

# ACTIVAL™

## Motorized Two-Way Valve with Flanged-End Connection (PN16 / GG-20) (Spring Return Type Actuator)

### ■ Overview

ACTIVAL™ Models VY51X8K and VY51X8H are series of motorized two-way valves with flanged-end connection. 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. Since the actuator fully closes the valve in case of power failure, it is suitable for failsafe application.

5 kinds of control signals are available to operate ACTIVAL.

1. Nominal 135 Ω feedback potentiometer (built-in):  
Provides proportional control in combination with a DDC controller (e.g., Inflex™ GC Model WY5111).
2. Nominal 135 Ω resistance input:  
Provides proportional control in combination with a proportional controlled electric controller (e.g, Neostat Model TY900XZ, Model TY9800).
3. 4-20 mA DC input:  
Provides proportional control in combination with a DDC controller (e.g., Inflex™ GC Model WY5111, Model R35/R36).
4. 2-10 V DC input:  
Provides proportional control in combination with a DDC controller (e.g., Inflex™ AC Model WY5117).
5. 0-10 V DC input:  
Provides proportional control in combination with a DDC controller.

\* DDC: Direct Digital Control

### IMPORTANT:

To control ACTIVAL with a third-party controller, please consult with Azbil Corporations' sales personnel.



### ■ Features

- Compact and lightweight:  
Rotary motor actualizes small body and light weight.
- Valve and actuator integrated in a single unit:  
Pre-assembled body requires no adjustment.
- A variety of control signals available:
  - Nominal 135 Ω feedback potentiometer
  - Nominal 135 Ω resistance input
  - 4-20 mA DC input
  - 2-10 V DC input
  - 0-10 V DC input
- Valve applicable to high differential pressure, with large Cv value, wide rangeability, and low leakage.
- Durable actuator with low power consumption.
- Equal percentage flow characteristic.
- 2-10 V DC output (for position feedback) available with 4-20 mA DC input, 2-10 V DC input, and 0-10 V DC input types.
- Spring return actuator:  
Actuator automatically closes the valve in 0 % position in case that the power is down.
- CE Marking certified:  
ACTIVAL Model VY51 conforms to all the applicable standards of CE Marking.

\* Although our company name changed from Yamatake Corporation to Azbil Corporation on April 1, 2012, our former logo remains on this product.

## Safety Precautions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby for quick 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.

### ■ Warnings and Cautions

 <b>WARNING</b>	Alerts users that improper handling may cause death or serious injury.
 <b>CAUTION</b>	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 removing the actuator, fully close the valve. If you try to remove the actuator without fully closing the valve, the actuator may suddenly rotate and cause an injury.



Do not disassemble the spring unit.

The spring may fly out of the unit and cause an injury.

### 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.



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.

**IMPORTANT:**

To control ACTIVAL with a third-party controller, please consult with Azbil Corporations' sales personnel.

**■ Model Numbers**

Model VY51X8K00XX/VY51X8H00XX is the model for the valve and actuator integrated into a single unit. The model number label is attached to the yoke. The control signal is indicated on the actuator label and on the wiring diagram label, as shown below.

Nominal 135 $\Omega$ feedback potentiometer:	F.B. Pot
Nominal 135 $\Omega$ resistance input:	135 $\Omega$
4-20 mA DC input:	4-20 mA
2-10 V DC input:	2-10 V
0-10 V DC input:	0-10 V

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 $\Omega$ feedback potentiometer
	2					Nominal 135 $\Omega$ 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
		8				PN16 / GG-20
			K			IEC IP54 protected and standard torque type spring return actuator with terminal block (Mountable valve sizes: DN15 to DN80)
			H			IEC IP54 protected and standard torque type spring return actuator with terminal block for high differential pressure application (Mountable valve sizes: DN65 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

Note: For DN65 and DN80 valves to control chilled/hot water or high-temperature water, Models VY51X8H0061 and VY51X8H0081 (for high differential pressure application) are applicable. (Model VY51X8K0061 or VY51X8K0081 is not applicable.)

## ■ Specifications

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

### ● Valve specifications

Item	Specification				
Model	Two-way valve with flanged-end connection, proportional control				
Body pressure rating	PN16 (Max. working pressure:1.6 MPa)				
End connection	Flanged-end, PN16 (equivalent to ISO 7005-2: 1988)				
Size, Cv, Close-off ratings  Note: Close-off ratings of the actuator in combination are shown on the right. Practical close-off rating required for the valve controlling 175 °C steam is 0.8 MPa.	Model number	Nominal size	Cv	Close-off ratings	
				Steam	Chilled/hot water High-temperature water
	VY51X8K0011	DN15 (1/2")	1.0	1.0 MPa	1.0 MPa
	VY51X8K0012	DN15 (1/2")	2.5	1.0 MPa	1.0 MPa
	VY51X8K0013	DN15 (1/2")	6.0	1.0 MPa	1.0 MPa
	VY51X8K0014	DN15 (1/2")	1.6	1.0 MPa	1.0 MPa
	VY51X8K0015	DN15 (1/2")	4.0	1.0 MPa	1.0 MPa
	VY51X8K0021	DN25 (1")	10	1.0 MPa	1.0 MPa
	VY51X8K0022	DN25 (1")	16	1.0 MPa	1.0 MPa
	VY51X8K0041	DN40 (1 1/2")	25	1.0 MPa	1.0 MPa
	VY51X8K0042	DN40 (1 1/2")	40	1.0 MPa	1.0 MPa
	VY51X8K0051	DN50 (2")	65	1.0 MPa	1.0 MPa
	VY51X8K0061	DN65 (2 1/2")	95	0.3 MPa	—
	VY51X8K0081	DN80 (3")	125	0.1 MPa	—
	VY51X8H0061	DN65 (2 1/2")	95	1.0 MPa	0.7 MPa
	VY51X8H0081	DN80 (3")	125	0.7 MPa	0.4 MPa
Materials	Body	Gray cast iron (GG-20)			
	Plug, stem	Stainless steel			
	Seat ring	Heat-resistant PTFE			
	Gland packing	Inorganic fiber			
	Gasket	Non-asbestos joint sheet			
Applicable fluid	Chilled/hot water, high-temperature water, steam				
Allowable fluid temperature	0 °C to 175 °C (Non-freezing)				
Flow characteristic	Equal percentage				
Rangeability	100 : 1				
Seat leakage	0.01 % of rated Cv value (0.0006 Cv or less for DN15 model)				
Paint	Gray				
Actuator to be combined	Integrated with the valve				

### ● Actuator specifications

(1/2)

Item	Specification
Power supply	24 V AC $\pm$ 15 %, 50 Hz/60 Hz
Type	Spring return actuator for standard and high differential pressure application
Power consumption	Nominal 135 $\Omega$ feedback potentiometer type (Model VY511X8): 13 VA Nominal 135 $\Omega$ resistance input type (Model VY512X8), 4-20 mA DC input type (Model VY513X8), 2-10 V DC input type (Model VY514X8), 0-10 V DC input type (Model VY515X8): 15 VA
Timing	63 $\pm$ 5 sec (50 Hz) / 53 $\pm$ 5 sec (60 Hz) Return time: 3 to 40 seconds (Fully open $\rightarrow$ fully close operation)
Control signal input	- Nominal 135 $\Omega$ feedback potentiometer (Total resistance: Nominal 135 $\Omega$ , Max. applied voltage: 5 V DC) - Nominal 135 $\Omega$ resistance input - 4 mA DC to 20 mA DC input (Input impedance: 100 $\Omega$ ) * Input impedance fluctuates depending on temperature and other environmental conditions. Therefore, a controller with 200 $\Omega$ or higher allowable load resistance is recommended. - 2 V DC to 10 V DC input (Input impedance: 150 k $\Omega$ or higher) * A controller with 100 k $\Omega$ or lower allowable load resistance is recommended. - 0 V DC to 10 V DC input (Input impedance: 150 k $\Omega$ or higher) * A controller with 100 k $\Omega$ or lower allowable load resistance is recommended.
Feedback signal output (only with 4-20 mA DC input, 2-10 V DC input, 0-10 V DC input types)	Range: 2 V DC (0 % position) to 10 V DC (100 % position) Allowable load resistance: 10 k $\Omega$ or higher (Max. output current: 1mA)

Item	Specification	
Materials	Case	Cast aluminum alloy
	Top cover, terminal cover	Polycarbonate resin (Color: gray)
	Yoke	Steel plate
	Case of the spring unit	Cast aluminum alloy
	Cover of the spring unit	Cast aluminum alloy
	Spring	Stainless steel
Surface finishing	Case	None
	Yoke	Electro-galvanized (Bright chromate finish)
Valve 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 front, rear, and bottom sides.	
Manual operation	Not available.	
Wires connection	M3.5 screw terminal connection	
Enclosure rating	IEC IP54 (dust-proof and splash-proof)	
Insulation resistance	Between terminal and case: 5 MΩ or higher at 500 V DC	
Dielectric strength	Between terminal and case: 500 V AC/min with 1 mA or less leakage current	
Service life of spring return operation	30,000 operations	

### ● Valve and actuator (as a single unit) specifications

Item	Specification		
Environmental conditions	Rated operating condition	Limit operating condition	Transport/storage conditions (packaged* <sup>2</sup> )
	Ambient temperature* <sup>1</sup>	-20 °C to 60 °C	-20 °C to 70 °C
	-20 °C to 50 °C (Fluid temperature 0 °C to 150 °C)		
	-20 °C to 40 °C (Fluid temperature 150 °C to 175 °C)		
Ambient humidity	5 %RH to 95 %RH		
Vibration	4.9 m/s <sup>2</sup> (10 Hz to 150 Hz)	9.8 m/s <sup>2</sup> (10 Hz to 150 Hz)	19.6 m/s <sup>2</sup> (10 Hz to 150 Hz)
Notes: *1 Do not allow the fluid to freeze. *2 Actuator shall be packed during transport and storage. <div style="text-align: center;"> <p>Ambient temperature (°C)</p> <p>Fluid temperature (°C)</p> </div>			
Installation locations	Indoor / outdoor (Keep away from direct sunlight.) Note: Salt air, corrosive gas, flammable gas, and organic solvent must be avoided.		
Installation orientation	Installable in any position ranging from upright to sideways (90° tilted.) * Always install in upright position outdoors.		
Position for shipment	0 % (fully closed) preset at factory.		

### ● Options

For options, separate order is required.

