Compact Ball Valve Type 27
Electric actuated TC Type (13–50mm)

Instruction Manual

Thank you for choosing our product.
This instruction manual contains important information for safe operation of our product.
Please read this manual before handling the product.
After reading, please keep this manual in a location where it can be easily accessed
by anyone who uses the product.

ASAHI YUKIZAI CORPORATION

- Important Safety Instructions -

This instruction manual is written on the assumption that those who handle our products have basic knowledge of our products, electricity, machinery, control, etc., and may contain technical terms depending on the content. Please read this instruction manual carefully, fully understand its contents, and use the product correctly in compliance with safety requirements.

This instruction manual uses ""Warning,"" ""Caution,"" ""Prohibited,"" and ""Mandatory"" marks to categorize particularly important matters to inform you of the circumstances and extent of personal injury or property damage.
Failure to comply may result in unexpected injury or damage, so please be sure to comply.

<Warning and Caution Indications>

⚠Warning	**This sign denotes that death or serious injury may result** from improper use of the product.
⚠ Caution	**This sign denotes that bodily injury or damage to property may result** from improper use of the product.

<Prohibited and Mandatory Indications>

Prohibited	**This indicates actions that must not be performed** when handling the product.
Mandatory	**This indicates actions that must be followed** when handling the product.

Table of Contents

1. Warranty information

Unless otherwise specified in contracts, specifications, etc., the warranty for piping material products such as valves manufactured and sold by us (hereinafter referred to as ""applicable products"") is as follows.

1.1. Scope of Application

This warranty applies only when the applicable products are used within Japan. If you intend to use the products overseas, please contact us separately.

1.2. Warranty Period

The warranty period is one year from delivery.

1.3. Scope of Warranty

If a failure or defect occurs due to our responsibility during the above warranty period, we will replace or repair the product free of charge. However, the following cases are not covered under warranty (repair will be chargeable) even within the warranty period:

- ▶ When storage/usage conditions and precautions described in specifications, instruction manuals, etc. are not followed during construction, installation, handling, and maintenance.
- ▶ When the defect is caused by factors other than the applicable products, such as the customer's equipment or software design.
- ▶ When the defect is caused by modification or secondary processing of the product by parties other than us.
- ▶ When the defect could have been avoided if periodic inspections and maintenance/replacement of consumable parts described in the instruction manual had been properly performed.
- ▶ When parts are used for purposes other than the product's intended use.
- ▶ When the failure or defect is caused by reasons that could not have been foreseen based on the level of science and technology at the time of shipment.
- ▶ When the defect is caused by external factors not attributable to us, such as natural disasters.

1.4. Disclaimer

- ▶ Secondary damages caused by failure of our products (equipment damage, opportunity loss, lost profits, etc.) and any other damages are not covered by compensation.
- ▶ We strive to improve the quality and reliability of our products, but we do not guarantee their perfection. When using the products in equipment that may endanger human life, body, or property, please implement appropriate safety design measures that fully consider defects that may normally occur. Please note that we cannot be held responsible for such use unless our prior written consent has been obtained through specifications or other documents.
- ▶ When using our products, please comply with product specifications and precautions. We shall not be liable for any damage caused to customers due to their failure to comply with these requirements. However, this does not apply when the damage is caused by defects in our products.

2. Safety Precautions

2.1. Unpacking, Transportation, and Storage

⚠ Warning	
Prohibited	**Serious injury may result.** ► When lifting or slinging valves, exercise sufficient safety precautions and do not go under suspended loads.

⚠ Caution	
Prohibited	**The valve may be damaged, broken, or may leak.** ► Do not subject the valve to impact from throwing, dropping, or striking. ► Do not scratch or puncture with sharp objects such as knives or hand hooks. ► Do not stack cardboard packaging excessively to prevent collapse. ► Do not allow contact with coal tar, creosote (wood preservative), termiticide, insecticide, paint, etc.
Mandatory	**The valve may be damaged, broken, or may leak.** ► Keep in cardboard packaging until immediately before piping, avoid direct sunlight, and store indoors (at room temperature). Also avoid storing in high-temperature locations. (Cardboard packaging loses strength when wet. Handle and store with care.) ► After unpacking, check that there are no abnormalities in the product and that it matches the specifications.

2.2. Handling the Product

⚠Warning	
Prohibited	**Serious injury may result.** ► Do not disassemble the actuator. ► Do not touch moving parts during operation with hands, feet, or tools.
Mandatory	**The valve may be damaged or serious injury may result.** ► When using positive pressure gas with our resin piping materials, even at the same pressure as water, dangerous conditions may occur due to the repulsive force characteristic of compressible fluids. Be sure to implement safety measures for the surrounding area, such as covering pipes with protective materials. If you have any questions, please contact us separately. ► Ball-type valves have structural dead spaces. Volatile liquids such as hydrogen peroxide (H2O2) and sodium hypochlorite (NaClO) may vaporize within dead spaces and cause abnormal pressure rise inside the valve, so exercise sufficient caution. (Gas with abnormally increased pressure due to vaporization is a compressible fluid, and in the event of valve failure, fragments may scatter explosively, which is extremely dangerous.) ► After piping installation is complete, always use water pressure when conducting leak tests on the pipeline. If testing with gas is unavoidable, please consult us in advance. **The actuator may be damaged or serious injury may result.** ► Before use, check the power supply voltage and the voltage on the nameplate.

⚠ Caution	
Prohibited	**The valve may be damaged, broken, or may leak.** ► Do not step on the valve or place heavy objects on it. ► Keep away from open flames and high-temperature objects. ► Do not use in locations where submersion is possible. ► Do not subject the valve to strong vibrations. **The actuator may malfunction.** ► Do not use the actuator outside the allowable ambient temperature range.

⚠ Caution

Mandatory

Injury may result.

- ▶ Use a commercially available hex wrench for manual operation.
- ▶ When performing manual operation, cut off the power supply to the actuator and confirm that the actuator is not operating.
- ▶ Install piping with sufficient space for maintenance.

The valve may be damaged, broken, or may leak.

- ▶ Pay attention to the atmosphere where the valve is installed. Avoid locations exposed to sea breeze, corrosive gases, chemical solutions, seawater, steam, etc.
- ▶ Use the fluid pressure and temperature within the allowable range. (Maximum allowable pressure includes water hammer pressure.)
- ▶ Use a valve made of materials suitable for the operating conditions. (Some chemicals may damage parts. Please consult us in advance for details.)
- ▶ Use fluids containing crystalline substances under conditions that prevent recrystallization.
- ▶ Avoid locations where water or dust constantly splashes and locations exposed to direct sunlight, or protect the valve with a cover that covers the entire unit.
- ▶ Refer to ""**9. Inspection Items**"" and perform maintenance regularly. Pay particular attention to long-term storage, shutdown periods, temperature changes during use, and changes over time.
- ▶ When installing the valve, provide appropriate valve support to prevent excessive force from being applied to the valve or piping.
- ▶ Always use within the specified product specifications.
- ▶ Using the valve at intermediate opening may leave marks from the ball opening on the seat (PTFE), temporarily reducing sealing performance when fully closed. Full open or full close operation is recommended.

The base plate may be damaged.

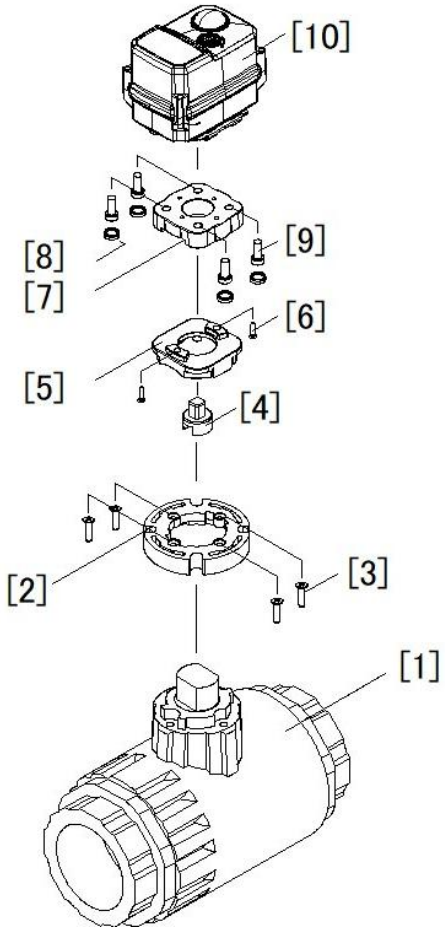
- ▶ When removing the actuator from the valve body, always use the base plate removal jig (sold separately).

The actuator may malfunction.

- ▶ If unusual odor, heat generation, or smoke occurs, immediately turn off the power supply. If any abnormality is observed, be sure to contact the dealer where you purchased the product or contact us for inspection.
- ▶ Keep the ambient temperature at the installation location within the allowable range.
- ▶ Avoid locations with volatile gases or poor atmosphere, and provide a cover that covers the entire unit.

3. Name of Components

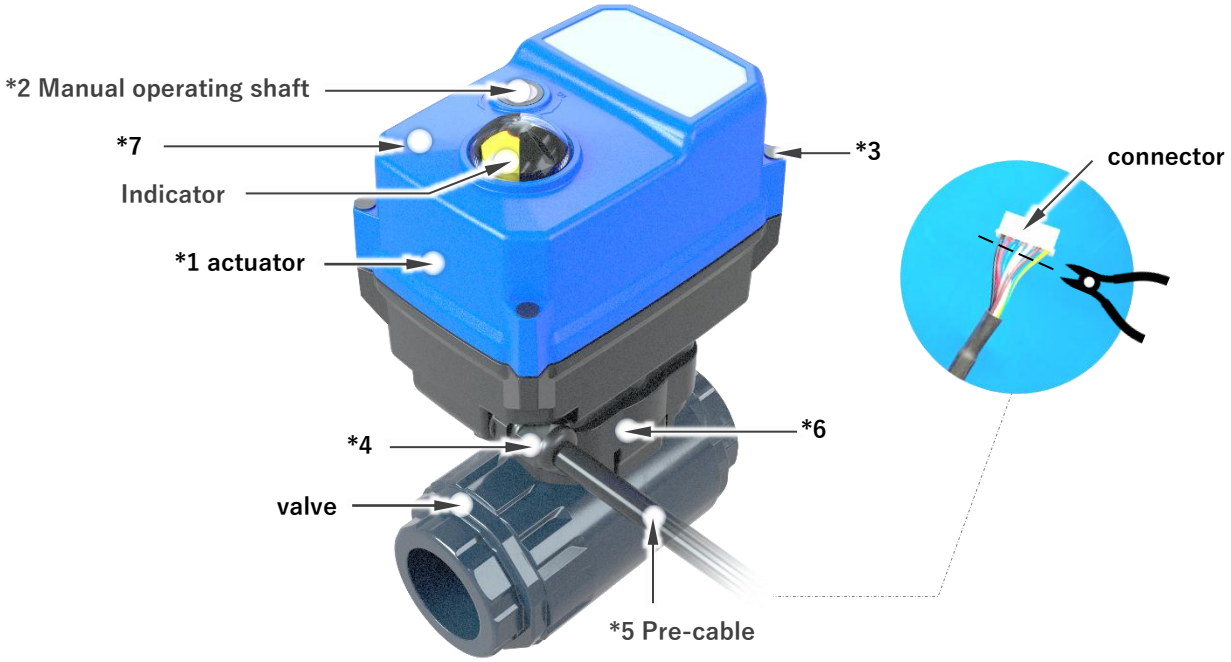
3.1. Developed View



3.2. Parts List

No.	Name	No.	Name	No.	Name
[1]	Body	[5]	Base plate	[9]	Bolt
[2]	ISO plate	[6]	Tapping screw	[10]	Actuator
[3]	Tapping screw	[7]	Connector plate	-	-
[4]	Shaft adapter	[8]	Connector plate	-	-

3.3. External Appearance



*1) Do not open the actuator cover. This will void the warranty regardless of the warranty period.
This is an external appearance image of the standard specification. Appearance varies depending on options.
Refer to **4.3 Actuator** for actuator specifications.

