ACTIVAL™
Motorized Two-Way Valve with Flanged-End Connection (PN16 / GG-20)
Models VY51XXL

General

ACTIVAL™ Models VY51XXL is 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.

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., Infilex™ 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., Infilex™ GC Model WY5111, Model R35/ R36).
4. 2-10 V DC input:
   Provides proportional control in combination with a DDC controller (e.g., Infilex™ 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 Yamatake's sales personnel.

CE

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.
- CE Marking certified:
  ACTIVAL Model VY51 conforms to all the applicable standards of CE Marking.

Safety Instructions

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

Usage Restrictions

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

⚠ WARNING

- This product weighs 18 kg or over (depending on the models). To prevent hazardous accident and severe injury, move or carry the product with enough manpower or using a vehicle.
- Do not disassemble the product. Disassembly may result in electrical shock or equipment damage.

⚠ CAUTION

- Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
- Disconnect power from ACTIVAL (including the optional devices) before performing any wiring or maintenance to prevent equipment damage.
- All wiring must comply with local codes of indoor wiring and electric installation rules.
- Use crimp terminal lugs with insulation for electric wires to be connected to the screw terminals.
- Make sure all the wires are tightly connected to the screw terminals. Loose connection may cause fire or heat generation.
- Install the ACTIVAL in the position as specified in this manual. Excessively tight connection of the valve to a pipe and improper installation position may damage the valve.
- 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.
- Avoid using the ACTIVAL in an atmosphere containing oxidizing or explosive gas since it may damage the actuator, valve, or their components.
- After installation, make sure no fluid leaks from the connecting parts of valve and pipes. Incorrect piping may cause fluid leakage.
- Do not allow any foreign substance inside the piping. Flush the piping so that no foreign substance remains. Attach a strainer (with 40 or more meshes) in a pipe on the inflow side of the ACTIVAL to prevent equipment damage.
- This product must be operated within its rated operating ranges specified in this manual. Failure to comply will cause equipment damage.
- This product must be operated under the operating conditions (power, temperature, humidity, vibration, installation position, atmospheric condition, etc) specified in this manual to prevent equipment damage.
- Avoid application that keeps the operating cycle of ACTIVAL excessively frequent. Excessively frequent operation may cause fire or equipment failure.
- Do not leave the controlled fluid frozen to prevent equipment damage or fluid leakage.
- Do not put heavy load on the actuator.
- Avoid touching the installed ACTIVAL (valve body, yoke, joint). When being used to control steam, it may reach high temperature and may cause burn injury.
- Dispose of this product as an industrial waste in accordance with your local regulations. Do not reuse all or part of this product.

Model Numbers

Model VY51XXL00XX 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 Ω feedback potentiometer:	F.B. Pot
Nominal 135 Ω resistance input:	135 Ω
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 Ω feedback potentiometer
	2					Nominal 135 Ω resistance input
	3					2 V DC to 10 V DC input with 2 V DC to 10 V DC position feedback output
	4					4 mA DC to 20 mA 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]
			L			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 [for steam only]
					15	DN15 (1/2") / 4.0 in Cv value [for steam only]
					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

Specifications

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

Valve specifications

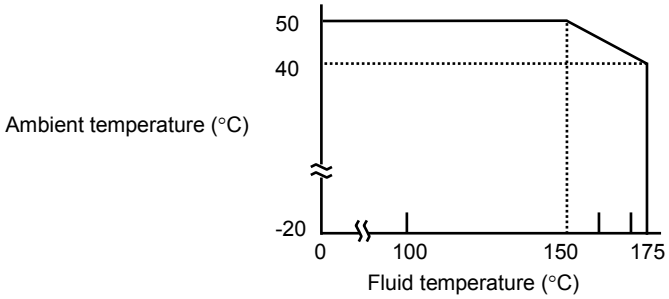
Item	Specification			
Model	Two-way valve with flanged-end connection (raised face flange), proportional control			
Body pressure rating	PN16 (Max. working pressure: 1.6 MPa)			
Size, Cv, Close-off ratings Note: Close-off ratings of the actuator in combination are shown on the right. Practical close-off rating required for the valve controlling 175 °C steam is 0.8 MPa.	Model number	Nominal size	Cv	Close-off ratings
	VY51XXL0011	DN15 (1/2")	1.0	1.0 MPa
	VY51XXL0012	DN15 (1/2")	2.5	1.0 MPa
	VY51XXL0013	DN15 (1/2")	6.0	1.0 MPa
	VY51XXL0014	DN15 (1/2")	1.6	1.0 MPa
	VY51XXL0015	DN15 (1/2")	4.0	1.0 MPa
	VY51XXL0021	DN25 (1")	10	1.0 MPa
	VY51XXL0022	DN25 (1")	16	1.0 MPa
	VY51XXL0041	DN40 ($1^1/_2$")	25	1.0 MPa
	VY51XXL0042	DN40 ($1^1/_2$")	40	1.0 MPa
	VY51XXL0051	DN50 (2")	65	1.0 MPa
	VY51XXL0061	DN65 ($2^1/_2$")	95	1.0 MPa
	VY51XXL0081	DN80 (3")	125	0.7 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		
End connection	Flanged-end, PN16 (equivalent to ISO 7005-2: 1988)			
Applicable fluid	Chilled/hot water, high temperature water, steam, brine (ethylene glycol solutions, 50 wt.% max.)			
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 (equivalent to Munsell 5B 4/1)			
Installation orientation	Installable in any position ranging from upright to sideways (90° tilted) *Always install in upright position outdoors.			
Actuator to be combined	Integrated with the valve			

Actuator specifications

(1/2)

Item	Specification
Power supply	24 V AC ± 15 %, 50 Hz/60 Hz
Applicable valve size	DN15 to DN80 of standard torque type
Power consumption	Nominal 135 Ω feedback potentiometer type (Model VY511XL): 7 VA Nominal 135 Ω resistance input type (Model VY512XL), 4-20 mA DC input type (Model VY513XL), 2-10 V DC input type (Model VY514XL), 0-10 V DC input type (Model VY515XL): 8 VA
Timing	63 ± 5 sec (50 Hz) / 53 ± 5 sec (60 Hz)
Control signal input	- Nominal 135 Ω feedback potentiometer (Total resistance: Nominal 135 Ω, Max. applied voltage: 5 V DC) - Nominal 135 Ω resistance input - 4 mA DC to 20 mA DC input (Input impedance: 100 Ω) * Input impedance fluctuates depending on temperature and other environmental conditions. Therefore, a controller with 200 Ω or higher allowable load resistance is recommended. - 2 V DC to 10 V DC input (Input impedance: 150 kΩ or higher) * A controller with 100 kΩ or lower allowable load resistance is recommended. - 0 V DC to 10 V DC input (Input impedance: 150 kΩ or higher) * A controller with 100 kΩ 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 kΩ or higher (Max. output current: 1mA)

(2/2)

Item			Specification	
Environmental conditions			Rated operating conditions	Transport/storage conditions*2
	Water / Steam	Ambient temperature*1	-20 °C to 50 °C (Fluid temperature 0 °C to 150 °C) -20 °C to 40 °C (Fluid temperature 150 °C to 175 °C)	-20 °C to 70 °C
		Ambient humidity	5 %RH to 95 %RH	
		Vibration	4.9 m/s^2 (10 Hz to 150 Hz)	19.6 m/s^2 (10 Hz to 150 Hz)
		Notes: *1 Do not allow the fluid to freeze. *2 The actuator shall be packed during transport. 		
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)	
Installation locations		Indoor / outdoor (Keep away from direct sunlight.)		
Installation orientation		Installable in any position ranging from upright to sideways (90° tilted) *Always install in upright position outdoors.		
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		Available. Refer to the section **Manually opening/closing the ACTIVAL**.		
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 5 mA or less leakage current		
Position for shipment		100 % (fully open)		

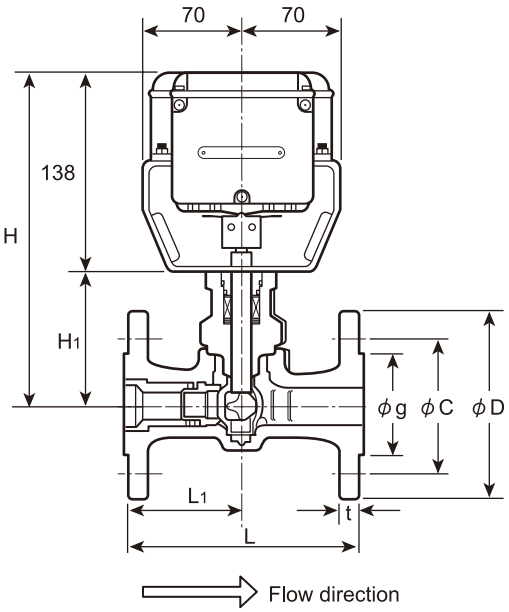
Options

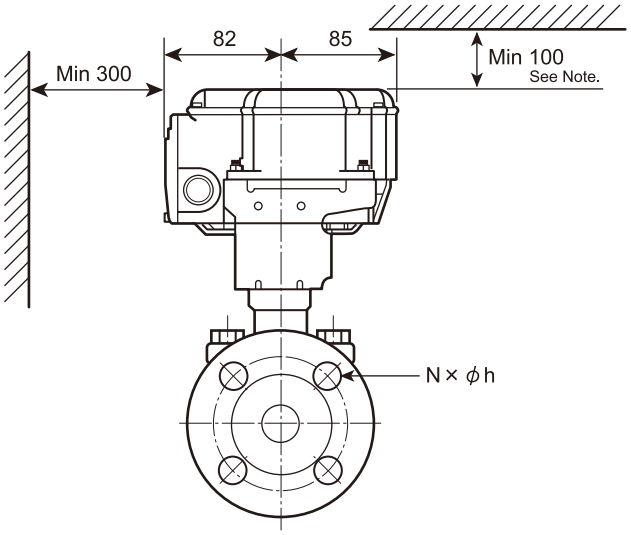
For options, separate order is required.

