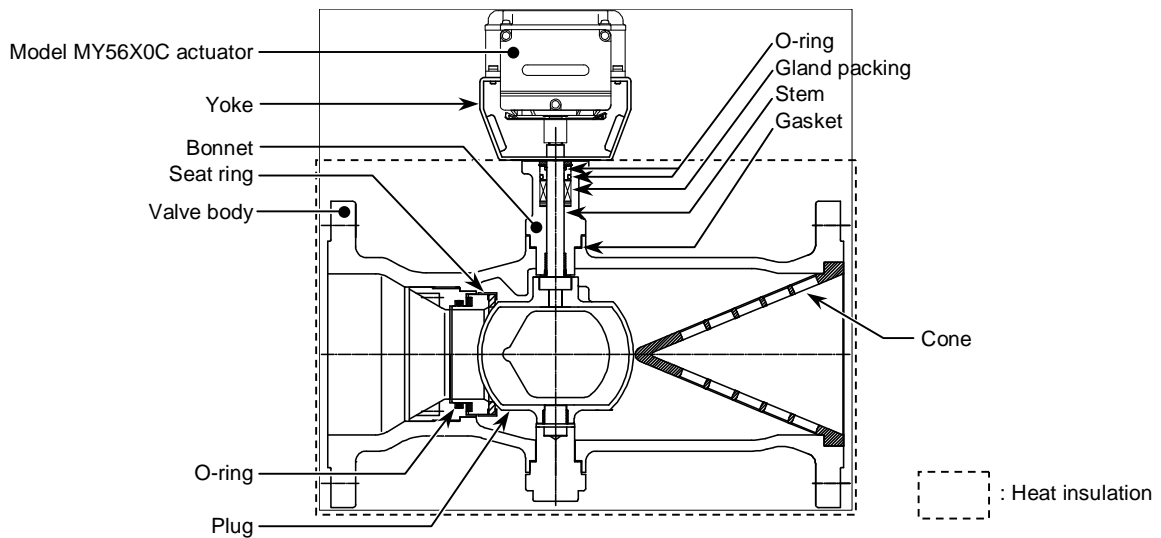


Figure 3. Parts identification

### Recommended Criteria to Prevent Cavitation Erosion

Cavitation erosion is likely to occur in the case that the pressure ratio  $X_F$  calculated by the following formula overreaches the criterion value.

$$X_F = \frac{P_1 - P_2}{P_1 - P_v}$$

$X_F$ : Pressure ratio

$P_1$ : Absolute pressure of valve inlet [kPa (abs)]

$P_2$ : Absolute pressure of valve outlet [kPa (abs)]

$P_v$ : Saturated vapor pressure of fluid\* [kPa (abs)]

\* Saturated vapor pressure of fluid varies depending on the fluid temperature.

#### Always keep the pressure ratio $X_F < 0.7$ (criterion value).

If the pressure ratio does not meet this criterion, cavitation erosion may occur. This value is thus necessary to prevent cavitation erosion. Note that cavitation itself may be generated even if the pressure ratio is kept below 0.7.

In addition to the pressure ratio, the flow velocity at the valve in 100 % position is another criterion for cavitation erosion.

$$\text{Flow velocity [m/s]} = 21.22 \times \frac{Q}{d^2}$$

$Q$  = Flow rate [liter/min]

$d$  = Valve size [DN (mm)]

Always keep the flow velocity  $< 7.0$  m/s (criterion value) for chilled water and  $< 5.0$  m/s (criterion value) for hot water.

If the flow velocity does not meet these criteria, cavitation erosion may occur.

## Installation

A CAUTION	
α	• Disconnect power from the assembled actuator before performing any wiring to prevent damages.
α	• Do not allow any foreign substance inside the piping. Flush the piping so that no foreign substance remains. Attach a strainer (with 40 or more meshes) in a pipe on the inflow side of the valve to prevent equipment damage.
α	• Avoid using the product (valve, actuator to combine with, and other components) in a corrosive gas including oxide gas and explosive gas.
α	• Do not install the product in a location close to a steam coil or a hot-water coil. High temperature radiation may result in malfunction of the combined actuator.

