ACTIVAL™
Motorized Two-Way Valve with Flanged-End Connection (PN16 / GG-20)

■ Overview

ACTIVAL™ Model VY51_ _J is a series of motorized two-way valves with flanged-end connection. Rotary valve and actuator are integrated in a single unit.

Valve size ranges from DN15 (1/2") to DN80 (3"), and valve body rating corresponds to ISO PN16.

Actuator has a reversible synchronous motor, which operates at a low voltage of 24 V AC.

5 kinds of control signals are available to operate ACTIVAL.

- Nominal 135 Ω feedback potentiometer (built-in):
  Provides proportional control in combination with a DDC controller (e.g., Infilex™ GC Model WY5111).
- Nominal 135 Ω resistance input:
  Provides proportional control in combination with a proportional controlled electric controller (e.g., Neostat Model TY900_Z, Model TY9800).
- 4-20 mA DC input:
  Provides proportional control in combination with a DDC controller (e.g., Infilex™ GC Model WY5111, Model R35/ R36).
- 2-10 V DC input:
  Provides proportional control in combination with a DDC controller (e.g., Infilex™ AC Model WY5117).
- 0-10 V DC input:
  Provides proportional control in combination with a DDC controller.

■ Features

- Compact and lightweight
- Valve and actuator integrated in a single unit
- Dust- and splash-proof structure (IEC IP54)
  Installable in an AHU.
  Note: Waterproof connectors are required to ensure IP54.
- A variety of control signals available
- Durable actuator with low power consumption
- 2–10 V DC output with feedback signal
  Only for the 4–20 mA DC input type (model VY513_), the 2–10 V DC input type (model VY514_), and the 0–10 V DC input type (model VY515_)
- Equal percentage flow characteristic
- Valve for water/steam control applicable to high differential pressure, with large Cv value, wide rangeability, and low leakage.

IMPORTANT	• If you want to use this product combined with a third party's controller, please contact Azbil corporation.

Safety Precautions

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

Restrictions on Use

This product was developed, designed, and manufactured for general air conditioning use.

Do not use the product in a situation where human life may be at risk or for nuclear applications in radiation controlled areas. If you wish to use the product in a radiation controlled area, please contact Azbil Corporation.

Particularly when the product is used in the following applications where safety is required, implementation of fail-safe design, redundant design, regular maintenance, etc., should be considered in order to use the product safely and reliably.

- Safety devices for protecting the human body
- Start/stop control devices for transportation machines
- Aeronautical/aerospace machines

For system design, application design, instructions for use, or product applications, please contact Azbil Corporation.

Azbil Corporation bears no responsibility for any result, or lack of result, deriving from the customer's use of the product.

■Recommended Design Life

It is recommended that this product be used within the recommended design life.

The recommended design life is the period during which you can use the product safely and reliably based on the design specifications.

If the product is used beyond this period, its failure ratio may increase due to time-related deterioration of parts, etc.

The recommended design life during which the product can operate reliably with the lowest failure ratio and least deterioration over time is estimated scientifically based on acceleration tests, endurance tests, etc., taking into consideration the operating environment, conditions, and frequency of use as basic parameters.

The recommended design life of this product is 10 years.

The recommended design life assumes that maintenance, such as replacement of the limited life parts, is carried out properly.

Refer to the section on maintenance in this manual.

■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.

■Symbols

	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 means 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.

⚠ 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.
	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.
	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.
	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.

⚠ CAUTION
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.
After wiring, setting, engineering, maintenance, or replacement work, be sure to reattach the cover. Failure to do so may result in electric shock.
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.

■ Model Numbers

Model VY51_ _J00_ _ 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/valve		Actuator		Valve	Description
	Control signal	Rating/ material	Type	—	Nominal size/Cv	
VY51						Motorized two-way valve with flanged-end connection
	1					Nominal 135 Ω feedback potentiometer
	2					Nominal 135 Ω resistance input
	3					4 mA DC to 20 mA DC input with 2 V DC to 10 V DC position feedback output
	4					2 V DC to 10 V DC input with 2 V DC to 10 V DC position feedback output
	5					0 V DC to 10 V DC input with 2 V DC to 10 V DC position feedback output
		7				PN16 / GG-20 [for water]
		8				PN16 / GG-20 [for steam]
			J			IEC IP54 protected and standard torque type actuator with terminal block (Mountable valve sizes: DN15 to DN80)
				00		—
					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
					14	DN15 (1/2”) / 1.6 in Cv value
					15	DN15 (1/2”) / 4.0 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

● Options

Item	Model number		Specification	
Seal connector*1	83104346-	003	Applicable wire size	ϕ7 mm to ϕ9 mm
Auxiliary switch*2	83174063-	101	Number of switches	2
			Maximum applied voltage/current	30 V DC / 100 mA*3 (Inductive load includes inrush current.)
			Actuating position	SW A: Adjustable between 0 % (fully closed) and 100 % (fully open) SW B: Adjustable between 0 % (fully closed) and 100 % (fully open
Auxiliary potentiometer*2	83165275-	001	Number of potentiometer:	1
			Total resistance	Nominal 1 kΩ
			Operating position	0 % (fully closed) to 100 % (fully open)
			Max. applied voltage	5 V DC
Outdoor cover	DY3001A1017		Material	Stainless steel plate t1.0
			Weight	Approx. 550 g

Note:

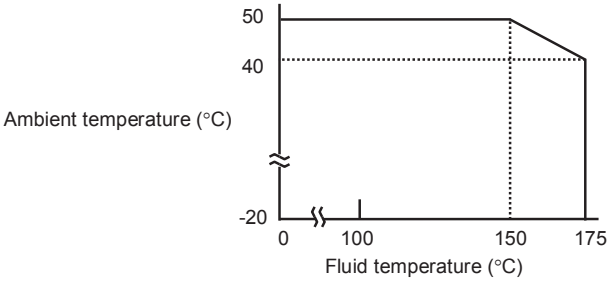
*1 Required to maintain IP54.

*2 Either the auxiliary switch or auxiliary potentiometer can be added, but not both.
For details, refer to the user's manual attached to the product.

*3 If the applied current exceeds 100 mA, please contact Azbil Corporation.

■ Specifications

● Valve and actuator

<table>
<tr><td>Item</td><td colspan="4">Specification</td></tr>
<tr><td rowspan="8">Operating conditions</td><td rowspan="3">Rated operating condition</td><td rowspan="2">Ambient temperature</td><td colspan="2">−20 to 50 °C
(Fluid temperature 0 °C to 150 °C)</td></tr>
<tr><td colspan="2">−20 to 45 °C
(Fluid temperature 150 to 175 °C)</td></tr>
<tr><td>Ambient humidity</td><td colspan="2">5 to 95 %RH</td></tr>
<tr><td>Vibration</td><td colspan="2">4.9 m/s^2 (10 to 150 Hz)</td></tr>
<tr><td rowspan="3">Transport/storage conditions
(in packed state*2)</td><td>Ambient temperature</td><td colspan="2">−20 to 70 °C</td></tr>
<tr><td>Ambient humidity</td><td colspan="2">5 to 95 %RH</td></tr>
<tr><td>Vibration</td><td colspan="2">19.6 m/s^2
(10 Hz to 150 Hz)</td></tr>
<tr><td colspan="3"></td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">Installation location</td><td colspan="4">Indoor use
Note: Salt air, corrosive gas, flammable gas, and organic solvent must be avoided.</td></tr>
<tr><td colspan="4">Outdoor use
Note: Salt air, corrosive gas, flammable gas, and organic solvent must be avoided. And, use the outdoor cover (to be ordered separately) etc. to avoid direct sunlight.</td></tr>
<tr><td>Mounting position</td><td colspan="4">Refer to ■ “Installation,” ● “Mounting position.”</td></tr>
<tr><td>Manual operation</td><td colspan="4">Available
Refer to ■ “Installation,” ● “Manual open/close operation.”</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Between terminals and case</td><td colspan="2">5 MΩ or more at 500 V DC</td></tr>
<tr><td>Withstand voltage</td><td colspan="2">Between terminals and case</td><td colspan="2">500 V AC/min with 5 mA or less leakage current</td></tr>
<tr><td rowspan="11">Weight</td><td rowspan="11">Model VY51_ _J00</td><td>11</td><td colspan="2" rowspan="5">4.6 kg</td></tr>
<tr><td>12</td></tr>
<tr><td>13</td></tr>
<tr><td>14</td></tr>
<tr><td>15</td></tr>
<tr><td>21</td><td colspan="2" rowspan="2">6.6 kg</td></tr>
<tr><td>22</td></tr>
<tr><td>41</td><td colspan="2" rowspan="2">10 kg</td></tr>
<tr><td>42</td></tr>
<tr><td>51</td><td colspan="2">11.5 kg</td></tr>
<tr><td>61</td><td colspan="2">16.0 kg</td></tr>
<tr><td>81</td><td colspan="2">18.5 kg</td></tr>
</table>