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 (Part No. 83165274-002)	Number of switches: 2 (SW A and SW B) Maximum applied voltage/current: 30 V DC / 3 A DC 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 (Part No. 83165275-002)	Number of potentiometer: 1 Total resistance: Nominal 1 kΩ Operating position: 0 % (fully closed) to 100 % (fully open) Max. applied voltage: 5 V DC

* Note:
Either the auxiliary switch or auxiliary potentiometer can be added, but not both.

Dimensions





Note:
Leave a clearance of 300 mm if you open the top cover after the installation (e.g., to set the auxiliary switch).

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)
VY51XXL001X	15	213	75	108	50	16	65	95	46	14	4	4.6
VY51XXL002X	25	228	90	127	60	18	85	115	65	14	4	6.6
VY51XXL004X	40	241	103	165	82.5	20	110	150	84	19	4	10.0
VY51XXL0051	50	245	107	178	89	20	125	165	99	19	4	11.5
VY51XXL0061	65	262	124	190	90	22	145	185	118	19	4	16.0
VY51XXL0081	80	263	125	203	100	22	160	200	132	19	8	18.5

Figure 1. Dimensions and maintenance clearance (mm)

Parts Identification

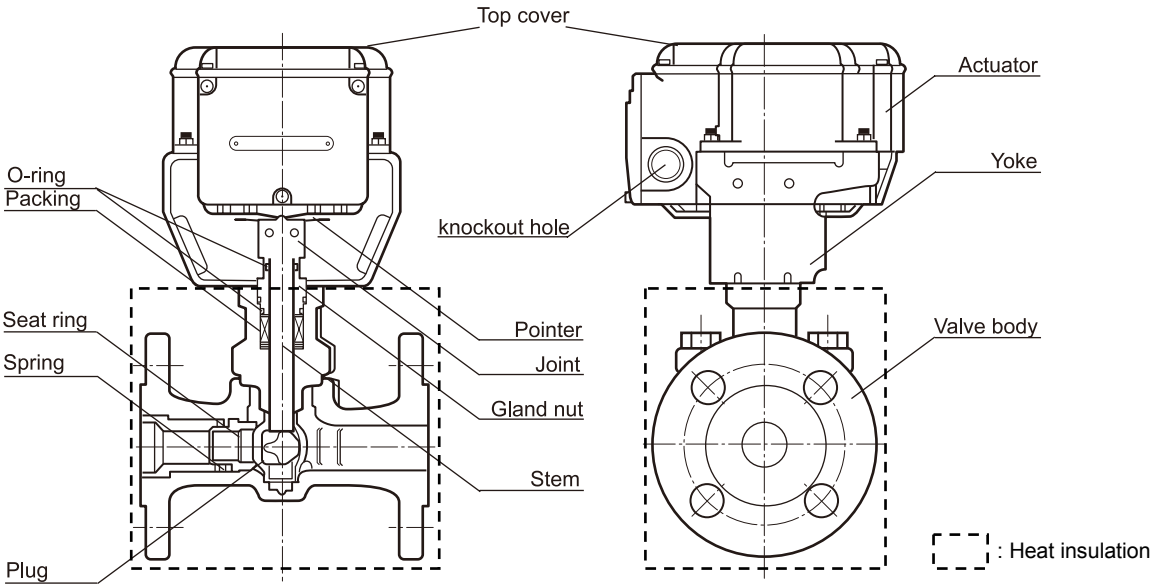


Figure 2. Parts identification

Installation

Precautions for installation

⚠ CAUTION
• Disconnect power from ACTIVAL (including the optional devices) before performing any wiring or maintenance (installation) to prevent equipment damage. • Install the ACTIVAL in the position as specified in this manual. Excessively tight connection of piping and improper installation position may damage the valve. • After piping installation, make sure no fluid leaks from the connecting parts. Incorrect piping may cause fluid leakage. • Do not allow any foreign substance inside the piping. Flush the piping so that no foreign substance remains. Attach a strainer (with 40 or more meshes) in a pipe on the inflow side of the ACTIVAL to prevent equipment damage.

- ACTIVAL Model VY51XXL 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 80 or more meshes recommended for steam application) 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

⚠ CAUTION
• Avoid using the ACTIVAL in an atmosphere containing oxidizing gas, explosive gas, etc. since it may damage the actuator, valve, or their components. • 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.

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.

- 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 mount the ACTIVAL on a pipe where water hammer occurs, or where 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.

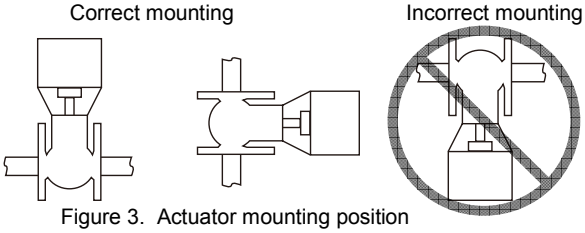


Figure 3. Actuator mounting position

Piping

- 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 (with 80 or more meshes recommended for steam application) 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: 100 %)

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 100 % (in fully open position) for shipment. The shaft is thus completely turned clockwise, and the pointer points at '100'. (See Fig. 4.)

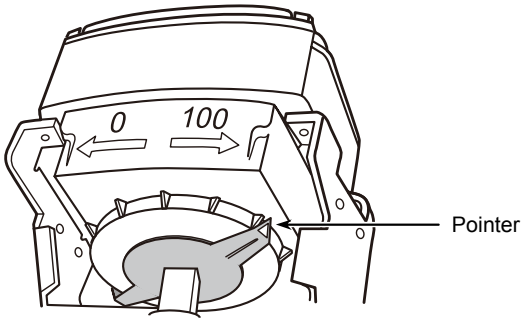


Figure 4. Pointer position for shipment

Manually opening/closing the ACTIVAL

IMPORTANT:

- Manually opening/closing the ACTIVAL with the power (24 V AC) applied may damage the actuator.
- To manually open/close the ACTIVAL, do not turn the joint beyond the fully open (100)/closed (0) mark.
- To manually open/close the ACTIVAL, slowly turn the joint. If shock is sent to the actuator, the actuator may get damaged.

Disconnect the power from the ACTIVAL before manually operating the ACTIVAL. As shown in Fig. 5, from the front of the ACTIVAL, hold the joint using a tool such as a wrench, and turn the joint slowly toward the set position.

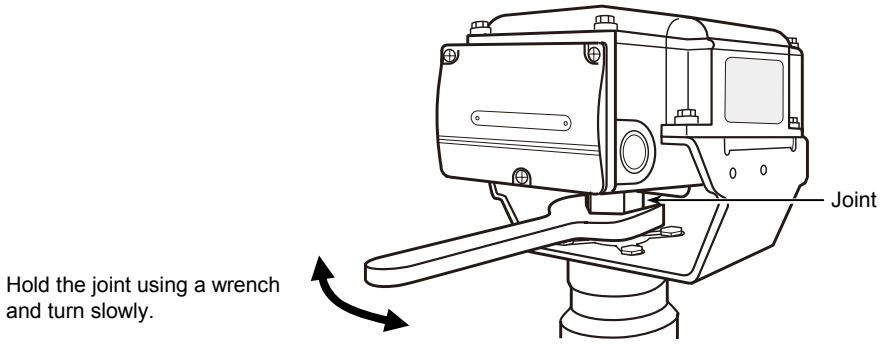


Figure 5. Manual operation

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.

Procedure to change the actuator mounting position

IMPORTANT:

- Do not change the combination of the valve, yoke, and actuator.
- Set the ACTIVAL (actuator and valve) in 100 % position when changing the mounting position. If the valve in 0 % position is assembled with the actuator in 100 % position, the actuator put torque on the closed valve, and the gear of the actuator gets damaged.

1) Remove the screws connecting the actuator and the yoke. Lift the actuator and detach it from the yoke. Make sure that the groove on the top of the valve stem is parallel to the pipes (indicating the valve in 100 % position). <Step 1 in Fig. 6>
2) Remove the screws connecting the yoke and the valve. <Step 2 in Fig. 6>
3) Change the facing direction of the yoke. The yoke and actuator can be horizontally rotated every 90° (0°/90°/180°/270° from the factory preset position) to mount onto the valve.
4) A thermal insulation sheet is inserted between the yoke and the valve. When changing the mounting positions, reinsert the sheet and then fit the yoke into the new mounting position.
5) Before fixing the yoke to the valve with the screws, check that the actuator engages correctly with the valve stem (at the new mounting position). Check that the pointer of the actuator indicates 100 % position as well. Then, fix the yoke to the valve. <Step 3 in Fig. 6>
6) Mount the actuator. Place the actuator, with its facing direction changed, on the yoke, and fix them with the screws. <Step 4 in Fig. 6>
7) Check that the ACTIVAL with the mounting position changed operates smoothly (from 0 % to 100 %).

