Intelligent Component Series
ACTIVAL+™
(JIS 10K / FC200)

■ General

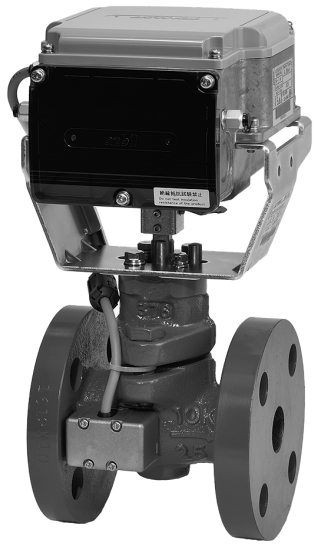
ACTIVAL +™ Model FVY5160J is a series of motorized two-way valves with flanged-end connection. DN15 to DN80 rotary valve and actuator are integrated in a single unit.

In combination with the functions of a control valve, Model FVY5160J measures and controls flow rate. Model FVY5160J thus enables to control temperature for air conditioning by controlling chilled/hot water volume and to measure chilled/hot water flow rate.

For such a high functionality, compact size and simple installation of Model FVY5160J are incomparable.

Model FVY5160J communicates with a controller via SAnet (proprietary protocol).

∗ JIS: Japanese Industrial Standards



■ Features

- Compact and lightweight:
  Rotary valve actualizes small body and light weight.
- Valve and actuator integrated in a single unit.
- SAnet communication:
  Model FVY5160J communicates with a controller via SAnet. Flow rate signal or position control signal is input from the controller, and flow rate, pressure, temperature measuring signal, and position signal are output to the controller.
- Valve for chilled/hot water control applicable to large Cv value, high rangeability, and low leakage.
- Durable actuator with low power consumption.
- Flow rate control/position control operation selectable:
  For flow rate control, flow characteristic is selectable (equal percentage or linear). For position control, flow characteristic is equal percentage.
- Sub-DI and sub-DO for wire saving:
  Sub-DI (digital input) and sub-DO (digital output) provided take signals, including humidifying output and differential pressure switch of neighboring devices, leading to wire saving.
- In combination with Display Panel (optional) and the temperature sensor for pipe surface (optional), pressure, temperature, and flow rate can be displayed on the Display Panel.
- CE Marking certified product:
  Model FVY5160J conforms to all the applicable standards of CE Marking.

IMPORTANT:
Do not use the data measured by Model FVY5160J for charging or dealing purposes.

Safety Instructions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby for quick 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 Azbil Corporation's sales representative. Azbil Corporation will not bear any responsibility for the results produced by the operators.

■ Warnings and Cautions

⚠ WARNING	Alerts users that improper handling may cause death or serious injury.
⚠ CAUTION	Alerts users that improper handling may cause minor injury or material loss.

■ Signs

	Alerts users possible hazardous conditions caused by erroneous operation or erroneous use. The symbol inside △ indicates the specific type of danger. (For example, the sign on the left warns of the risk of electric shock.)
	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⃠ graphically indicates the prohibited action. (For example, the sign on the left notifies that disassembly is prohibited.)
	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠ WARNING	
	When handling or transporting any heavy product (more than 18 kg), carefully move the product with a hand truck or the like, or with 2 or more people. Careless lifting or accidental dropping of the product may result in injury or product damage.
	Before wiring, setting, maintenance, or replacement, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.
	Be sure to ground this product with a ground resistance of less than 100 Ω. Improper grounding may cause electric shock or malfunction.
	After wiring, setting, engineering, maintenance, or replacement work, be sure to reattach the cover. Failure to do so may result in electric shock.
	Before setup or engineering work, be sure to turn off power that is supplied from external devices to the output terminals. Failure to do so may cause electric shock.

⚠ CAUTION	
	Provide a circuit protector (e.g., a fuse or circuit breaker) for the power source. Failure to do so may cause a short circuit leading to fire or device failure.
	Do not freeze this product. Doing so may damage the valve body and cause leakage.
	When piping this product, be sure there is no foreign matter in the pipes. If foreign matter remains in the pipes, the product may break down.
	Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
	Use full face gaskets for flat face flanges. Failure to do so may damage the flanges or cause leakage outside of the valve.
	When installing this product, hold it in the proper position and securely fasten it to the pipes. Excessive tightening or improper installation position may damage the valve.
	After installation, make sure no fluid leaks from the valve-pipe connections. Improper piping may cause fluid leakage outside of the valve.
	Do not put a load or weight on this product. Doing so may damage the product.
	Installation and wiring of the actuator must be performed by personnel qualified to do instrumentation and electrical work. Mistakes in installation or wiring may cause fire or electric shock.
	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
	For wiring, strip the insulation from cables as specified in this manual. If the length of exposed wire is longer than specified, it may cause electric shock or short circuit between adjacent terminals. If it is too short, it may not make proper contact.
	Use crimp terminals with insulation for connections to the product terminals. Failure to do so may cause short circuit leading to fire or device failure.
	Tighten the terminal screws with the specified torque. Insufficient tightening of the terminal screws may cause fire or overheating.
	Do not carelessly touch this product when it is used to control hot water. Doing so may result in burns, because the product reaches a high temperature.

IMPORTANT:

- This product is applicable only to chilled/hot water control. If the product is used to control any other medium such as brine or air, flow rate cannot be measured or controlled.
- Install the valve so that the flow direction of process fluid agrees with the arrow indicated on the valve body. If the flow direction is opposite to the arrow, correct measurement and control of flow is not assured.
- The actuator mounting position onto the valve cannot be changed. Therefore, do not loosen the yoke fixing screws and the actuator fixing screws. Loose fixing screws lower flow measuring accuracy.
- Flow measuring accuracy in the subsection **Measuring range and accuracy** shown later is for the valve sensor measuring 7 to 17 °C and 45 to 65 °C ranges, 0.1 to 0.8 MPa pipe pressure, and 0.03 to 0.3 MPa differential pressure. Without these ranges, the flow rate measuring accuracy may lower.
- To keep flow measuring accuracy, control the quality of process fluid (water), and do not allow rust or foreign object inside the valve. Rust or foreign object inside the valve lowers flow measuring accuracy.