● Valve

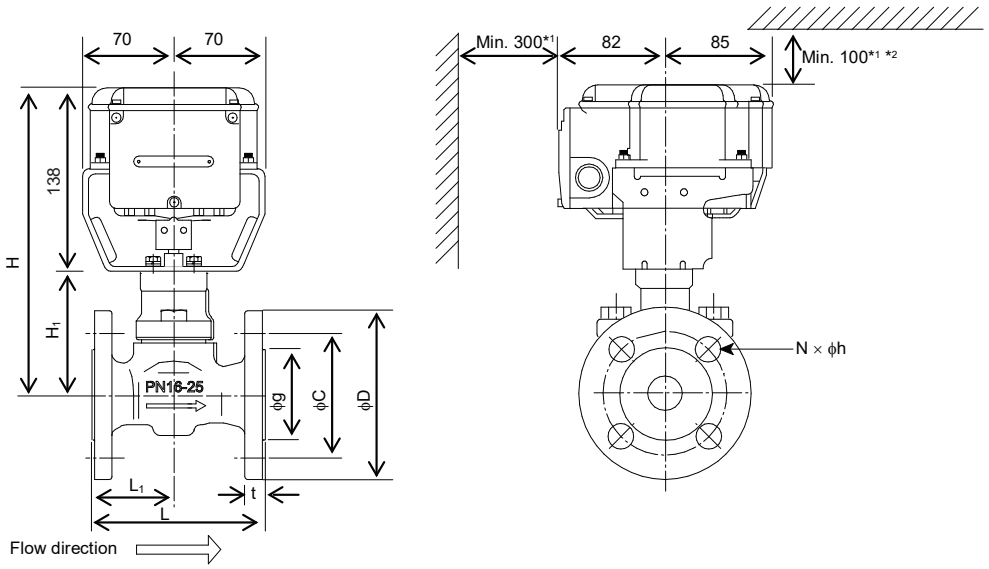
Item	Specification				
Type	Two-way valve with flanged-end connection (raised face flange), proportional control				
Body pressure rating	PN16 (Max. working pressure: 1.6 MPa)				
Size, Cv, Close-off rating	Model number		Nominal size	Cv	Close-off ratings
	VY51_ _J00	11	DN15 (1/2")	1.0	1.0 MPa
		12	DN15 (1/2")	2.5	
		13	DN15 (1/2")	6.0	
		14	DN15 (1/2")	1.6	
		15	DN15 (1/2")	4.0	
		21	DN25 (1")	10	
		22	DN25 (1")	16	
		41	DN40 ($1^1/_2$")	25	
		42	DN40 ($1^1/_2$")	40	
		51	DN50 (2")	65	
		61	DN65 ($2^1/_2$")	95	
		81	DN80 (3")	125	0.7 MPa (for chilled/hot water and steam*)
End connection	PN16 flanged-end (equivalent to ISO 7005-2: 1988)				
Applicable fluid	Chilled/hot water, high temperature water, steam, brine (ethylene glycol solutions, 50 % max.)				
Allowable fluid temperature	Chilled/hot water		0 °C to 175 °C		
	Steam		0 °C to 175 °C		
Flow characteristic	Equal percentage				
Rangeability	100 : 1				
Leakage from valve seat	0.01 % of rated Cv value (0.0006 Cv or less for DN15 model)				
Materials	Body		Gray cast iron (GG-20)		
	Plug, stem		Stainless steel (equivalent to SCS)		
	Seat ring		Heat-resistant PTFE		
	Gland packing		Inorganic fiber		
	Gasket		Non-asbestos joint sheet		
Paint color	Gray (equivalent to M5B 4/1)				
Actuator mounting	Integrated with the valve				
Valve position indication	Indicated by the groove on the tip of the valve stem.				

* Indicates the limit of temperature in which the actuator can operate.
Pressure should be 0.8 MPa or lower for the 175 °C steam.

● **Actuator**

Item	Specification	
Power supply	24 V AC ± 15 %, 50 Hz/60 Hz	
Power consumption	Nominal 135 Ω feedback potentiometer type	7 VA
	Nominal 135 Ω resistance input type	8 VA
	4-20 mA DC input type	
	2-10 V DC input type	
Type	For valve size DN15 to DN80	Standard torque type
Valve travel time	63 ± 5 s (50 Hz) / 53 ± 5 s (60 Hz)	
Control signal	Nominal 135 Ω feedback potentiometer type	Total resistance: Nominal 135 Ω Max. applied voltage: 5 V DC
	Nominal 135 Ω resistance input type	
	4-20 mA DC input type	Input impedance: 100 Ω
	2-10 V DC input type	Input impedance: 150 kΩ or higher
	0-10 V DC input type	Input impedance: 150 kΩ or higher
2–10 V DC valve travel output signal (for 4–20 mA DC, 2–10 V DC, 0–10 V DC control signal input types)	Range	2 V DC (0 % position) to 10 V DC (100 % position)
	Allowable load resistance	10 kΩ or higher (Max. output current: 1mA)
Valve position indication	Indicator: 0 (fully closed) to 100 (fully open) Can be seen from the forward, backward, or lower position.	
Wiring	Screwed on the terminal block (M3.5), tightening torque 0.8–1.0N·m Note: Open an appropriate knockout hole (dia. 22) located on both sides of the actuator at the worksite	
Enclosure protection	IEC IP54 (dust-proof and splash-proof)	
Factory preset position	Fully open	
Materials	Case	Cast aluminum alloy
	Top cover, terminal cover	Polycarbonate resin (Color: gray)
	Yoke	Steel plate
Surface finishing	Case	None
	Yoke	Electro-galvanized (Bright chromate finish)

■ Dimensions



*1 Clearance for maintenance.
*2 Leave a clearance of 300 mm if you open the top cover after installation (e.g., to set the auxiliary switch).

Figure 1. Dimensions (mm)

Table 1. Dimensions (mm)

Model number	Valve size (DN)	H (mm)	H_1 (mm)	L (mm)	L_1 (mm)	t (mm)	φC (mm)	φD (mm)	φg (mm)	φh (mm)	N	Weight (kg)
VY51_ _J001_	15	213	75	108	50	16	65	95	46	14	4	4.6
VY51_ _J002_	25	228	90	127	60	18	85	115	65	14	4	6.6
VY51_ _J004_	40	241	103	165	82.5	20	110	150	84	19	4	10.0
VY51_ _J0051	50	245	107	178	89	20	125	165	99	19	4	11.5
VY51_ _J0061	65	262	124	190	90	22	145	185	118	19	4	16.0
VY51_ _J0081	80	263	125	203	100	22	160	200	132	19	8	18.5

■ Parts Indication

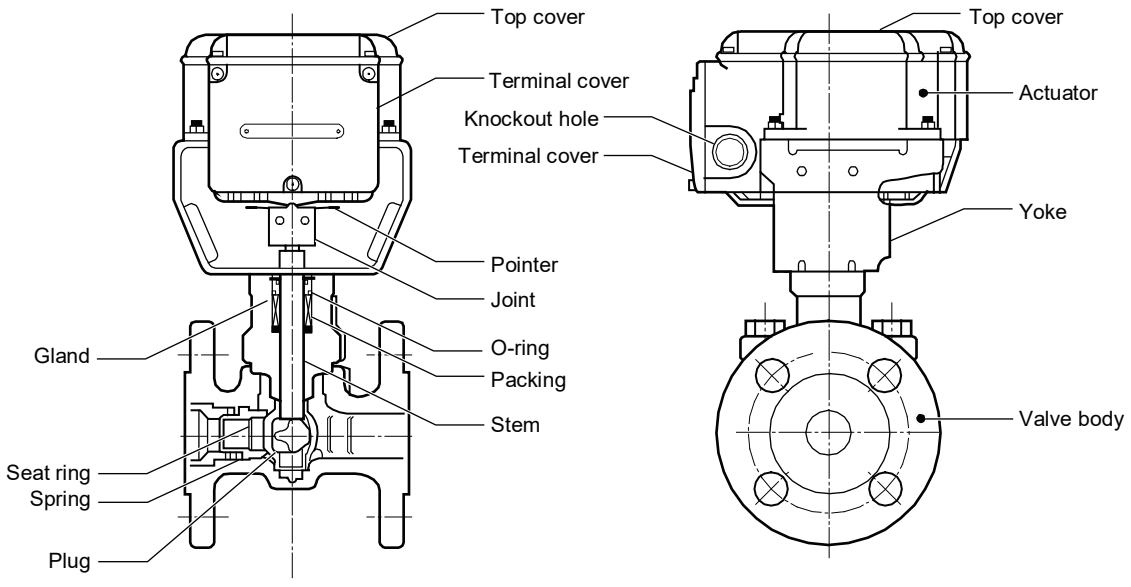


Figure 2. Parts identification

■ 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.

● Precautions for installation

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

- Do not strike or jar this product.
- Be sure there is no foreign matter in the pipes. Observe the following instructions to remove foreign matter.
  - Install a strainer on the upstream side of the product.

    For chilled/hot water: 40 or more mesh

    For steam: 80 or more mesh
  - If the strainer cannot be installed just before the inlet of each valve, install it on the pipe diverting sections for each piping group.
- Do not install this product near a steam coil, hot water coil, etc. High-temperature radiant heat may cause failure ofthe actuator.
- Avoid connecting the product to piping where water hammer may occur or slag, etc. easily collects.