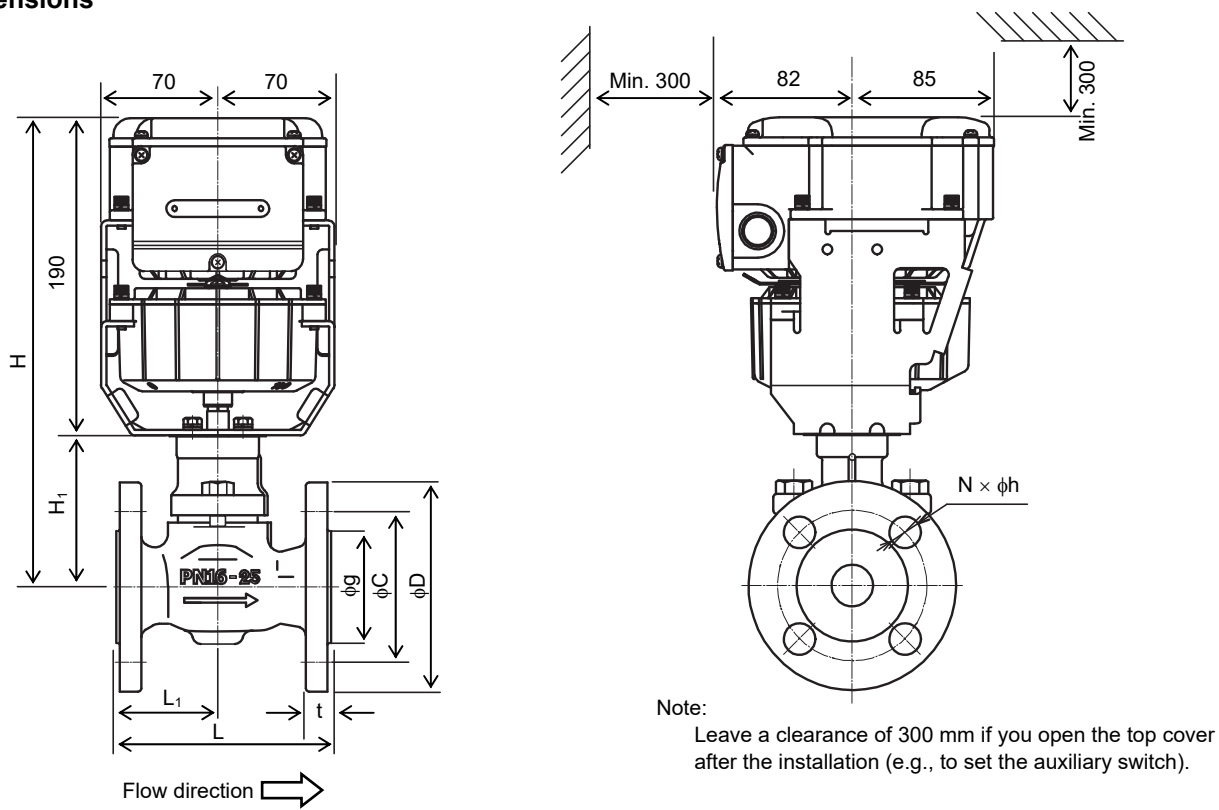
Item	Specification
Seal connector (Part No. 83104346-003)	Applicable wire size: φ7 mm to φ9 mm (Seal connector is necessary for IEC IP54 protection.)
Auxiliary switches* <sup>1</sup> (Part No. 83174063-101)	Number of switches: 2 (SW A and SW B) Maximum applied voltage/current: 30 V DC / 100 mA* <sup>2</sup> DC (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* <sup>1</sup> (Part No. 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

Notes:

\*1 Either the auxiliary switch or auxiliary potentiometer can be added, but not both.

\*2 If the applied current exceeds 100 mA, please contact Azbil Corporation.

■ Dimensions



Model VY51X8K00XX

Model number	Valve size (DN)	H (mm)	H <sub>1</sub> (mm)	L (mm)	L <sub>1</sub> (mm)	t (mm)	φC (mm)	φD (mm)	φg (mm)	φh (mm)	N	Weight (kg)
VY51X8K001X	15	265	75	108	50	16	65	95	46	14	4	6.6
VY51X8K002X	25	280	90	127	60	18	85	115	65	14	4	8.6
VY51X8K004X	40	293	103	165	82.5	20	110	150	84	19	4	12.0
VY51X8K0051	50	297	107	178	89	20	125	165	99	19	4	13.5
VY51X8K0061	65	314	124	190	90	22	145	185	118	19	4	18.0
VY51X8K0081	80	315	125	203	100	22	160	200	132	19	8	20.5

Model VY51X8H00X1

Model number	Valve size (DN)	H (mm)	H <sub>1</sub> (mm)	L (mm)	L <sub>1</sub> (mm)	t (mm)	φC (mm)	φD (mm)	φg (mm)	φh (mm)	N	Weight (kg)
VY51X8H0061	65	314	124	190	90	22	145	185	118	19	4	18.5
VY51X8H0081	80	315	125	203	100	22	160	200	132	19	8	20.5

Figure 1. Dimensions and maintenance clearance (mm): Models VY51X8K00XX, VY51X8H00X1

## ■ Parts Indication

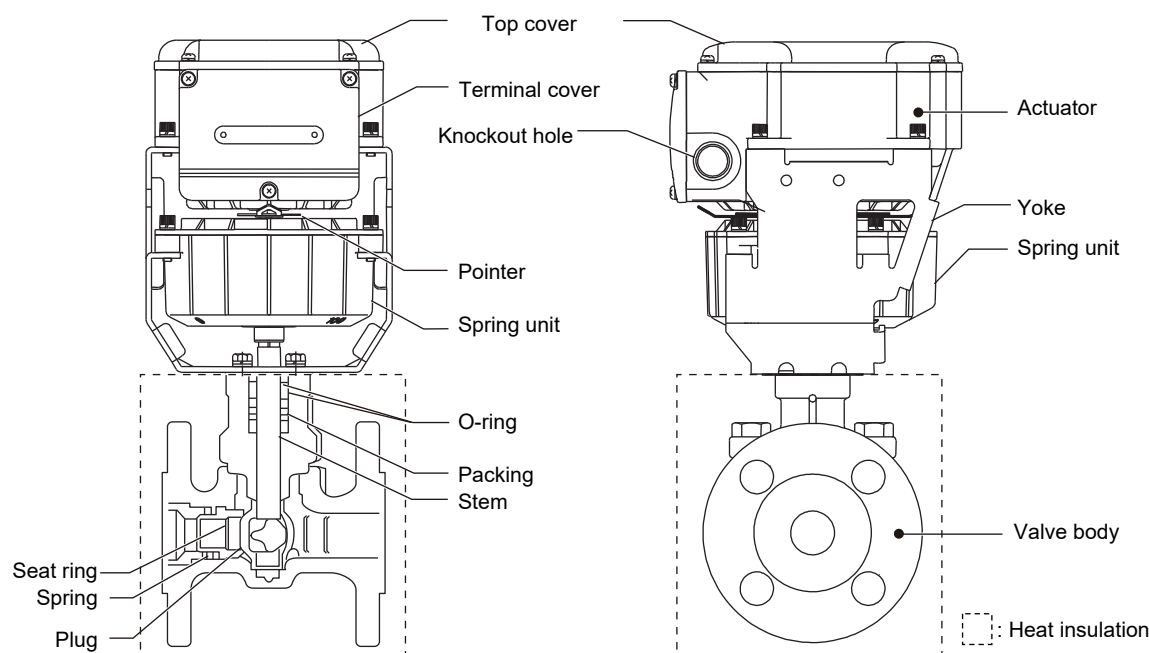


Figure 2. Parts identification

## ■ 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.



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.

## ● Precautions for installation

- ACTIVAL Model VY51X8K/VY51X8H is the valve and actuator integrated into a single unit. Do not combine the valve with any other actuator, or do not combine the actuator with any other valve.
- To remove foreign substances inside the pipes, install a strainer with 40 or more meshes (with 80 or more meshes recommended for steam control) on the inflow side of each valve. In case that the strainers cannot be installed on the inflow side of each valve, install it on the pipe diverting sections (sections diverting from main piping system to sub piping system).
- Install the valve so that the flow direction of process fluid agrees with the arrow indicated on the valve body.

## ● Installation location

### IMPORTANT:

- The top and the terminal covers might be corroded by chemicals and organic solvent or their vapor. Do not expose the ACTIVAL to such substances/vapor.
- When the ACTIVAL is used for steam humidifying, install a valve interlocking with air-conditioning unit on the inflow side in case the ACTIVAL gets damaged.
- Although the ACTIVAL can be used in high humidity environments (max. 95 %RH), do not immerse the actuator in water.
- Although the ACTIVAL can be used outdoors, be sure not to expose the ACTIVAL to direct sunlight.
- When the ACTIVAL is used for steam humidifying, set the high limit alarm of supply air temperature in case that the valve fails to properly operate. For critical piping system, in addition to the high limit alarm of supply air temperature, set the high and low limit alarms of humidity for AHU (air handling unit) operation, and install a valve interlocking with the AHU fan on the inflow side.

- Install the ACTIVAL in a position allowing easy access for maintenance and inspection. Fig. 1 show the minimum clearance for maintenance and inspection. When installing the ACTIVAL in a ceiling space, provide an access hole within the 50 cm radius of the ACTIVAL. And, place a drain pan under the valve.
- Do not install the ACTIVAL nearby a steam coil or a hot-water (in high temperature) coil. High heat radiation may result in an actuator malfunction.
- Do not mount the ACTIVAL on a pipe where water hammer occurs, or solid objects including slug may accumulate.

## ● Mounting position

The ACTIVAL can be mounted in any position ranging from upright to sideways (90° tilted). The ACTIVAL should be installed with its actuator vertically positioned above the valve body. (See Fig. 3.) However, the ACTIVAL must be installed always in upright position outdoors.

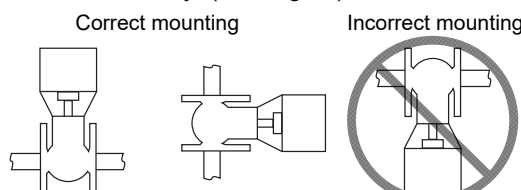


Figure 3. Actuator mounting position

## ● 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.

- Check that the model number of the product is what you ordered. The model number is shown on the label attached to the yoke.
- Install a bypass pipe and gate valves on the inflow, outflow, and bypass sides. Also, install a strainer (with 40 or more meshes for water control, 80 or more meshes for steam control recommended) on the inflow side.
- When installing the ACTIVAL to the pipes, do not allow any object, such as chips, to get inside a pipe or valve. Valve cannot fully close, or the valve seat may get damaged causing fluid leakage, due to an object jammed inside the valve.
- When piping, do not apply too much sealing material, such as solidifying liquid and tape, to the pipe connection sections so that these materials flow into the valve. Valve cannot fully closes, or the valve seat may get damaged causing fluid leakage, due to the sealing material jammed inside the valve.
- Before activating the ACTIVAL, flush the pipes (with the ACTIVAL installed) at the maximum flow rate to remove all the foreign substances. Fully open (100 % position) the ACTIVAL to flush. (Factory preset position: 0 %)

### ⚠ 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

Do not apply heat insulation to the actuator or to the yoke, as [ ] shows in Fig. 2. If the yoke and the actuator are covered with insulation material, the pointer cannot be checked and may be distorted.