■ System Configurations

● Connection example of savic-net™ G5 system

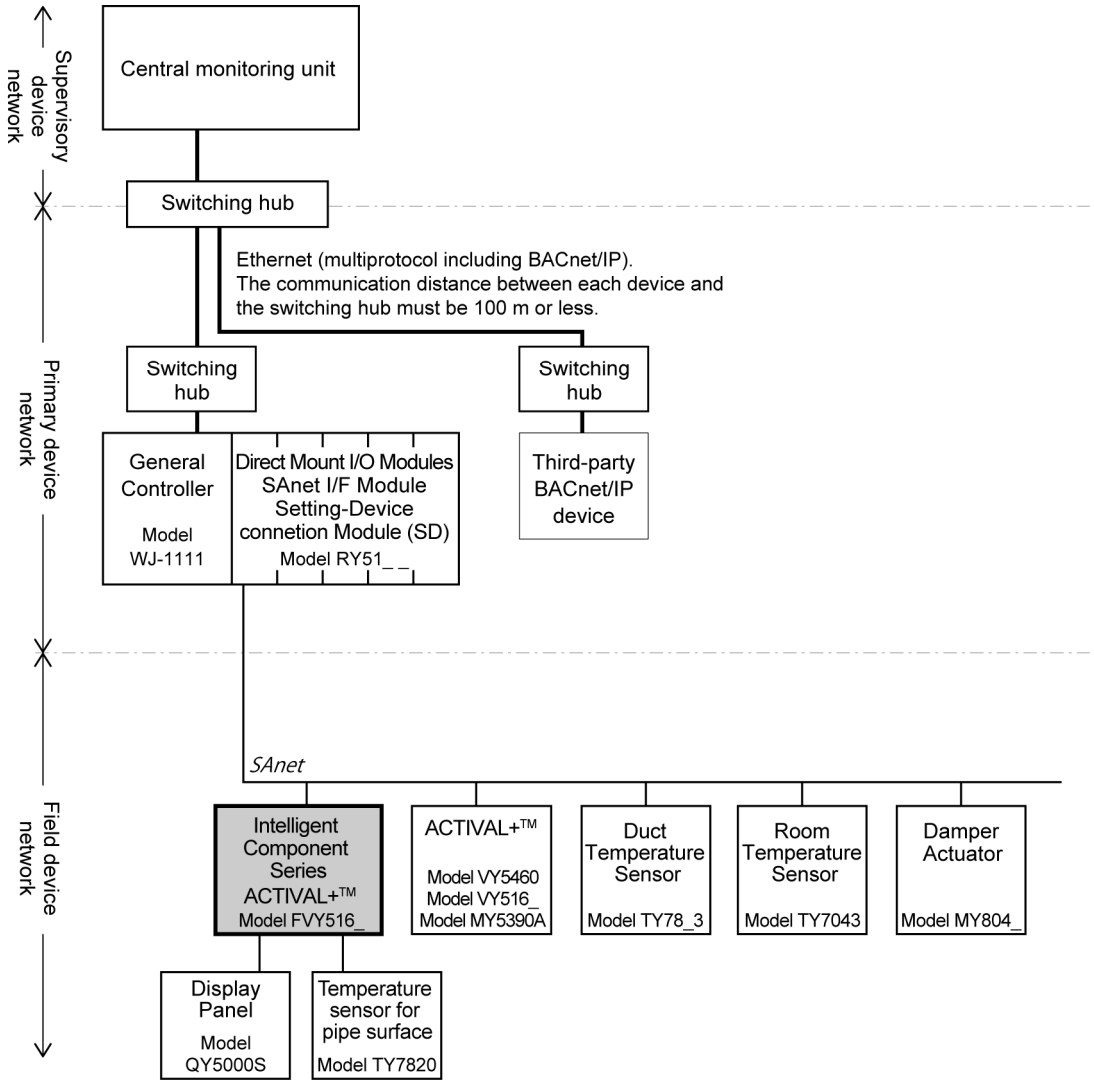


Figure 1. System configuration example: SAnet connection in savic-net G5 system

● Connection example of savic-net™ FX system

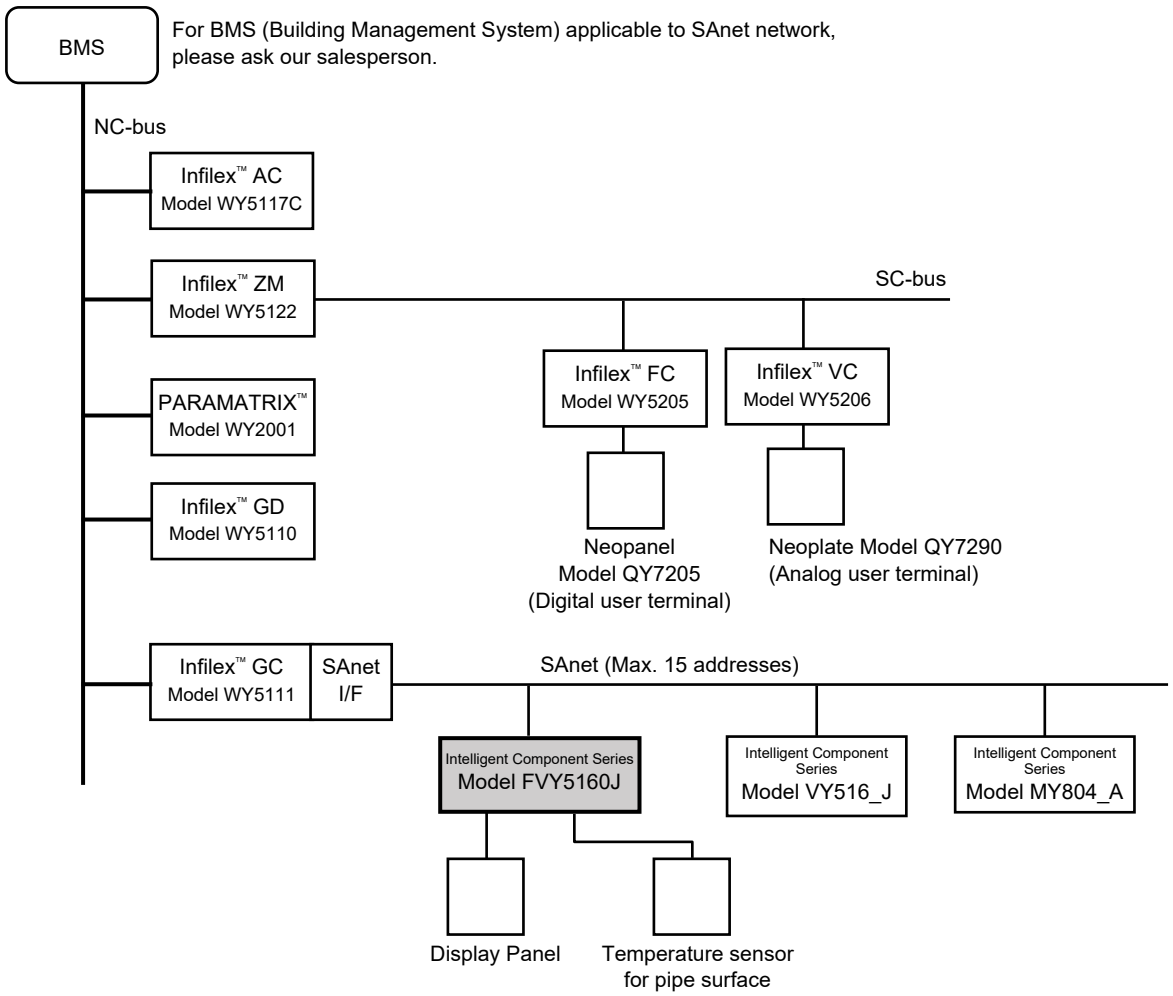


Figure 2. System configuration example: SAnet connection in our BMS (Building Management System)

Notes:

* For detailed specifications of Ethernet, refer to **Specifications of General Controller (Model WJ-1111W0000).**
* For detailed specifications of SC-bus, refer to **Specifications/Instructions of Infilex ZM.**
* For detailed specifications of SAnet, refer to **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713).**
* Up to two SAnet I/F modules can be connected to one General Controller or InfilexGC/InfilexGD.
* Single Model FVY5160J requires two SAnet addresses. Single Model VY516_J or Single Model MY804_A requires one SAnet address.

■ Model Numbers

Model FVY5160J00XX is the model for the valve and actuator integrated into a single unit.
The model number label is attached to the yoke.

Base model number	Actuator control signal	Valve rating/ material	Actuator type	—	Valve size/Cv value	—	Description
FVY51							Flow measurement and control valve
	6						SAnet
		0					JIS 10K / JIS FC200 for chilled/hot water
			J				IEC IP54 protected and standard torque type actuator with terminal block
				00			Fixed
					11		DN15 (1/2") / 1.0 in Cv value
					12		DN15 (1/2") / 2.5 in Cv value
					13		DN15 (1/2") / 6.0 in Cv value
					21		DN25 (1") / 10 in Cv value
					22		DN25 (1") / 16 in Cv value
					41		DN40 ($1^1/_2$") / 25 in Cv value
					42		DN40 ($1^1/_2$") / 40 in Cv value
					51		DN50 (2") / 65 in Cv value
					61		DN65 ($2^1/_2$") / 95 in Cv value
					81		DN80 (3") / 125 in Cv value
						-B	Fixed

● Options

For options, separate order is required.

Item		Specification	Note
Seal connector	Part No. 83104346-003	Applicable wire size: ϕ7 mm to ϕ9 mm	Seal connector is necessary for IEC IP54 protection.
	Part No. 83104346-004	Applicable wire size: ϕ9 mm to ϕ11 mm	
Seal connector for the cable gland	Part No. 83104346-012	Applicable wire size: ϕ6 mm to ϕ8 mm	Seal connector for the cable gland is necessary for IEC IP54 protection.
	Part No. 83104346-013	Applicable wire size: ϕ7 mm to ϕ9 mm	
	Part No. 83104346-014	Applicable wire size: ϕ9 mm to ϕ11 mm	
Cable gland with three ports Part No. DY7000A1000		Do not use outdoors.	For the specifications of the cable gland with three ports, refer to the **Specifications (AS-923E)**. For the installation of the cable gland with three ports, refer to the **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)**.
Display Panel Model QY5000S1000		Data displaying device for Model FVY516 series	For the specifications of Display Panel, refer to the **Specifications/Instructions (AB-6922)**. For the installation of the Display Panel, refer to the **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)**.
Temperature sensor for pipe surface (Pipe sensor)	Model TY7820Z0P01	Total length: 1.5 m	For the specifications of Pipe sensor, refer to the **Specifications/Instructions (AB-6923)**. For the installation of Pipe sensor, refer to the **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)**.
	Model TY7820Z0P05	Total length: 5 m	
	Model TY7820Z0P10	Total length: 10 m	
	Model TY7820Z0P30	Total length: 30 m	
Outdoor cover Part No. DY3001A1017		Required when the product is installed outdoors.	
		Material: Stainless steel plate	
		Weight: Approx. 550 g	
Valve flange adapter kit (for replacing Model V5063/V5064 with Model FVY5160J)		Hot-rolled steel (JIS SS400), electro-galvanized	
		Part number: 83168456-001	Applicable valve size: DN15
		83168456-002	DN25
		83168456-003	DN40
		83168456-004	DN50
		83168456-005	DN65
		83168456-006	DN80

■ Specifications

For weight, refer to the table shown in the section **Dimensions**.