IMPORTANT	• Position the pipes so that drainage does not accumulate next to the valve.If there is remaining drainage, the valve or pipes may be damaged by steam hammer or corrosion. Install a trap so that drainage does not accumulate or use a valve made of stainless steel with high erosion and corrosion resistance (JIS SCS13A). • When the product is used for steam humidifying, install a valve interlocking with air-conditioning unit on the inflow side in case the product gets damaged

In addition, observe the following cautions.

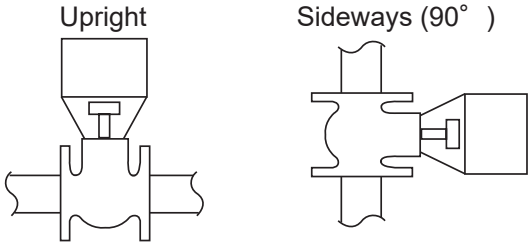
- Install a bypass pipe and gate valves on the inflow, outflow, and bypass sides.
- Install the product in a position allowing easy access for maintenance and inspection.

  Refer to ■Dimensions”
- When installing the product in the ceiling, provide a trapdoor within 50 cm around the valve. And, place a drain pan under the valve.

● Mounting position

Install the product so that fluid flows in the direction pointed by the arrow on the body. It can be mounted in any position ranging from upright to sideways (90°tilted).

Note: If the product is installed outdoors, place it in upright



position.

Figure 3. Correct mounting

Actuator is below the valve

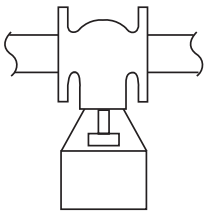


Figure 4. Incorrect mounting

● Piping

⚠ CAUTION
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.

(1) Check that the model number of the product is what you ordered. The model number is shown on the label attached to the yoke.

(2) Install the valve so that fluid flows in the direction pointed by the arrow on the valve body.
Refer to ● “Mounting position.”

- When piping, 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 get into the pipes.
  The foreign matter, such as chippings, seal material for screwing the pipes, may be caught in, resulting damages on the valve seat and the valve may not be fully closed.

(3) Fully open the valve and flush the pipes at the maximum flow rate. When fluid flows for the first time, it is to clean out the foreign matter 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 insulation

- Apply heat insulation in the area illustrated by [- - - -] in figure 5.
- If the heat insulation material is placed above the yoke, the indicator may be hidden from sight or be deformed by being entangled with the insulation material.

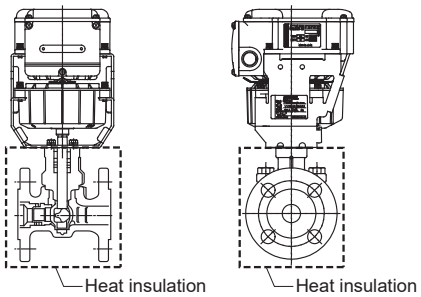


Figure 5. Manual operation

● Factory preset position

Actuator shaft: fully open
Pointer: competely turned clockwise

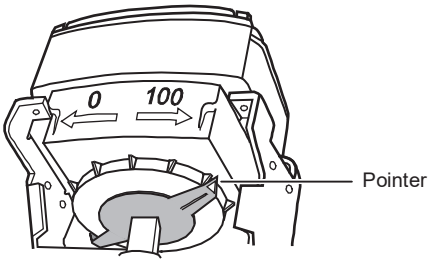


Figure 6. Pointer position for shipment

● Manually opening/closing valve

MPORTANT	• 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) is applied, the actuator may break down. • Do not manually open or close the valve beyond the fully open or fully closed scale.

(1) Trun 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.

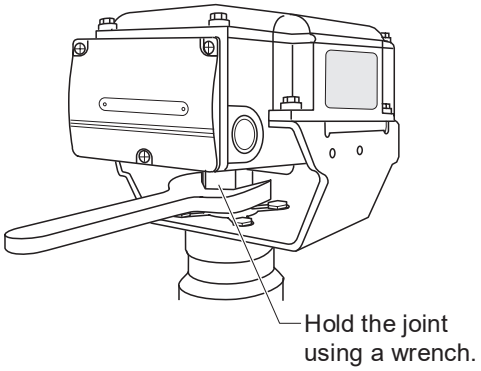
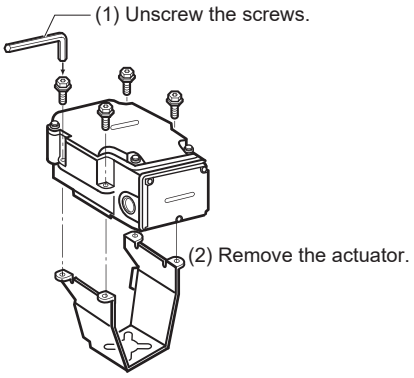


Figure 7. Manual operation

● **Changing the actuator mounting position**

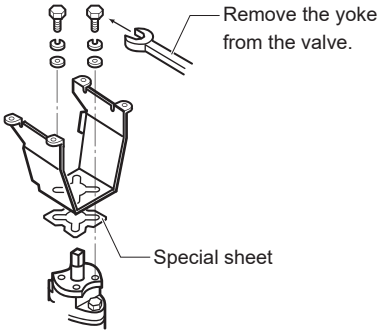
IMPORTANT	• Do not change the combination of the valve, yoke, and actuator. • When changing the mounting position of the actuator, set the position to 100 % (fully open) for the valve and actuator. If the valve and actuator are assembled in different valve positions, gears in the actuator will be damaged because the actuator will try to close or open the valve although the valve stops at the fully closed or fully open position.

1) Remove the screws connecting the actuator and the yoke.



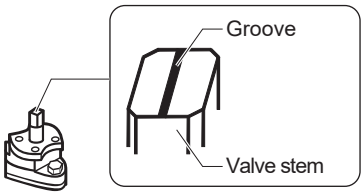
2) Lift the actuator and detach it from the yoke.

3) Remove the screws connecting the yoke and the valve.

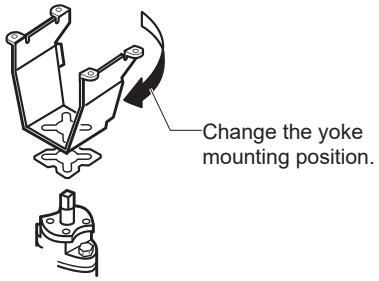


Note: A special sheet is inserted between the yoke and valve for heat insulation. When you changed the mounting position, be careful not to lose the sheet.

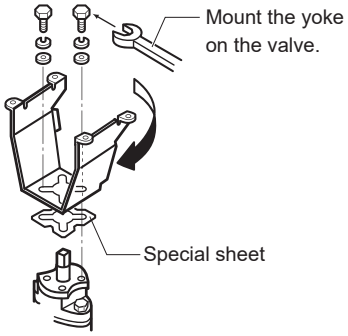
4) Make sure that the groove on the tip of the valve stem is parallel to the pipes (indicating the fully open position).



5) Align the yoke to the desired orientation.
Orientation of the actuator can be changed by 90° steps from the factory preset position. (0°/90°/180°/270°)



6) Reinsert the sheet removed in step (3) between the yoke and the valve, and then mount the yoke on the valve with the screws.



7) Check that the pointer on the actuator indicates the fully open, and that the actuator can be properly seated on the valve stem.

8) Mount the actuator on the yoke using the screws removed in step (1).

9) Check that the valve smoothly operates from the fully closed to the fully open positions.

■ Wiring

⚠ 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.
❗	Before wiring, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.
❗	All wiring must comply with applicable codes and ordinances. Otherwise there is a danger of fire.
❗	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	• This product is designed for 24 V AC power supply voltage. Do not apply other power supply voltage other than 24 V AC. • For the 2–10 V DC, 0–10 V DC, and 4–20 mA DC input types, check the polarity of the power supply and of the 2–10 V DC feedback signal against the wiring diagram to make sure that the product is correctly wired. Incorrect wiring may result in burnout of the printed circuit board, etc.

● **How to maintain IP54 (dust-proof, splash-proof)**

In order to maintain IP54 performance, use a waterproof connector or a water-resistant plica tube when the product is used in high humidity environment or outdoor.

- Be sure to completely close the terminal cover and top cover.
- Apply a waterproofing treatment for the knockout hole.
- For cable connection, use the waterproof connector (to be ordered separately) .
- For conduit connection, use the waterproof plica tubes etc.

● **Control signals type**

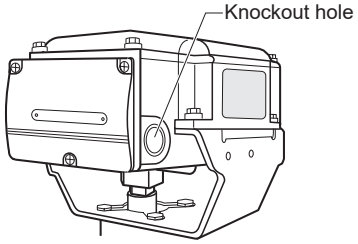
The type of control signals is printed on the actuator label and the wiring diagram label as shown below.

F.B. Pot:	Nominal 135 Ω feedback potentiometer (F motor)
135Ω:	Nominal 135 Ω resistance input (E motor)
4–20mA:	4–20 mA DC input
2–10V:	2–10 V DC input
0–10V:	0–10 V DC input

● **Wiring procedure**

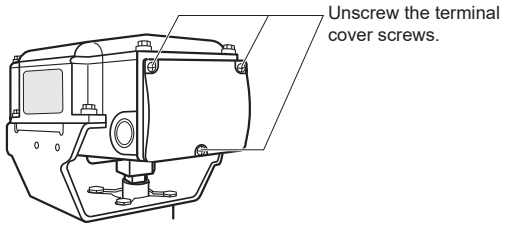
(1) Select a knockout hole according to the wire outlet direction, and open a knockout hole.