### Precautions for installation

Install the valve so that the flow direction of process fluid agrees with the arrow indicated on the valve body.

### Installation location

- Install the valve in a position allowing easy access for maintenance and inspection.
- Do not mount the valve on a pipe where water hammer occurs, or where solid objects including slug may accumulate.

### Mounting position

The valve assembled with the actuator can be mounted in any position ranging from upright to sideways (90° tilted). The valve should be installed with its actuator vertically positioned above the valve body. (See Fig. 4.) However, the valve must be installed always in upright position outdoors.

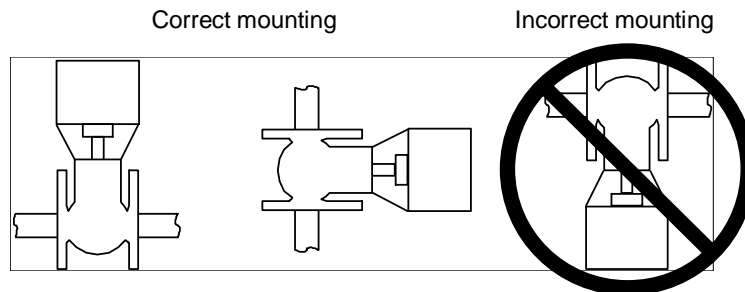


Figure 4. Mounting positions of the valve assembled with the actuator

### Piping

- Check that the model number of the product is what you ordered. The model number is shown on the tag attached to the valve bonnet.
- Install a bypass pipe and gate valves on the inflow, outflow, and bypass sides. Also, install a strainer on the inflow side.
- When installing the valve to pipes, do not allow any object, such as chips, to get inside a pipe or valve (with 40 or more meshes). Valve cannot fully close, or the valve seat may get damaged causing fluid leakage, due to an object jammed inside the valve.
- When piping, do not apply too much sealing material, such as solidifying liquid and tape, to the pipe connection sections so that these materials flow into the valve. Valve cannot fully close, or the valve seat may get damaged causing fluid leakage, due to the sealing material jammed inside the valve.
- Before activating the valve and actuator, fully open (in 100 % position) the valve and flush the pipes at the maximum flow rate to remove all the foreign substances. (Factory preset position: 100 %)

### Heat insulation

Do not apply heat insulation to the actuator or to the yoke, as [ ] shows in Fig. 3. If the yoke and the actuator are covered with insulation material, the pointer cannot be checked and may be distorted.

## Assembling the valve Model VY5609A with the actuator Model MY56X0C

### IMPORTANT:

- Do not assemble the valve with any other actuator.
- Mount the valve in 100 % (fully open) position onto the actuator in 100 % (fully open) position.

This valve Model VY5609A must be combined with the actuator Model MY56X0C. The following illustrates the procedure for mounting the actuator onto the valve.

- 1) Make sure that the valve is in fully open (100 %) position. (The valve position is preset at 100 % before factory shipment.) As shown in Fig. 6, the valve is in fully open position when the groove on the valve stem (top surface) points to the raised line on the valve bonnet (side surface). To set the valve position to 100 %, turn the valve stem so that the groove points to the raised line, using a 10 mm wrench.
- 2) Mount the yoke on the valve and fix them with four hexagon bolts (M6) with washers, using a 10 mm wrench. Fasten the bolts at 7.0 N·m to 10.0 N·m fastening torque. Yoke mount position can be turned every 90° by engaging the holes for the bolts of the yoke with the holes of the valve. (Yoke, thermal insulation sheet, and four hexagon bolts with washers are accessories of the valve.)