*2) Do not remove the cap on the manual operation shaft except when performing manual operation.

*3) Do not remove the caps (4 locations) on the enclosure fastening section.

*4) Do not loosen the tightening cap at the base of the pre-cable. The waterproof and dustproof performance of the actuator will decrease.

*5) Cut the connector at the end of the pre-cable (for product shipping inspection only) when performing wiring installation.

*6) The actuator can be removed from the valve. The required tool is a removal jig (sold separately).

*7) The unit is not equipped with an LED lamp; therefore, it does not illuminate.

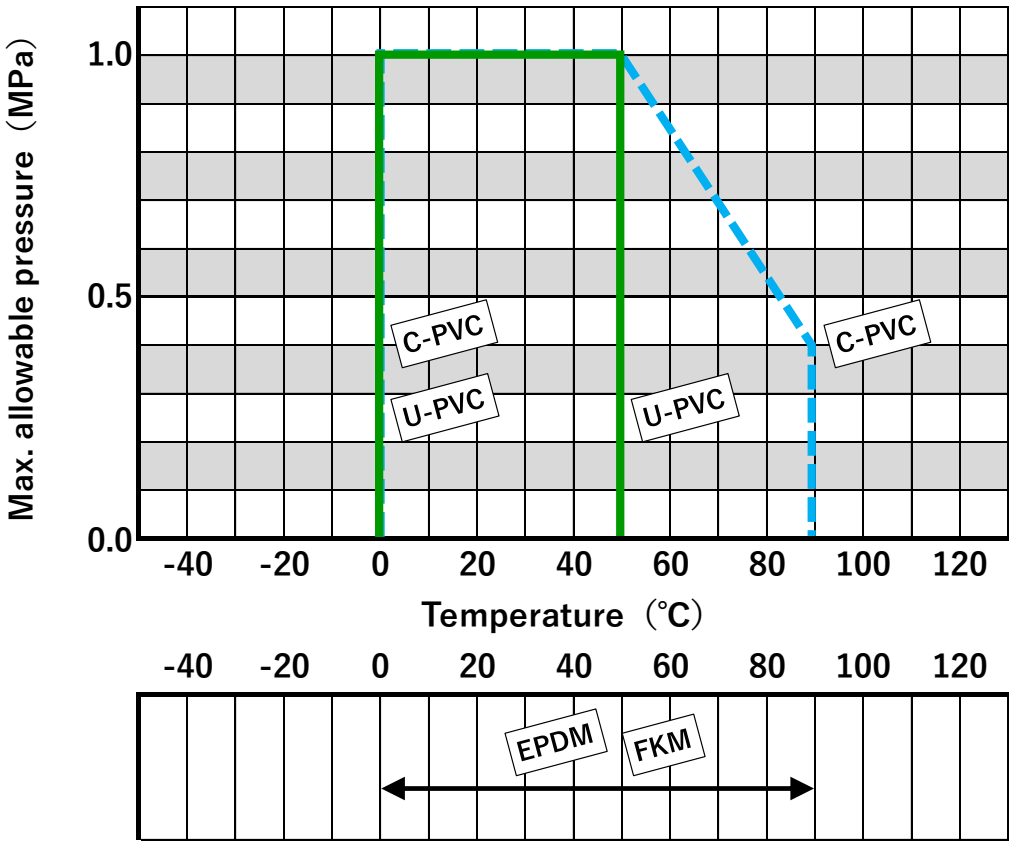
4. Product specifications

4.1. Model number table

Actuation	Valve type	Operating system	Voltage	Body material	Seal material	Connection	Standard	Size	High purity series	Terminal box
A	7B	C	U	*	*	*	*	* * *	*	*
A Automatic valve	7B Type 27	C Electric Type TC	U 95～265VAC	U U-PVC C C-PVC	E EPDM V FKM	S Socket N Threaded	J JIS D DIN A ANSI	013 13mm 015 15mm 020 20mm 025 25mm 032 32mm 040 40mm 050 50mm	0 Non 1 Lubricant free	0 Non D Attached

4.2. Relationship between maximum allowable pressure and temperature

Nominal size 13-50 mm



4.3. actuator

Product type (Option name)	TC-020(BASIC)-B3S (Standard equipment)	TC-050(BASIC)-B3R (Potentiometer)	TC-050(SMART)-B3J (Speed controller)	TC-050(SMART-MODU) (E-E Positioner)
Valve size[mm]	13-50	13-50	13-50	13-50
Product specifications				
Rated torque	20 N-m	50 N-m		
rated voltage ※1	95-265VAC (50/60Hz)			
Power consumption MAX/RUN	15W/9.6W	25W/9.6W		
Cycle time/90°	10 sec	12 sec		
Duty Cycle *2	75%			
Enclosure Material/Color/Protection rating	PC+PET/Top: Blue, Bottom: Black/IP67			
Net Weight	0.6 kg	1.6 kg		
Wiring inlet *3	Pre-cable (3 meters)			
Motor	BLDC motor			
Built-in functions				
indicator *4	●	●	●	●
Position switch assembly *5	●	●	-	●
Contact rating	Fully open / Fully closed: 1 each (dry contact) 250VAC-0.1A／30VDC-0.5A			
Space heater *6	●	●	●	●
overload protection *7	●	●	●	●
manual operation *8	●	●	●	●
Hexagon socket diameter/Number of turns	4 mm/6.5 turns	5 mm/3 turns		
potentiometer *9	-	●	-	-
Speed controller	-	-	●	-
Electro-pneumatic positioner	-	-	-	●
Installation environment				
Installation environment *10	Indoor and outdoor			
Applicable Temperature	-15° C to 45° C			
Storage temperature	≤-40° C or ≥ 80° C			
Ambient humidity	5-95%RH (without condensation)			
Insulation resistance/Dielectric Strength	500VDC, 10MΩ or more / 1500VAC, 1 minute			

***1)** The guideline for overcurrent protection devices (fuses or thermal protectors) is ""1A"".

***2)** Load and Duty cycle conform to S4 (refer to IEC60034-1) equivalent to valve load.

***3)** The wiring distance between the actuator and the distribution panel should be ""50 meters or less"". If it exceeds this, the actuator may malfunction.

***4)** Solid yellow indicates fully open, solid red indicates fully closed.

***5)** Designed for both general load and micro load.

***6)** The space heater monitors the internal temperature of the actuator and automatically turns ON/OFF.

***7)** When the actuator detects an abnormal valve load, it stops actuator operation regardless of whether it is fully open or fully closed. Remove the cause of the abnormal load and switch the actuator open/close control to restore operation.

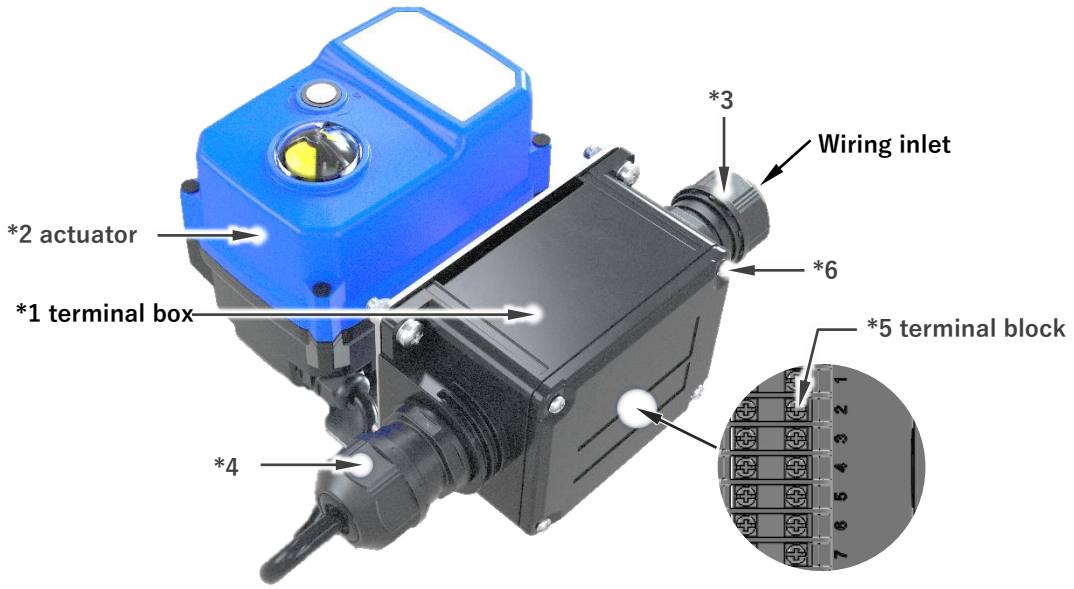
***8)** Manual operation tools (hex wrench) are not included, so please prepare commercially available products.

***9)** The resistance value of the potentiometer is ""10kΩ"". There are no resistance value options.

***10)** When using outdoors, attach protective covers to the actuator and cables, and avoid direct sunlight and rain.

4.3.1. With terminal box

You can select a product specification with a terminal box containing a built-in round terminal block on the side of the actuator.



***1)** The protection rating of the terminal box is ""IP67"".

***2)** This is the external appearance image of the actuator when no option is selected.
When a function option is selected, the external appearance of the actuator will differ.

***3)** The cable gland on the wiring inlet side (thread standard: G 1/2) is removable.

***4)** Do not loosen the tightening cap on the actuator side. The protective performance of the terminal box may be compromised.