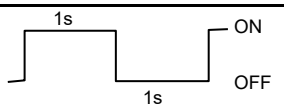
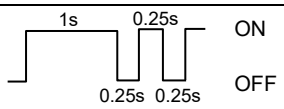
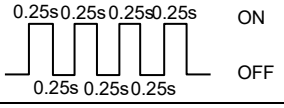
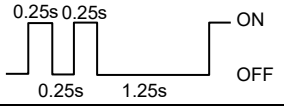
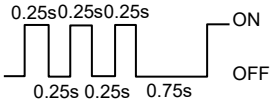
● Valve and actuator (as a single unit) specifications

Item		Specification	
Environmental conditions		Rated operating condition	Transport/storage conditions (packaged*2)
	Ambient temperature*1	-20 °C to 50 °C (Do not allow process fluid to freeze.)	-20 °C to 70 °C
	Ambient humidity	5 %RH to 95 %RH	
	Vibration	4.9 m/s^2 (10 Hz to 150 Hz)	19.6 m/s^2 (10 Hz to 150 Hz)
		Notes: ∗1 Do not allow the fluid to freeze. ∗2 Actuator shall be packed during transport and storage.	
Installation locations		Indoor / outdoor (Outdoor cover (optional) is required outdoors.) Note: Salt air, corrosive gas, flammable gas, and organic solvent must be avoided.	
Mounting position		Refer to ■ “Installation,” ● “Mounting position.”	
Manual operation		Available. Refer to the subsection **Manually opening/closing valve**.	
Factory preset position		100 % (fully open)	

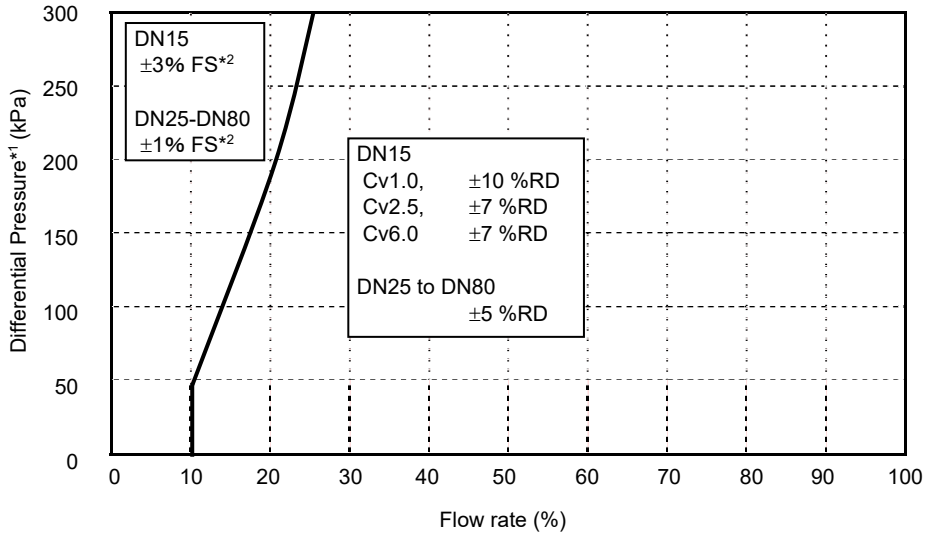
● Valve specifications

Item		Specification			
Model		Two-way valve with flanged-end connection			
Body pressure rating		JIS 10K (Max. working pressure: 1.0 MPa)			
End connection		JIS 10K flanged-end, flat face flange (FF)			
Size, Cv, Close-off rating		Model number	Nominal size	Cv	Close-off ratings
		FVY5160J0011	DN15 (1/2”)	1.0	1.0 MPa
		FVY5160J0012	DN15 (1/2”)	2.5	1.0 MPa
		FVY5160J0013	DN15 (1/2”)	6.0	1.0 MPa
		FVY5160J0021	DN25 (1”)	10	1.0 MPa
		FVY5160J0022	DN25 (1”)	16	1.0 MPa
		FVY5160J0041	DN40 ($1^1/_2$”)	25	1.0 MPa
		FVY5160J0042	DN40 ($1^1/_2$”)	40	1.0 MPa
		FVY5160J0051	DN50 (2”)	65	1.0 MPa
		FVY5160J0061	DN65 ($2^1/_2$”)	95	1.0 MPa
		FVY5160J0081	DN80 (3”)	125	1.0 MPa
Applicable fluid		Chilled/hot water			
Allowable fluid temperature		0 °C to 80 °C (Non-freezing) ∗ Frozen process fluid around the valve sensor may damage or may cause output error.			
Rangeability		100 : 1			
Flow characteristic		Equal percentage For flow rate control, flow characteristic is selectable between equal percentage and linear.			
Seat leakage		0.01 % of rated Cv value (0.0006 Cv or less for DN15 model)			
Materials	Body	Gray cast iron (equivalent to JIS FC200)			
	Plug, stem	Stainless steel (equivalent to JIS SCS13)			
	Seat ring	Heat-resistant PTFE			
	Gland packing	Inorganic fiber			
	Gasket	Expansion graphite sheet			
Paint		Gray			
Actuator to be combined		Integrated with the valve			

● Actuator specifications

Item		Specification	
Power supply		24 V AC ± 15 %, 50 Hz/60 Hz	
Power consumption		8 VA	
Timing		63 ± 5 sec (50 Hz) / 53 ± 5 sec (60 Hz)	
Position indication		Pointer located at the bottom of the actuator shows the position by pointing at the value of the scale (0: close to 100: open) on back sides. Position and flow rate can be indicated on the optional Display Panel.	
Enclosure rating		IEC IP54 (dust-proof and splash-proof)	
Materials	Case	Die cast aluminum	
	Top cover, terminal cover	Polycarbonate resin	
	Yoke	Steel plate (bright chromate finish)	
Wire connection	Power, control signal	M3.5 screw terminal	
	Ground	M3.5 screw terminal	
	Temperature sensor for pipe surface (Pipe sensor)	3-pin connector (pre-connected to the actuator for shipment)	
	Display Panel	4-pin connector (pre-connected to the actuator for shipment)	
Contact input (Sub-DI)	Input type	Potential free (dry) contact input	
	Voltage, current	12 V DC, 5 mA	
Contact output (Sub-DO)	Output type	Potential free (dry) contact output	
	Contact rating	250 V AC/24 V DC, Max. 0.5 A (2 A at startup) * To connect a device requiring 100 V AC or over, be sure to ground the actuator with 100 Ω or lower ground resistance.	
	Min. applicable load	24 V DC, 5 mA	
Temperature input (Pipe sensor)		Pt 100 Ω	
Communication (control signal)	Transmission system	SAnet (voltage transmission)	
	Transmission speed	1200 bps	
	Transmission distance	Transmission distance varies depending on the number of devices and the type of devices to be connected to. For details regarding the transmission distance, refer to **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)**.	
Communication (Display Panel)	Transmission system	AP-bus (RS-485 communication)	
	Transmission speed	4800 bps	
	Transmission distance	Max. 50 m	
Operation status indicator LED		1 red LED	
(Refer to the section **LED Indication** for details.)	Status	LED indication	
	Initializing	Continuous ON → LED indication corresponding to the operating status (after initializing is complete.)	
	Normal	Repetition of 1-second ON → 1-second OFF.	
	Major alarm	Continuous ON.	
	Minor alarm	Repetition of 1-second ON → 0.25-second OFF → 0.25-second ON → 0.25-second OFF.	
	Communication error (and minor alarm)	Repetition of 0.25-second ON → 0.25-second OFF	
	Manual operation	Repetition of 0.25-second ON → 0.25-second OFF → 0.25-second ON → 1.25-second OFF.	
	Error during manual operation	Repetition of 0.25-second ON → 0.25-second OFF → 0.25-second ON → 0.25-second OFF → 0.25-second ON → 0.75-second OFF.	
Flow rate status indicator LED		4 green LEDs	
(Refer to the section **LED Indication** for LED operation.)	Status (Q = Flow rate)	LED indication (LED indication varies every 25 % flow rate.)	
	Q = 0 %	All LEDs OFF	
	0 % < Q ≤ 25 %	1 LED ON	
	25 % < Q ≤ 50 %	2 LEDs ON	
	50 % < Q ≤ 75 %	3 LEDs ON	
	75 % < Q	4 LEDs ON	
	Backflow	Repetition of LED 1 and LED 3 blink → LED 2 and LED 4 blink.	

● Measuring range and accuracy

Item			Specification			
Flow rate measuring		Setting range	Model number	Nominal size	Cv value	Max. setting flow rate
			FVY5160J0011	DN15 (1/2")	1.0	10 l/min
			FVY5160J0012	DN15 (1/2")	2.5	25 l/min
			FVY5160J0013	DN15 (1/2")	6.0	60 l/min
			FVY5160J0021	DN25 (1")	10	100 l/min
			FVY5160J0022	DN25 (1")	16	160 l/min
			FVY5160J0041	DN40 ($1^1/_2$")	25	250 l/min
			FVY5160J0042	DN40 ($1^1/_2$")	40	400 l/min
			FVY5160J0051	DN50 (2")	65	650 l/min
			FVY5160J0061	DN65 ($2^1/_2$")	95	950 l/min
			FVY5160J0081	DN80 (3")	125	1250 l/min
		Measuring accuracy (Factory preset)				
Valve sensor*3	Pressure measuring	Measuring range	0 MPa to 1.0 MPa*3			
		Accuracy of the displayed pressure	± 0.5 %FS (factory preset)*4			
	Temperature measuring	Measuring range	0 °C to 80 °C			
		Accuracy	± 1.0 °C (factory preset)*5 (within 0 °C to 80 °C measuring range, at -25 °C to 40 °C temperature difference between measuring temperature and ambient temperature)			
Pipe Sensor*7	Temperature measuring	Measuring range	0 °C to 80 °C			
		Accuracy	± 1 °C (factory preset)*6			

Notes:

∗1 The flow measurement accuracy figures assume a temperature range of 7–17 °C or 45–65 °C, internal pipe pressure of 0.1–0.8 MPa, and differential pressure of 0.03–0.3 MPa.
If the actual conditions differ, accuracy may be less.
Differential pressure is the difference between valve inlet pressure and valve outlet pressure as measured inside the valve.

∗2 Flow rate measuring accuracy above may change depending on the conditions including valve positions, differential pressure, etc.

∗3 When you test the withstand pressure of the valve sensor manufactured on and after Nov. 1, 2011 (date code: 1144 or greater), up to 1.6 MPa pressure can be applied to the valve sensor.

∗4 Accuracy of the displayed pressure was calibrated with the conditions, temperature of fluid: 7 °C to 65 °C, barometric pressure: 99 kPa.
If the actual conditions are out of the estimated ones, the accuracy may degrade.
(This specification is applied for the products manufactured on Dec. 1, 2016 or later (date code: 1648).)