### ● Factory preset position

The actuator shaft is positioned at 0% (in fully closed position) for shipment. The shaft is thus completely turned counterclockwise, and the pointer points at '0'. (See Fig. 4.)

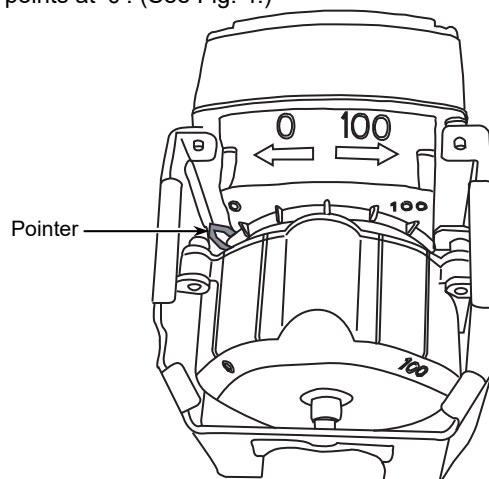


Figure 4. Pointer position for shipment

### ● Auxiliary switch / Auxiliary potentiometer (optional)

#### IMPORTANT:

- The auxiliary switch/potentiometer is installed on site. Refer to the instructions supplied with the auxiliary switch/potentiometer for installation.
- Do not open the top cover except when adjusting the auxiliary switch/potentiometer. Close the top cover instantly after adjusting the auxiliary switch/potentiometer.
- Do not put any load on the top cover.

### ■ Wiring

#### ⚠ CAUTION

- |   |   |
|---|---|
| ⚠ | Provide a circuit protector (e.g., a fuse or circuit breaker) for the power source.<br>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.<br>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.<br>Mistakes in installation or wiring may cause fire or electric shock. |
| ⚠ | Before wiring, be sure to turn off the power to this product.<br>Failure to do so may result in electric shock or device failure.   |
| ⚠ | All wiring must comply with applicable codes and ordinances.<br>Otherwise there is a danger of fire.  |
| ⚠ | Use crimp terminals with insulation for connections to the product terminals.<br>Failure to do so may cause short circuit leading to fire or device failure.  |
| ⚠ | Tighten the terminal screws with the specified torque.<br>Insufficient tightening of the terminal screws may cause fire or overheating.   |

**IMPORTANT:**

- The ACTIVAL 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 the ACTIVAL.
- For 2-10 V DC input, 0-10 V DC input, and 4-20 mA DC input types, make sure the polarity of the power supply and 2-10 V DC feedback output, referring to the wiring diagrams. Incorrect wiring may result in PCB (print circuit board) burnout.
- Do not connect 24 V AC power to the terminals 4 to 7 (terminals 4 to 6 for Model VY511).

**● Wiring procedure**

- 1) To lead the wires into the terminals, cut out a knockout hole for a wiring port. Two knockout holes ( $\phi 22$  mm) 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.

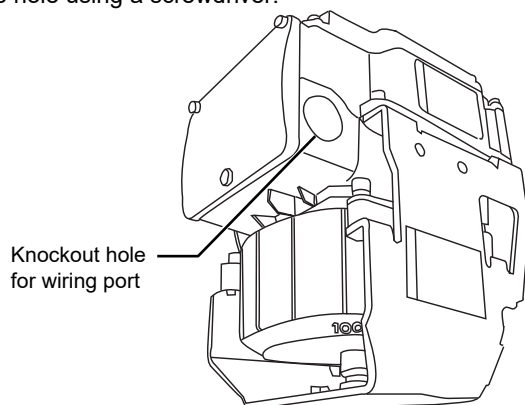


Figure 5. Knockout hole for wiring port

**IMPORTANT:**

- Do not leave any refuse including metal chips after cutting a knockout hole and after connecting the wires inside the actuator.

- 2) Unscrew the 3 setscrews ( $M4 \times 10$ ) of the terminal cover and remove the terminal cover, as shown in Fig. 6.

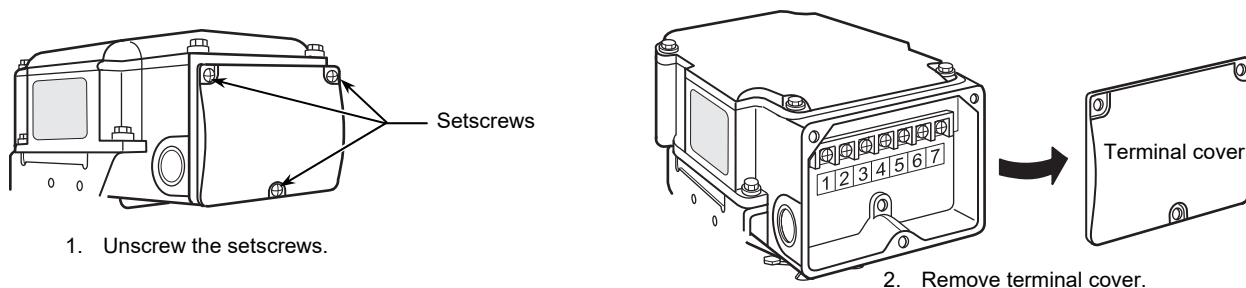


Figure 6. Terminal cover removal

- 3) Correctly connect the wires to the terminals with M3.5 screw terminal lugs, referring to Figs 7 to 24.
- 4) When the ACTIVAL is used in a high-humidity environment or outdoors, use a water-proof connector for the wiring port.

**⚠ CAUTION**

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

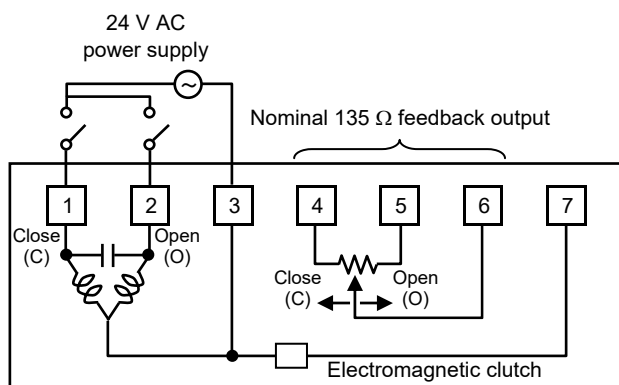
**● To keep IP54 protection (dust-proof and splash-proof),**

Use a water-proof connector for the ACTIVAL in a high-humidity environment or outdoor location.

- Be sure to completely close the terminal cover and the top cover.
- Waterproof the wiring port.
  - For cable connection, use a water-proof connector. (Seal connector Part No. 83104346-003 is recommended.)
  - For conduit connection, use a water-proof plica tube or the like.

## ● Terminals connection

### Model VY5118K/VY5118H



When power supply is disconnected between terminals 3 and 7, the actuator fully closes the valve (in 0 % position).

Figure 7. Terminals connection of Model VY5118K/VY5118H (Nominal 135  $\Omega$  feedback potentiometer type)

\* Note:

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

⎓ : Circuit of recommended controller  
E : Voltage applied from controller  
V : Voltage between terminals 4 and 6

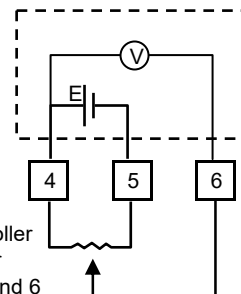
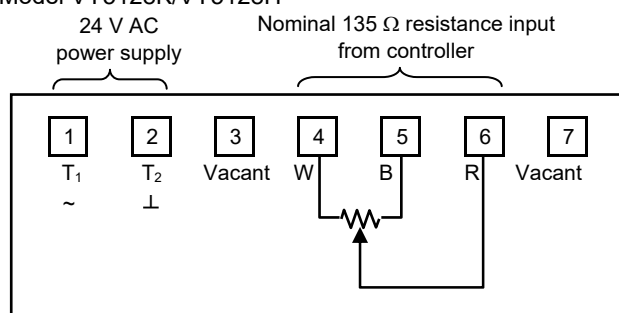


Figure 8. Circuit of recommended controller

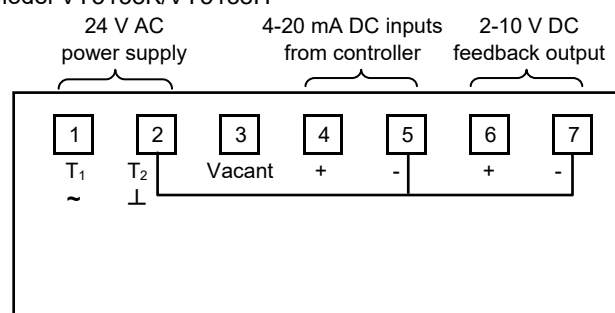
### Model VY5128K/VY5128H



When power supply is disconnected, the actuator fully closes the valve (in 0 % position).

Figure 9. Terminals connection of Model VY5128K/VY5128H (Nominal 135  $\Omega$  resistance input type)

### Model VY5138K/VY5138H



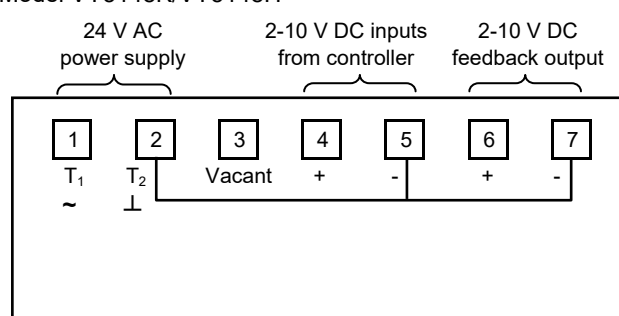
When power supply is disconnected, the actuator fully closes the valve (in 0 % position).

\*Note:

Terminals 2, 5, and 7 are connected inside the actuator.