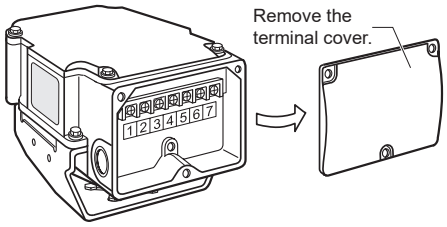
Two knockout holes are provided on the bilateral sides of the actuator. The knockout holes can be easily opened by lightly knocking the hole using a screwdriver.



IMPORTANT	• Do not leave pieces of metal (generated by making the knockout hole) inside the actuator.

2) Unscrew the 3 setscrews (M4 × 10) of the terminal cover to remove the cover.





3) Correctly connect the wires to the terminals with M3.5 terminal screws.

Do not apply 24 V AC to terminals 4 to 7.

Note: Correctly connect the wires referring to figures 8 to 13, “Terminals Connection,” figures 14 to 27, “Wiring Examples” and “Advanced Wiring Examples.”

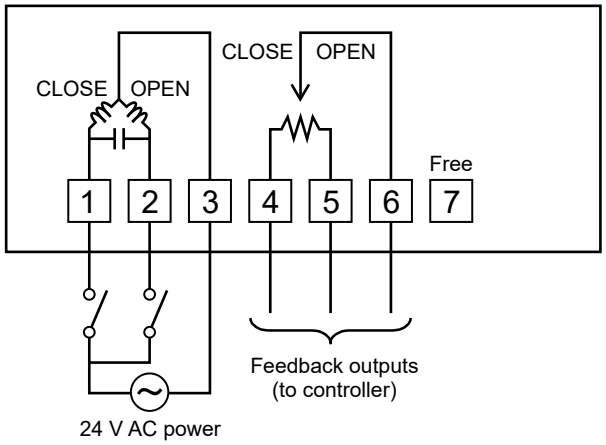
4) Attach the terminal cover and fasten it with the setscrews.

⚠ CAUTION	
❗	After wiring, be sure to reattach the cover. Failure to do so may result in electric shock.

■ Terminals connection

● Nominal 135 Ω feedback potentiometer

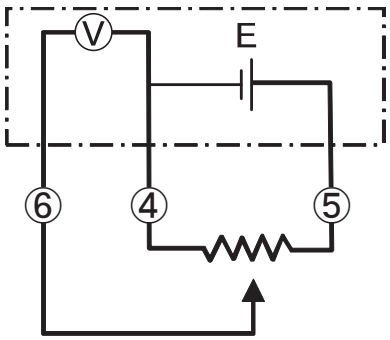
(Model VY511_J)



Note: Controller that receives voltage between the terminals 4 and 6 as feedback signal is recommended to connect.

Figure 8

Recommended controller circuit



Note: If a third-party's controller is used combining with the product, the controller in above is to be used.

⬚: Recommended controller circuit
E: Voltage supplied by the controller
Ⓥ: Voltage between 4 and 6.

Figure 9

● Nominal 135 Ω resistance input

(Model VY512_J)

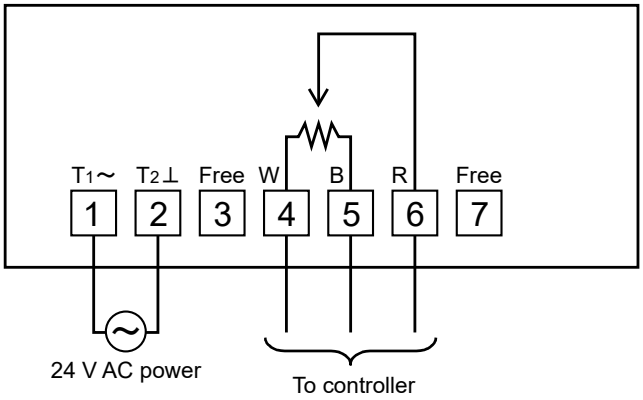
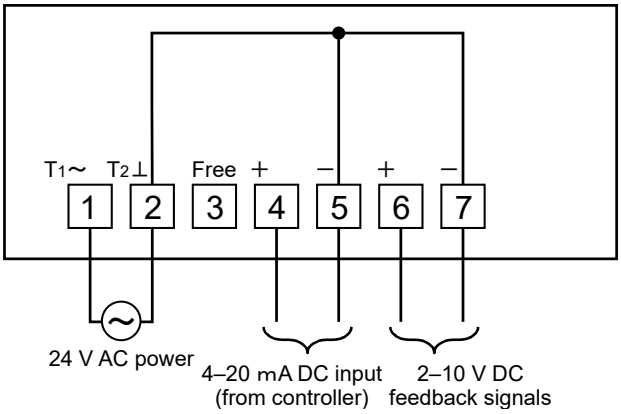


Figure 11

● 4–20 mA DC input

(Model VY513_J)

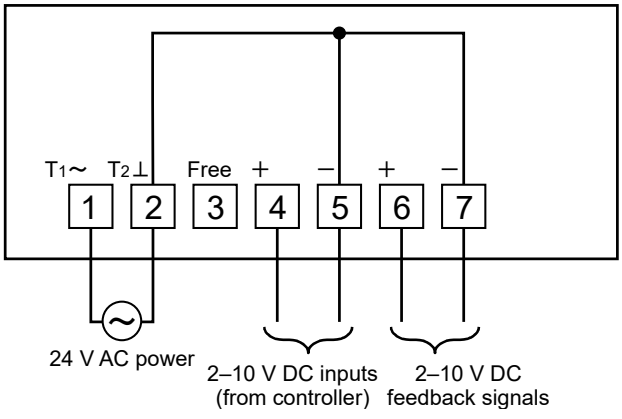


Note: The terminal 2 (power), terminal 5 (4–20 mA DC input), and terminal 7 (2–10 V DC feedback signal) are internally connected.

Figure 12

● 2–10 V DC input

(Model VY514_J)

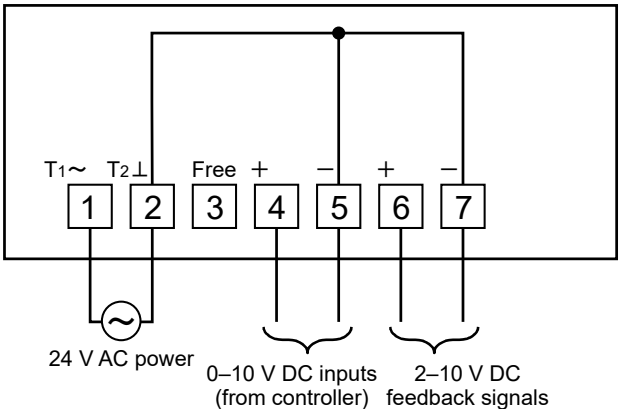


Note: The terminal 2 (power), terminal 5 (2–10 V DC input), and terminal 7 (2–10 V DC feedback signal) are internally connected.

Figure 10

● 0–10 V DC input

(Model VY515_J)



Note: The terminal 2 (power), terminal 5 (0–10 V DC input), and terminal 7 (2–10 V DC feedback signal) are internally connected.

Figure 13

■ Wiring Examples

● **Nominal 135 Ω feedback potentiometer**

(Model VY511_J)

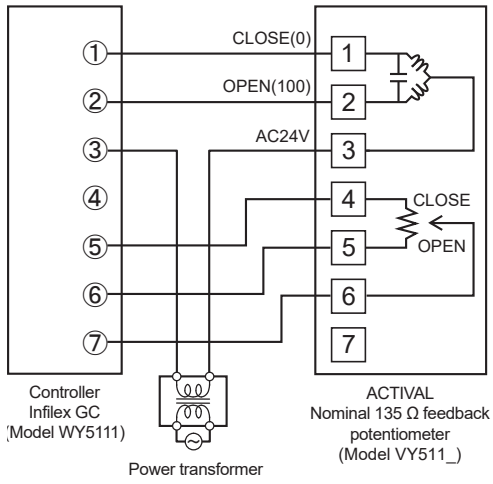


Figure 14. Connection to Infilex GC

● **Nominal 135 Ω resistance input**

(Model VY512_)