∗5 For accurate measuring of flow temperature, thermal insulation is required. Refer to the subsection **Heat insulation** for applying thermal insulation.

∗6 For accurate measuring of flow temperature, thermal insulation is required. Refer to **AB-6923 Specifications/Instructions of Temperature Sensor for Pipe Surface (Pt100 RTD) Model TY7820Z**.

● Function

Function	Description
Data monitoring	Following items can be monitored/operated from the host system (BMS), General Controller (model WJ-1111), and Infilex GC/Infilex GD Control setpoint, actual valve position, sub-DO, sub-DI, actual flow rate, set flow rate, temperature measured by the Pipe sensor, temperature measured by the valve sensor, valve inlet pressure, valve outlet pressure

∗ Note:
Data monitoring function is available in combination with General Controller (model WJ-1111), Infilex GC/Infilex GD, and our BMS.

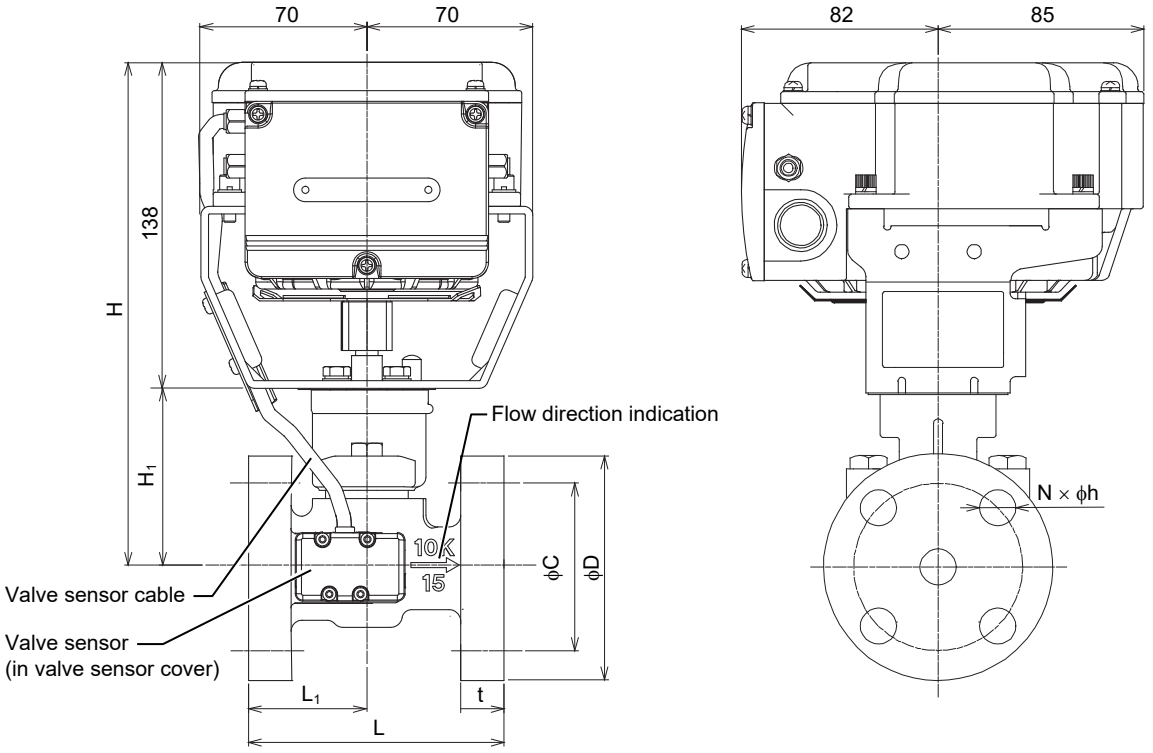
● Wire specifications

For details regarding specifications of SAnet communication line (24 V (~), GND (⊥), SAnet), refer to the Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713).

Item	Specification	Length
Contact input	JIS CVV, JIS VCT, JIS IV, KPEV® for low power 0.75 mm^2, 0.9 mm^2, 1.25 mm^2, 2.0 mm^2	30 m
Contact output	JIS CVV, JIS VCT, JIS IV, KPEV® for low power 0.75 mm^2, 0.9 mm^2, 1.25 mm^2, 2.0 mm^2	30 m
Display Panel	JIS VCTF (0.3 $mm^2 \times 4$) ϕ4.5 mm to ϕ6.0 mm	50 m
Temperature sensor for pipe surface (Pipe sensor)	3-core cable assembled with the sensor	30 m

Notes:
∗ JIS: Japanese Industrial Standards
∗ KPEV: Wire standard provided by Furukawa Electric Co., Ltd.

■ Dimensions



Model number	Valve size (DN)	H (mm)	H_1 (mm)	L (mm)	L_1 (mm)	t (mm)	ϕC (mm)	ϕD (mm)	ϕh (mm)	N	Weight (kg)
FVY5160J001X	15	213	75	108	50	16	70	95	15	4	4.6
FVY5160J002X	25	228	90	127	60	18	90	125	19	4	6.6
FVY5160J004X	40	241	103	165	82.5	20	105	140	19	4	10.0
FVY5160J0051	50	245	107	178	89	20	120	155	19	4	11.5
FVY5160J0061	65	262	124	190	90	22	140	175	19	4	16.0
FVY5160J0081	80	263	125	203	100	22	150	185	19	8	18.5

Figure 3. Dimensions (mm)

● **Maintenance space**

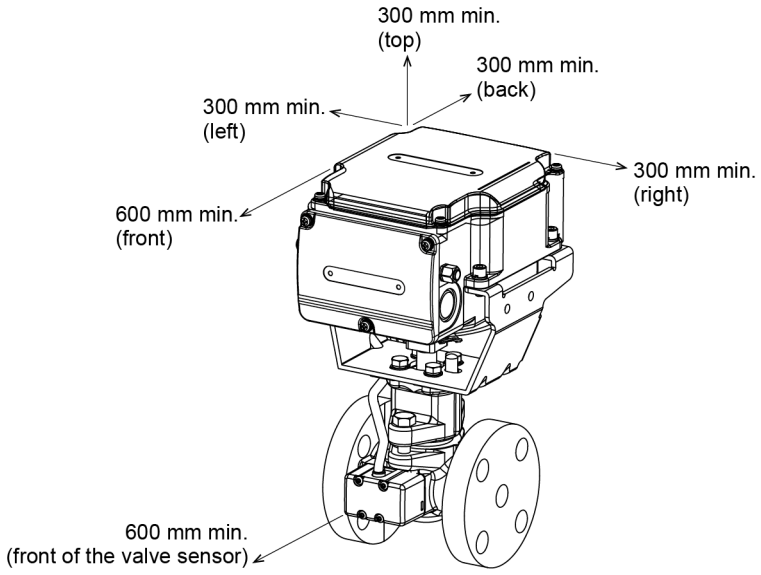


Figure 4. Maintenance space

■ Parts Indication

● Valve details

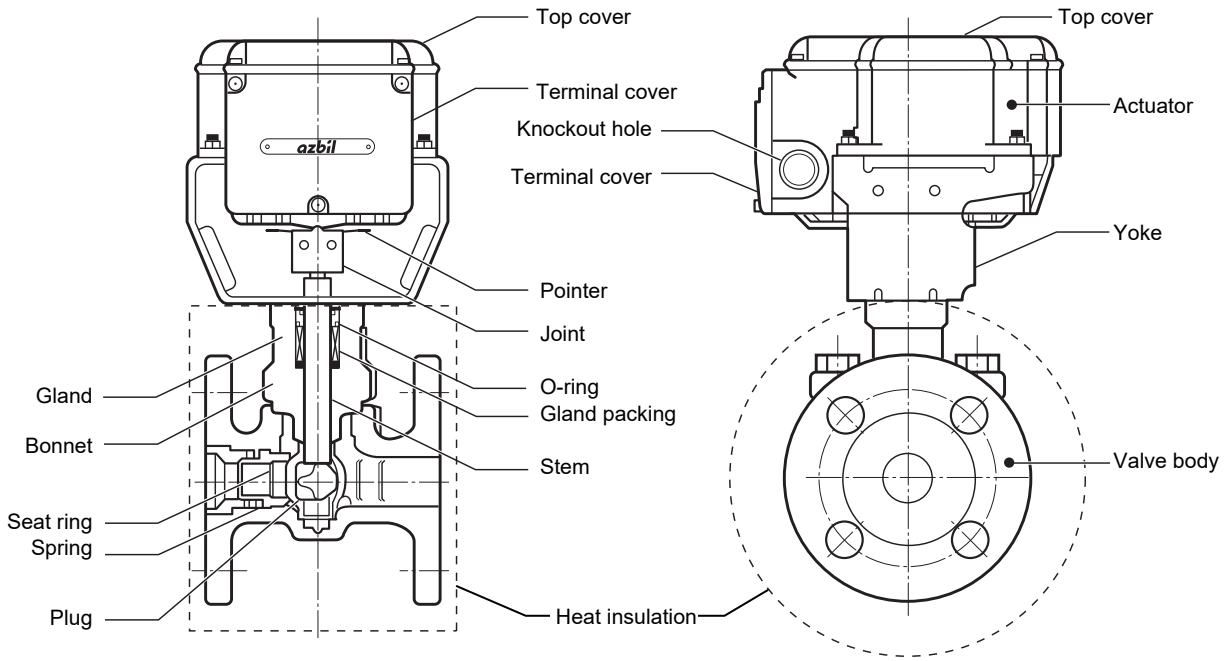


Figure 5. Parts identification: Valve details

● Actuator details (LEDs and terminals)