Figure 10. Terminals connection of Model VY5138K/VY5138H (4-20 mA DC input type)

### Model VY5148K/VY5148H



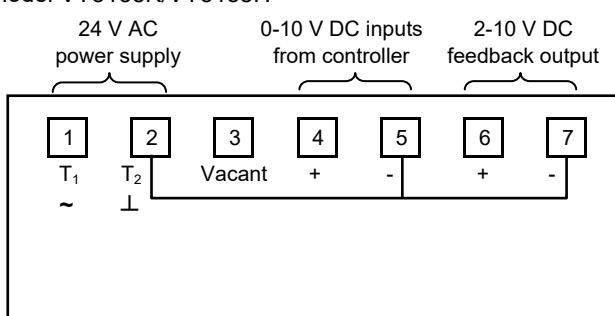
When power supply is disconnected, the actuator fully closes the valve (in 0 % position).

\*Note:

Terminals 2, 5, and 7 are connected inside the actuator.

Figure 11. Terminals connection of Model VY5148K/VY5148H (2-10 V DC input type)

### Model VY5158K/VY5158H



When power supply is disconnected, the actuator fully closes the valve (in 0 % position).

\*Note:

Terminals 2, 5, and 7 are connected inside the actuator.

Figure 12. Terminals connection of Model VY5158K/VY5158H (0-10 V DC input type)

## ■ Wiring Examples

### ● Model VY5118K / VY5118H (Control signal: Nominal 135 $\Omega$ feedback potentiometer)

Single [ACTIVAL + Azbil Corporations' Inflex™ GC (Model WY5111 with Model RY5001F)+ transformer]

Constraint:

- \* For power supply, provide an isolation transformer.

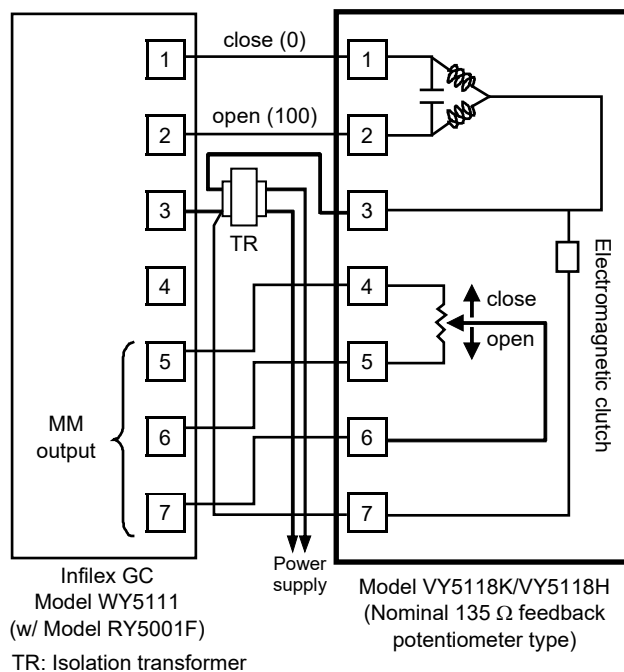


Figure 13. Connection example:  
Model VY5118K/VY5118H to Model WY5111 (w/ Model RY5001F)

### ● Model VY5128K / VY5128H (Control signal: Nominal 135 $\Omega$ resistance input)

Single [ACTIVAL + Neostat (Model TY900XZ)+ transformer]

Constraint:

- \* For power supply, provide an isolation transformer.

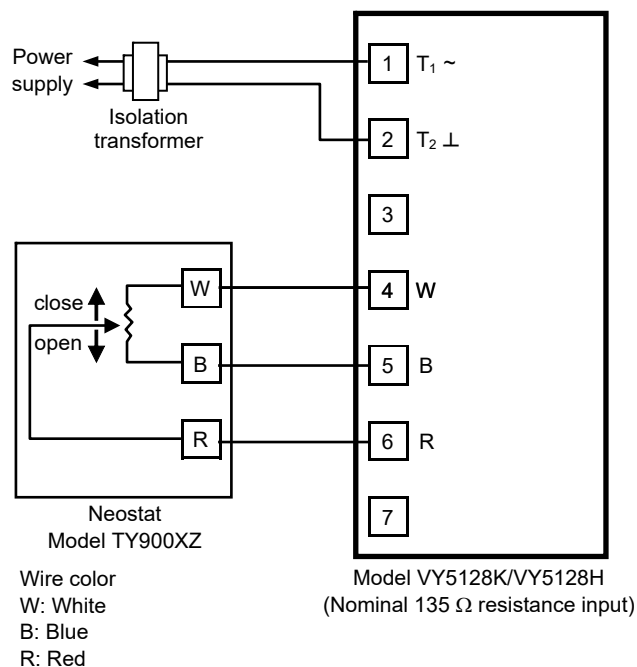


Figure 14. Connection example:  
Model VY5128K/VY5128H to Model TY900XZ

● **Model VY5138K / VY5138H (Control signal: 4-20 mA DC input)**

Single [ACTIVAL + Azbil Corporations' R series (Model R35/R36) + transformer]

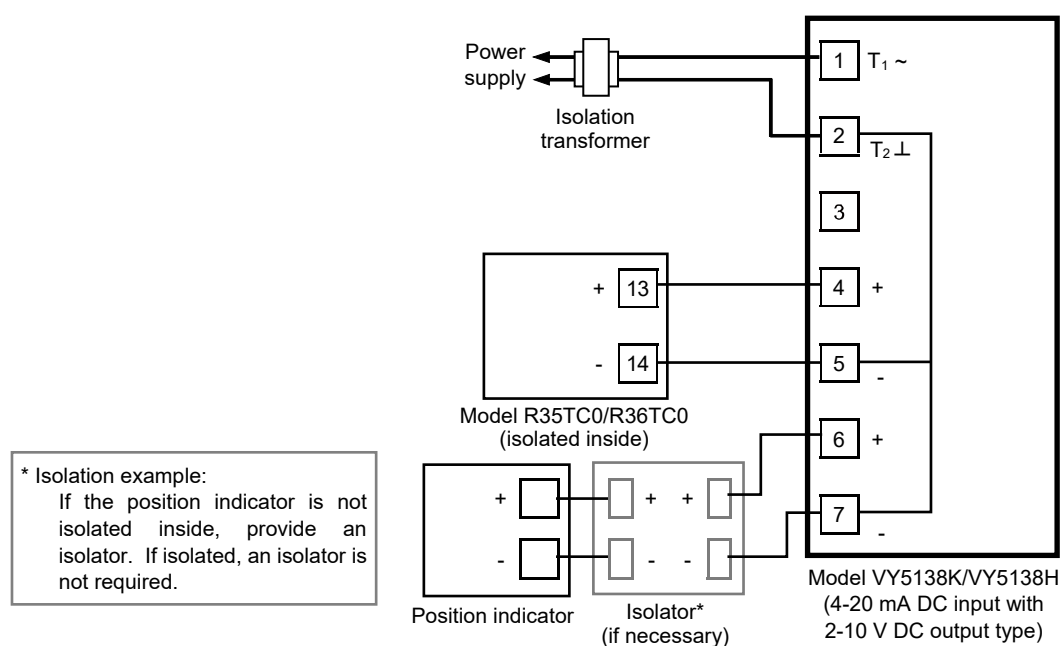


Figure 15. Connection example (1): Model VY5138K/VY5138H to Model R35TC0/R36TC0

**Constraints**

\* For power supply, provide an isolation transformer.

\* The terminals 2, 5, and 7 of the actuator are not isolated inside:

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.**

Note: Azbil Corporations' Model R35/R36 is internally isolated.

● **Model VY5138K / VY5138H (Control signal: 4-20 mA DC input)**

Multiple [ACTIVAL + Azbil Corporations' R series (Model R35/R36)] + single transformer

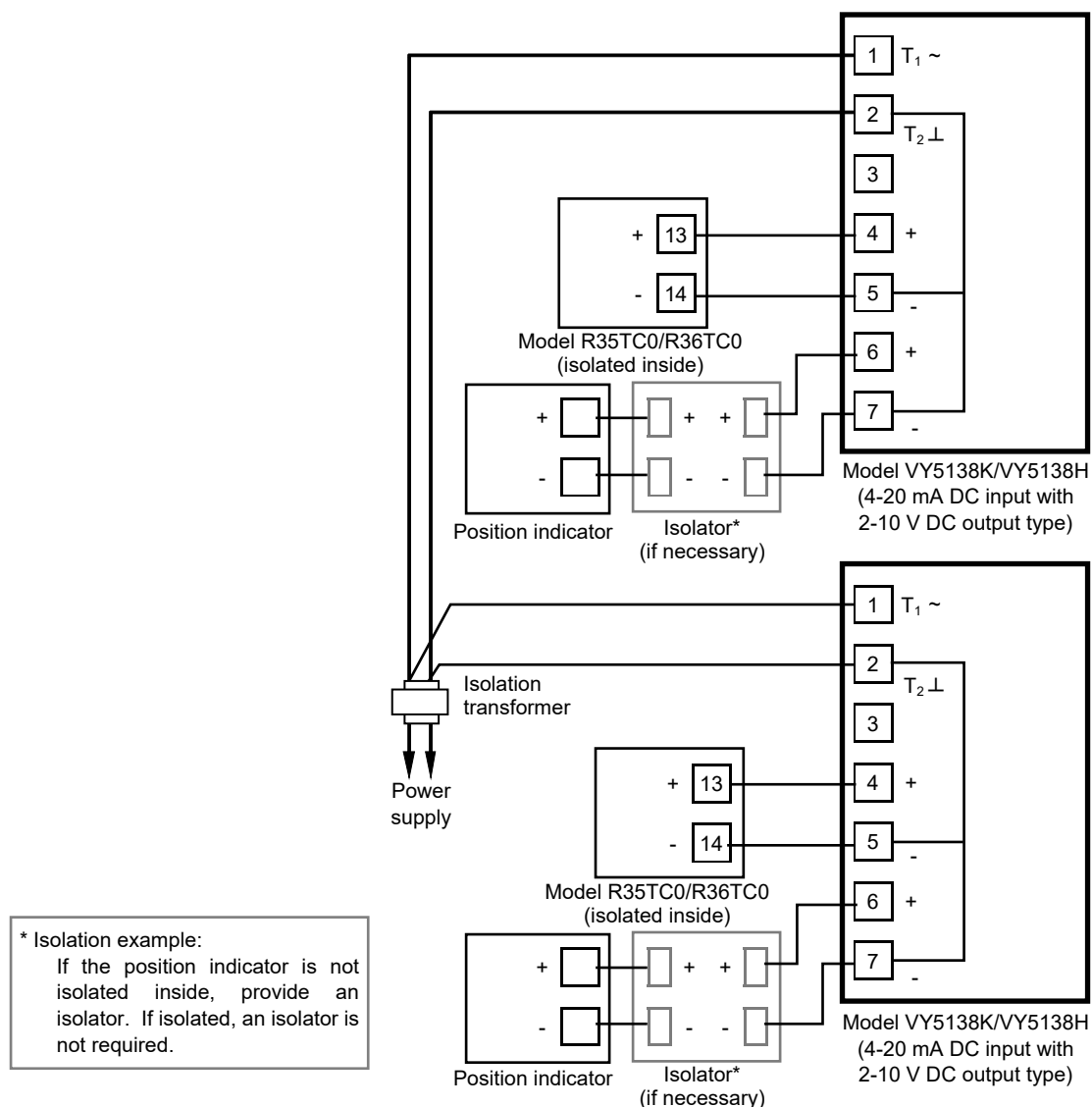


Figure 16. Connection example (2): Model VY5138K/VY5138H to Model R35TC0/R36TC0

**Constraints**

\* For power supply, provide an isolation transformer.