***5)** Connect the wiring cables to the terminal block (thread standard: M3) inside the terminal box.

***6)** Securely tighten the cover fastening screws (4 locations) of the terminal box.

4.3.2. Options

Option name	Actuator model
	Nominal size 13-50 mm
None (standard specification)	TC-020(BASIC)-B3S
Potentiometer ※1	TC-050(BASIC)-B3R
Speed controller *1	TC-050(SMART)-B3J
Electro-pneumatic positioner	TC-050(SMART-MODU)

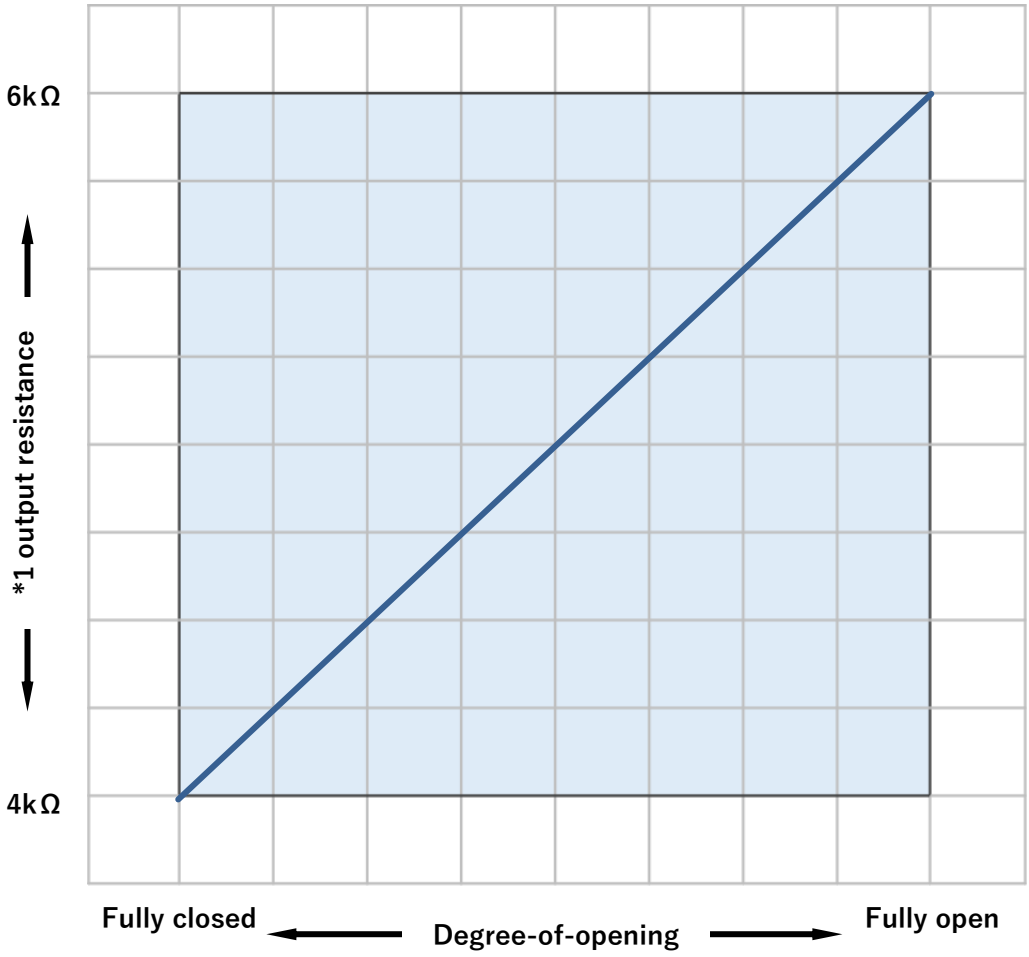
*1) Potentiometer and speed controller cannot be installed simultaneously.

*2) When selecting with options for nominal size 15-50 mm, the actuator will be upgraded.

*3) **4.3.1 With terminal box** can be selected for all options.

4.3.2.1. potentiometer

The potentiometer is an option that converts valve opening degree information into ""resistance value (Ω)"" and outputs it externally. Input the output resistance value to an external device such as a potentiometer converter.

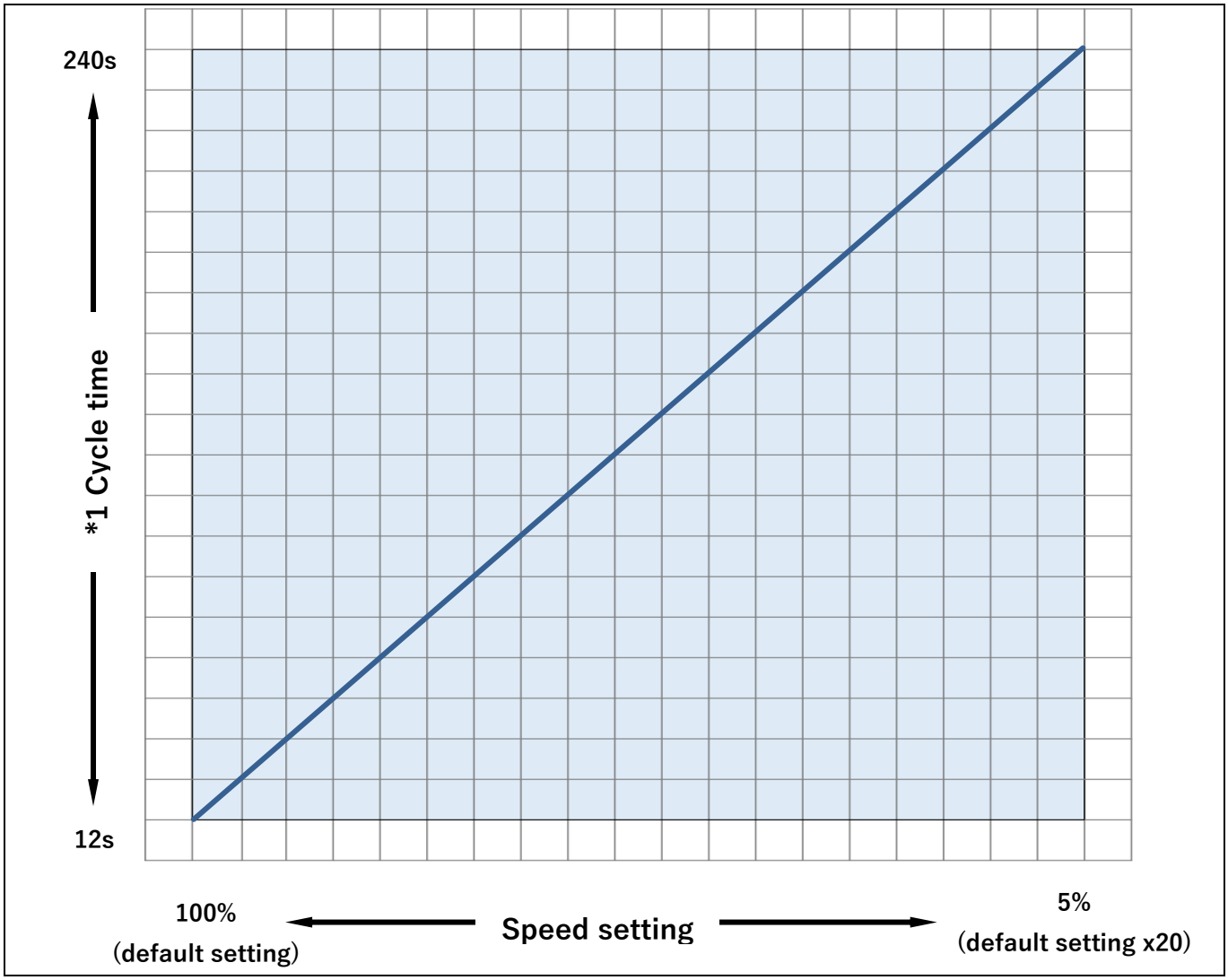


*1) The output resistance value is a guideline value. It is not a guaranteed value as it varies depending on the actuator's operating environment and individual differences.
This is the resistance value between the gray and white wires of the actuator's pre-cable. The polarity is reversed for the resistance value between the brown and white wires of the pre-cable.

4.3.2.2. Speed controller

The speed controller is an optional function used to adjust the opening and closing time.
It allows 20-step adjustment in 5% increments, from 100% (default setting) to 5% (default setting × 20).

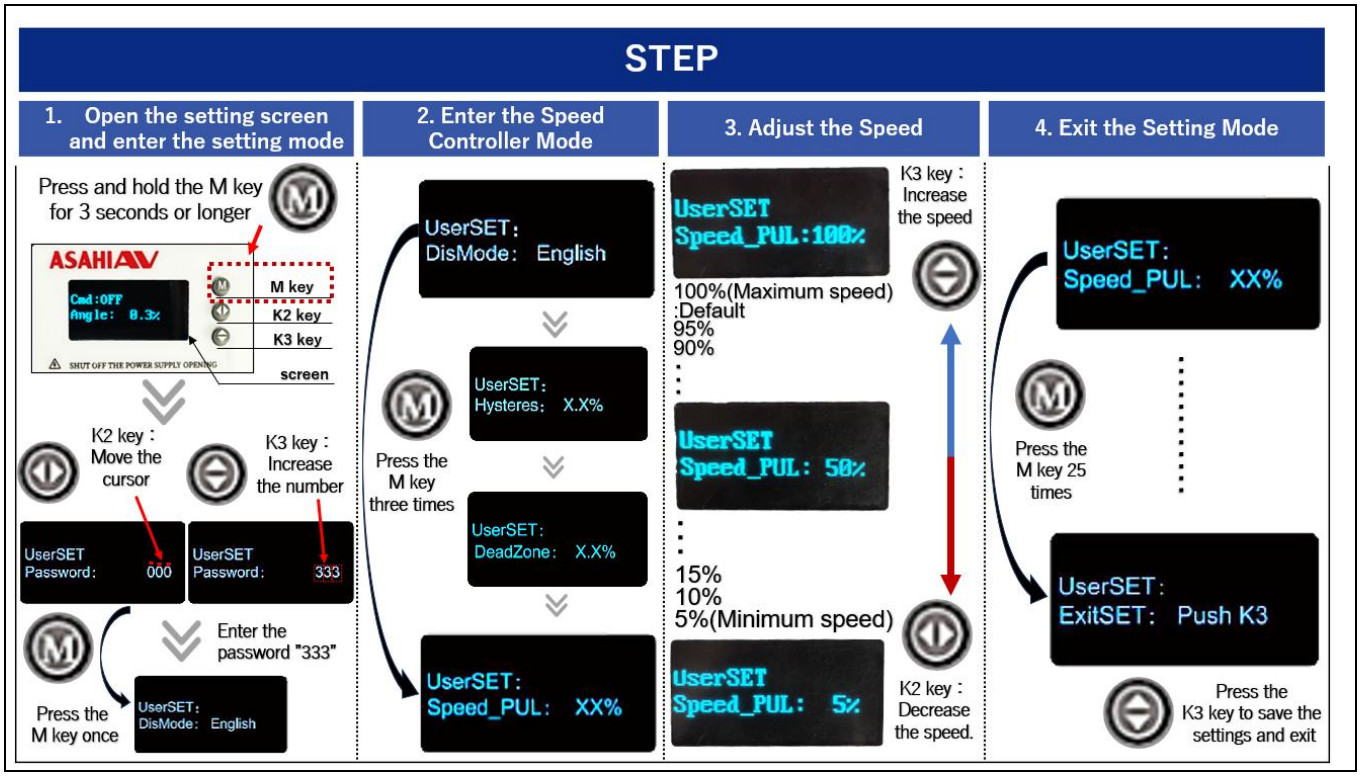
The opening and closing time is adjusted by repeating operation and stop cycles from the start to the end of actuator control, and by varying the stop time during these cycles.



*1) Cycle Time is a guideline value. It is not a guaranteed value as it varies depending on the actuator's operating environment and individual differences.

●Speed Controller Setting Procedure

When setting the speed controller, please ensure that either the open power supply or the close power supply is applied to the actuator. Do not turn off the power during the setting process.



1. Open the setting screen and enter the setting mode.

Press and hold the M key for 3 seconds or longer.

Then perform the following key operations in order:

① K Press the K3 key three times, then press the K2 key once.