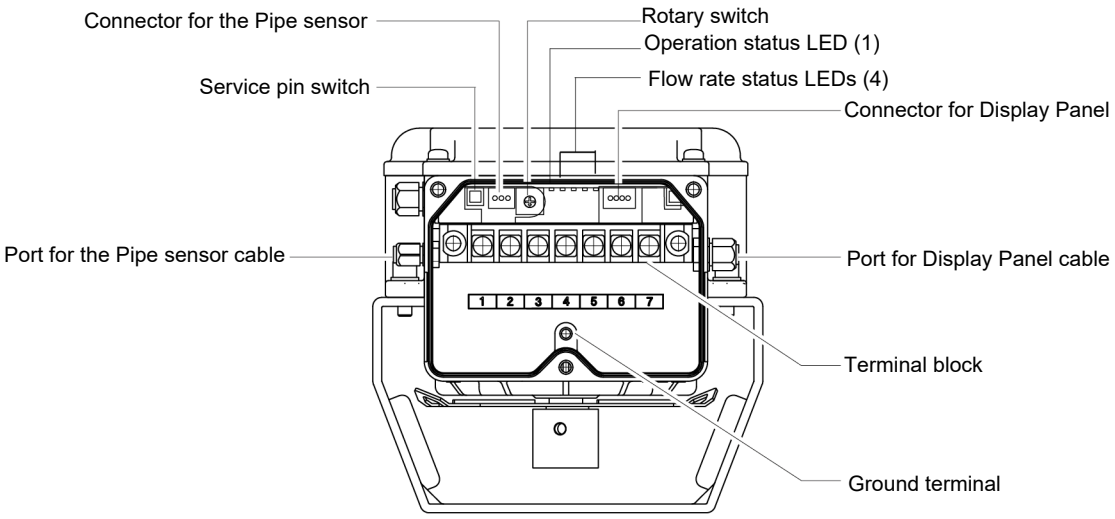


Figure 6. Parts indication: Actuator details

■ Installation

⚠ WARNING
When handling or transporting any heavy product (more than 18 kg), carefully move the product with a hand truck or the like, or with 2 or more people. Careless lifting or accidental dropping of the product may result in injury or product damage.

⚠ CAUTION
Do not freeze this product. Doing so may damage the valve body and cause leakage.
When piping this product, be sure there is no foreign matter in the pipes. If foreign matter remains in the pipes, the product may break down.
Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
Use full face gaskets for flat face flanges. Failure to do so may damage the flanges or cause leakage outside of the valve.
Installation and wiring of the actuator must be performed by personnel qualified to do instrumentation and electrical work. Mistakes in installation or wiring may cause fire or electric shock.

● Notes for installation

Observe the following cautions in order to avoid failure of this product.

- Do not subject this product to shock or impact.
- Do not leave any foreign substances in the pipes of this product.
  Observe the following instructions to remove foreign substances.
  - Provide a strainer on the inflow side of the valve.
    For chilled/hot water: 40 or more meshes
  - If the strainer cannot be installed just before the inlet of each valve, install it on the pipe diverting sections for each piping system.
  - Install the bypass pipes for this product and install the gate valves at the inflow, outflow, and bypass side.
- Do not install this product nearby a steam coil or a hot-water coil.
  High temperature radiation may cause device failure of the actuator.
- Avoid connecting the product to pipes where water hammer may occur or slag, etc. easily collects.

Observe the following cautions in order to measure flow precisely.

- Install straight pipes, minimum length is 2 times of valve diameter (d), on the inflow and outflow sides of the valve.
- If flange gaskets are installed for connecting to the pipes, do not use the rubber gaskets or the gaskets that go inside the pipes.
- Install the product to pipes so that they are electrically connected at the same potential.
  If the valve and the pipe are electrically isolated, noise will be generated, causing incorrect measurement and control of flow.

In addition, observe the following cautions.

- Place a drain pan under the valve.
- Install the product where maintenance or replacement can be done easily.
  Refer to ● “Maintenance space.”
- When installing the product in the ceiling, make a trapdoor within 50 cm around the valve.

● **Mounting position**

- Install the valve so that fluid flows in the direction pointed by the arrow on the valve body, and keep the valve orientation as described below.
  Orientation of the actuator cannot be changed.
- The product can be mounted with any position from upright to sideways (max. 90-degree inclination) and flow direction is from bottom to top.
- If the product is installed inclining from the upright position, the valve sensor should be placed upper side.

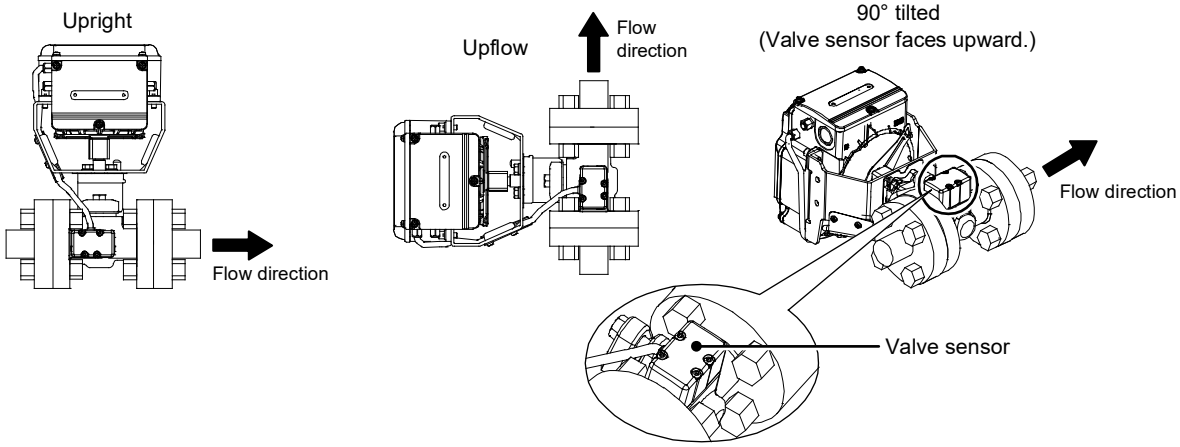


Figure 7. Correct mounting orientations

- If the product is installed outdoors, place it in upright position.

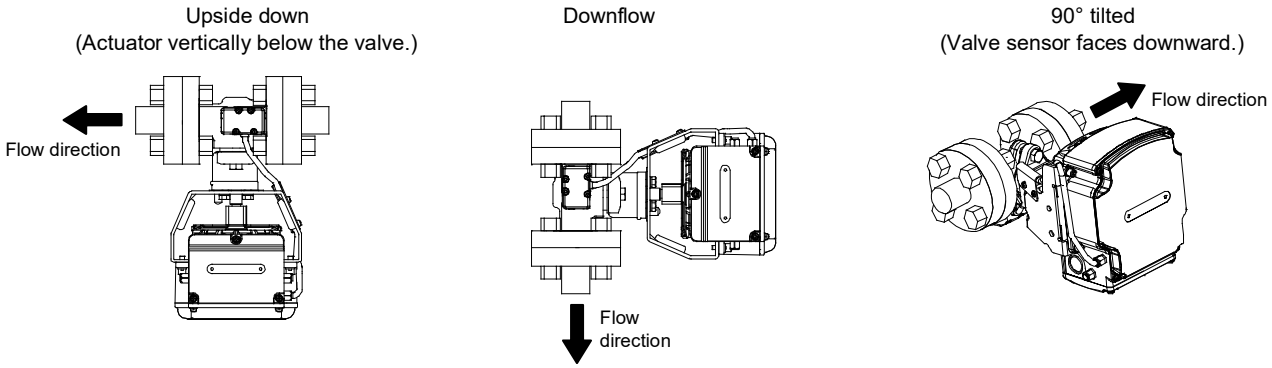


Figure 8. Incorrect mounting orientations

● **Piping**

⚠ WARNING
When handling or transporting any heavy product (more than 18 kg), carefully move the product with a hand truck or the like, or with 2 or more people. Careless lifting or accidental dropping of the product may result in injury or product damage.

⚠ CAUTION
Do not freeze this product. Doing so may damage the valve body and cause leakage.
When piping this product, be sure there is no foreign matter in the pipes. If foreign matter remains in the pipes, the product may break down.
Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
When installing this product, hold it in the proper position and securely fasten it to the pipes. Excessive tightening or improper installation position may damage the valve.

IMPORTANT:
Do not apply excessive force on the valve sensor and its cable during piping or applying heat insulation. Doing so may cause device failure.

1) Check the Model number, printed on the label affixed on the yoke, of this product
2) Install the valve so that fluid flows in the direction pointed by the arrow on the valve body.
   Refer to ● "Mounting Position."

- Do not apply too much sealing material, such as solidifying liquid and tape, to the pipe connection sections.
- Do not allow chippings, sealing material, etc. to enter the pipes.

  The foreign substances, such as chippings, seal material, may be caught in, resulting damages on the sheet and the valve may not be fully closed.

3) Fully open the valve and flush it out with the maximum flow rate.
   When fluid flows for the first time, it is to clean out the foreign substances and refuse in the pipes.
   The valve is set to fully open when it is shipped from the factory.

⚠ CAUTION
After installation, make sure no fluid leaks from the valve-pipe connections. Improper piping may cause fluid leakage outside of the valve.
Do not put a load or weight on this product. Doing so may damage the product.