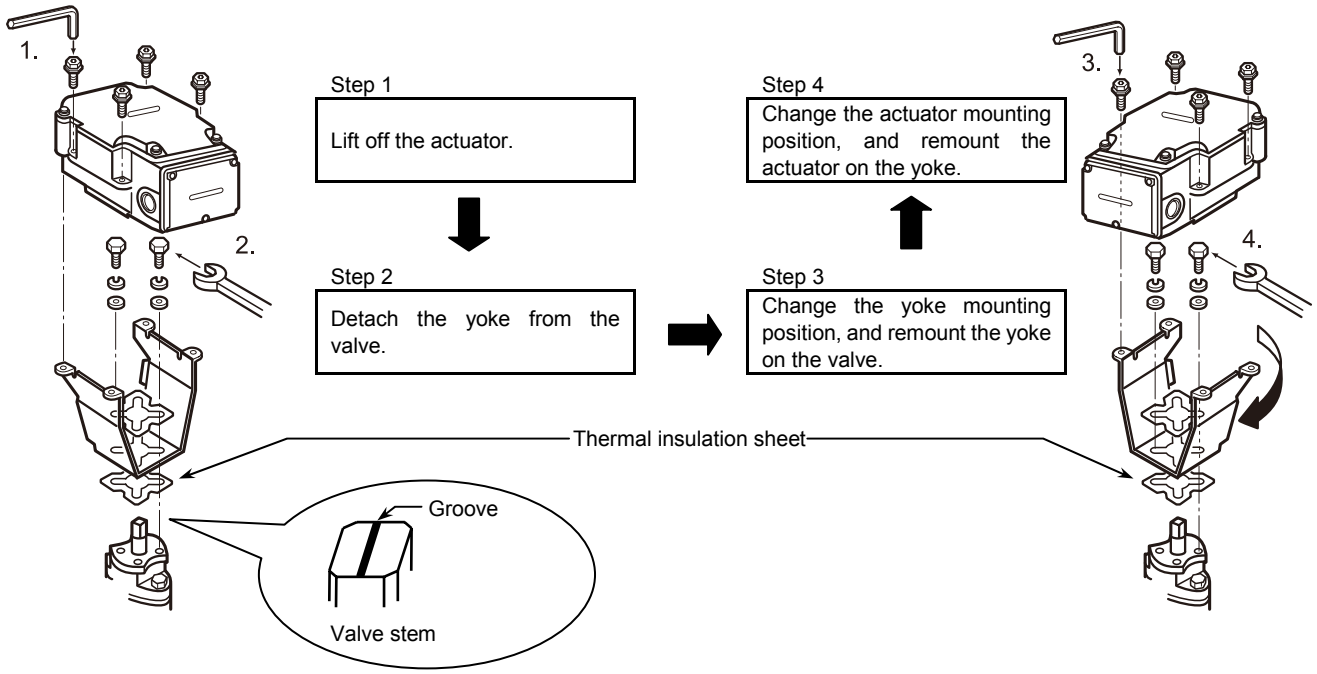


Figure 6. Changing the actuator mounting position

Wiring

⚠ CAUTION
• Disconnect power from ACTIVAL (including the optional devices) before performing any wiring or maintenance (installation) to prevent equipment damage.

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 Figs 9 to 13. Incorrect wiring may result in PCB (print circuit board) burnout.
- To prevent damage, cover the terminals except when connecting/disconnecting wires.
- Do not connect 24 V AC power to the terminals 4 to 7.

Wiring precautions

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

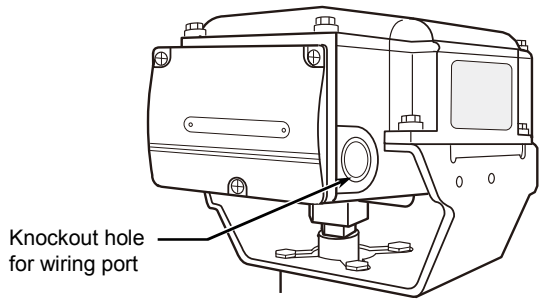


Figure 7. Knockout hole for wiring port

2) Unscrew the 3 setscrews (M4 × 10) of the terminal cover and remove the terminal cover, as shown in Fig. 8.

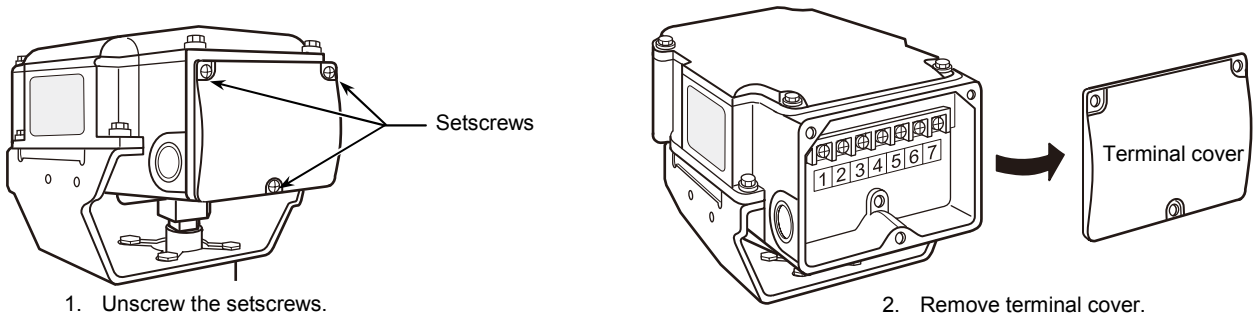


Figure 8. Terminal cover removal

3) Correctly connect the wires to the terminals with M3.5 screw terminal lugs, referring to Figs 9 to 26.

4) When the ACTIVAL is used in a high-humidity environment or outdoors, use a water-proof connector for the wiring port.

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 VY511XL

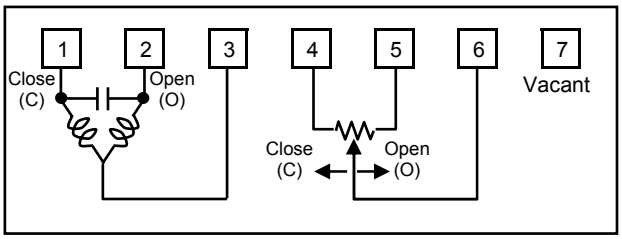


Figure 9. Terminals connection of Model VY511XL
(Nominal 135 Ω feedback potentiometer type)

Model VY51XL

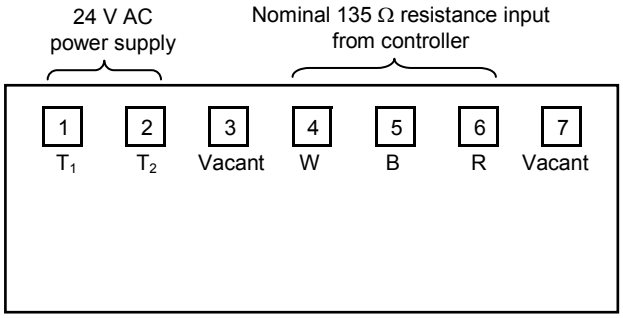
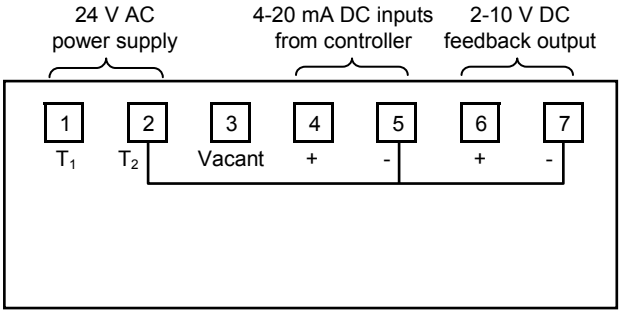


Figure 10. Terminals connection of Model VY512XL
(Nominal 135 Ω resistance input type)

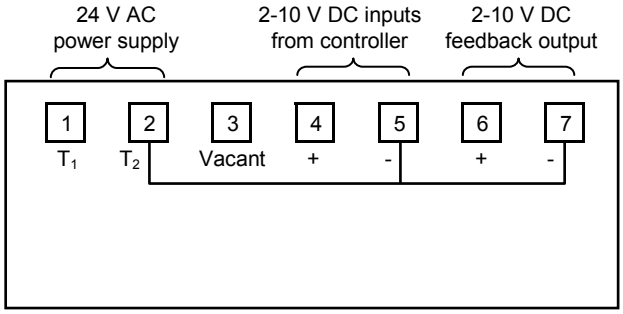
Model VY513XL



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

Figure 11. Terminals connection of Model VY513XL
(4-20 mA DC input type)

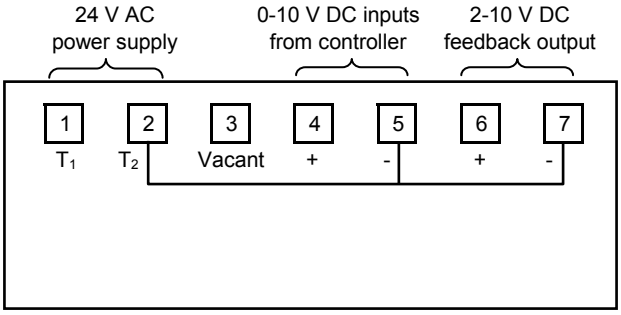
Model VY514XL



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

Figure 12. Terminals connection of Model VY514XL
(2-10 V DC input type)

Model VY515XL



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

Figure 13. Terminals connection of Model VY515XL
(0-10 V DC input type)

Connection Examples

Model VY511XL (Control signal: Nominal 135 Ω feedback potentiometer)

Single [ACTIVAL + Yamatake's Infilex™ GC (Model WY5111 with Model RY5001F)+ transformer]

Constraint:

* For power supply, provide an isolation transformer.