② Again, press the K3 key three times, then press the K2 key once.

③ Finally, press the K3 key three times, then press the M key.

＊Using the K2 and K3 keys, confirm that the password display is set to “333”.

After completing these operations, confirm that the setting screen “DisMod : English” (shown in the table above) is displayed.

2. Enter the Speed Controller Mode

Press the M key three times and confirm that the display changes to “Speed_PUL : 100%”.

3. Adjust the Speed

Set the desired speed.

-K2 key：Decreases the speed

-K3 key：increases the speed

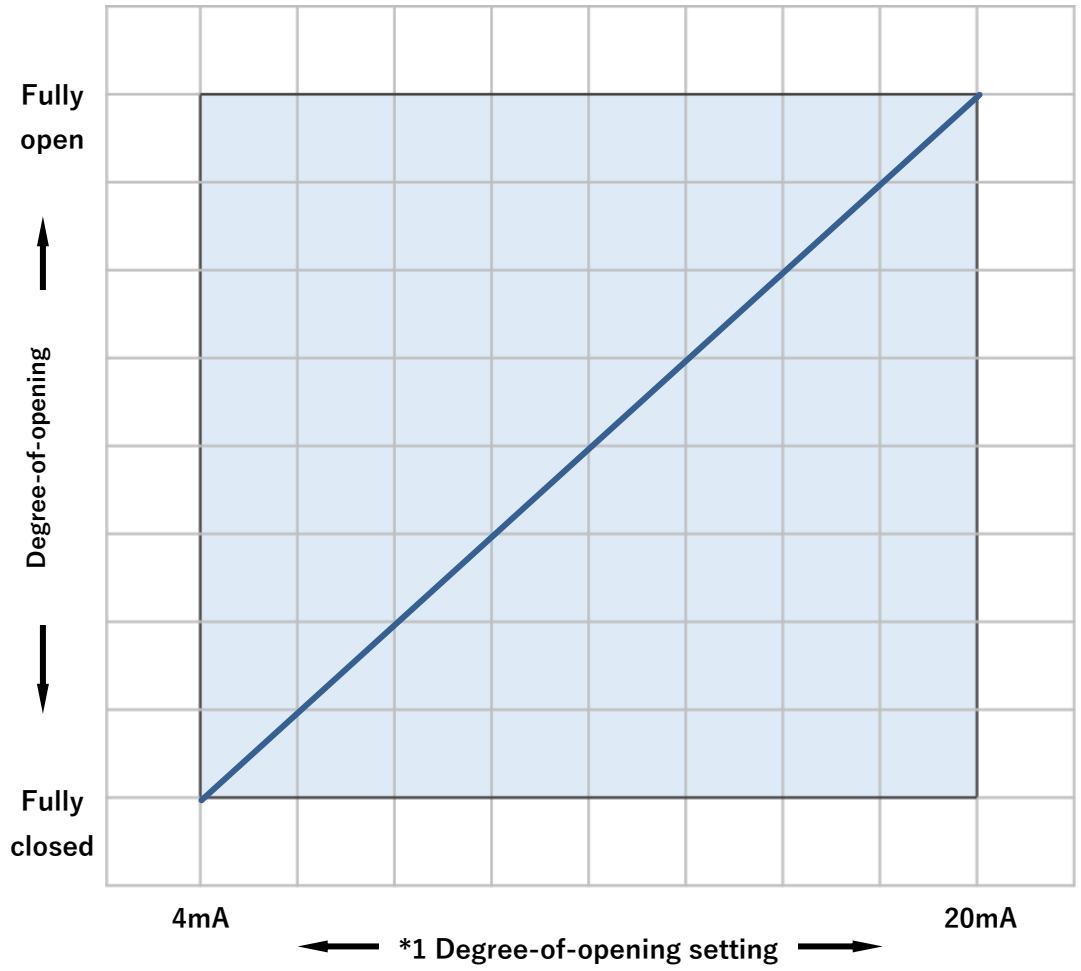
※Each press of the K2 or K3 key adjusts the speed in 5% increments.

4. Exit the Setting Mode

From the “Speed_PUL” screen, press the M key 25 times and confirm that the display changes to “ExitSET : Push K3”. Then press the K3 key to save the settings. After saving, the unit can be operated with the updated settings.

4.3.2.3. E-E positioner

The electro-pneumatic positioner is an option that controls valve opening degree with DC current (4-20mADC).



*1) Supply DC current (4-20mADC) between the gray and white wires of the actuator's pre-cable.

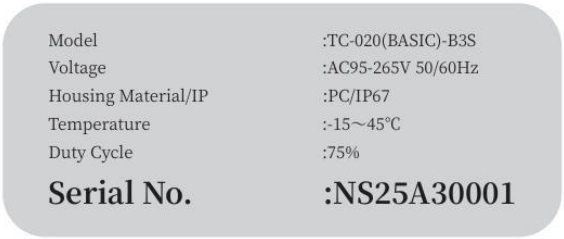
4.3.3. Labels

Labels are affixed to the actuator for purposes such as product identification information and product warranty management. Do not peel off, damage, or modify them.

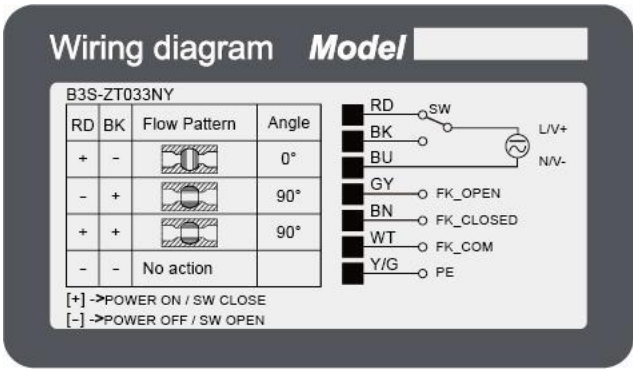
【 example 】 Nominal size 13-50 mm (standard specification)

Logo label

Specification label



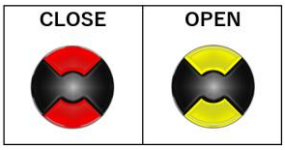
Wiring label



*1 Do not open label

*2 Traceability label

Indicator label



*1) If evidence of removal is found on the do not open seal, the product warranty may be voided.

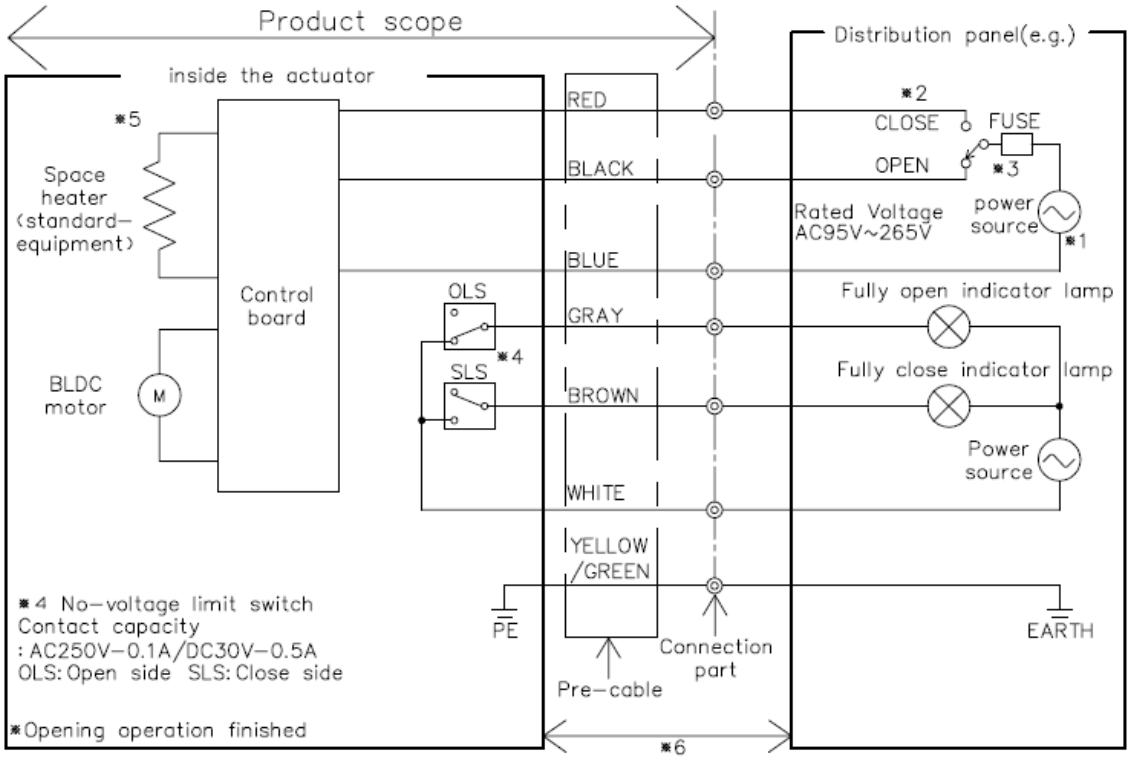
*2) If the traceability label is missing or unreadable, warranty service or after-sales service may not be available.

4.4. Wiring diagram

⚠ Caution	
Prohibited	Seat leakage may occur. ▶ Do not stop power supply by the operation of the voltage-free position switch.

4.4.1. Standard specifications

The following shows a wiring example for standard specifications. For actual wiring, follow the specifications of the distribution panel.



※1 Use a power supply within the rated voltage range.

※2 Open control: Supply power between the black and blue wires of the pre-cable. Close control: Supply power between the red and blue wires of the pre-cable.

※3 The guideline current for overcurrent protection device (FUSE) is ""1A"". Select according to the specifications of the distribution panel.

※4 ・The gray-white wires of the pre-cable turn ON slightly before fully open. The brown-white wires of the pre-cable turn ON slightly before fully closed.
・Refer to **Figure 4.4.1-1** for the switching chart.
・This is a specification for both general load and micro load.
・Do not perform control that turns OFF power to the actuator upon receiving the fully closed signal output. The valve may not fully close and internal leakage may occur.

※5 The space heater (standard equipment) automatically turns ON/OFF according to the internal temperature of the actuator.

※6 The wiring distance between the actuator and the distribution panel should be ""50 meters or less"". If it exceeds this, the actuator may malfunction. If long-distance wiring is required, refer to **4.4.6 Standard specifications: Long-distance wiring**.

※7 Refer to **Figure 4.4.1-2** for the actuator pre-cable specifications.