\* The terminals 2, 5, and 7 of the actuator are not isolated inside:

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.**

Note: Azbil Corporations' Model R35/R36 is internally isolated.

\* When the transformer is shared with multiple ACTIVAL, 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.

**If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**

\* Do not pass the power supply line to another device through the terminals of ACTIVAL.

● **Model VY5138K / VY5138H (Control signal: 4-20 mA DC input)**

Multiple ACTIVAL + single Azbil Corporations' R series (Model R35/R36) + single transformer

Constraints

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:

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.**

Note: Azbil Corporations' Model R35/R36 is internally isolated.

- \* Never fail to isolate between slave-ACTIVAL and the controller (Model R35/R36 in Fig. 17) regardless of internal isolation of the controller.
- \* 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.

**If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**

- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.

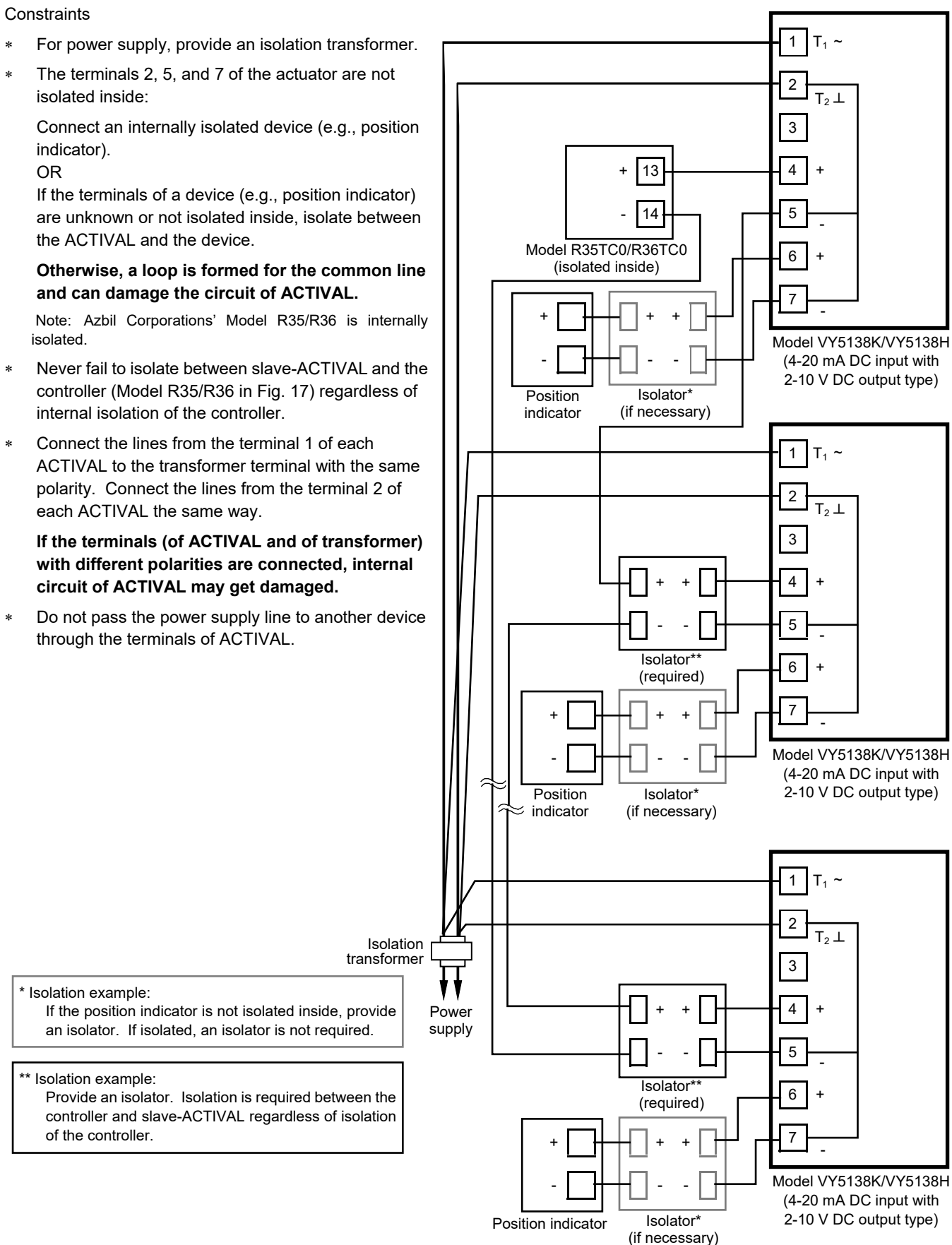


Figure 17. Connection example (3):  
Model VY5138K/VY5138H to Model R35TC0/R36TC0

● **Model VY5148K / VY5148H (Control signal: 2-10 V DC input)**

Single [ACTIVAL + Azbil Corporations' Inflex™ AC (Model WY5117) + transformer]

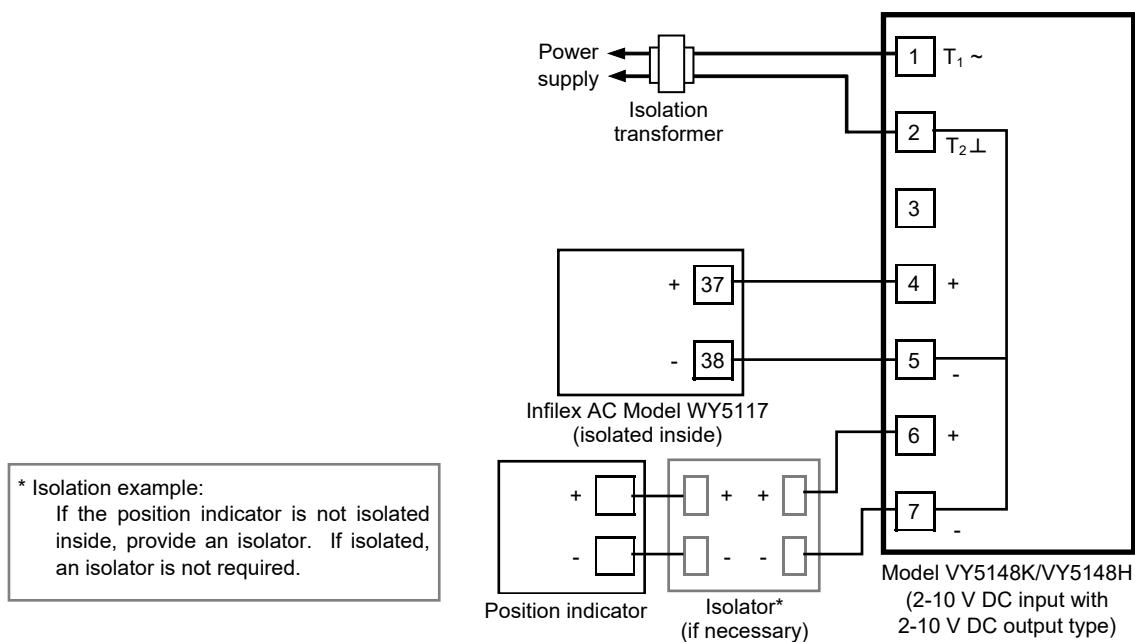


Figure 18. Connection example (1): Model VY5148K/VY5148H to Model WY5117

Constraints

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:

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.**

Note: Azbil Corporations' Model WY5117 is internally isolated.

- \* 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.  
(Inflex AC Model WY5117 in Fig. 18 is internally isolated, and its power supply voltage is 24 V AC. Therefore, the transformer can be shared.)



● **Model VY5148K / VY5148H (Control signal: 2-10 V DC input)**

Multiple [ACTIVAL + Azbil Corporations' Inflex™ AC (Model WY5117)] + single transformer