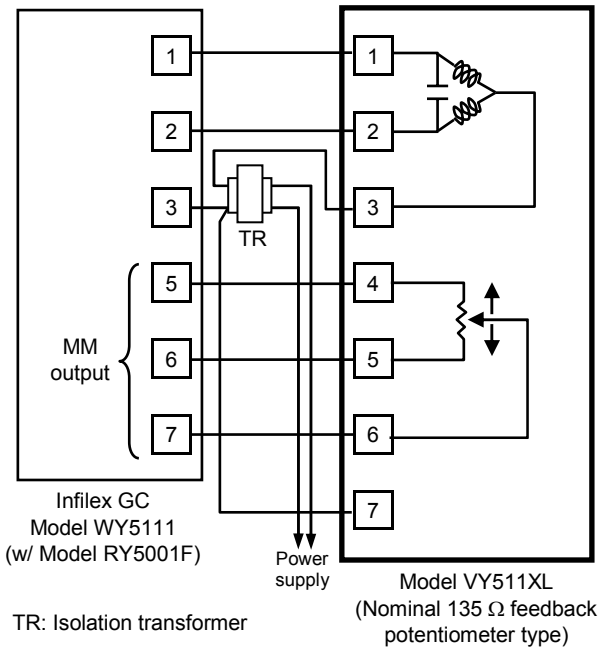


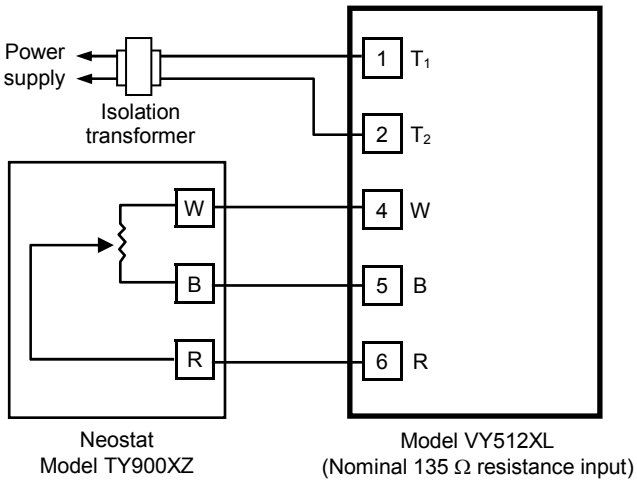
Figure 14. Connection example:
Model VY511XL to Model WY5111 (w/ Model RY5001F)

Model VY512XL (Control signal: Nominal 135 Ω resistance input)

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

Constraint:

* For power supply, provide an isolation transformer.



Wire color
W: White
B: Blue
R: Red

Figure 15. Connection example:
Model VY512XL to Model TY900XZ

Model VY513XL (Control signal: 4-20 mA DC input)

Single [ACTIVAL + Yamatake's R series (Model R35/R36) + transformer]

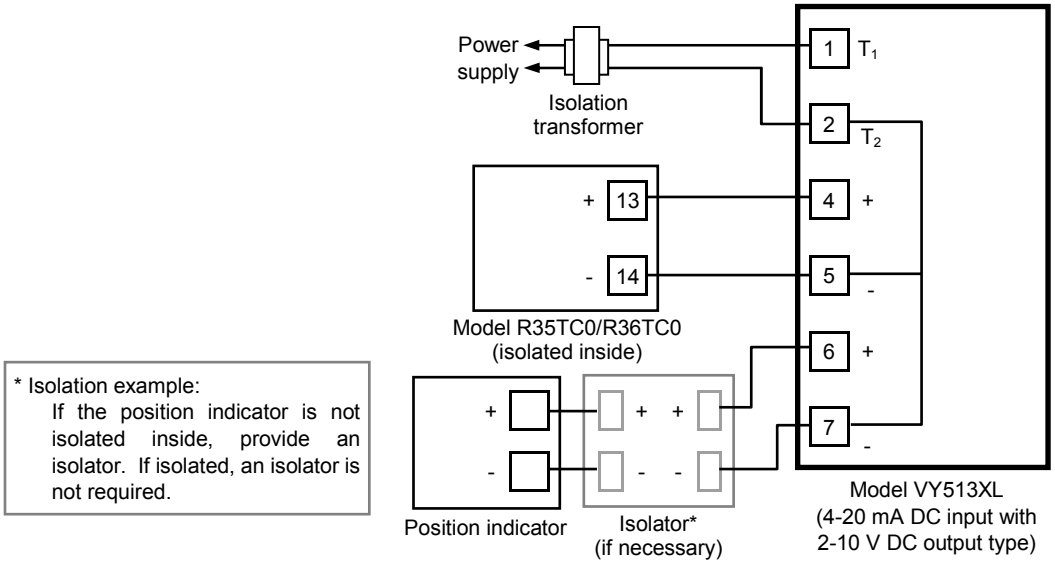


Figure 16. Connection example (1): Model VY513XL to Model R35TC0/R36TC0

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: Yamatake's Model R35/R36 is internally isolated.

Model VY513XL (Control signal: 4-20 mA DC input)

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

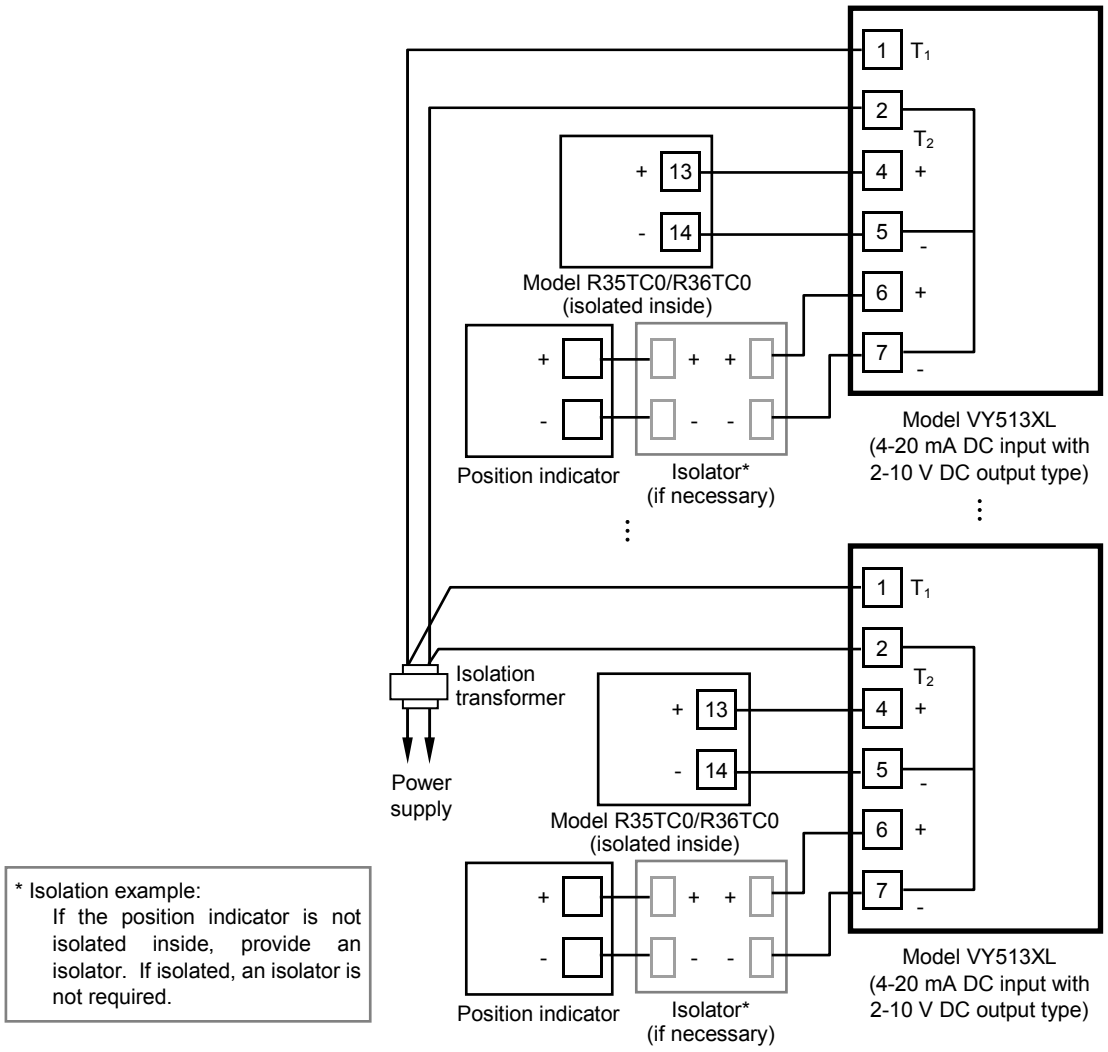


Figure 17. Connection example (2): Model VY513XL to Model R35TC0/R36TC0

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: Yamatake's 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 VY513XL (Control signal: 4-20 mA DC input)