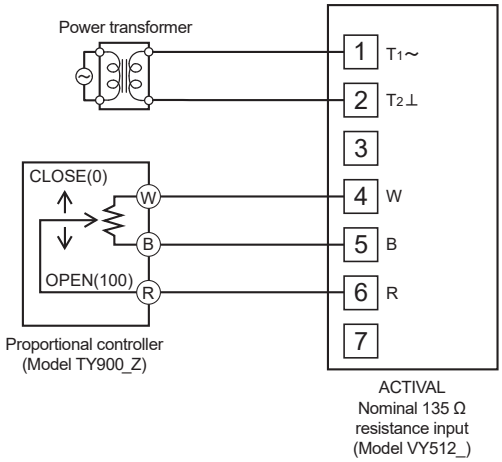
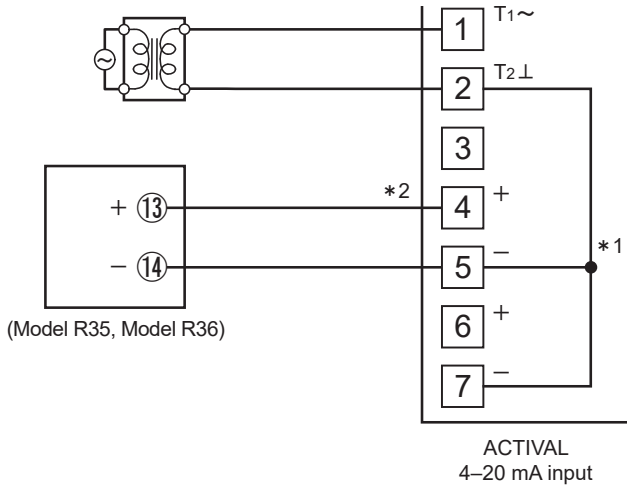


Figure 15. Connection to Neostat

● **4–20 mA DC input**

(Model VY513_)



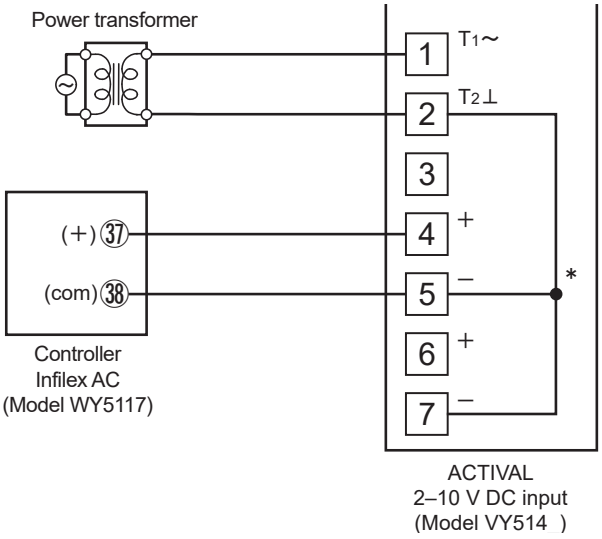
*1 The terminal 2 (power), terminal 5 (4–20 mA DC input), and terminal 7 (2–10 V DC feedback signal) are internally connected.

*2 Input impedance of 4–20 mA DC input of the actuator is 100 Ω. 4–20 mA DC input is not isolated. Install the power transformer separately.

Figure 16. Connection to R-series

● **2–10 V DC input**

(Model VY514_)



* Terminals 2, 5, and 7 are internally connected.

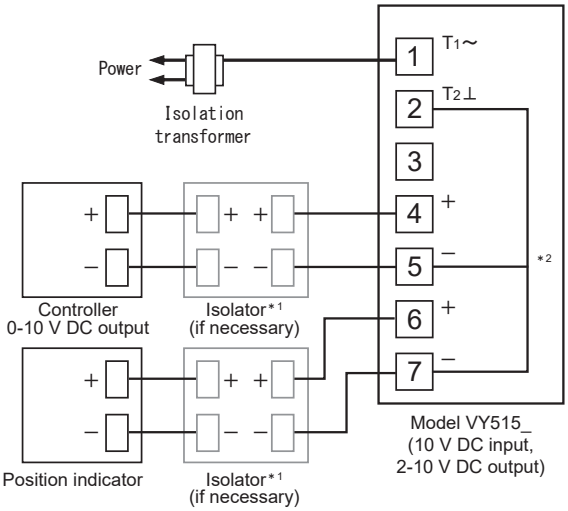
Note: Do not implement a daisy chain wiring passing through the actuator's power terminals.

Figure 17. Connection to Infilex AC

- **0–10 V DC input**

(Model VY515_)

Single [ACTIVAL + a third-party controller with 0–10 V DC output + transformer)



*1 Connect an internally isolated device (e.g., position indicator). Or, if the terminals of a device (e.g., position indicator) are unknown or not isolated inside, isolate between the ACTIVAL and the device.
Otherwise, a loop is formed for the common line and can damage the circuit of ACTIVAL.

*2 The terminals 2, 5, and 7 of the actuator are internally connected.

Notes

1. If the position indicator/controller is not isolated inside, provide an isolator. If isolated, an isolator is not required.
2. For power supply, provide an isolation transformer.
3. If the power supply voltage of the controller is 24 V AC (same as ACTIVAL) AND the controller is internally isolated, transformer for the ACTIVAL can be shared with the controller.

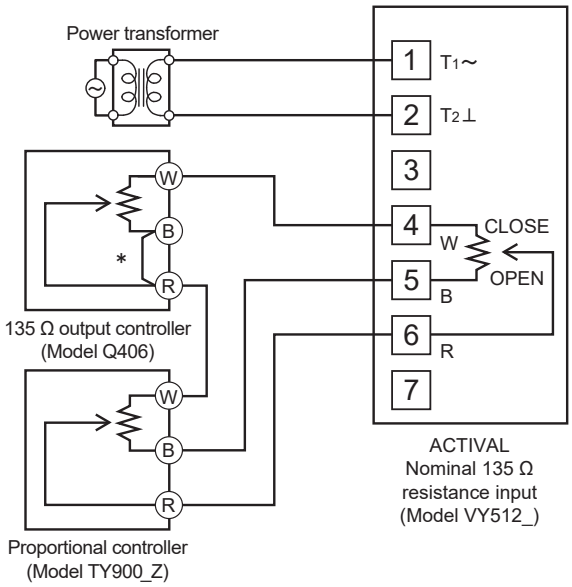
Figure 18

■ Advanced Wiring Examples

● Nominal 135 Ω resistance input

(Model VY512_)

Minimum opening setting



In addition to the proportional controller, by adding the setting device of 135 Ω output, the minimum opening of the actuator can be set within the range of 0 to 50 % (approximately).

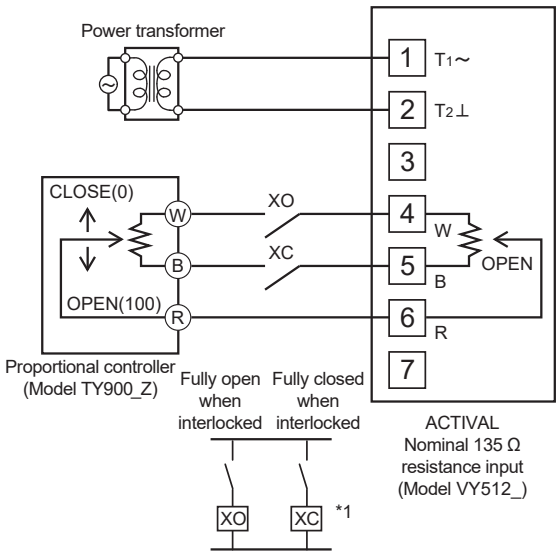
* Connect between (R) and (B) with a jumper.

Note: In an abnormal condition (such as disconnection in the actuator, an abnormal input signal, failure of the feedfeedback potentiometer due to its product service life), the minimum opening position cannot be maintained.

Avoid instrumentation that may cause secondary damage in case of abnormality.

Figure 19

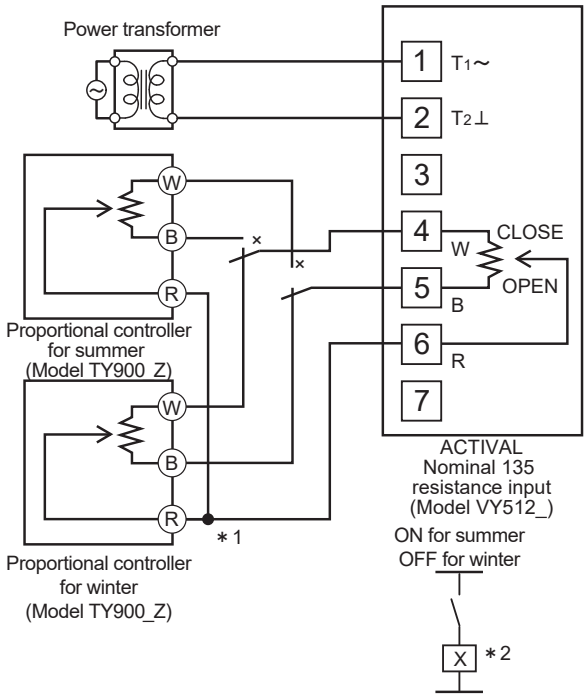
Using relay, interlock



*1 When XO, XC, or both XO and XC is (are) open, the valve position becomes 100 %, 0 %, or 0 % respectively.

Figure 20

Summer-winter changeover



*1 Directly wire between (R) and (R).

*2 The current among W, B, and R is 5 mA or more.

Figure 21

● **4–20 mA DC input**

(Model VY513_)

Precautions

● Power transformer is shared

If a power transformer is shared by two products, connect the terminal 1 of each actuator to the transformer with the same polarity. Connect the terminal 2 in the same way.

It the terminals are connected with different polarities, the product may break down (see figure 23).

● Control signals are shared for 4–20 mA DC input

The 4–20 mA DC input signals of this product are not isolated from the power.