Figure 4.4.1-1 Switching chart

Nominal size 13-50 mm

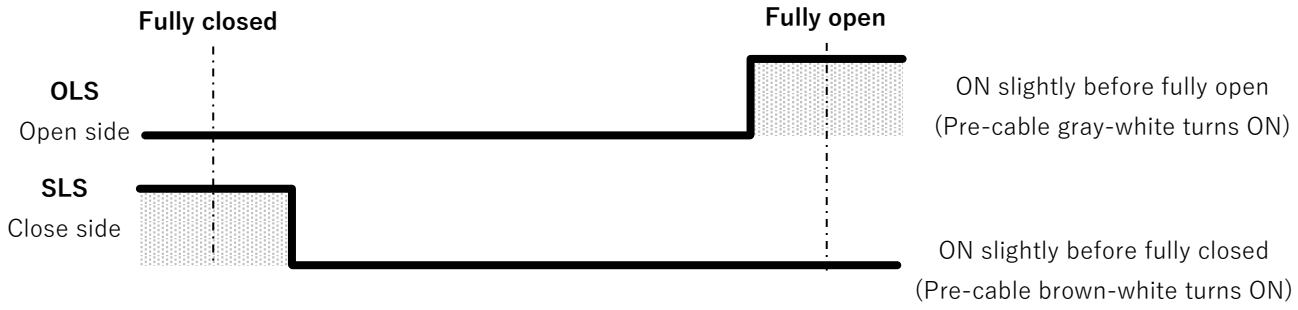
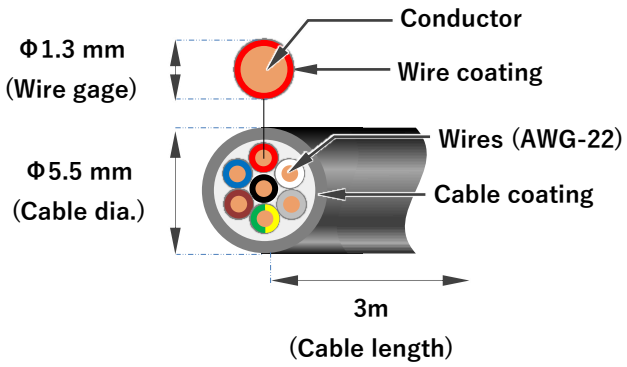


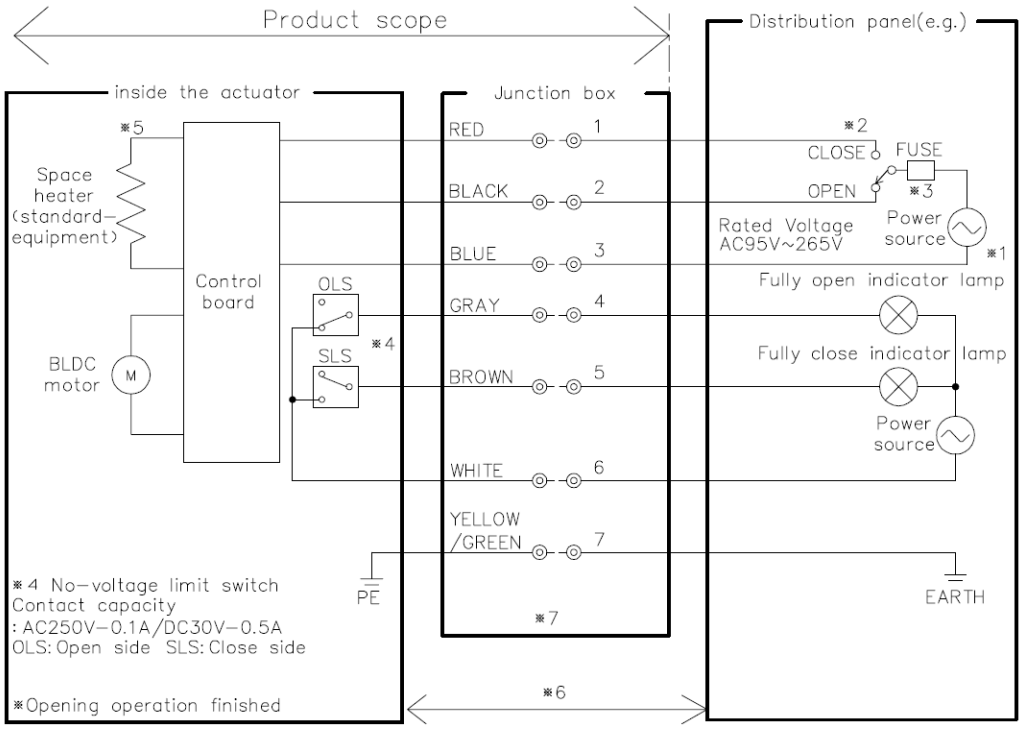
Figure 4.4.1-2 Pre-cable specifications

Nominal size 13-50 mm



4.4.2. Standard specification: With terminal box

The following shows a wiring example when **4.3.1 With terminal box** is selected. For actual wiring, follow the specifications of the distribution panel.



※1 Use a power supply within the rated voltage range.

※2 Open control: Supply power between 2 (black) and 3 (blue) of the terminal box.
Close control: Supply power between 1 (red) and 3 (blue) of the terminal box.

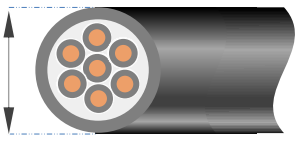
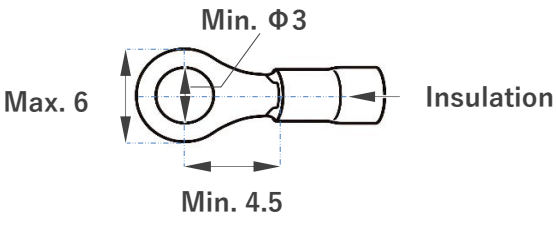
※3 The guideline current for overcurrent protection device (FUSE) is ""1A"". Select according to the specifications of the distribution panel.

※4 ・Terminals 4 (gray) - 6 (white) inside the terminal box turn ON slightly before fully open.
Terminals 5 (brown) - 6 (white) inside the terminal box turn ON slightly before fully closed.
・Refer to **Figure 4.4.1-1** for the switching chart.
・This is a specification for both general load and micro load.
・Do not perform control that turns OFF power to the actuator upon receiving the fully closed signal output.
The valve may not fully close and internal leakage may occur.

※5 The space heater (standard equipment) automatically turns ON/OFF according to the internal temperature of the actuator.

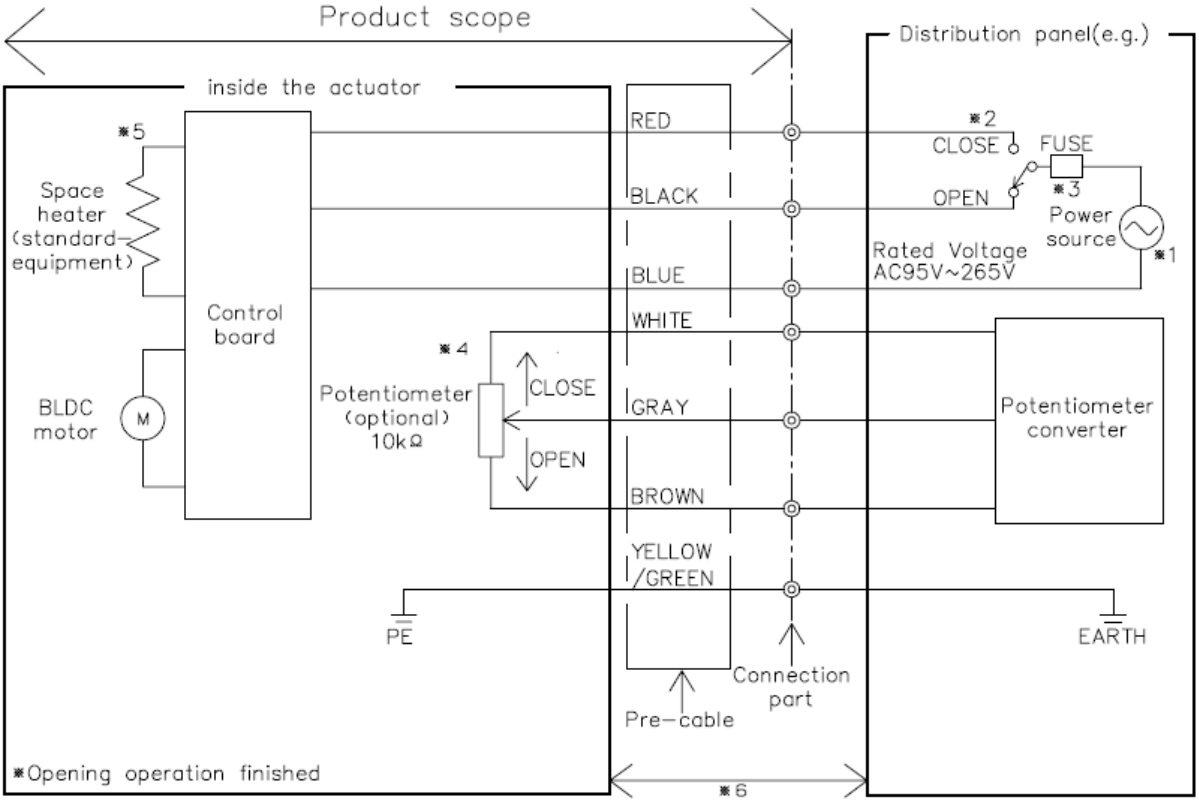
※6 The wiring distance between the actuator and the distribution panel should be ""50 meters or less"". If it exceeds this, the actuator may malfunction. If long-distance wiring is required, refer to **4.4.6 Standard specifications: Long-distance wiring**.

※7 The terminal box model is ""JB-WG307"", thread standard is ""G 1/2"", refer to **Figure 4.4.2-2** for compatible terminals.
Refer to **Figure 4.4.2-1** for compatible cables for the terminal box with the included cable gland.
Select terminals with insulation coating or install mark tubes to ensure insulation distance between terminals.

Figure 4.4.2-1 Compatible cables	Figure 4.4.2-2 Compatible terminals
Φ8–15 mm (Cable dia.) 	

4.4.3. Option: Potentiometer

This shows a wiring example when a potentiometer is selected in **option 4.3.2** For actual wiring, follow the specifications of the distribution panel.



※**1** Use a power supply within the rated voltage range.

※**2** Open control: Supply power between the black and blue wires of the pre-cable. Close control: Supply power between the red and blue wires of the pre-cable.

※**3** The guideline current for overcurrent protection device (FUSE) is ""1A"". Select according to the specifications of the distribution panel.

※**4** The resistance between the gray and white wires of the pre-cable is maximum when fully open. The resistance between the gray and white wires of the pre-cable is minimum when fully closed.

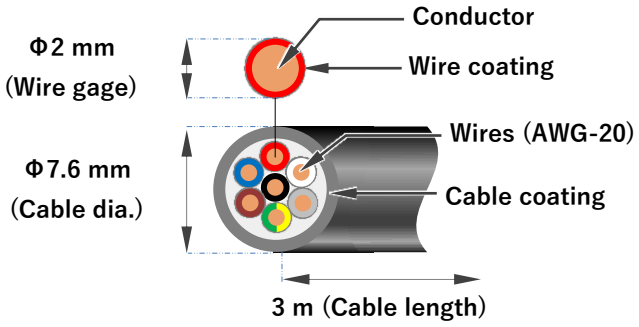
※**5** The space heater (standard equipment) automatically turns ON/OFF according to the internal temperature of the actuator.

※**6** The wiring distance between the actuator and the distribution panel should be ""50 meters or less"". If it exceeds this, the actuator may malfunction. If long-distance wiring is required, refer to **4.4.6 Standard specifications: Long-distance wiring**.

※**7** Refer to **Figure 4.4.3-1** for the actuator pre-cable specifications.