Multiple ACTIVAL + single Yamatake's R series (Model R35/R36) + single transformer

Constraints

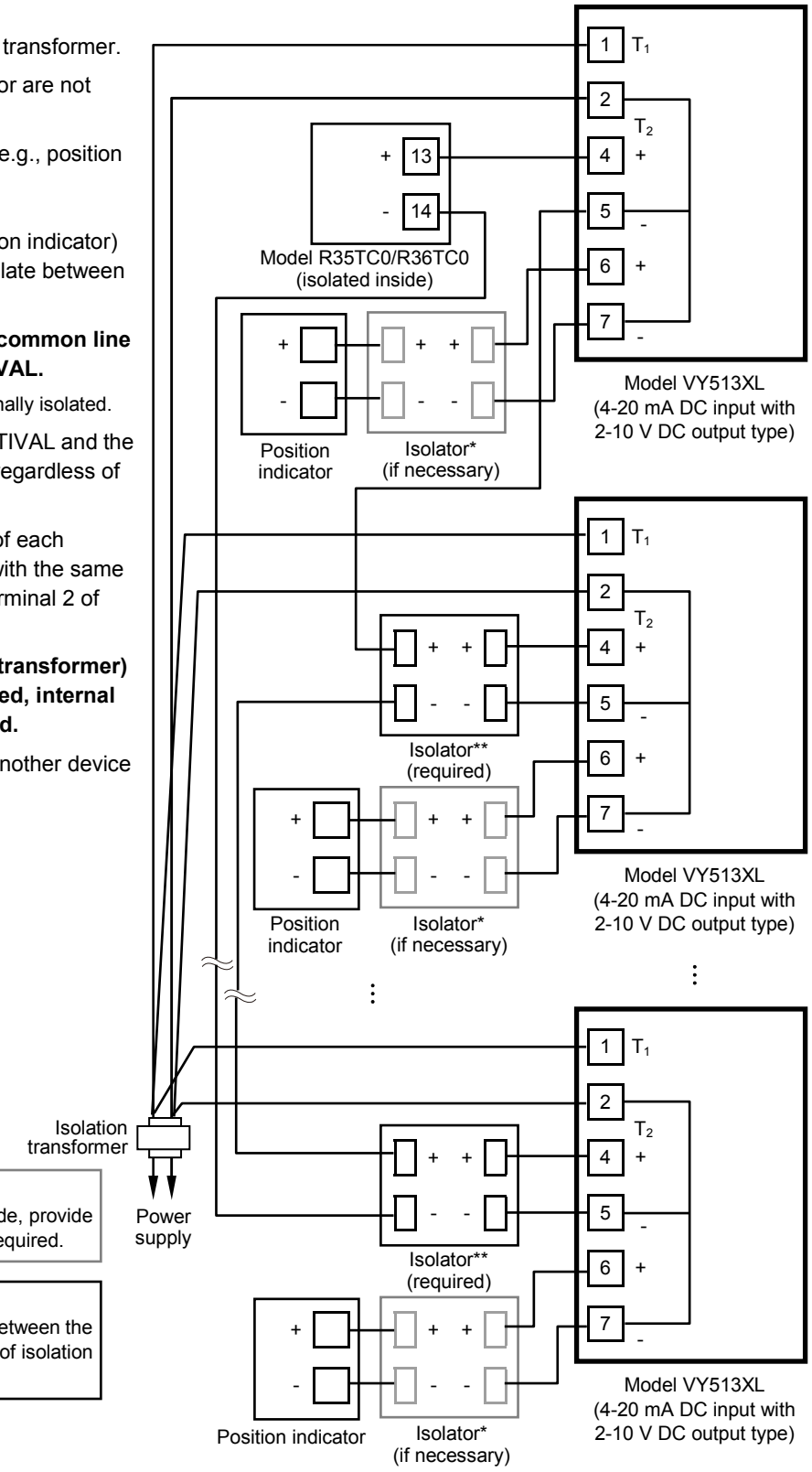
* For power supply, provide an isolation transformer.
* The terminals 2, 5, and 7 of the actuator are not isolated inside:

  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: Yamatake's Model R35/R36 is internally isolated.
* Never fail to isolate between slave-ACTIVAL and the controller (Model R35/R36 in Fig. 18) 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.



* Isolation example:
  If the position indicator is not isolated inside, provide an isolator. If isolated, an isolator is not required.

** Isolation example:
  Provide an isolator. Isolation is required between the controller and slave-ACTIVAL regardless of isolation of the controller.

Figure 18. Connection example (3):
Model VY513XL to Model R35TC0/R36TC0

Model VY514XL (Control signal: 2-10 V DC input)

Single [ACTIVAL + Yamatake's Infilex™ AC (Model WY5117) + transformer]

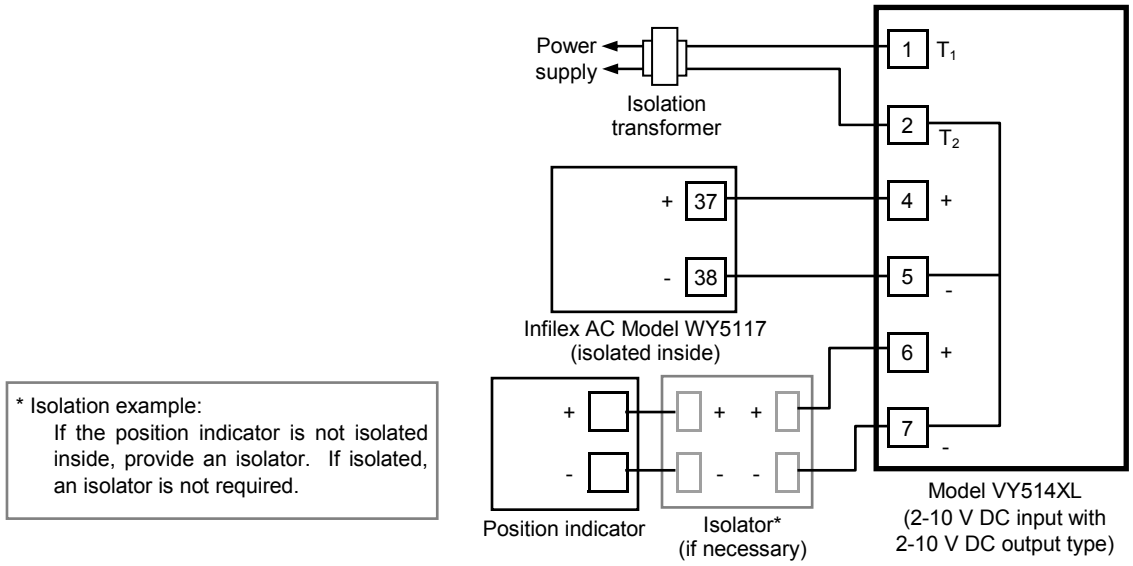


Figure 19. Connection example (1): Model VY514XL to Model WY5117

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: Yamatake's 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.
  (Infilex 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 VY514XL (Control signal: 2-10 V DC input)