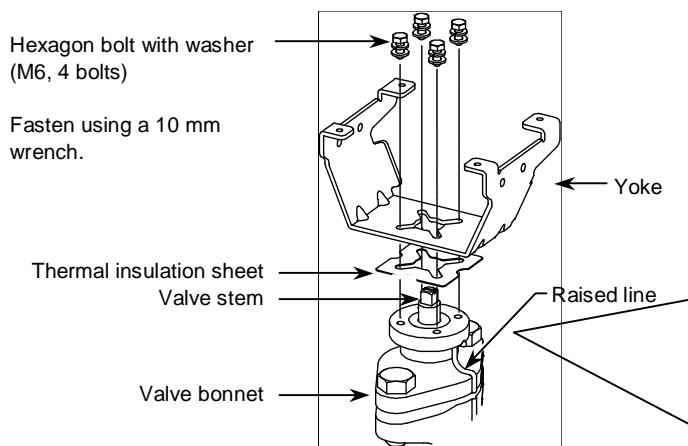


Figure 5. Mounting the yoke onto the valve

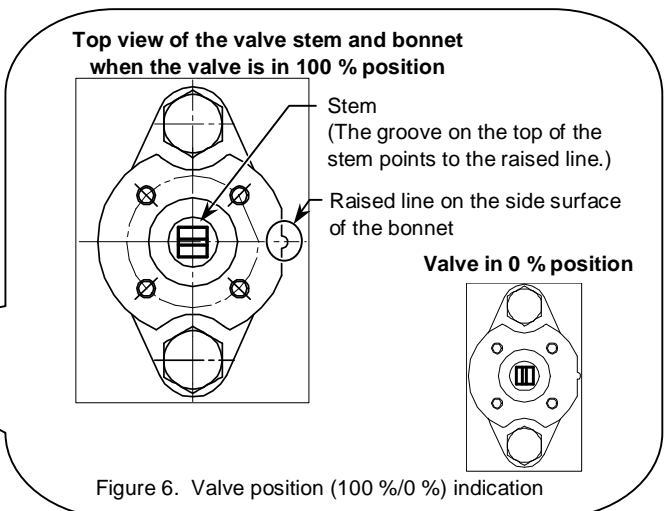


Figure 6. Valve position (100%/0%) indication

- 3) Make sure that the actuator is in fully open (100 %) position. (The actuator position is preset at 100 % before factory shipment.) As shown in Fig. 7, the pointer on the bottom of the actuator indicates the position. To set the actuator position to 100 %, see **Manually opening/closing the actuator** section.

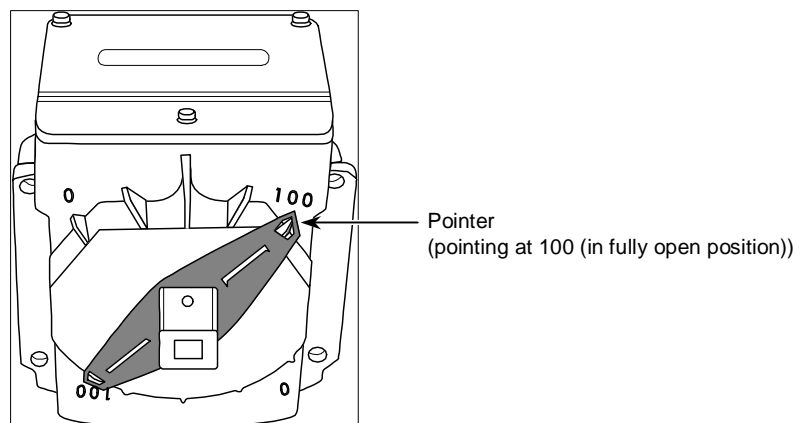


Figure 7. Pointer of the actuator in fully open position

Assemble the actuator in 100 % position with the valve in 100 % position. If the actuator in 100 % position is assembled with the valve in 0 % position, actuator puts torque (to closing direction) on the fully closed valve, and the gear of the actuator gets damaged.

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- 4) To mount the actuator on the yoke assembled with the valve, engage the holes for the bolts of the actuator and of the yoke, and insert the valve stem in the actuator joint.  
Fix the actuator on the yoke with 4 hexagon socket head cap bolts (M5), using a 4 mm hexagon wrench. Fasten the bolts at 5.0 to 8.0 N·m torque. (The hexagon socket head cap bolts are supplied with the actuator.)