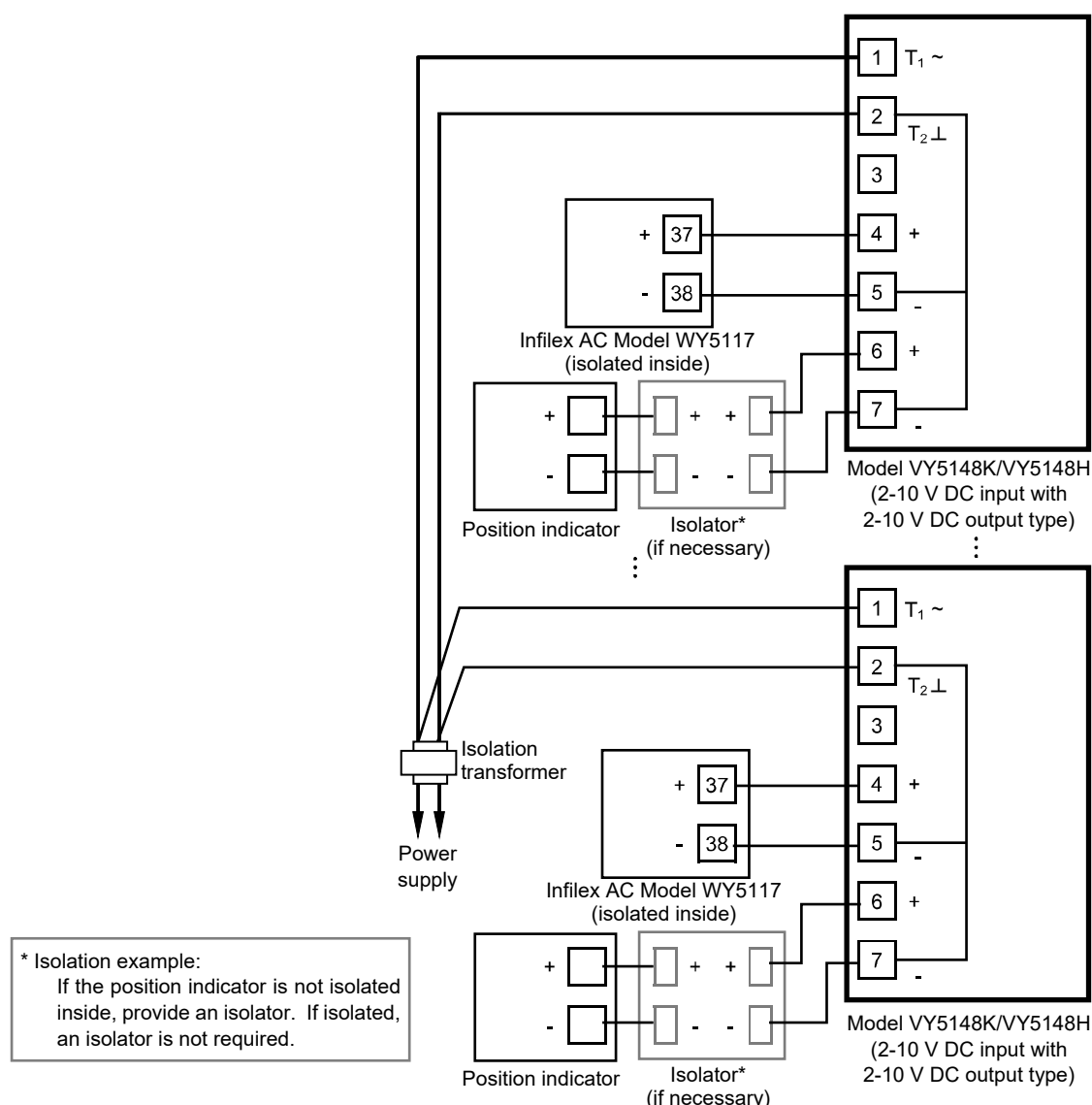


Figure 19. Connection example (2): Model VY5148K/VY5148H to Model WY5117

**Constraints**

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:  
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.**
- Note: Azbil Corporations' Model WY5117 is internally isolated.
- \* 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.  
**If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**
- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.
- \* 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.  
(Inflex AC Model WY5117 in Fig. 19 is internally isolated, and its power supply voltage is 24 V AC. Therefore, the transformer can be shared.)

● Model VY5148K / VY5148H (Control signal: 2-10 V DC input)

Multiple ACTIVAL + single Azbil Corporations' Infiflex™ AC (Model WY5117) + single transformer:

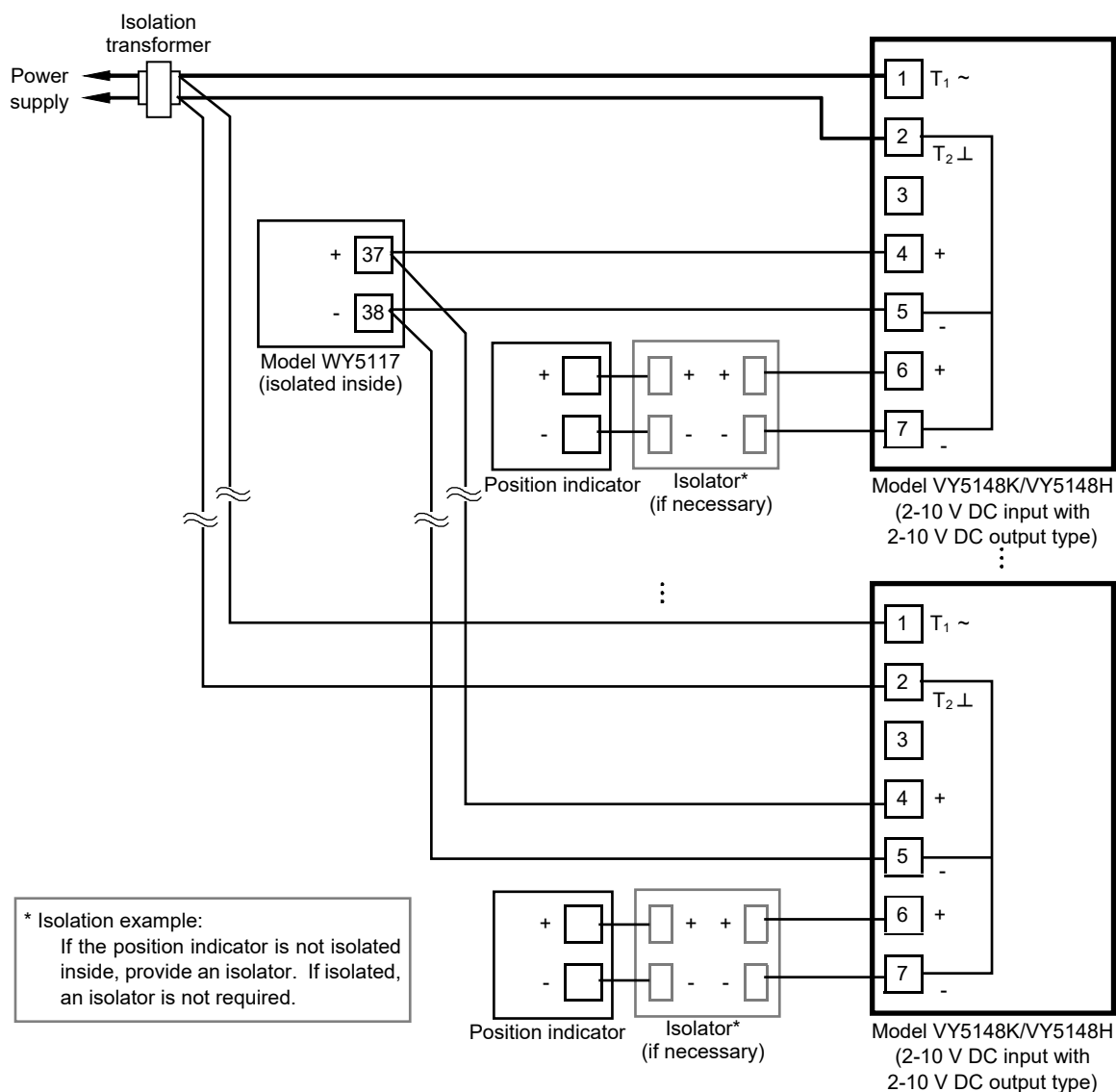


Figure 20. Connection example (3): Model VY5148K/VY5148H to Model WY5117

## Constraints

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:

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.**

Note: Azbil Corporations' Model WY5117 is internally isolated.

- \* 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.

**If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**

- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.
- \* 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.  
(Inflex AC Model WY5117 in Fig. 20 is internally isolated, and its power supply voltage is 24 V AC. Therefore, the transformer can be shared.)

● **Model VY5148K / VY5148H (Control signal: 2-10 V DC input)**

ACTIVAL × 2 + single Azbil Corporations' Inflex™ AC (Model WY5117) + single transformer shared with controller  
(System common wiring):

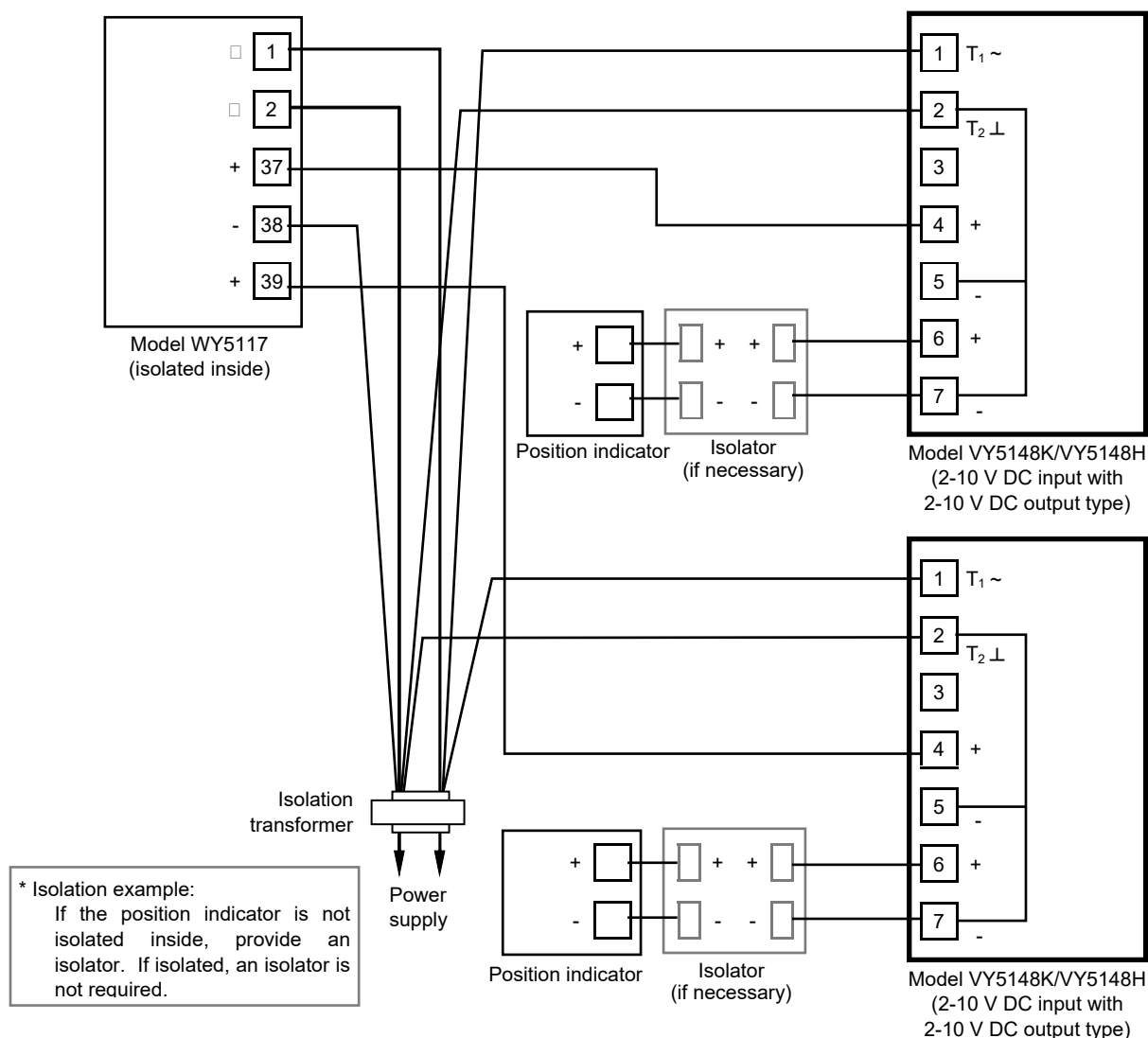


Figure 21. Connection example (4): Model VY5148K/VY5148H to Model WY5117

**Constraints**

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:  
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.**  
Note: Azbil Corporations' Model WY5117 is internally isolated.
- \* 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.  
**If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**
- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.
- \* 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.  
(Inflex AC Model WY5117 in Fig. 21 is internally isolated, and its power supply voltage is 24 V AC. Therefore, the transformer can be shared.)