Multiple [ACTIVAL + Yamatake's Infilex™ AC (Model WY5117)] + single transformer

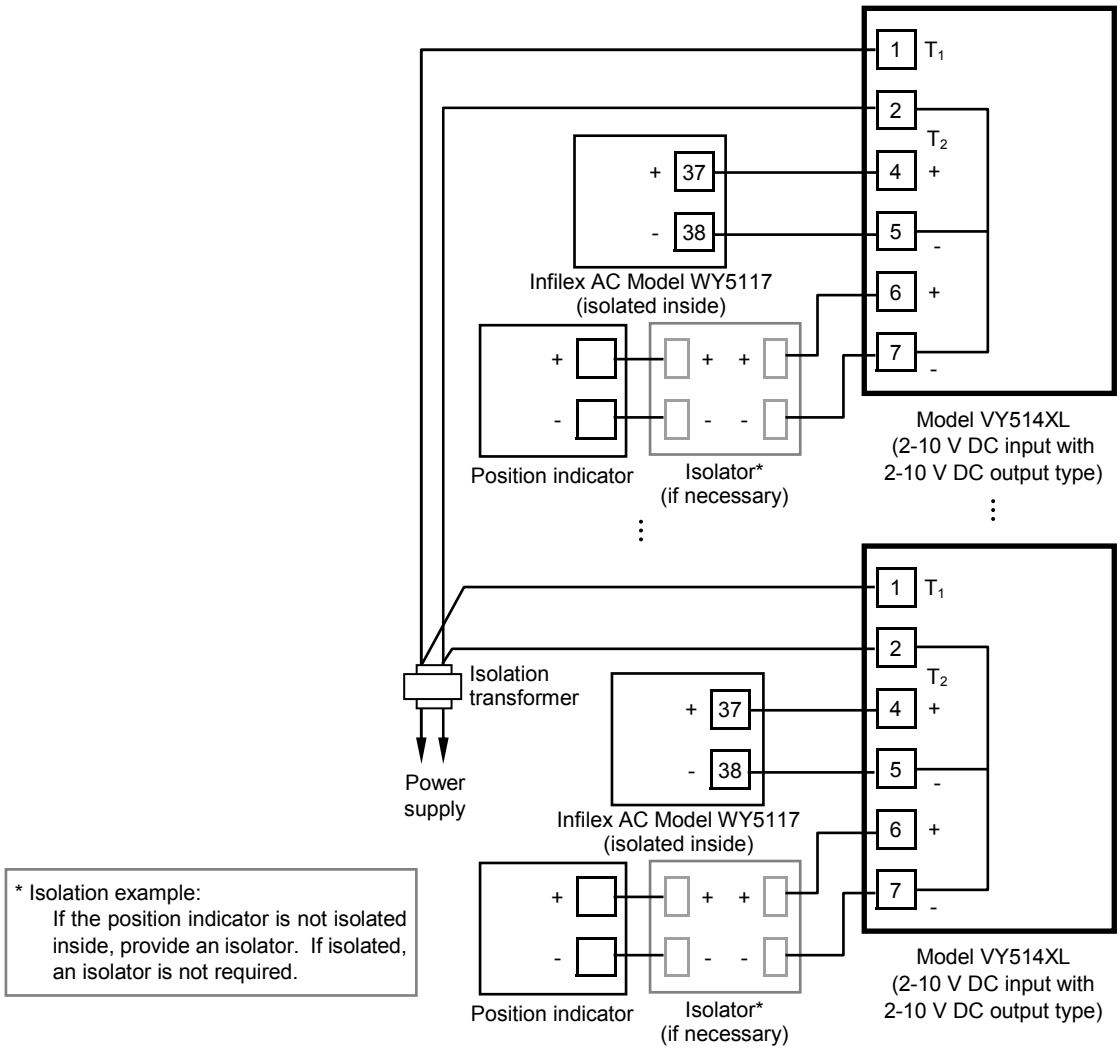


Figure 20. Connection example (2): Model VY514XL to Model WY5117

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: Yamatake's 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.
  (Infilex 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 VY514XL (Control signal: 2-10 V DC input)

Multiple ACTIVAL + single Yamatake's Infilex™ AC (Model WY5117) + single transformer:

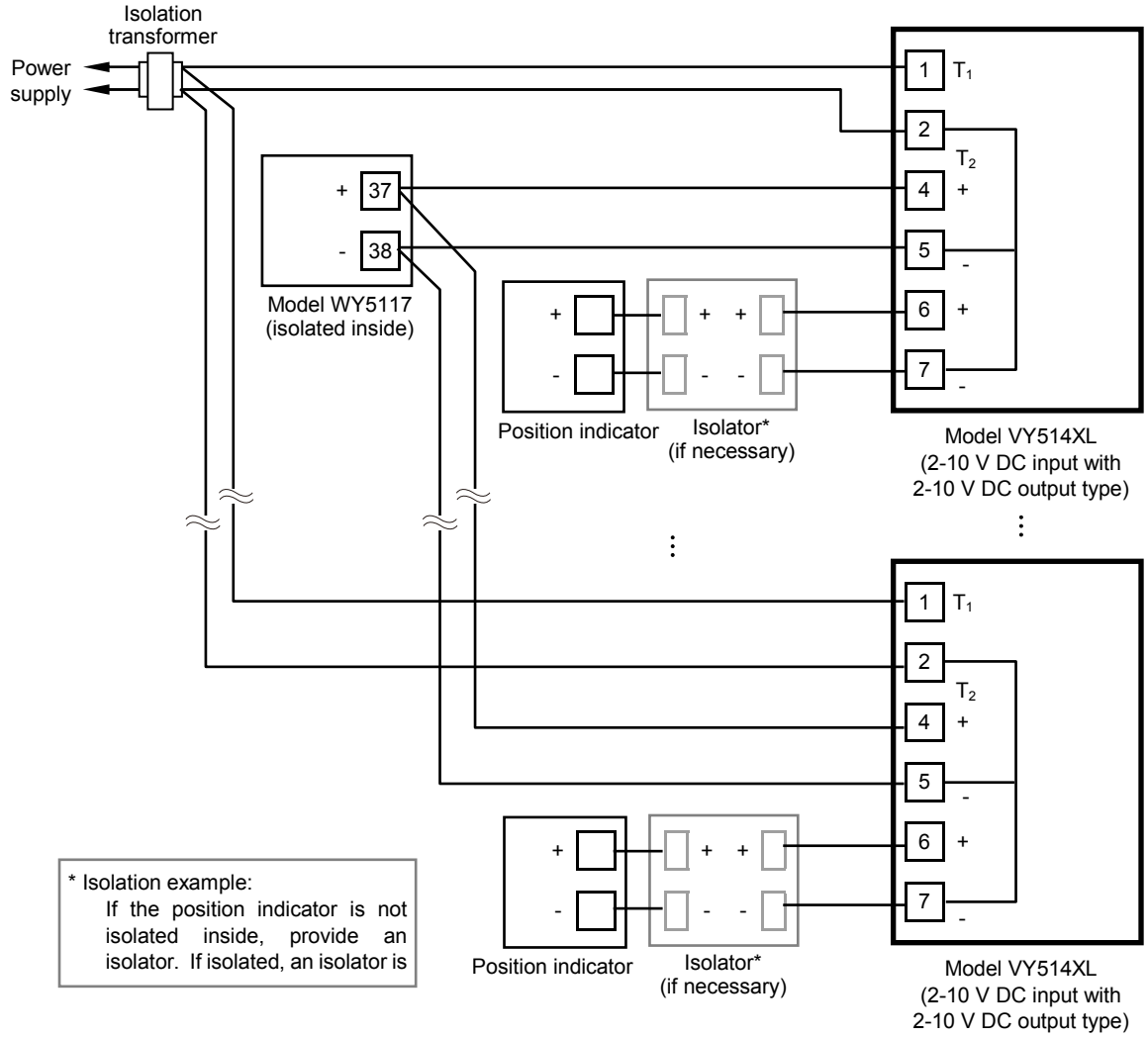


Figure 21. Connection example (3): Model VY514XL to Model WY5117

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: Yamatake's 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.
  (Infilex AC Model WY5117 in Fig. 21 is internally isolated, and its power supply voltage is 24 V AC. Therefore, the transformer can be shared.)

Model VY514XL (Control signal: 2-10 V DC input)

ACTIVAL × 2 + single Yamatake's Infilex™ AC (Model WY5117) + single transformer shared with controller (System common wiring):

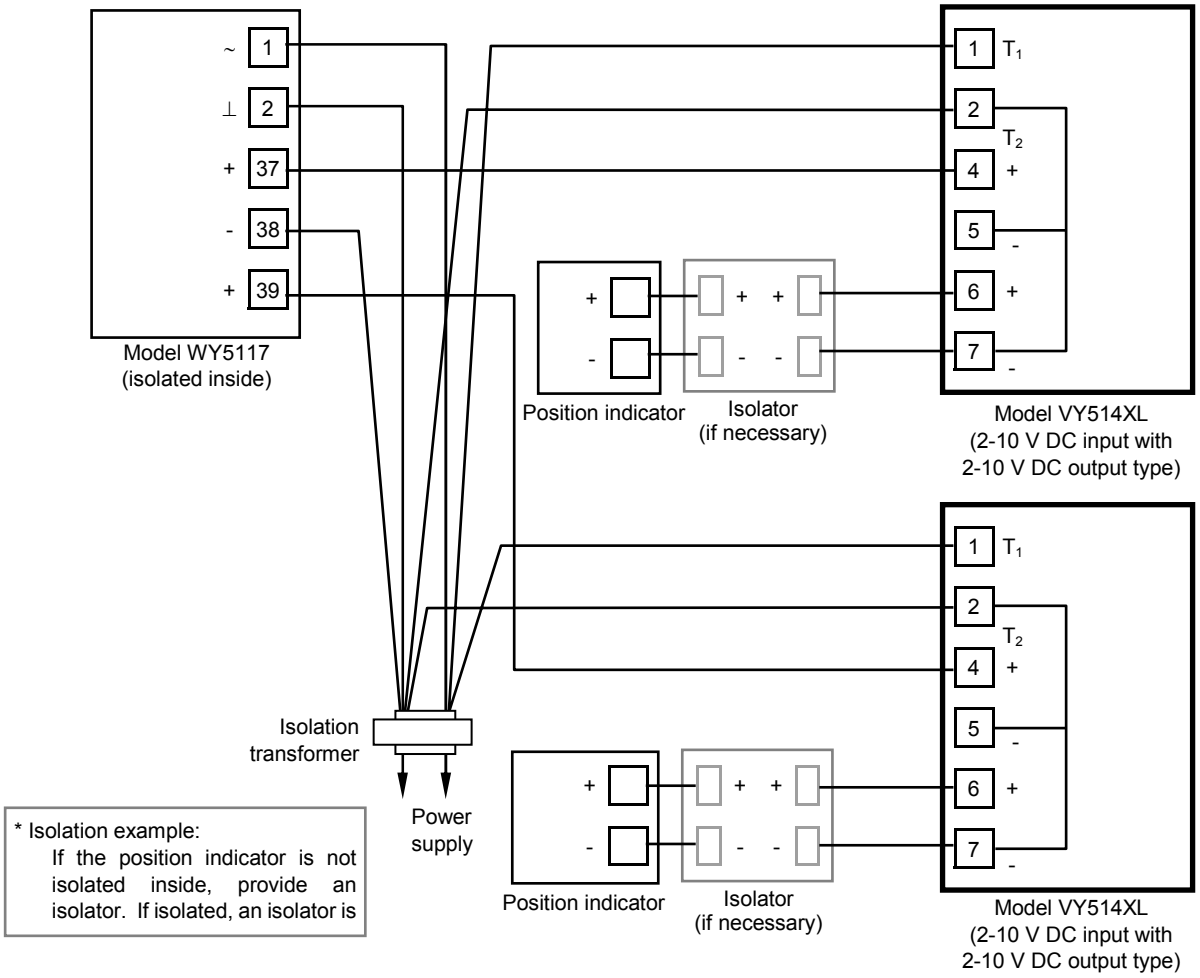


Figure 22. Connection example (4): Model VY514XL to Model WY5117

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: Yamatake's 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.
  (Infilex AC Model WY5117 in Fig. 22 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. 22, 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 VY515XL (Control signal: 0-10 V DC input)