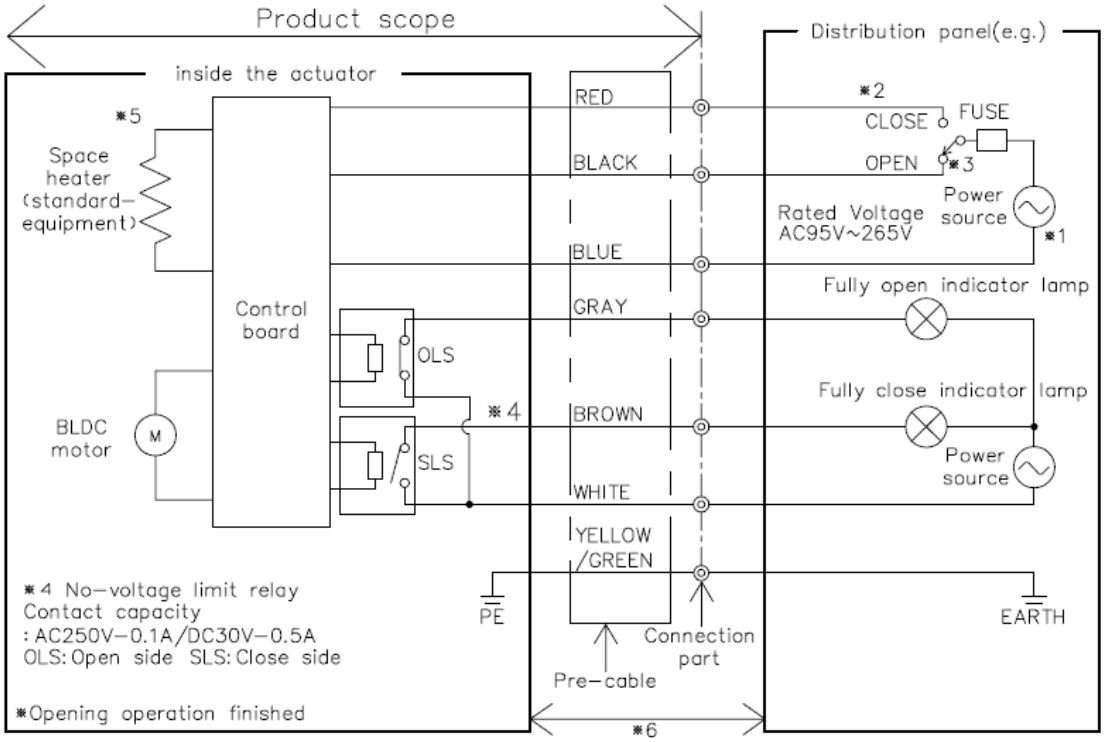
Figure 4.4.3-1 Pre-cable specifications

Nominal size 13-50 mm



4.4.4. Option: Speed controller

This shows a wiring example when a speed controller is selected in **option 4.3.2** For actual wiring, follow the specifications of the distribution panel.



※1 Use a power supply within the rated voltage range.

※2 Open control: Supply power between the black and blue wires of the pre-cable. Close control: Supply power between the red and blue wires of the pre-cable.

※3 The guideline current for overcurrent protection device (FUSE) is ""1A"". Select according to the specifications of the distribution panel.

※4 ・The gray-white connection of the pre-cable turns ON simultaneously with fully open. The brown-white connection of the pre-cable turns ON simultaneously with fully closed.

When the actuator power is turned OFF, the gray-white and brown-white connections of the pre-cable turn OFF regardless of the opening degree.

・Refer to **Figure 4.4.4-1** for the switching chart.

・This is a specification for both general load and micro load.

※5 The space heater (standard equipment) automatically turns ON/OFF according to the internal temperature of the actuator.

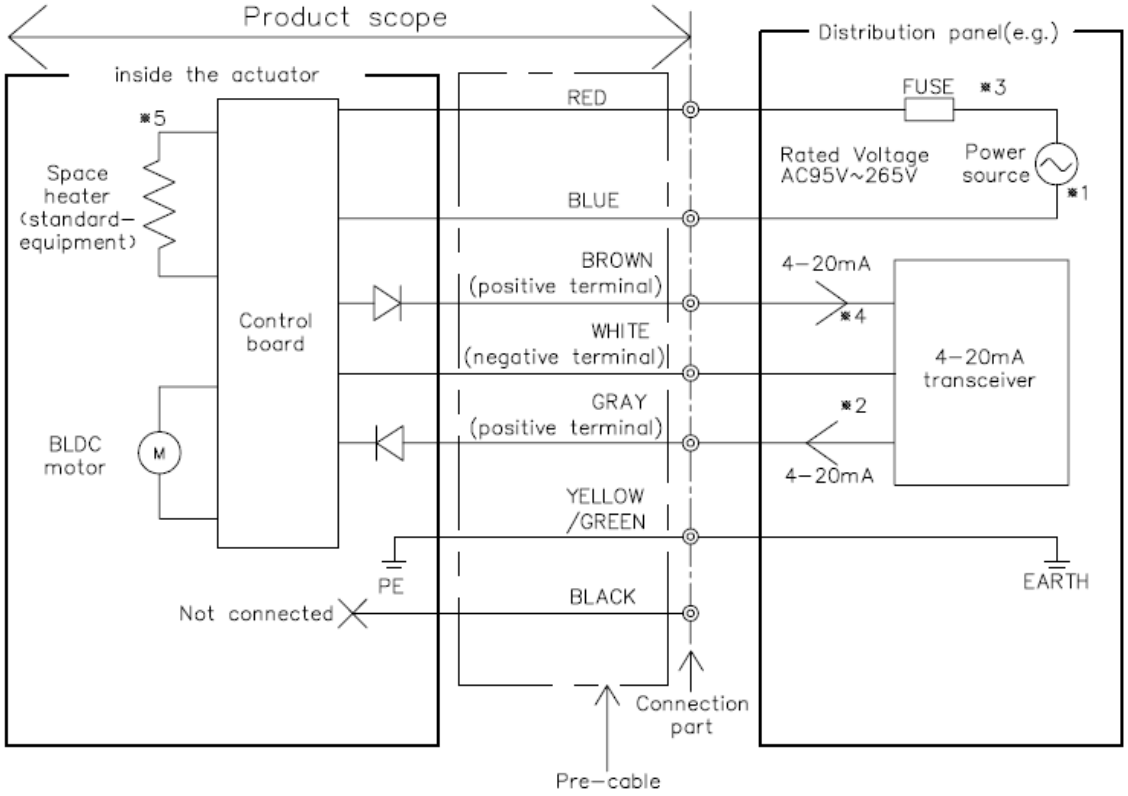
※6 The wiring distance between the actuator and the distribution panel should be ""50 meters or less"". If it exceeds this, the actuator may malfunction. If long-distance wiring is required, refer to **4.4.6 Standard specifications: Long-distance wiring**.

※7 Refer to **Figure 4.4.3-1** for the actuator pre-cable specifications.

Figure 4.4.4-1 Switching chart

4.4.5. Option: E-E positioner

This shows a wiring example when an electric positioner is selected in **option 4.3.2** For actual wiring, follow the specifications of the distribution panel.



※**1** Use a power supply within the rated voltage range.

※**2** Open control: Supply DC 20 mA between the gray and white wires of the pre-cable.
Close control: Supply DC 4 mA between the gray and white wires of the pre-cable.

※**3** The guideline current for overcurrent protection device (FUSE) is ""1A"". Select according to the specifications of the distribution panel.

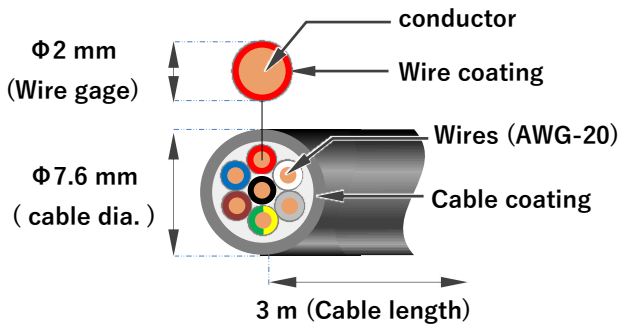
※**4** DC 20 mA is output between the brown and white wires of the pre-cable when fully open.
DC 4 mA is output between the brown and white wires of the pre-cable when fully closed.
・For cable wiring of this product, the white wire is the negative terminal, and the brown and gray wires are the positive terminals.

※**5** The space heater (standard equipment) automatically turns ON/OFF according to the internal temperature of the actuator.

※**6** Refer to **Figure 4.4.5-1** for the actuator pre-cable specifications.

Figure 4.4.5-1 Pre-cable specifications

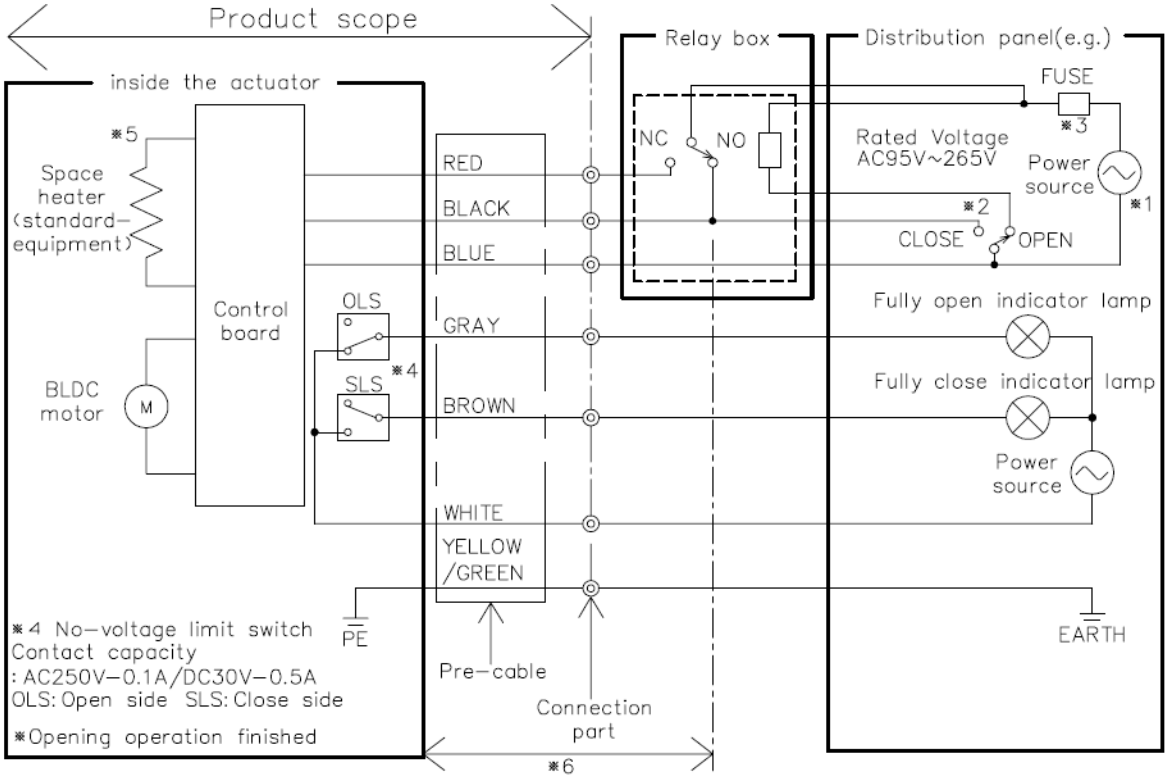
Nominal size 13-50 mm



*The black wire is not used. (It is not connected inside the actuator.)