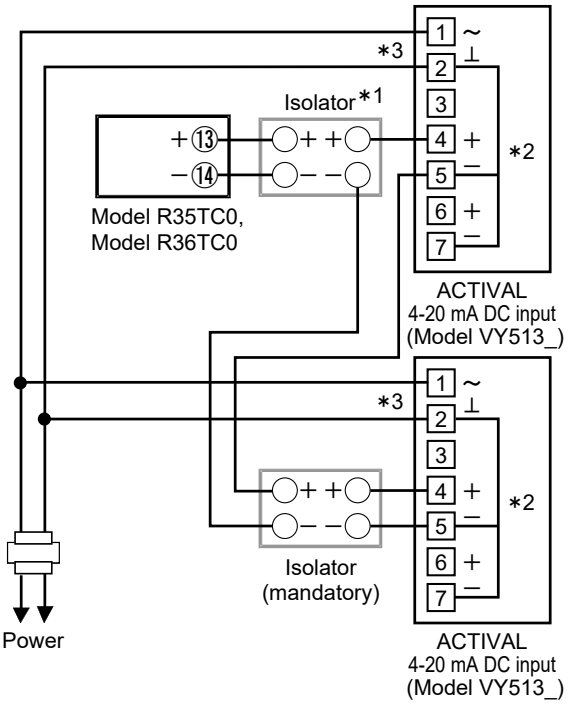
And, the input impedance of 4–20 mA DC signals is 100 Ω. The relations among the input impedance of the product, the output load resistance of the controller, and the output load resistance and input impedance of an isolator (if necessary) must meet the following formula.

'Applicable load resistance' > 'Total of input impedance'

If two products are operated by one controller, configure the system referring to figure 24 for two individual transformers, figure 22 for a shared transformer. To share a power transformer, install an isolator to the 4–20 mA DC input terminals of the second product. Otherwise, the product will malfunction.

Input signals and power are shared

*1 Provide an isolator for the controller that is not internally isolated.

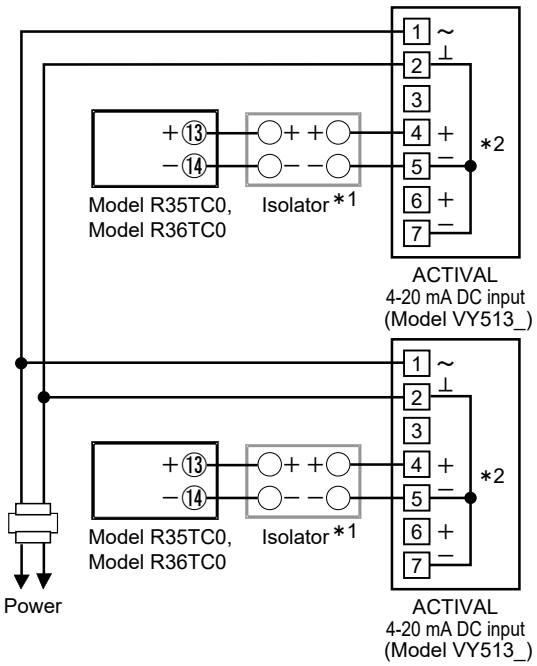


*2 Terminals 2, 5, and 7 are internally connected.

*3 Refer to notes under "Power transformer is shared."

Figure 22

Power is shared

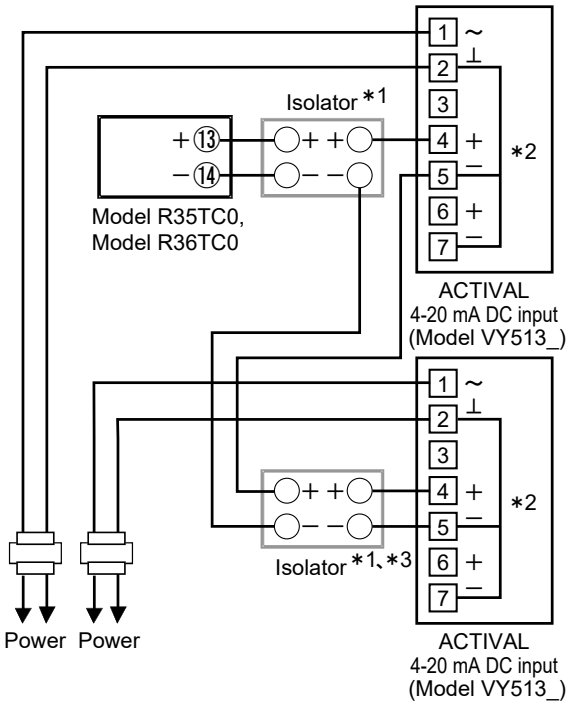


*1 Provide an isolator for the controller that is not internally isolated.

*2 Terminals 2, 5, and 7 are internally connected.

Figure 23

Input signals are shared



*1 Provide an isolator for the controller that is not internally isolated.

*2 Terminals 2, 5, and 7 are internally connected.

*3 Provide an isolator if no isolator is provided to the 4–20 mA DC input of the first actuator AND the applicable load resistance of controller is less than 200 Ω.

Figure 24

- **2–10 V DC input**

(Model VY514_)

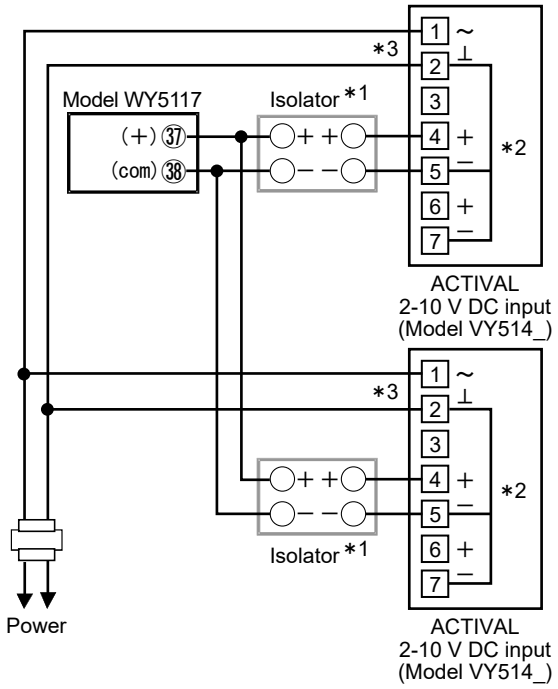
Precautions

- Power transformer is shared

If a power transformer is shared by two products, connect the terminal 1 of each actuator to the transformer with the same polarity. Connect the terminal 2 in the same way.

It the terminals are connected with different polarities, the product may break down (see figure 25).

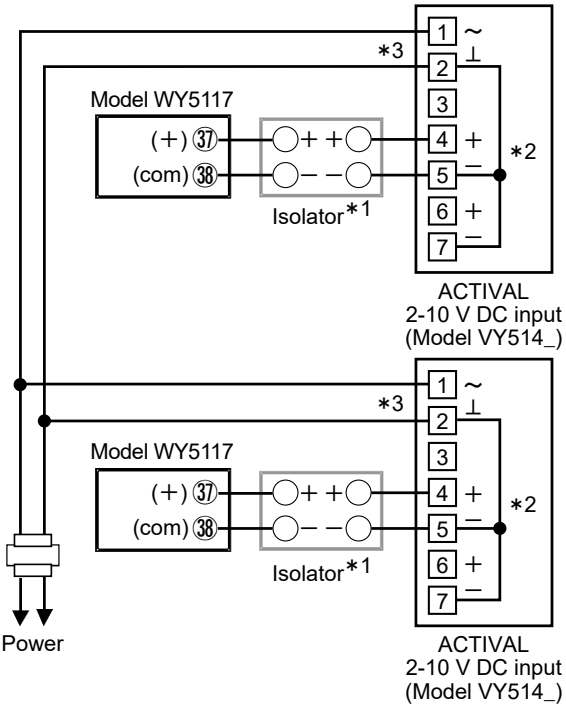
Input signals and power are shared



*1 Provide an isolator for the controller that is not internally isolated.
*2 Terminals 2, 5, and 7 are internally connected.
*3 Refer to notes under “Power transformer is shared.”

Figure 25

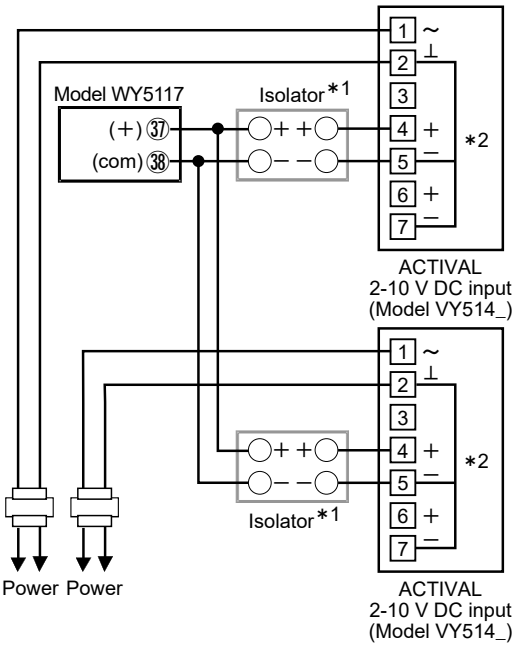
Power is shared



*1 Provide an isolator for the controller that is not internally isolated.
*2 Terminals 2, 5, and 7 are internally connected.
*3 Refer to notes under “Power transformer is shared.”