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

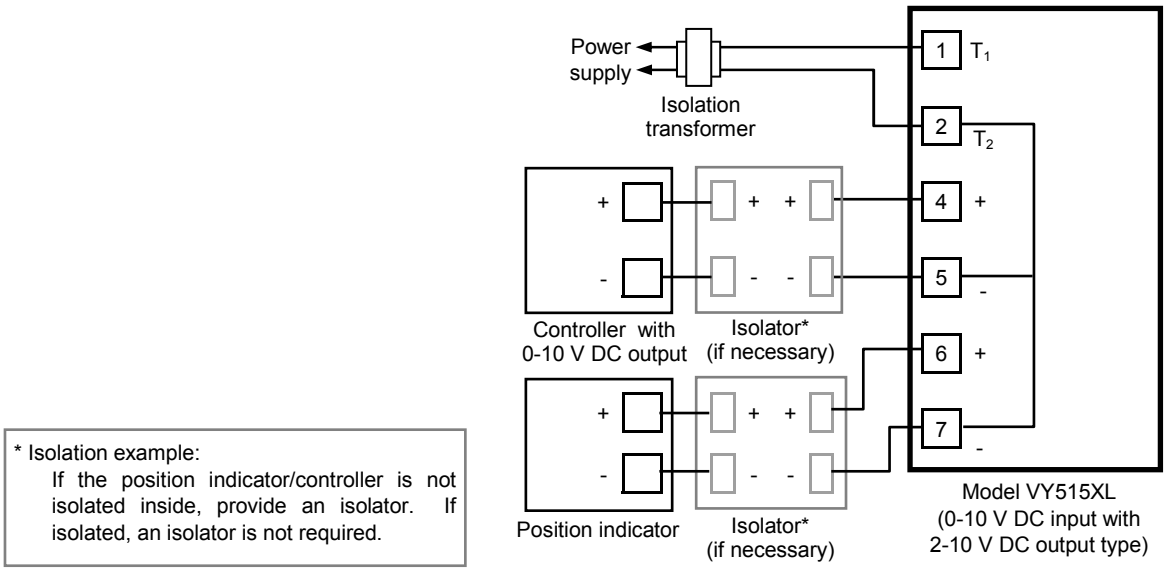


Figure 23. Connection example (1): Model VY515XL to a controller with 0-10 V DC output

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 VY515XL (Control signal: 0-10 V DC input)

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

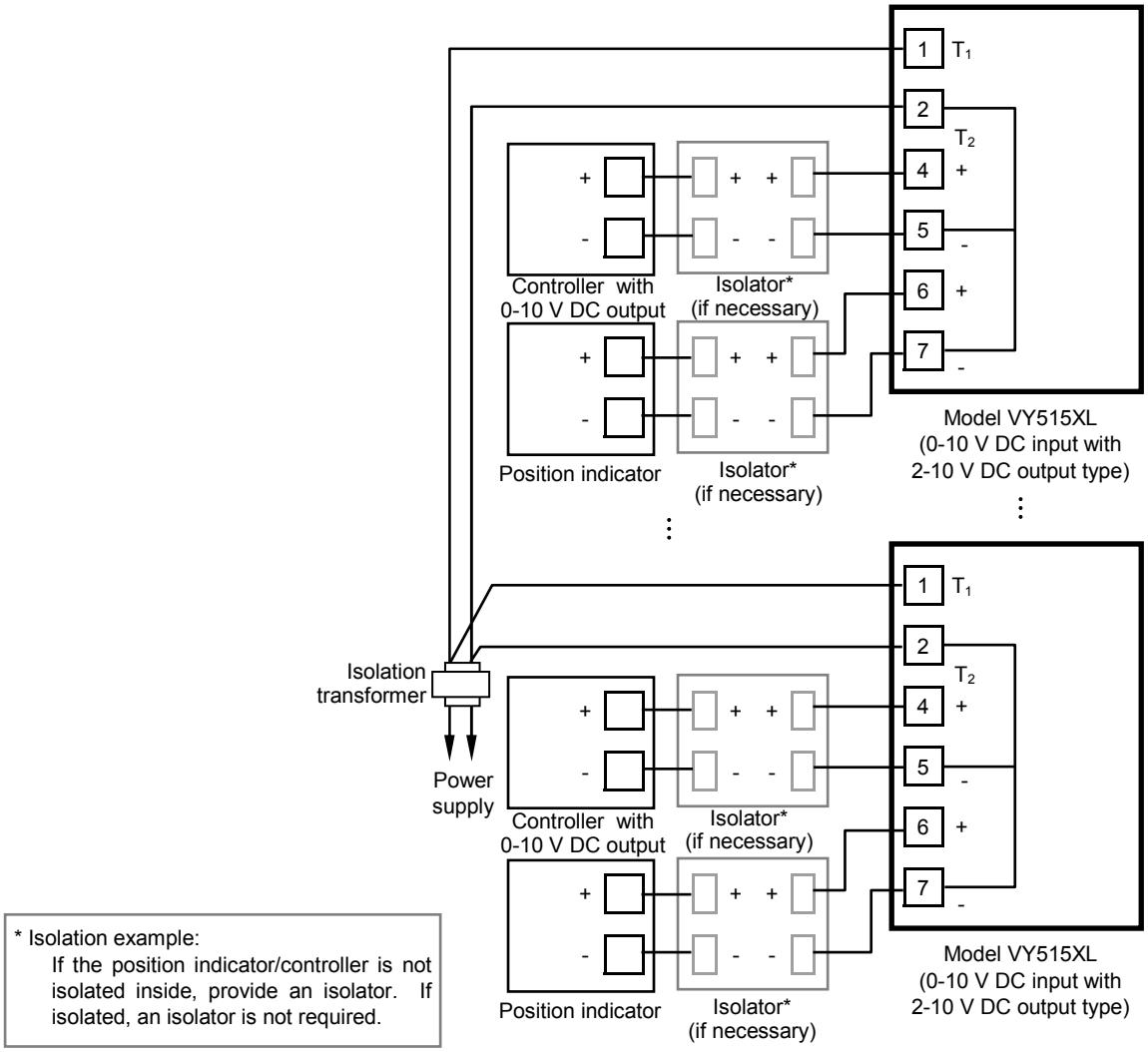


Figure 24. Connection example (2): Model VY515XL to a controller with 0-10 V DC output

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 VY515XL (Control signal: 0-10 V DC input)