System common wiring (All of the above constraints must be satisfied for System common wiring.):

As shown in Fig. 21, 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.

● **Model VY5158K / VY5158H (Control signal: 0-10 V DC input)**

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

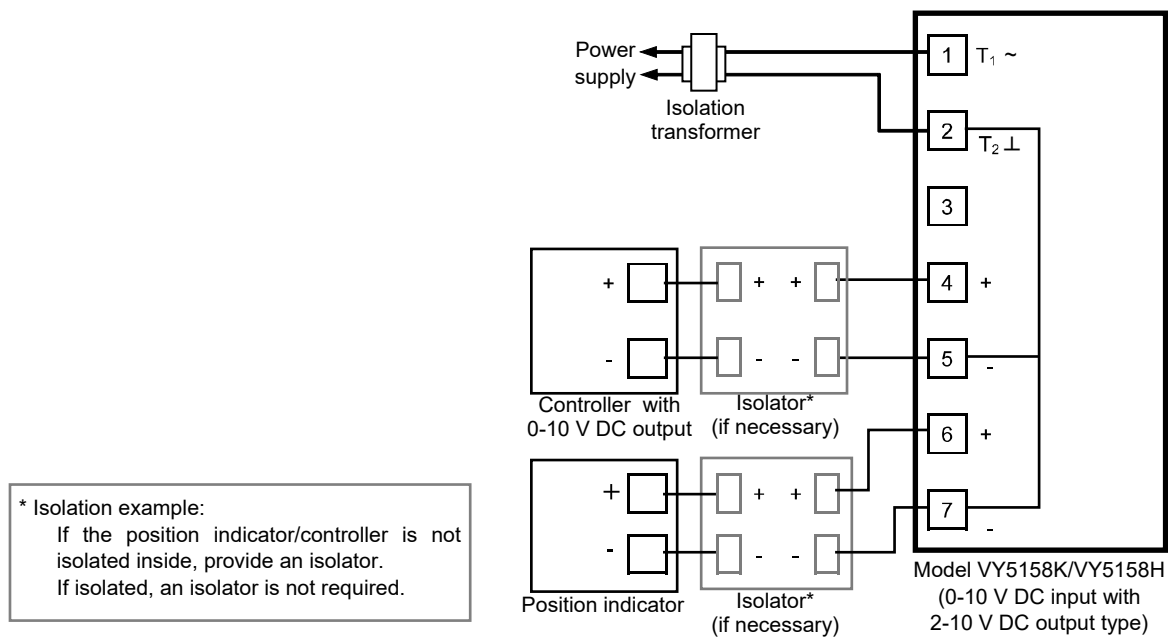


Figure 22. Connection example (1): Model VY5158K/VY5158H to a controller with 0-10 V DC output

**Constraints**

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:  
 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.**
- \* 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.

● **Model VY5158K / VY5158H (Control signal: 0-10 V DC input)**

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

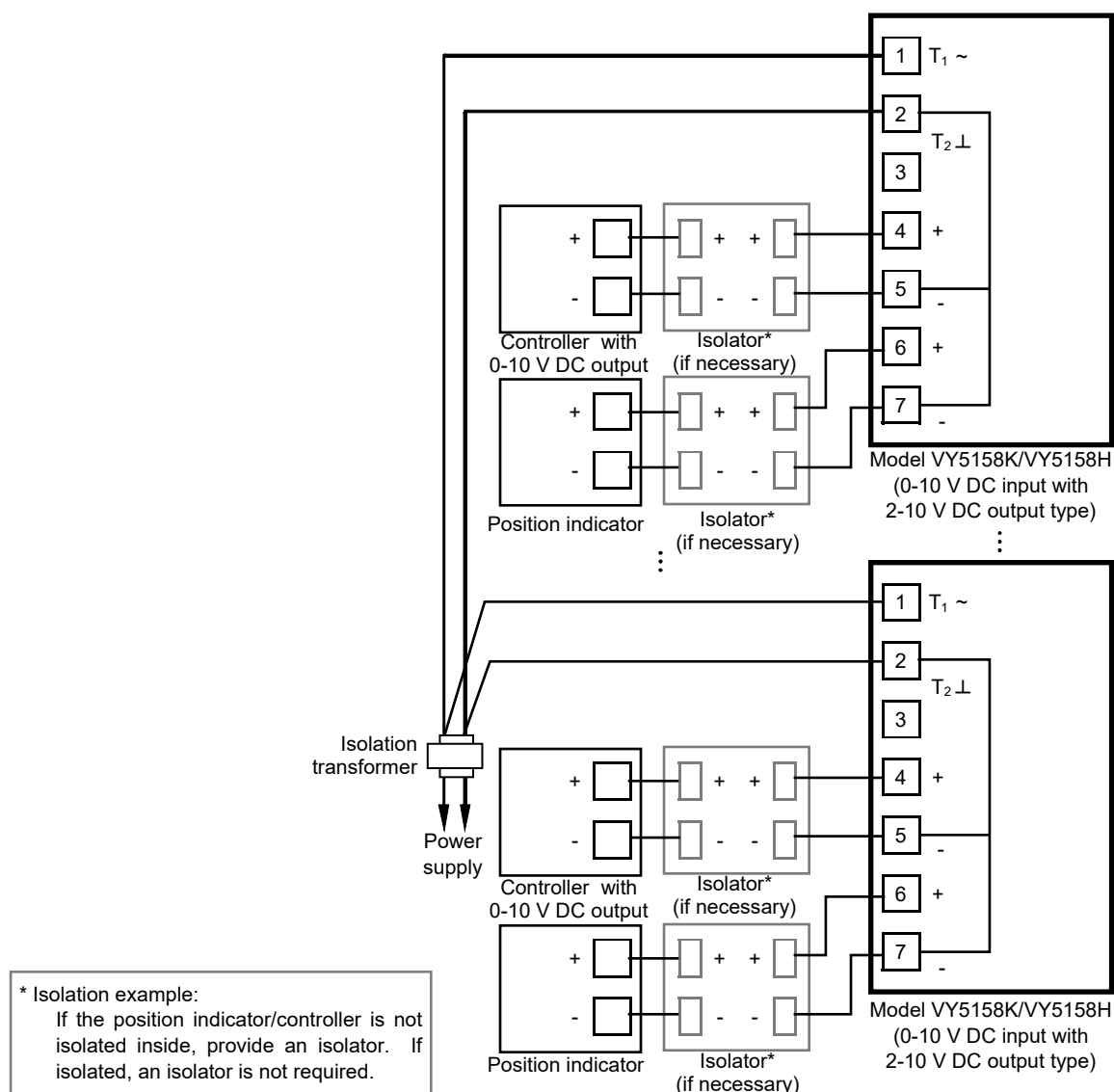


Figure 23. Connection example (2): Model VY5158K/VY5158H to a controller with 0-10 V DC output

**Constraints**

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:  
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.**
- \* 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.
- If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**
- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.
- \* 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.

● **Model VY5158K / VY5158H (Control signal: 0-10 V DC input)**

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

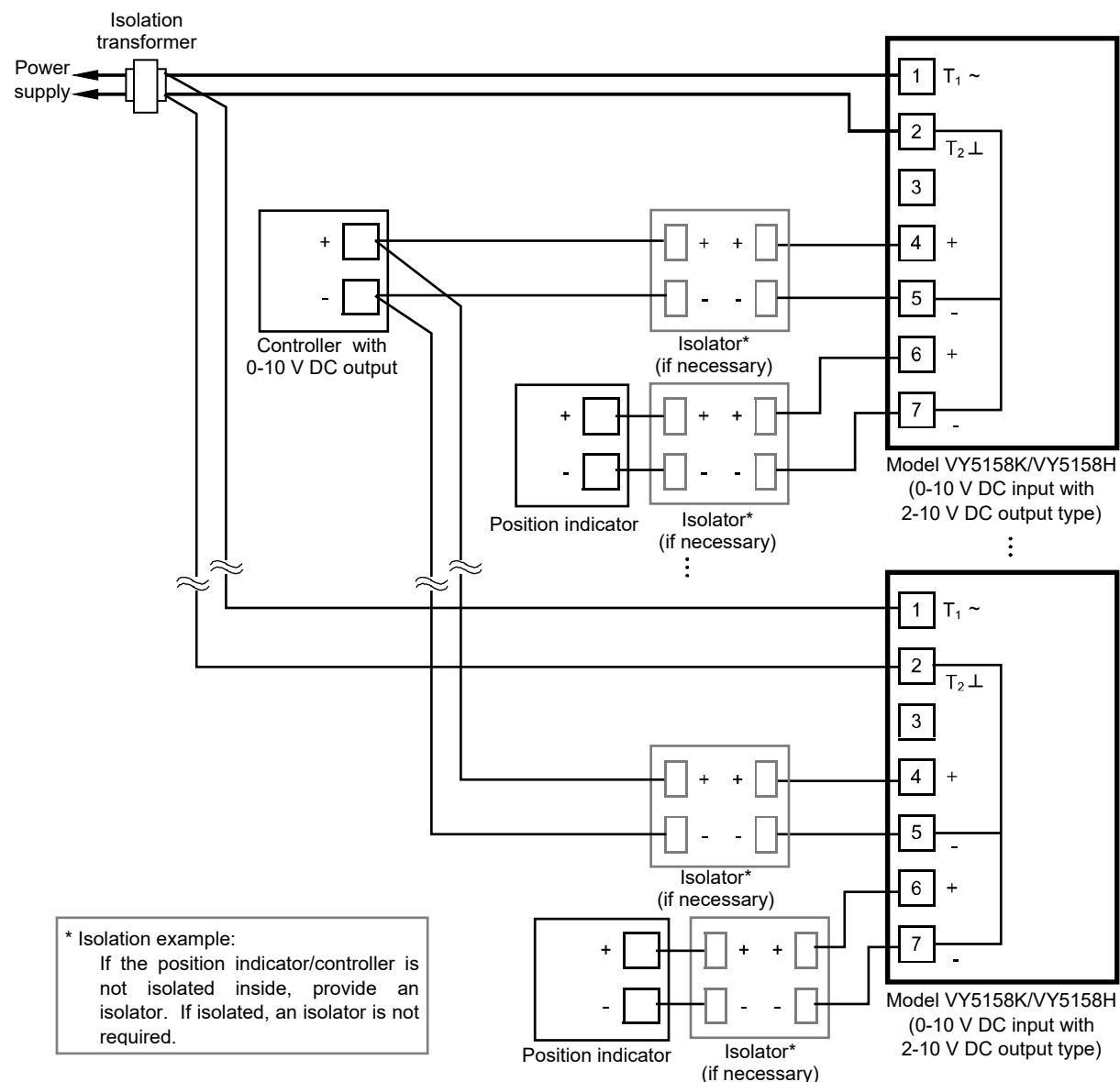


Figure 24. Connection example (3): Model VY5158K/VY5158H to a controller with 0-10 V DC output

### Constraints

- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:  
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.**
- \* 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.
- If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**
- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.
- \* 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.