● Heat insulating

- Apply heat insulation as illustrated by [ ] in Fig. 9.
- If the yoke and/or the actuator are covered with insulation material, the point cannot be checked or may be distorted.
- If the heat insulation is inappropriate, accuracy of flow rate measurement and temperature measurement may degrade.
- When cutting the insulation material that covers the valve, be sure not to damage the valve sensor cable.

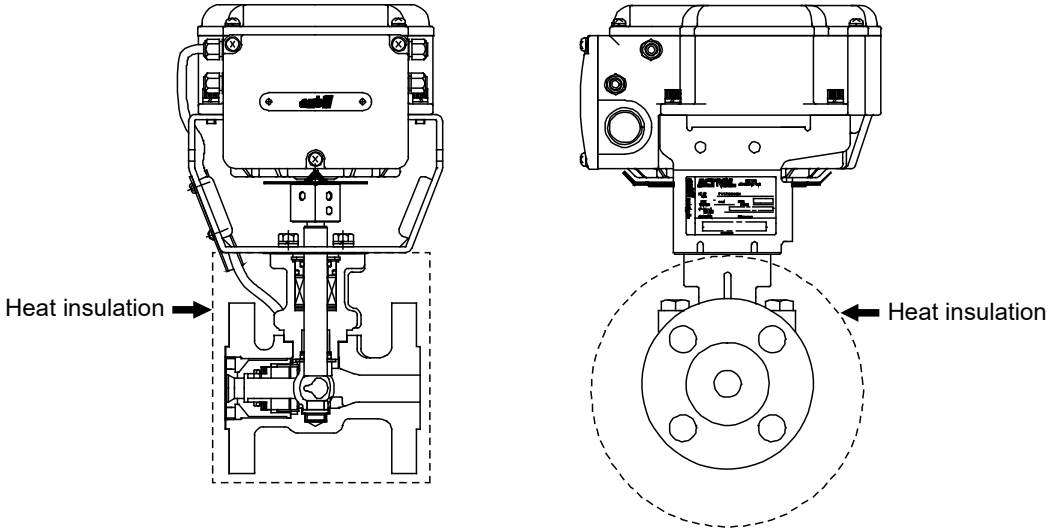


Figure 9. Heat insulating

● Factory preset position

The actuator shaft is positioned at 100 % for shipment.
The shaft is thus completely turned clockwise, and the pointer points at “100.”

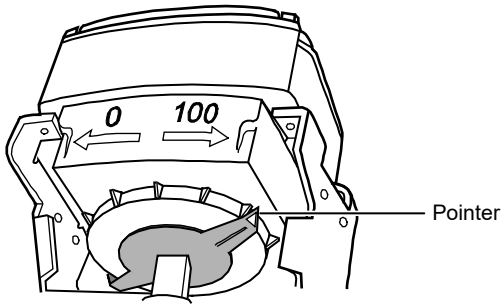


Figure 10. Pointer position for shipment

● **Manually opening/closing valve**

IMPORTANT:
- Before opening or closing the valve manually, turn off the power.
  If the valve is manually opened or closed while the power 24 V AC active, the actuator may break down.
- Do not manually open or close the valve more than 100 % or less than 0 % scale.

1) Turn off the power.
2) Hold the joint using a wrench, etc., gently turn the wrench to the desired position, open or close.

   Note: If the valve is subject to shock, the actuator may break down.

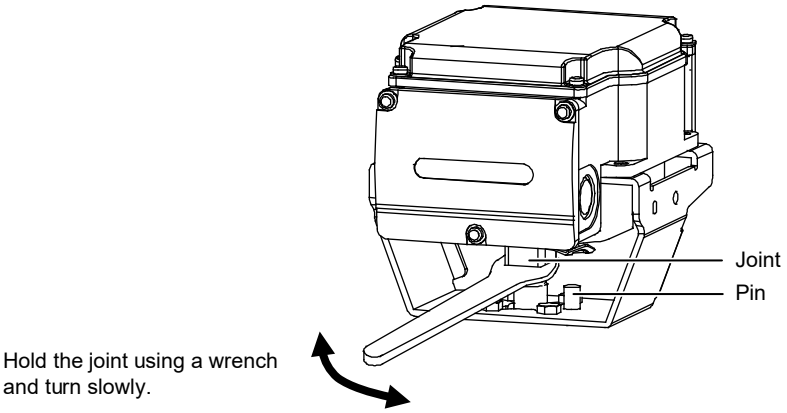


Figure 11. Manually opening/closing valve

■ Wiring

⚠ WARNING
Before wiring, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.
Be sure to ground this product with a ground resistance of less than 100 Ω. Improper grounding may cause electric shock or malfunction.
After wiring, be sure to reattach the cover. Failure to do so may result in electric shock.

⚠ CAUTION
Provide a circuit protector (e.g., a fuse or circuit breaker) for the power source. Failure to do so may cause a short circuit leading to fire or device failure.
Install, wire, and use this product under the conditions specified by this manual. Failure to do so may cause fire or device failure.
Installation and wiring of the actuator must be performed by personnel qualified to do instrumentation and electrical work. Mistakes in installation or wiring may cause fire or electric shock.
All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
For wiring, strip the insulation from cables as specified in this manual. If the length of exposed wire is longer than specified, it may cause electric shock or short circuit between adjacent terminals. If it is too short, it may not make proper contact.
Use crimp terminals with insulation for connections to the product terminals. Failure to do so may cause short circuit leading to fire or device failure.
Tighten the terminal screws with the specified torque. Insufficient tightening of the terminal screws may cause fire or overheating.

IMPORTANT:

- Model FVY5160J is designed for 24 V AC power supply voltage.
  Do not apply any other power voltage (e.g., 100 V AC, 200 V AC) to Model FVY5160J.
- To prevent damage, cover the terminals except when connecting/disconnecting wires.
- Do not leave any refuse including metal chips inside the actuator after cutting a knockout hole and after connecting the wires.

● Wiring precautions

1) To lead the wires into the terminals, cut out a knockout hole for a wiring port. Two knockout holes are provided on the bilateral sides of the actuator terminals. Select a knockout hole according to the conduit mounting direction, and cut it out by lightly knocking the hole using a screwdriver.

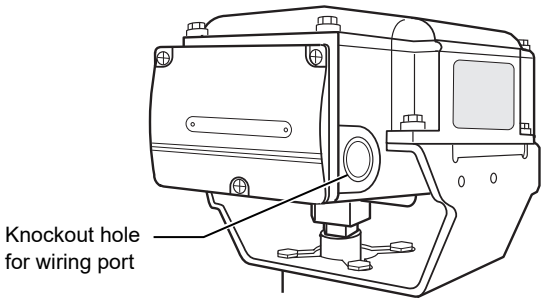


Figure 12. Knockout hole for wiring port

2) Unscrew the 3 setscrews (M4 × 10) of the terminal cover and remove the terminal cover, as shown in Fig. 13.

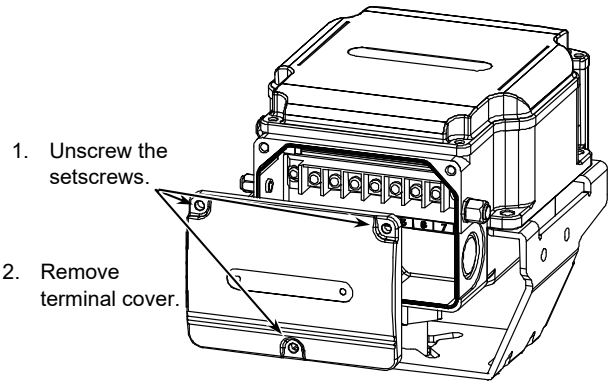


Figure 13. Terminal cover removal

3) Correctly connect the wires to the M3.5 screw terminals, as an example shown in Fig. 15.
To connect a device requiring over 100 V AC to the sub-DO, be sure to ground the actuator with 100 Ω or lower ground resistance. Refer to Fig. 14 for the location of each terminal.

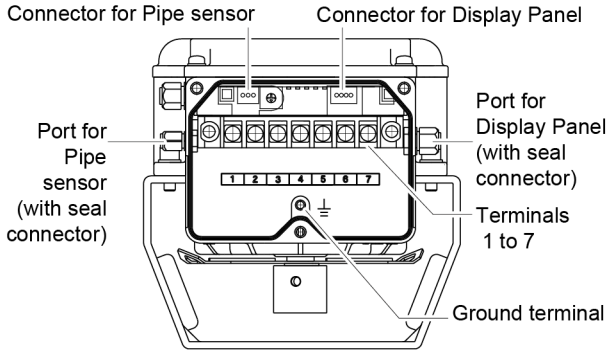


Figure 14. Terminals and connectors arrangement

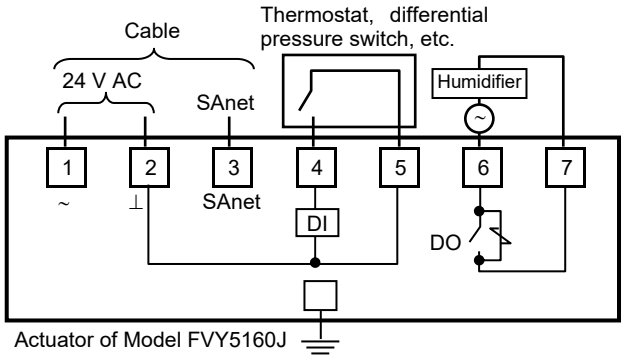


Figure 15. Basic connection example

4) Separate sub-DO line from SAnet and sub-DI lines. Do not lead the sub-DO line through the wiring port (knockout hole) for SAnet and sub-DI lines since the sub-DO line may generate noise.