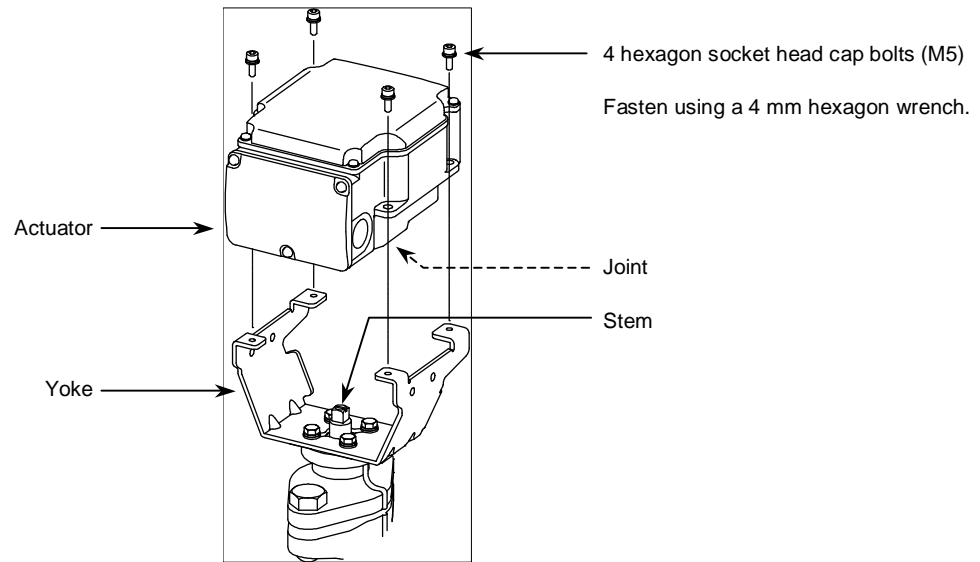


Figure 8. Mounting the actuator on the yoke

## Inspection and Maintenance

### ⚠ CAUTION

- Σ • Avoid touching the installed ACTIVAL (valve body, yoke, joint). When being used to control hot water, it reaches high temperature and may cause burn injury.

- Manually open/close the ACTIVAL at least once a month if it is left in inactive state for a long period.
- Inspect the valve and actuator according to Table 2.
- Visually inspect the fluid leakage of the valve and the actuator operations every six months. If any of the problems described in Table 3 are found, take corresponding actions shown in the table.  
If your problem is not solved by the corresponding action, please contact Yamatake near you.

Table 2. Inspection items and details

Inspection item	Inspection interval	Inspection detail
Visual inspection	Semiannual	<ul style="list-style-type: none"> <li>• Fluid leakage from the gland and the flange face</li> <li>• Loosened bolts</li> <li>• Valve and actuator damages</li> </ul>
Operating status	Semiannual	<ul style="list-style-type: none"> <li>• Unstable open/close operation</li> <li>• Abnormal noise and vibration</li> </ul>
Routine inspection	Any time	<ul style="list-style-type: none"> <li>• Fluid leakage to the outside</li> <li>• Abnormal noise and vibration</li> <li>• Unstable open/close operation</li> <li>• Valve hunting</li> </ul>

Table 3. Troubleshooting

Problem	Part to check	Action
Fluid leaks from the flange face.	Loosened flange bolts Gasket on the flange face Misaligned piping	Tighten the flange bolts. Replace the gasket. Redo piping.
Fluid leaks from the gland part.	—	Consult with our sales/service personnel.
Fluid leaks from the bonnet.	Loosened bolts	Tighten the bolts.
Valve does not operate smoothly / valve stops halfway / valve does not operate at all.	Conditions of the power applied and of the input signal applied Loosened terminals Wiring condition / disconnected wires	Check the power supply and the controller connected to. Tighten the terminals. Check the wiring.
Fluid leaks to the outside of the valve when the ACTIVAL is in fully closed position.	Actuator pointer not pointing to fully closed position	Fully close the ACTIVAL.
The valve vibrates or produces an abnormal noise.	Primary pressure condition Differential pressure condition	Adjust the mounting position and change the installation location.
Valve hunting occurs.	Secondary pressure condition Differential pressure condition Control stability	Adjust the mounting position and change the installation location. Correct the control parameter setting of controller.

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*Specifications are subject to change without notice.*

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