Figure 26

Input signals are shared

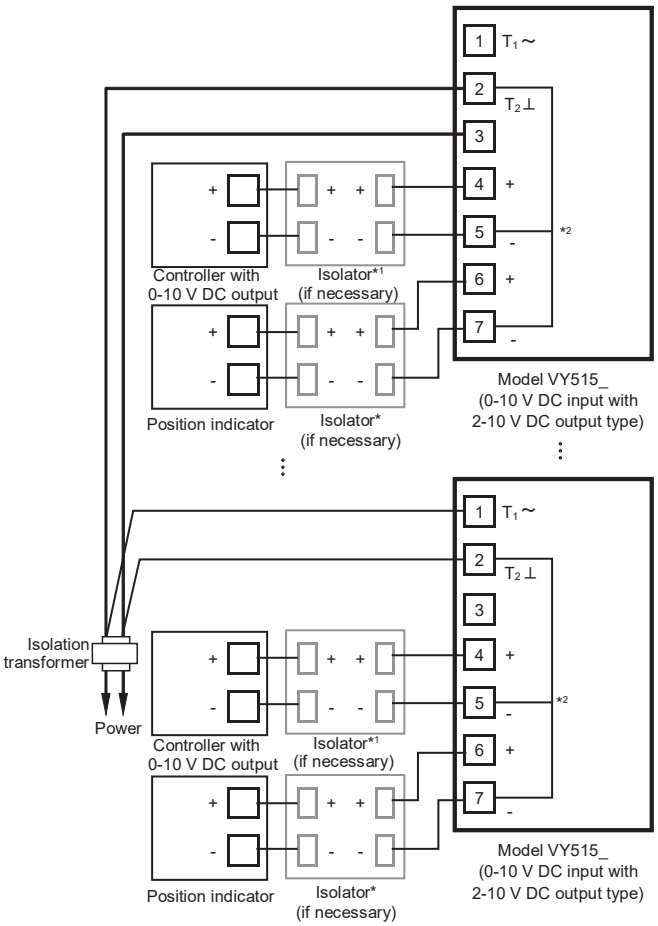


*1 Provide an isolator for the controller that is not internally isolated.
*2 Terminals 2, 5, and 7 are internally connected..

● **0-10 V DC input)**

(Model VY515_)

Multiple [ACTIVAL + third-party controller with 0-10 V DC output] + single transformer



*1 Connect an internally isolated device (e.g., controller, position indicator). Or, if the terminals of a device (e.g., controller, position indicator) are unknown or not isolated inside, isolate between the ACTIVAL and the device.
Otherwise, a loop is formed for the common line and can damage the circuit of ACTIVAL.

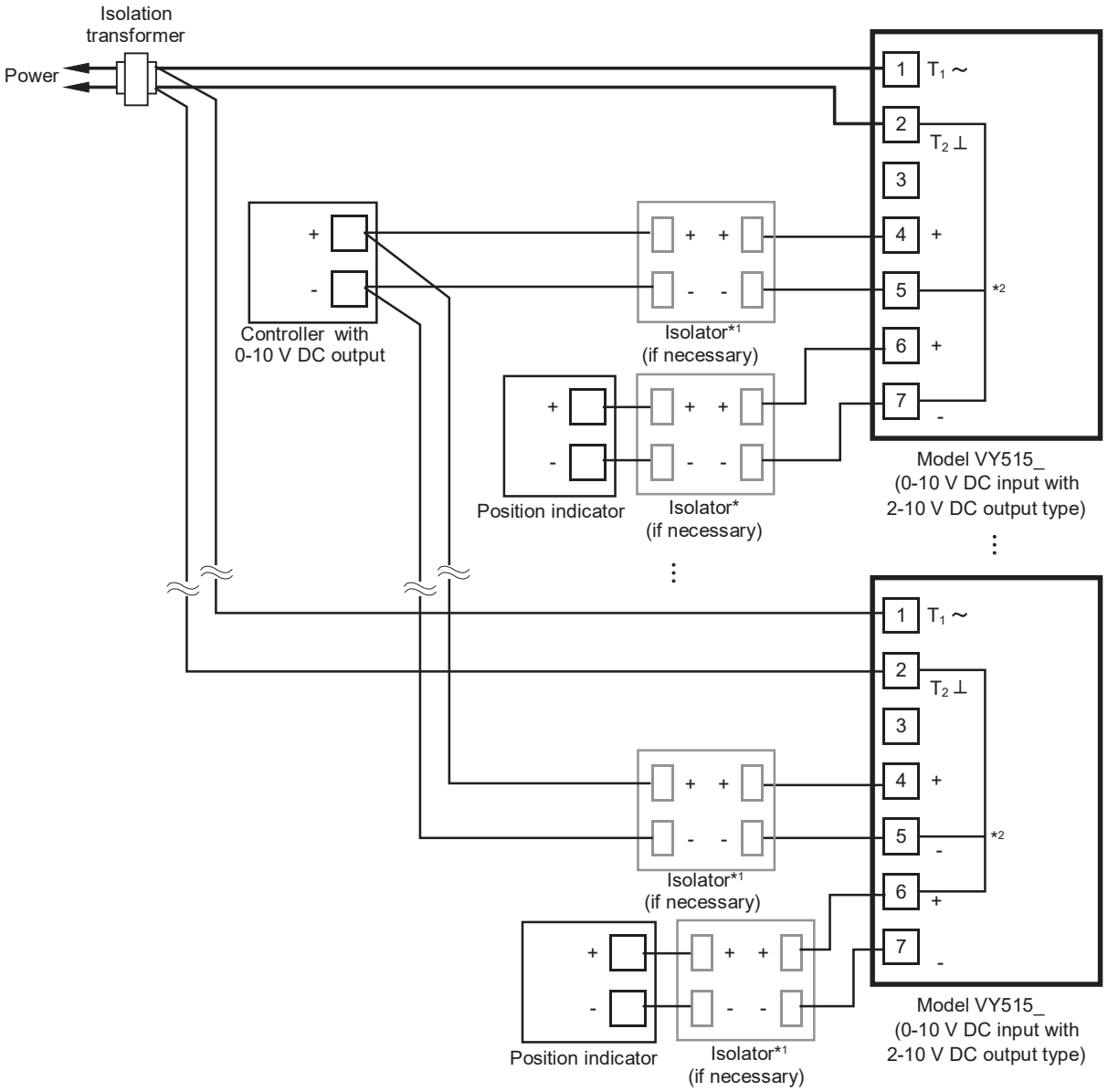
*2 Terminals 2, 5, and 7 are internally connected.

Notes

1. If the position indicator/controller is not isolated inside, provide an isolator. If isolated, an isolator is not required.
2. For power supply, provide an isolation transformer.
3. Connect the lines from the terminal 1 of each ACTIVAL to the transformer terminal with the same polarity. Connect the lines from the terminal 2 of each ACTIVAL the same way.
4. Do not pass the power supply line to another device through the terminals of ACTIVAL
5. If the power supply voltage of the controller is 24 V AC (same as ACTIVAL) AND the controller is internally isolated, transformer for the ACTIVAL can be shared with the controller.

Figure 28

Multiple ACTIVAL + single third-party controller with 0-10 V DC output + single transformer



*1 Connect an internally isolated device (e.g., controller, position indicator). Or, if the terminals of a device (e.g., controller, position indicator) are unknown or not isolated inside, isolate between the ACTIVAL and the device.
Otherwise, a loop is formed for the common line and can damage the circuit of ACTIVAL.

*2 Terminals 2, 5, and 7 are internally connected.

Notes

1. If the position indicator/controller is not isolated inside, provide an isolator. If isolated, an isolator is not required.
2. For power supply, provide an isolation transformer.
3. Connect the lines from the terminal 1 of each ACTIVAL to the transformer terminal with the same polarity. Connect the lines from the terminal 2 of each ACTIVAL the same way.
4. Do not pass the power supply line to another device through the terminals of ACTIVAL
5. If the power supply voltage of the controller is 24 V AC (same as ACTIVAL) AND the controller is internally isolated, transformer for the ACTIVAL can be shared with the controller.