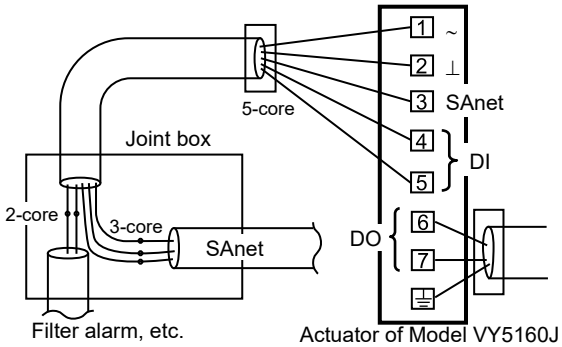


Figure 16. Separation of DO line from other lines

If sub-I/O is used, SAnet line cannot be daisy-chained since the number of the wiring ports is limited. In such a case, use the cable gland with three ports to daisy-chain the SAnet line, or branch the SAnet line ahead of connecting to the terminals.

Note:
For wiring of SAnet line, refer to the **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)**.

● **To keep IP54 protection (dust-proof and splash-proof),**

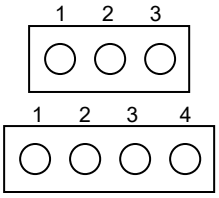
Use a water-proof connector for Model FVY5160J in a high-humidity environment or outdoor location.

- Be sure to completely close the terminal cover and the top cover.
- Waterproof the knockout hole.
  - For cable connection, use a water-proof connector.
    In accordance with the diameter of the cable used, select a suitable waterproof connector from ■ "Model Numbers," ●"Options."
    ＊ Refer to **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)** for detailed seal connector connection.
  - For conduit connection, use a water-proof plica tube or the like.

● **Wires connection procedure: Pipe sensor / Display Panel**

1) Pass the 3-core cable of the Pipe sensor through the actuator port for the Pipe sensor.
   Pass the 4-core cable of Display Panel through the actuator port for Display Panel.
2) Strip the lead wire sheath. (8 mm from the end)
3) Connect the cable (3 lead wires) to 3-pin connector pre-connected to the actuator.

   Connect the cable (4 lead wires) to 4-pin connector pre-connected to the actuator.



Pin number	Lead wire color
1	Red
2	White
3	White
1	Red*
2	Black*
3	White*
4	Green*

4) Connect the 3-pin connector to the connector for the Pipe sensor provided on the actuator, as shown in Fig. 17.
   Connect the 4-pin connector to the connector for Display Panel provided on the actuator, as shown in Fig. 17.
   ＊ Lead wire colors of 4-pin connector described are for the recommended cable (JIS VCTF), and the corresponding wire colors of the Display Panel are also described in the Specifications/Instructions of Display Panel (AB-6922). If you use a different cable, be sure to match the terminal numbers to connect the wires between the 4-pin connector and the Display Panel.

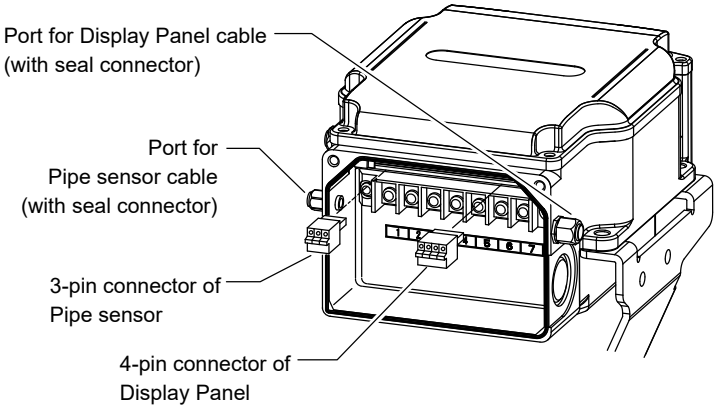


Figure 17. Connection of 3-pin connector and 4-pin connector

5) Lightly pull the cables from the outside of the ports. If too long cable is left inside the actuator, terminal cover cannot be completely closed.
6) Fasten the seal connectors. Screw the connector nuts well to seal the ports. Cable may be twisted as a connector nut is screwed. In such a case, loosen the connector nut and untwist the cable, then re-screw the connector nut.

● **Wires connection procedure: Power supply and SAnet communication**

For power supply and SAnet wiring, refer to **Installation Manual of Intelligent Component Series for SAnet Communication (AB-6713)**.

■ Address Setting (Addressing)

⚠ WARNING
After setup work, be sure to reattach the cover. Failure to do so may result in electric shock.
Before setup or engineering work, be sure to turn off power that is supplied from external devices to the output terminals. Failure to do so may cause electric shock.

⚠ CAUTION
Do not put a load or weight on this product. Doing so may damage the product.
Do not carelessly touch this product when it is used to control hot water. Doing so may result in burns, because the product reaches a high temperature.

To SAnet interface module, Model FVY5160J and other Intelligent Component Series devices are connected via SAnet. Set address for the terminal devices so that the SAnet interface module can recognize all the terminal devices connected. Follow the procedure below to set the address. For details regarding address setting (addressing), ask our salesperson/serviceperson.

1) Unscrew the 3 setscrews and remove the terminal cover. See Fig. 15 for removing the terminal cover.

2) Set address. (See Table 1.) Address can be set with rotary switch, with service pin switch, or based on SAnet ID. Rotary switch and service pin switch are provided on this product. To set the address with service pin switch or based on SAnet ID, Azbil Corporation's engineering tool (Data Setter or PC-MMI) is required. Set the address in either way according to your availability.

   Setting with rotary switch:
   Turn the rotary switch using a precision Phillips screwdriver and set.

   Setting with service pin switch:
   1. Set the rotary switch to '0'.
   2. Start addressing operation* of Data Setter or PC-MMI. Then, press the service pin switch. (Do not keep the switch pressed for longer than 5 seconds.)
   3. Address will be set within 5 seconds after pressing the service pin switch.

   * For the addressing operation of Data Setter or PC-MMI, ask our salesperson/serviceperson.

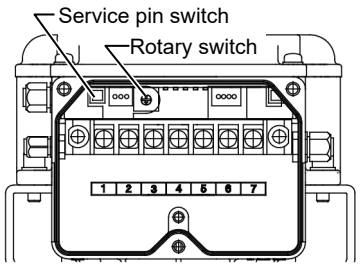


Figure 18. Setting switches (without terminal cover)

   Setting based on SAnet ID:
   1. Set the rotary switch to '0'.
   2. With Data Setter or PC-MMI, enter the SAnet ID (on the product code label) and address number to set. The product code label is attached on the rear side surface of the actuator, as shown in Fig. 19.

   * For the addressing operation of Data Setter or PC-MMI, ask our salesperson/serviceperson.

3) Attach the terminal cover after setting the address.

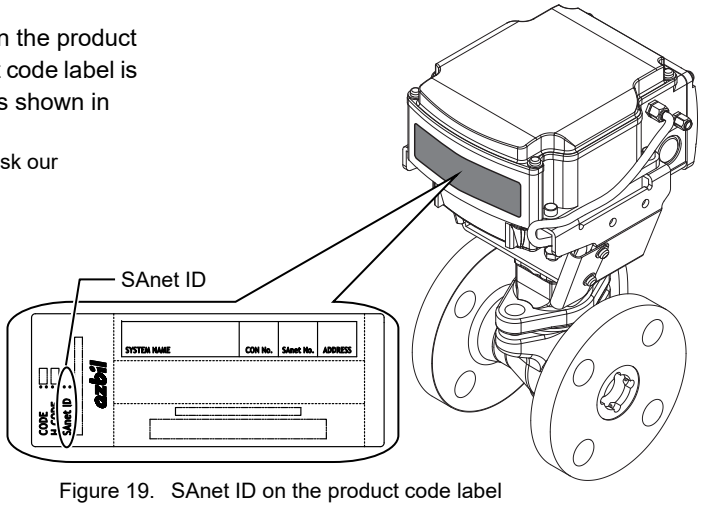


Figure 19. SAnet ID on the product code label

IMPORTANT:
- While the terminal cover is removed, do not touch the terminal block or allow anything to touch the terminal block.
- If the service pin switch is kept pressed for longer than 5 seconds, the mode will be switched and operation error (data point trouble) will be occurred. In such a case, press the service pin switch again and keep it pressed for longer than 10 seconds to go back to the normal mode.

Table 1. Basic address setting of this product and other Intelligent Component Series devices

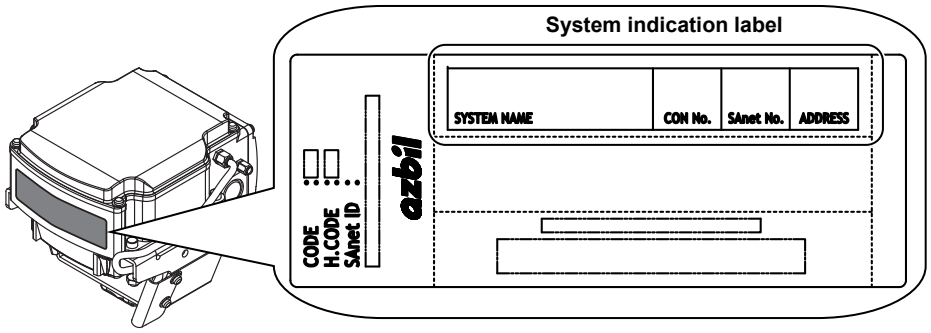
Add.	Device	Sub-DO/AI	Sub-DI
1	Outdoor air damper		
2	Exhaust air damper		
3	Return air damper		
4	Switch damper of total heat exchanger for outdoor air		
5	Switch damper of total heat exchanger for exhaust air		
6	**Chilled/hot water valve / Chilled water valve**		**Filter alarm**
8	**Hot water valve (Chilled water valve*)**	**Humidifying ON/OFF**	
A (10)	Humidifying valve		

Notes:

- For 'chilled/hot water valve + chilled water valve' application, set address 6 for chilled/hot water valve and 8 for chilled water valve.
- Items in bold characters are the basic address to set for Model FVY5160J. Address 7 and 9 are the second addresses for Model FVY5160J which requires two consecutive (first and second) addresses.
- The above list is a basic setting example. Set address and use sub-I/O in response to system configuration, installation location, and wiring best suitable for your application.
- Addresses B (11) to F (15) are reserved.