4.4.6. Standard Specification : Long Pattern

This shows a wiring example when using standard specifications and the wiring distance between the actuator and switchboard is long (guideline: 50 meters or more). Install a relay box containing a relay circuit between the actuator and the switchboard. For actual wiring, follow the specifications of the distribution panel.



※1 Use a power supply within the rated voltage range.

※2 Open control: Supply power between the black and blue wires of the pre-cable. Close control: Supply power between the red and blue wires of the pre-cable.

※3 The guideline current for overcurrent protection device (FUSE) is ""1A"". Select according to the specifications of the distribution panel.

・The gray-white wires of the pre-cable turn ON slightly before fully open. The brown-white wires of the pre-cable turn ON slightly before fully closed.

・Refer to **Figure 4.4.1-1** for the switching chart.

・This is a specification for both general load and micro load.

・Do not perform control that turns OFF power to the actuator upon receiving the fully closed signal output. The valve may not fully close and internal leakage may occur.

※4 The space heater (standard equipment) automatically turns ON/OFF according to the internal temperature of the actuator.

※5 The wiring distance between the actuator and relay box should be 50 meters or less as a guideline. If it exceeds this, the actuator may malfunction.

※6 Refer to **Figure 4.4.1-2** for the actuator pre-cable specifications.

Caution: The terminal box is not included with this product. If a terminal box is required, please prepare it separately.

5. Piping method

Warning	
Prohibited	**Serious injury may result.** ► When lifting or slinging valves, exercise sufficient safety precautions and do not go under suspended loads. ► Always perform safety inspections on mechanical tools and power tools before use. ► Wear appropriate protective equipment according to the work content.

Caution	
Prohibited	**The valve may be damaged, broken, or may leak.** ► Do not overtighten when using bands or similar items to support the piping.
Mandatory	**The valve may be damaged, broken, or may leak.** ► During installation, ensure that excessive stress such as tension, compression, bending, or impact is not applied to the piping or valve. ► When connecting to metal piping, ensure that piping stress is not applied to the valve.

5.1. Threaded end

⚠ Caution	
Prohibited	**The valve may be damaged or may leak.** ▶ Do not overtighten the threads at the joint. ▶ Do not use a pipe wrench.
Mandatory	**The valve may be damaged or may leak.** ▶ Confirm that the threads at the joint are made of resin. (The end connector may be damaged when piping with metal threads.) ▶ Use seal tape for threaded joints of our resin piping materials. (If liquid sealing material or liquid gasket is used, stress cracking (environmental stress cracking) may occur.)

Things to prepare	▶ Seal tape ▶ Wrench

Procedure	
1)	Wrap seal tape around the male thread of the fitting, leaving approximately 3 mm at the tip (**Figure 5.1-1**).
2)	Hand-tighten the male thread of the fitting and the female thread of the valve lightly.
3)	Tighten 1/2 to 1 turn with a wrench, being careful not to damage.

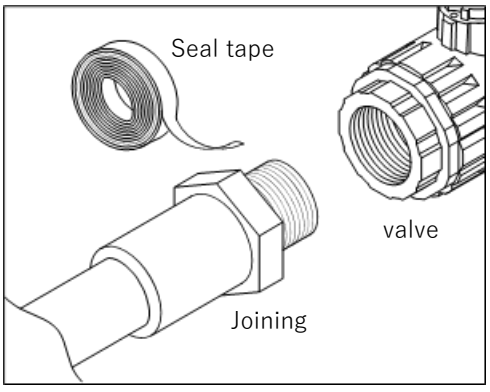


Figure 5.1-1

5.2. Socket end (adhesive)

Warning	
Prohibited	**Serious injury may result.** When using adhesive, ensure adequate ventilation, prohibit the use of open flames in the surrounding area, and do not inhale the odor directly.

Caution	
Mandatory	**Serious injury may result.** ► If adhesive adheres to your skin, remove it promptly. Also, if you feel sick or feel any abnormality, consult a doctor immediately and receive appropriate treatment. **The valve may be damaged or may leak.** ► When working at low temperatures, be careful as solvent vapor is difficult to evaporate and tends to remain. (Solvent cracking may occur, leading to damage.) After piping, open both ends of the pipe and ventilate with a blower (low-pressure type) or similar to remove solvent vapor. ► Use ""**AV cement**"" appropriate for the material. ► Perform the water flow test at least 24 hours after the adhesive has completely set.
Prohibited	**The valve may be damaged or may leak.** ► Do not apply too much adhesive. (If adhesive flows into the valve, it may cause malfunction or internal leakage.) Also, solvent cracking may occur, leading to damage.)

Things to prepare	▶ AV cement ▶ Cloth

Procedure

1） Wipe the socket of the valve and the spigot of the pipe clean with a cloth.

2） Apply adhesive evenly to the socket of the valve and the spigot of the pipe.

3） After applying adhesive, quickly insert the pipe into the socket of the valve and hold for at least 60 seconds.
Referring to ""**Table 5.2-1 Guideline for amount of adhesive to be applied**,"" apply adhesive evenly to the socket of the body and end connector, then to the insertion part of the pipe, in that order (**Figure 5.2-1**).

4） Wipe off any excess adhesive.

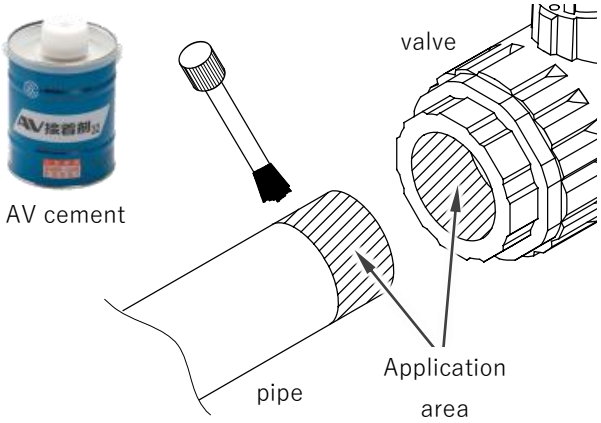


Figure 5.2-1

Table 5.2-1 Guideline for amount of adhesive to be applied

nominal size	Amount to apply
13mm	0.8 g
15mm	1.0 g
20mm	1.3 g
25mm	2.0 g
32mm	2.4 g
40mm	3.5 g
50mm	4.8 g

5.3. Product support

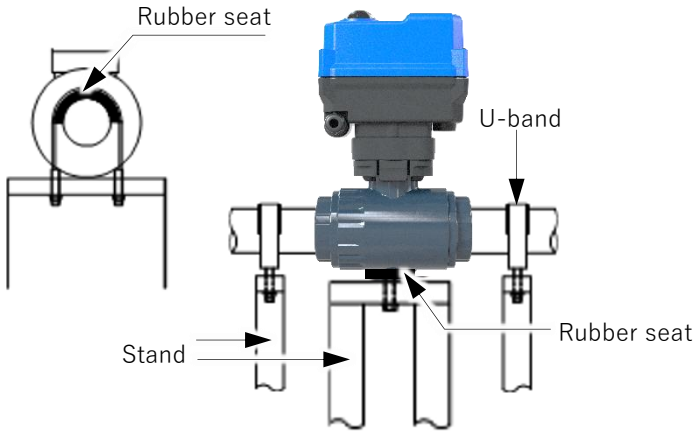
⚠ Caution	
Prohibited	**The valve may be damaged, broken, or may leak.** ▶ Do not overtighten when supporting piping with U-bands or similar items.

5.1.1. Horizontal piping

Things to prepare	▶ Rubber seat ▶ U-band (with bolts) ▶ Wrench

Procedure
1） Place a rubber seat under the valve and support it with a stand.
2） Place a rubber seat on top of the pipe and secure with a U-band.

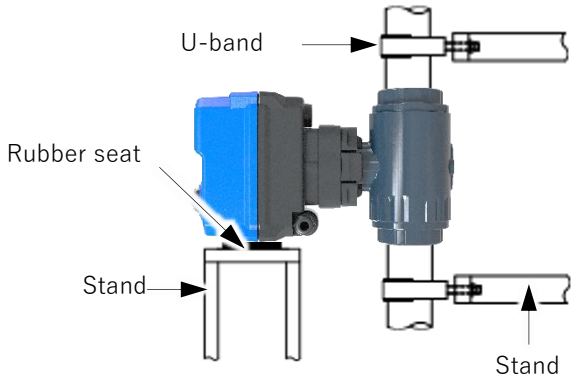
Example of horizontal piping support



5.1.2. Vertical piping

Procedure
1） Place a rubber seat on the actuator section and support it with a stand. Install with the electrical wiring port facing downward. (To prevent rainwater from entering)
2） Place a rubber seat on top of the pipe and secure with a U-band.

Example of vertical piping support



6. Electrical wiring method

Warning	
Prohibited	**There is a risk of electric shock.** ► Do not perform wiring work while the power is on. ► Do not perform wiring work in environments exposed to rainwater or moisture (such as outdoor work in rainy weather). ► Do not perform wiring work with wet hands or tools.
Mandatory	**Electric shock or injury may result.** ► Be sure to perform safety inspections on mechanical tools and power tools before use. ► Wear appropriate protective equipment according to the work content.

Caution	
Prohibited	**The actuator may malfunction or fail.** ► Do not apply a load exceeding the contact capacity to the voltage-free limit switch. ► Do not use near high-voltage lines, inverters, or other noise-generating or magnetic field-generating equipment.
Mandatory	**Electric shock or injury may occur.** ► Keep your hands free of moisture and oil during work. **The actuator may malfunction or fail.** ► Provide an open/close switch (or relay contact) for each electric valve. ► Be sure to connect the ground connection. ► Connect the wires correctly according to the wiring diagram. ► Perform wiring work in a condition free of insulation defects. ► Connect the wires so that the conductors of the pre-cable wires do not contact each other. ► After wiring work, confirm that there are no loose or unfastened screws on crimping terminals. ► This product supports universal power supply. Use the power supply within the rated voltage range.

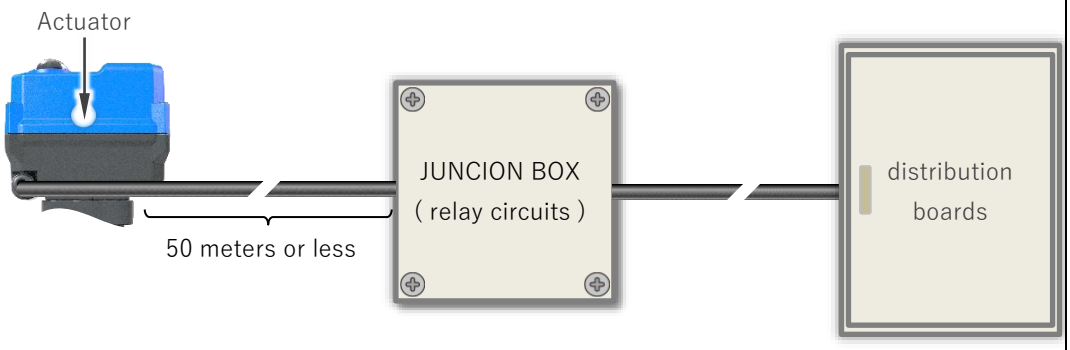
⚠ Caution

Mandatory

The actuator may malfunction or fail.