Figure 29

ACTIVAL × 2 + single third-party controller (0-10 V DC output)+ single transformer shared with controller (System common wiring)

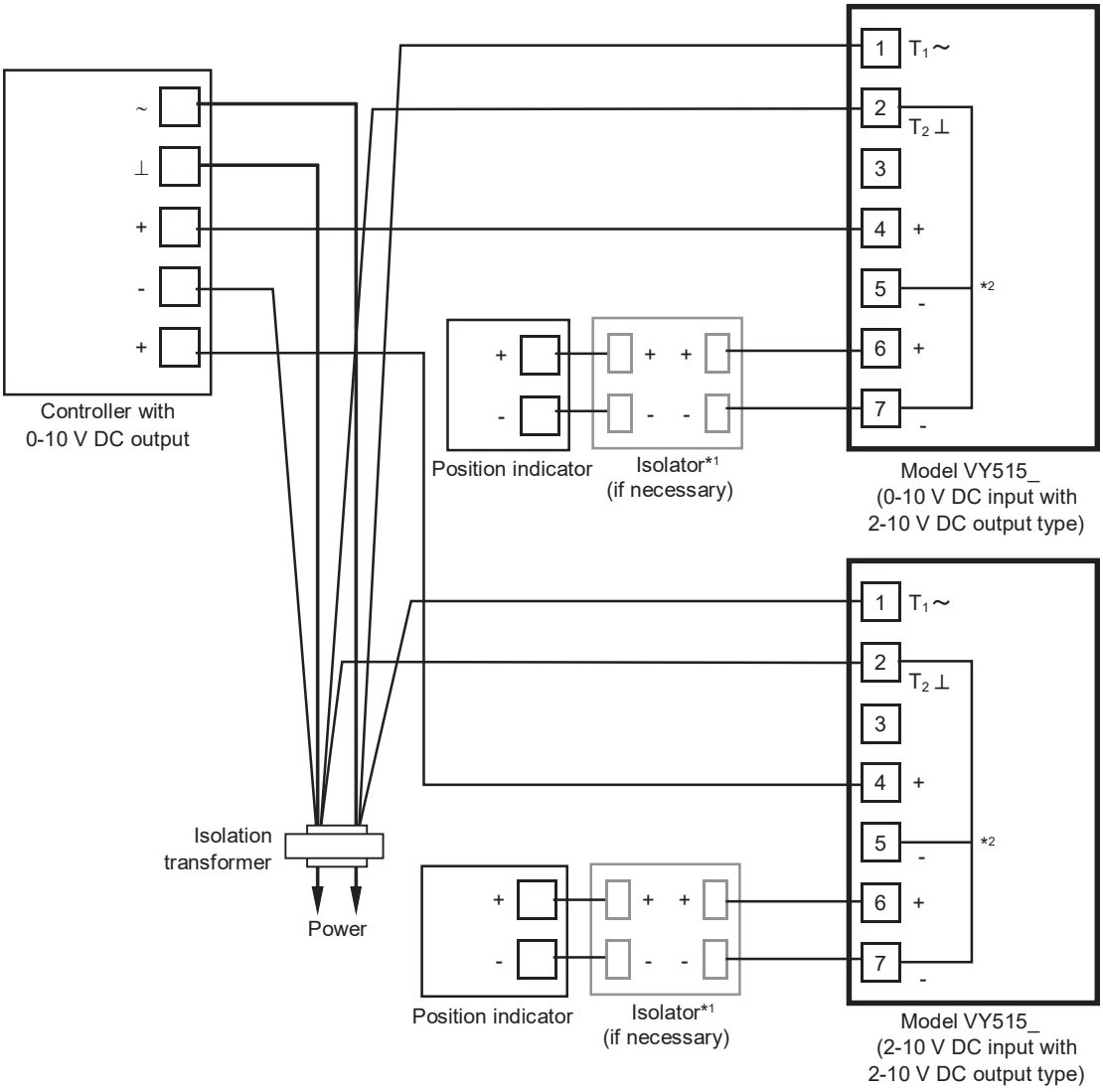


Figure 27. Connection example (4): Model VY515_J to Model WY5117

*1 Connect an internally isolated device (e.g., controller, position indicator). Or, if the terminals of a device (e.g., controller, position indicator) are unknown or not isolated inside, isolate between the ACTIVAL and the device.
Otherwise, a loop is formed for the common line and can damage the circuit of ACTIVAL.

*2 Terminals 2, 5, and 7 are internally connected.

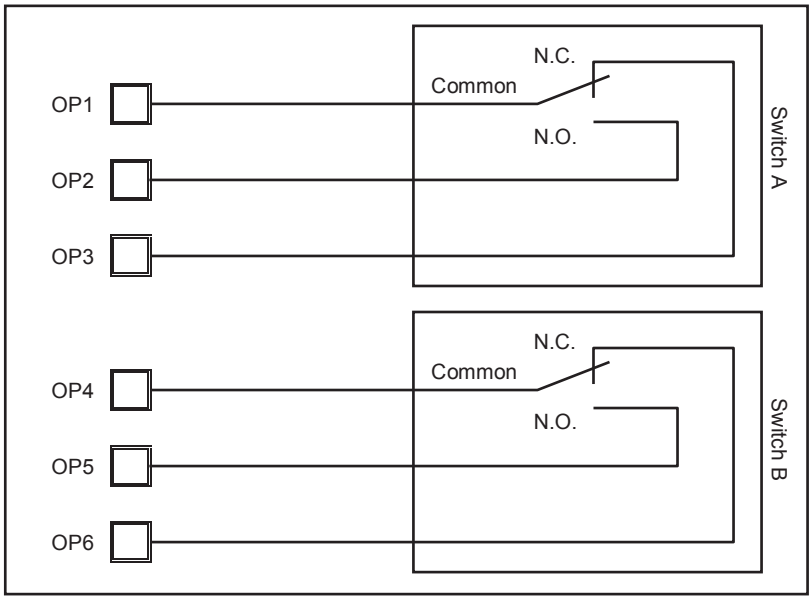
Notes

1. If the position indicator/controller is not isolated inside, provide an isolator. If isolated, an isolator is not required.
2. For power supply, provide an isolation transformer.
3. Connect the lines from the terminal 1 of each ACTIVAL to the transformer terminal with the same polarity. Connect the lines from the terminal 2 of each ACTIVAL the same way.
4. Do not pass the power supply line to another device through the terminals of ACTIVAL
5. If the power supply voltage of the controller is 24 V AC (same as ACTIVAL) AND the controller is internally isolated, transformer for the ACTIVAL can be shared with the controller.
6. System common wiring (All of the above constraints must be satisfied for System common wiring.):
   As shown in Fig. 27, the transformer for ACTIVAL is shared with the controller, and the ground line (⊥) is used as the common line (-). Thus, common line between ACTIVAL and the controller is omitted.

Figure 30

■ Internal Connection of Auxiliary Switch / Auxiliary Potentiometer

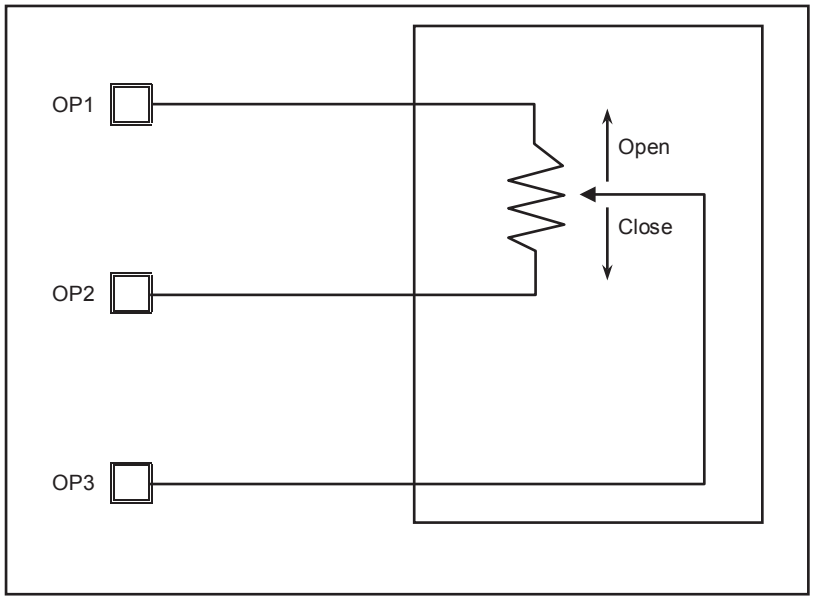
● **Auxiliary switch Part No. 83174063-101**



Switches A and B actuating position: Adjustable between 0 % (fully closed) and 100 % (fully open)

Figure 31. Internal connection of auxiliary switch

● **Auxiliary potentiometer Part No. 83165275-001**



Potentiometer operating position: 0 % (fully closed) to 100 % (fully open)

Figure 32. Internal connection of auxiliary potentiometer

■ Maintenance

⚠ CAUTION
Do not put a load or weight on this product. Doing so may damage the product.
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.
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.

- Manually open/close the ACTIVAL at least once a month if it is left in inactive state for a long period.
- Inspect the ACTIVAL 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 Azbil Corporation near you.

Table 2. 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
Routine inspection	Any time	• Fluid leakage to the outside • Abnormal noise and vibration • Unstable open/close operation • Valve hunting

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.
The auxiliary switch does not operate.	Auxiliary switch (cam switch) condition Loosened terminals Wiring condition / disconnected wires	Redo the cam switch setting. Tighten the terminals. Check the wiring.
The auxiliary potentiometer does not operate.	Condition of resistance Loosened terminals Wiring condition / disconnected wires	Check the resistance value (1 kΩ). Tighten the terminals. Check the wiring.
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.
Voltage/current input signal disagrees with the feedback output signal.	—	To completely shut off the valve, valve open and close (0-100% position) operation is controlled by 10-90 % range of actuator voltage/current input signal. Voltage/current input signal therefore disagrees with the feedback signal, and this is not an error.

■ Disposal

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

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AB-7057
Rev. 6.0 Jul. 2020
(J: AI-7057MJ Rev.0.0)