■ System Indication Label

A part of the product code label can be a system indication label. Clip the part, and write down the name of the system, host controller number of the system, SAnet line number, and address. Then attach the part, as the system indication label, to a location where you can easily check.



Clip and write down:
- SYSTEM NAME:
  System name or device number
- CON No.:
  Host controller number
  (general controller (model WJ-1111), Infilex GC/Infilex GD)
- SAnet No.:
  SAnet line number
- ADDRESS:
  Address

Figure 20. System indication label

IMPORTANT:
- Attach the system indication label to a clean location with no dust, oil, or moisture.
- Attach the system indication label by pressing the whole surface of the label to stick on the product surface.

■ Operation Check in Manual Operation Mode

⚠ WARNING

After engineering work, be sure to reattach the cover.
Failure to do so may result in electric shock.

Before setup or engineering work, be sure to turn off power that is supplied from external devices to the output terminals. Failure to do so may cause electric shock.

In the manual operation mode, even when this product has not been connected via SAnet yet, the operations shown in Table 2 can be performed and checked. Follow the procedure below for the operation check. For the locations of the service pin switch and the rotary switch, see Fig. 18.

1) Press and hold the service pin switch for 10 seconds to enter the manual mode.

2) Turn the rotary switch to the desired position (See Table 2.), using a precision slotted screwdriver.

Table 2. Operations in the manual operation mode

Rotary switch scale	Operation
0	Restart (to go back to the normal operation mode).
1	Cancel forced open/close.
2	Fully close (in 0 % position).
3	Open in 25 % position.
4	Open in 50 % position.
5	Open in 75 % position.
6	Fully open (in 100 % position).

∗ Note:
Do not set the rotary switch to scales 7, 8, 9, A, B, C, D, E, F. These scales are not available in the manual operation mode.

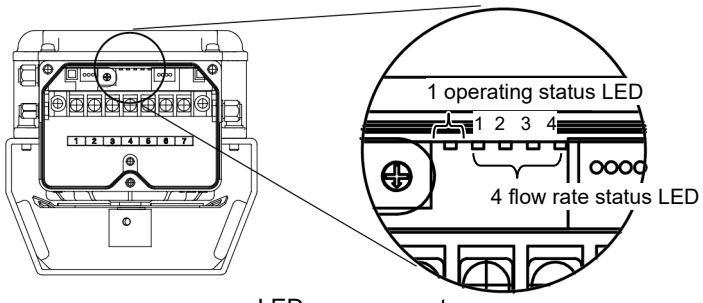
Operation will start in 3 seconds after setting the rotary switch.

3) After the operation check, press and hold the service pin switch for 10 seconds to go back to the normal operation mode.

4) If the address is set with the rotary switch, be sure to reset the rotary switch at the address after entering the normal operation mode.

■ LED Indication

Operating status is indicated by 1 LED, and flow status is indicated by 4 LEDs. There are 6 flow status indications, including 5 volumetric flow and 1 backflow indications.



LED arrangement

● Operating status

Operating status	LED indication
Initializing	Continuous ON → LED indication corresponding to the operating status (after initializing is complete.)
Normal	Repetition of 1-second ON → 1-second OFF.
Major alarm	Continuous ON.
Minor alarm	Repetition of 1-second ON → 0.25-second OFF → 0.25-second ON → 0.25-second OFF.
Communication error (and minor alarm)	Repetition of 0.25-second ON → 0.25-second OFF
Manual operation	Repetition of 0.25-second ON → 0.25-second OFF → 0.25-second ON → 1.25-second OFF.
Error during manual operation	Repetition of 0.25-second ON → 0.25-second OFF → 0.25-second ON → 0.25-second OFF → 0.25-second ON → 0.75-second OFF.

● Flow rate status

Flow rate status (Q = Flow rate)		LED indication (LED indication varies every 25 % flow rate.)			
		LED 1	LED 2	LED 3	LED 4
Q = 0 %		—	—	—	—
0 % < Q ≤ 25 %	1)	—	—	—	—
	2)	○	—	—	—
25 % < Q ≤ 50 %	1)	—	—	—	—
	2)	○	—	—	—
	3)	○	○	—	—
50 % < Q ≤ 75 %	1)	—	—	—	—
	2)	○	—	—	—
	3)	○	○	—	—
	4)	○	○	○	—
75 % < Q	1)	—	—	—	—
	2)	○	—	—	—
	3)	○	○	—	—
	4)	○	○	○	—
	5)	○	○	○	○

Notes:
∗ ○: ON, —: OFF
∗ 1) to 5) in the table indicate chronological order to show sequential LED operation. After the end, LED operation goes back to 1) to repeat.

● **Backflow**

Backflow status	LED indication			
	LED 1	LED 2	LED 3	LED 4
1)	⦿	—	⦿	—
2)	—	⦿	—	⦿

Notes:
∗ ⦿: Blink, —: OFF
∗ 1) and 2) in the table indicate chronological order to show sequential LED operation. LED operation repeats 1) and 2).

■ Maintenance

⚠ WARNING	
	Before doing maintenance, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.
	After maintenance, be sure to reattach the cover. Failure to do so may result in electric shock.

⚠ CAUTION	
	Do not put a load or weight on this product. Doing so may damage the product.
	Do not carelessly touch this product when it is used to control hot water. Doing so may result in burns, because the product reaches a high temperature.

- Inspect Model FVY5160J according to Table 3.
- Be sure to check the flow measuring accuracy according to **Flow measuring accuracy** in Table 3. Flow measuring accuracy is very essential for Model FVY5160J used for energy management, energy-saving application, etc.
  Install the Valve Sensor Diagnosis software in your client PC to inspect flow measuring accuracy. This software allows the client PC to automatically calculate differential pressure measuring accuracy. Note that optional Display Panel or our engineering tool (Data Setter/PC-MMI) is required for field inspection.
- Manually open/close valve at least once a month if it is left in inactive state for a long period.
- Visually inspect the fluid leakage of the valve and the actuator operations every six months. If any of the problems described in Table 4 are found, take corresponding actions shown in the table.
  If your problem is not solved by the corresponding action, please contact Azbil Corporation near you.

Table 3. Inspection items and details

Inspection item	Inspection interval	Inspection detail
Visual inspection	Semiannual	• Fluid leakage from the gland and the flange face • Loosened bolts • Valve and actuator damages
Operating status	Semiannual	• Unstable open/close operation • Abnormal noise and vibration • Abnormal differential pressure across valve (Pvin-Pvout) in fully closed/open position.
Routine inspection	Any time	• Fluid leakage to the outside • Abnormal noise and vibration • Unstable open/close operation • Valve hunting
Flow measuring accuracy	Any time (annual)	• Measuring accuracy of differential pressure across valve: Measure the valve inlet pressure and outlet pressure when they are equal and check the values measured by the valve sensor. If difference of the values is ± 3 kPa, flow measuring accuracy satisfies the factory preset accuracy. Situation of inlet pressure equal to outlet pressure → No flow across the valve in open position e.g, when supply pump is OFF, or when hand valves on the inflow and/or outflow sides of the valve are/is fully closed. • Valve position detecting accuracy: Ask our salesperson/serviceperson for details.

Note:

Simplified inspection of flow measuring accuracy is illustrated above. For accurate inspection, a reference flow meter is required. Note that you cannot field-calibrate or field-adjust flow measuring accuracy.

Table 4. 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 salesperson/serviceperson.
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.
The valve vibrates or produces an abnormal noise.	Insufficient air vent inside piping Primary (Pvin) pressure condition Differential pressure (Pvin-Pvout) condition	Take air out of piping. Adjust the mounting position and change the installation location.
Valve hunting occurs. (for position signal control)	Differential pressure (Pvin-Pvout) condition. Controller PID output stability	Adjust the mounting position and change the installation location. Correct PID setting.
Valve hunting occurs. (for flow rate control)	Unstoppable operation Unstable operation (Operation starts even though it stops once.) Controller PID output stability	Check and modify the actuator parameter. (For details, ask our salesperson/ serviceperson.) Correct PID setting.
Flow measuring accuracy is incorrect.	Differential pressure measuring accuracy and valve position detecting accuracy	Ask our salesperson/serviceperson.

■ Disposal

Dispose of this product as industrial waste in accordance with your local regulations.
Do not reuse all or any part of the product.

⚠ WARNING

When handling or transporting any heavy product (more than 18 kg), carefully move the product with a hand truck or the like, or with 2 or more people.
Careless lifting or accidental dropping of the product may result in injury or product damage.

This product complies with the following Electromagnetic Compatibility (EMC).
EMC: EN61000-6-2, EN55011 Class A

Specifications are subject to change without notice.

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