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

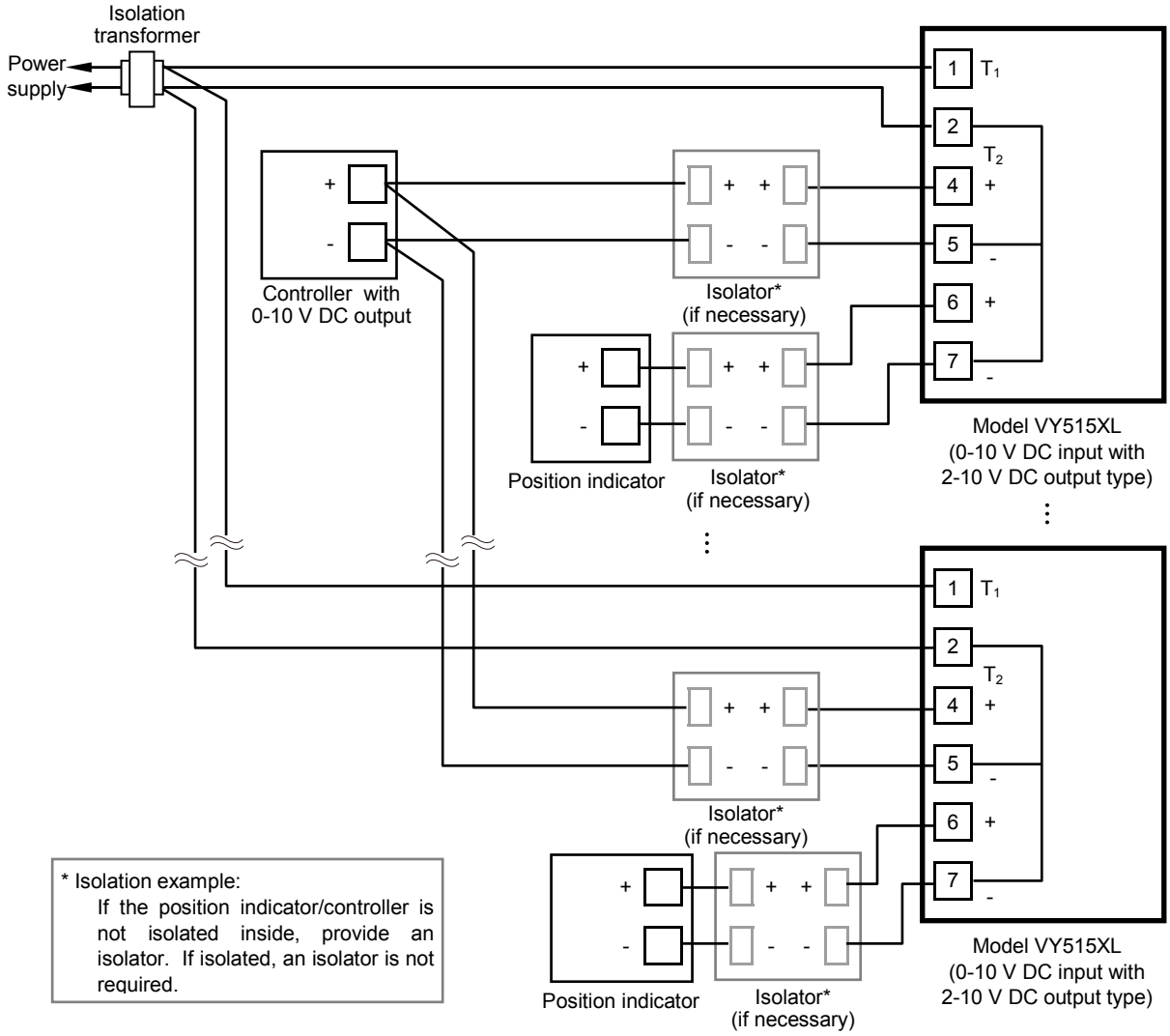


Figure 25. Connection example (3): Model VY515XL to a controller with 0-10 V DC output

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 VY515XL (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)

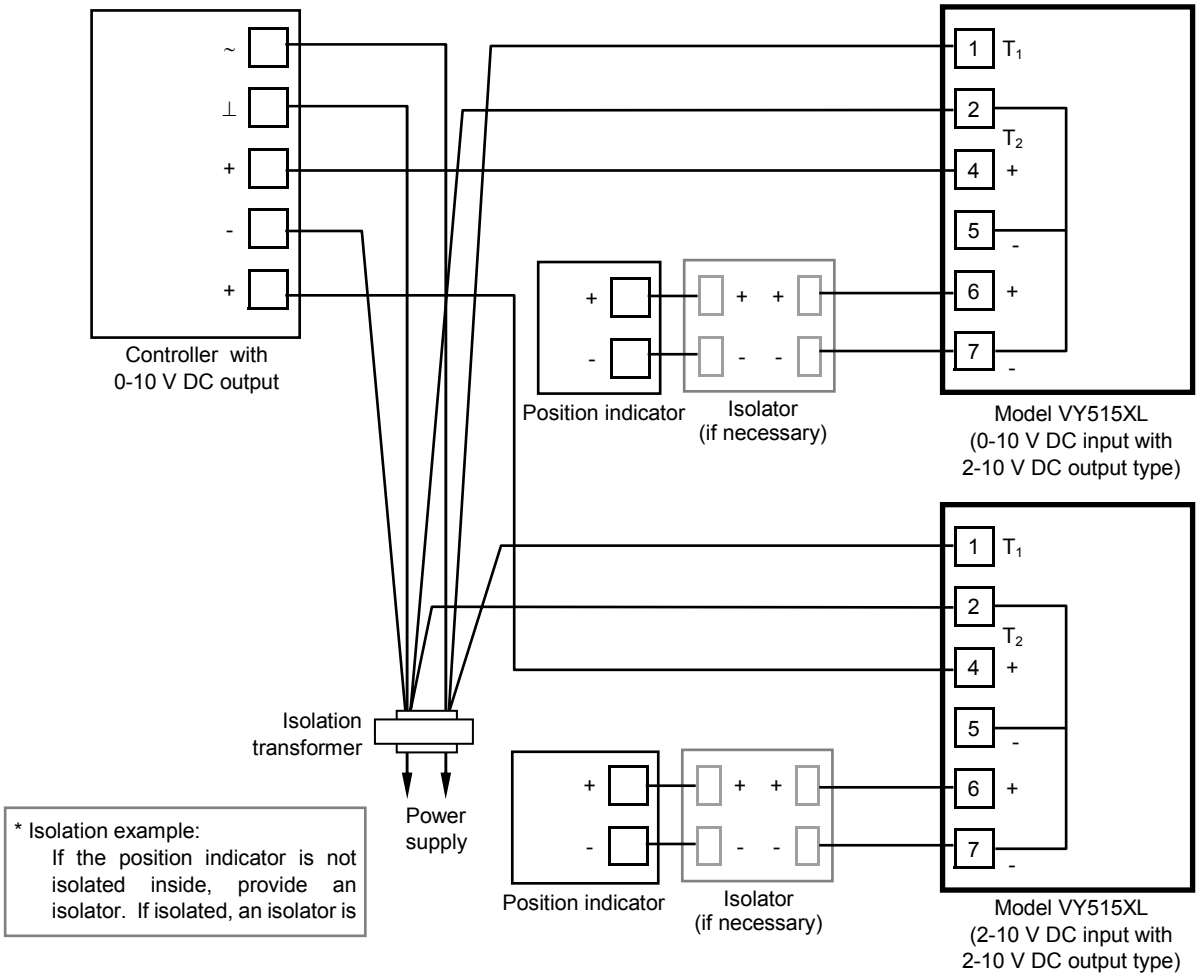


Figure 26. Connection example (4): Model VY515XL to Model WY5117

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.

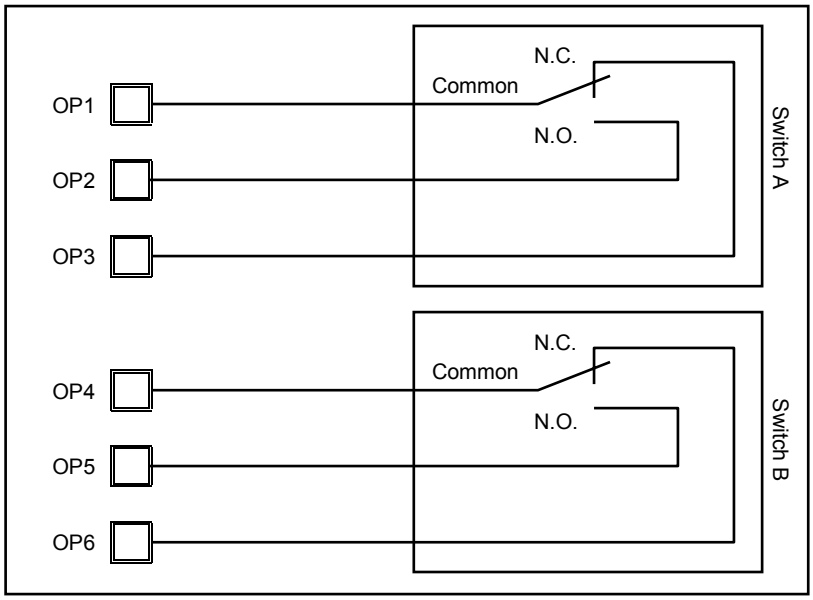
  If the terminals (of ACTIVAL and of transformer) with different polarities are connected, internal circuit of ACTIVAL may get damaged.
- Do not pass the power supply line to another device through the terminals of ACTIVAL.
- If the power supply voltage of the controller is 24 V AC (same as ACTIVAL) AND 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. 26, 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

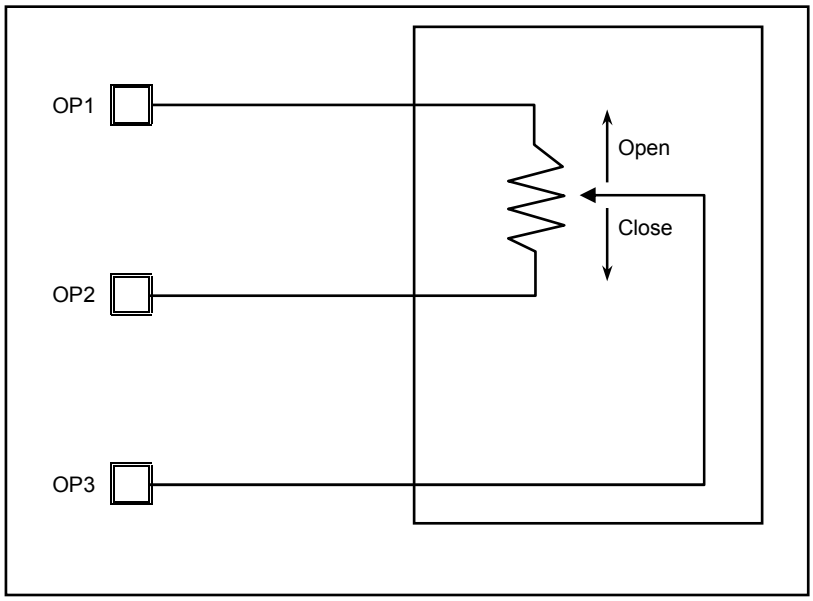
Auxiliary switch Part No. 83165274-002



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

Figure 27. Internal connection of Auxiliary switch Part No. 83165274-002

Auxiliary potentiometer Part No. 83165275-002



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

Figure 28. Internal connection of Auxiliary potentiometer Part No. 83165275-002

Inspection and Troubleshooting

⚠ CAUTION

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

- 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 Yamatake near you.

Table 1. 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 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 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.

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Specifications are subject to change without notice.

Yamatake Corporation
Building Systems Company

http://www.yamatake.com

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