● **Model VY5158K / VY5158H (Control signal: 0-10 V DC input)**

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

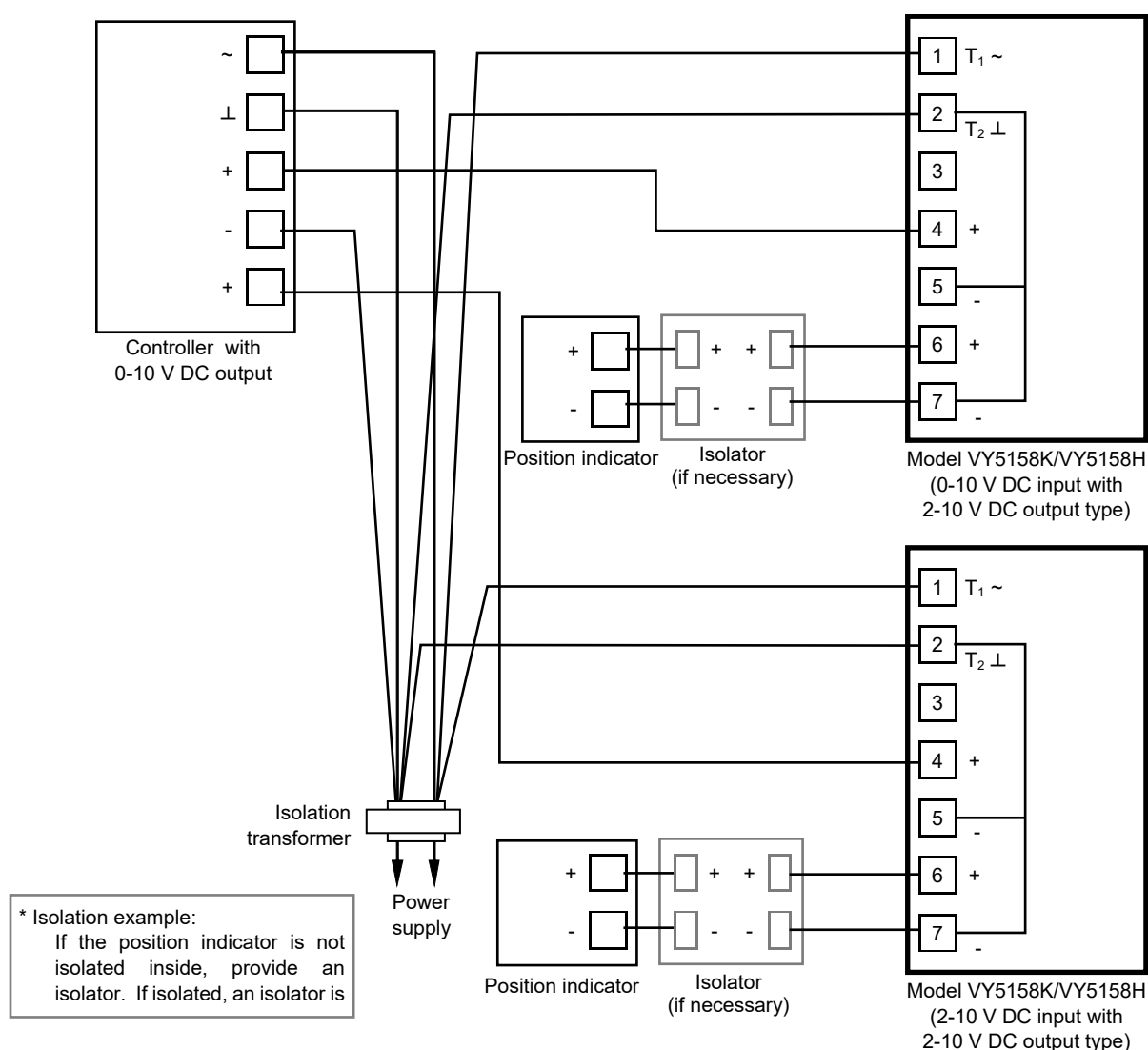


Figure 25. Connection example (4): Model VY5158K/VY5158H to Model WY5117

**Constraints**

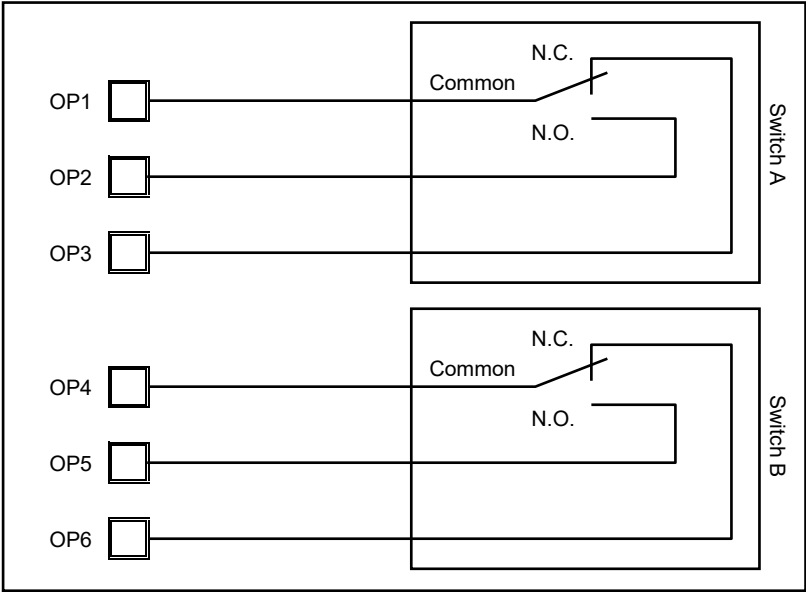
- \* For power supply, provide an isolation transformer.
- \* The terminals 2, 5, and 7 of the actuator are not isolated inside:  
 Connect an internally isolated device (e.g., position indicator).  
 OR  
 If the terminals of a device (e.g., position indicator) are unknown or not isolated inside, isolate between the ACTIVAL and the device.  
**Otherwise, a loop is formed for the common line and can damage the circuit of ACTIVAL.**
- \* 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.
- If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.**
- \* Do not pass the power supply line to another device through the terminals of ACTIVAL.
- \* 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.

System common wiring (All of the above constraints must be satisfied for System common wiring.):

As shown in Fig. 25, 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.

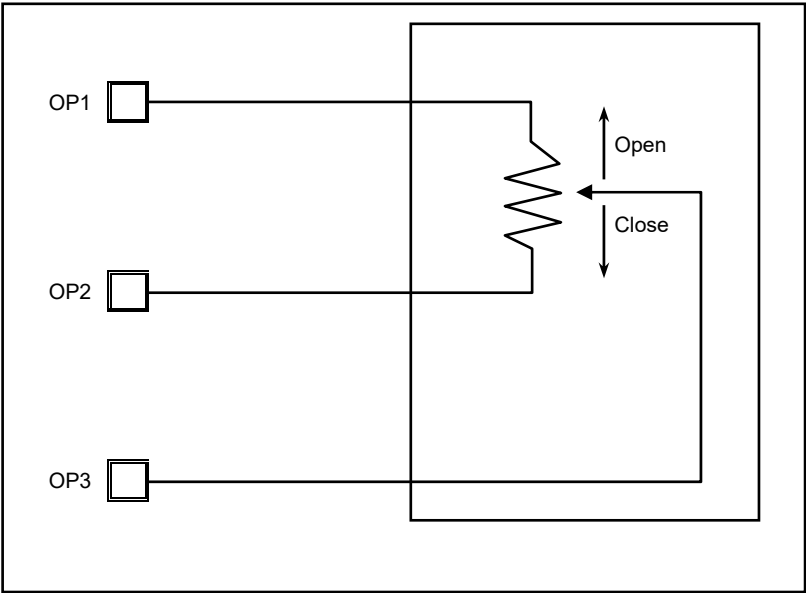
Internal Connection of Auxiliary Switch / Auxiliary Potentiometer

Auxiliary switch Part No. 83174063-101



Switches A and B actuating position: Adjustable between 0 % (fully closed) and 100 % (fully open)  
Figure 26. Internal connection of Auxiliary switch Part No. 83174063-101



Auxiliary potentiometer Part No. 83165275-001







Potentiometer operating position: 0 % (fully closed) to 100 % (fully open)  
Figure 27. Internal connection of Auxiliary potentiometer Part No. 83165275-001



## ■ Maintenance

⚠ WARNING	
	Before removing the actuator, fully close the valve. If you try to remove the actuator without fully closing the valve, the actuator may suddenly rotate and cause an injury.
	Do not disassemble the spring unit. The spring may fly out of the unit and cause an injury.

⚠ 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.

- Inspect the ACTIVAL according to Table 1.
- Manually open/close the ACTIVAL 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 2 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 1. Inspection items and details

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

Table 2. 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 k $\Omega$ ). 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.
Operating time of the spring return is too short.	Wiring condition of the brake motor	Consult with our sales/service personnel.
Operating time of the spring return is too long. The spring return does not operate.	Torque of valve operation	Consult with our sales/service personnel.
The actuator does not fully closes the valve (in 0 % position).	—	Consult with our sales/service personnel.
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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This product complies with the following harmonised standards of the Electromagnetic Compatibility Directive (EMCD).  
EMCD: EN61000-6-2  
EN55011 Class A, Group 1

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**azbil**

*Specifications are subject to change without notice.*

AB-7056  
Rev. 6.0 Jun. 2021