▶ Indicator lights and devices connected to the limit switch (voltage-free contact) for open/close signals should be within the contact capacity range.

▶ The wiring distance between the actuator and the distribution board should be 50 meters or less. If it exceeds this distance, connect via a junction box containing relay circuits between the actuator and the distribution board, and keep the wiring distance between the actuator and the junction box to 50 meters or less.



6.1. Wiring Method (Standard Specifications)

The following shows the procedure for wiring using a commercially available terminal box as an example of wiring between a standard specification actuator and distribution board. (**Figure 6.1-1**).

- ▶ Select an appropriate wiring method according to the installation environment and operating conditions.
- ▶ Select the terminal block and cable gland in the terminal box (commercially available) by referring to the actuator's pre-cable specifications (**Figure 4.4.1-2**).

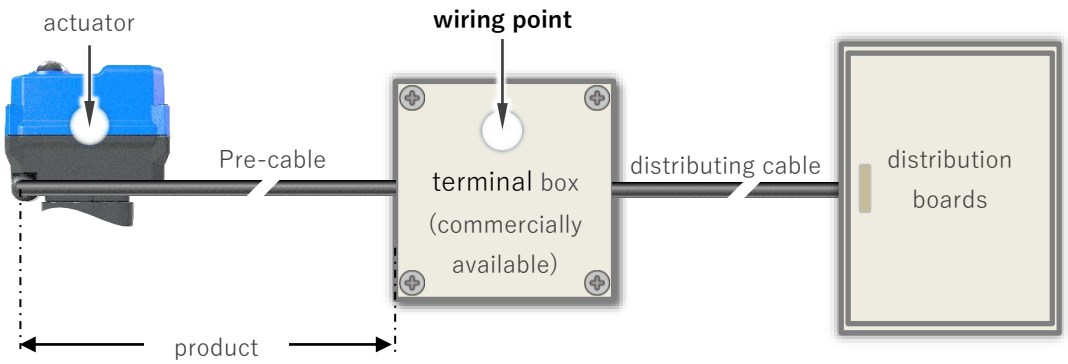
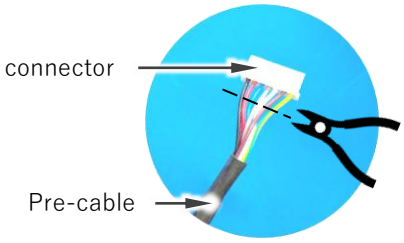


Figure 6.1-1 Wiring Image

Things to prepare	▶ Nippers ▶ Cable stripper ▶ Wire stripper ▶ Crimping terminals ▶ Crimping tool ▶ terminal box (commercially available)

Procedure	
1) Cut the connector at the tip of the actuator's pre-cable with nippers (**Figure 6.1-2**). 2) Remove the pre-cable sheath with a cable stripper to expose the wires. 3) Remove the wire insulation with a wire stripper to expose the wire conductor. 4) Attach crimping terminals to the wire conductor using a crimping tool. 5) Connect the pre-cable to the terminal box (commercially available).	 **Figure 6.1-2**

6.2. Wiring Method (Standard Specifications: terminal Box)

The following shows the wiring method when the actuator option "" terminal Box"" is selected in **4.3.2 Options**. (**Figure 6.2-1**).

► Select the wiring cable by referring to **Figure 4.4.2-1**.

► Select the wire terminals for the wiring cable by referring to **Figure 4.4.2-2**.

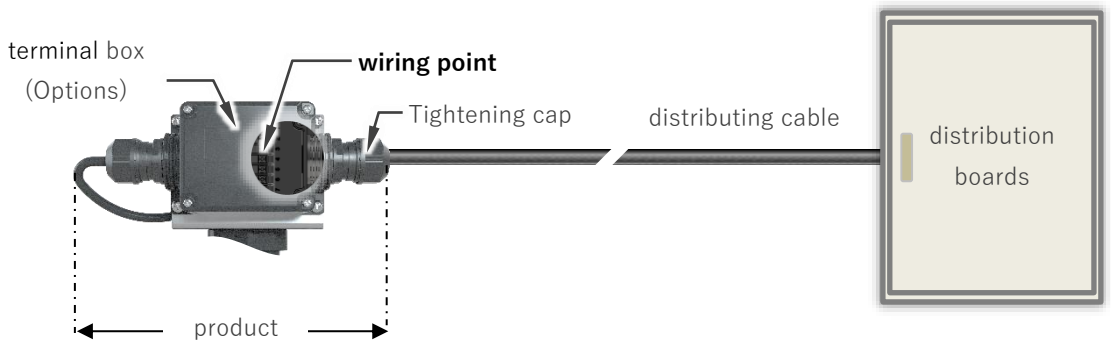


Figure 6.2-1 Wiring Image

Things to prepare	▶ Cable stripper ▶ Wire stripper ▶ Crimping terminals ▶ Crimping tool ▶ Phillips screwdriver ▶ Torque wrench

Procedure

1) Remove the cable sheath of the wiring cable with a cable stripper to expose the wires.
Remove the wire insulation of the wiring cable with a wire stripper to expose the wire conductor.
Attach crimping terminals to the conductor of the wiring cable with a crimping tool.

2) Loosen the screws (4 locations) of the terminal box with a Phillips screwdriver and remove the cover (**Figure 6.2-2**).

3) Insert the wiring cable into the terminal box through the cable gland.
Connect the crimping terminals of the wiring cable to the terminal block inside the terminal box with a Phillips screwdriver (**Figure 6.2-3**).
* For wiring points, refer to **4.4.2 Standard Specifications: terminal Box**.
* After wiring, gently pull the wire to confirm that it does not come off easily.

4) Tighten the tightening cap of the cable gland with a monkey wrench.
* Use **Table 6.2-1** as a guideline for the tightening torque of the tightening cap.
* Over-tightening or under-tightening may cause airtightness failure.

Attach the cover to the terminal box and tighten the screws (4 locations) with a Phillips screwdriver (**Figure 6.2-4**).
* Insufficient tightening may cause airtightness failure.

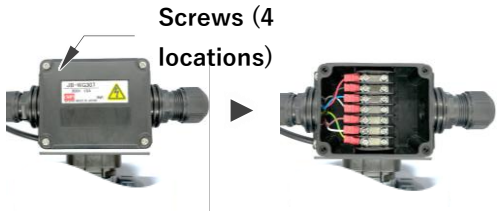


Figure 6.2-2

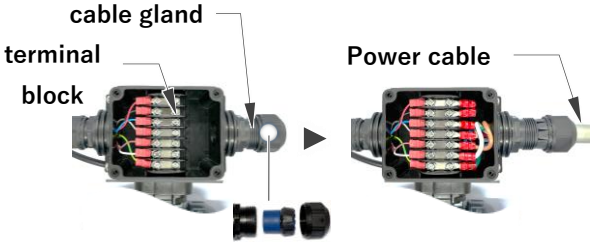


Figure 6.2-3

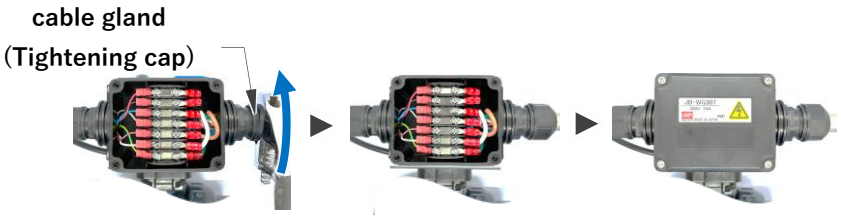


Figure 6.2-4

Table 6.2-1 Tightening Cap Tightening Torque

cable dia.	Tightening torque
Φ8 mm	1.3 N-m
Φ9 mm	1.6 N-m
Φ11 mm	1.6 N-m
Φ13 mm	1.0 N-m
Φ15 mm	0.7 N-m

7. Test Operation Method

Warning	
Prohibited	**Serious injury may result.** ► Do not apply high voltage without considering the insulation resistance and dielectric strength specifications of the actuator. ► Never touch moving parts (valve and actuator) during operation.
Mandatory	**Electric shock or injury may result.** ► Be sure to perform safety inspections on mechanical tools and power tools before use. ► Wear appropriate protective equipment according to the work content.

Caution	
Prohibited	**Electric shock or injury may occur.** ► Do not open the actuator cover. ► Do not perform manual operation with the power on. ► Do not perform electric operation with a hex wrench inserted in the manual operating shaft. **The actuator may malfunction.** ► For manual operation, do not turn beyond the fully open or fully closed position more than necessary.
Mandatory	**Electric shock or injury may occur.** ► Keep your hands free of moisture and oil during work. **The actuator may malfunction or fail.** ► If unusual odor, heat generation, or smoke occurs, immediately turn off the power supply. If any abnormality is observed, be sure to contact the dealer where you purchased the product or contact us for inspection. ► This product uses a switch mode power supply. If electromagnetic noise is a concern, be sure to check in advance that peripheral devices do not malfunction.

7.1. manual operation

Things to prepare	▶ Hex wrench *For size, refer to ""**4.3 Actuator**"".

Procedure

1） Getting Ready

Disconnect the power to the actuator and remove the cap from the manual operating shaft (**Figure 7.1-1**).

2） manual operation

[For closing operation]

Insert the hex wrench into the manual operating shaft. Confirm that the indicator is ""solid yellow"", turn the hex wrench clockwise, and stop turning when the indicator reaches ""solid red"" (**Figure 7.1-2**).

*Do not turn the hex wrench counterclockwise when the indicator is in the ""solid yellow"" state.

[For opening operation]

Confirm that the indicator is ""solid red"", turn the hex wrench counterclockwise, and stop turning when the indicator reaches ""solid yellow"" (**Figure 7.1-3**).

*Do not turn the hex wrench clockwise when the indicator is in the ""solid red"" state.

3） End of carrier sense

Remove the hex wrench from the manual operating shaft and attach the cap to the manual operating shaft (**Figure 7.1-4**).

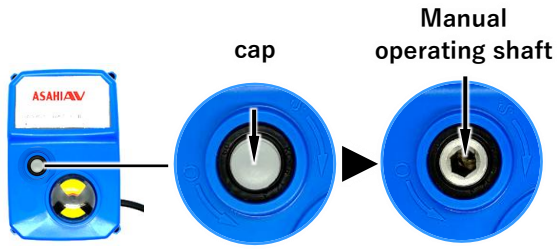


Figure 7.1-1

Figure 7.1-2

Figure 7.1-3

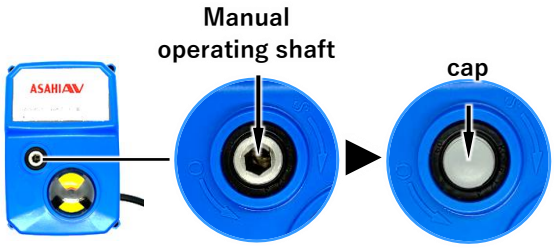


Figure 7.1-4

7.2. to control the current

Procedure
1） **to control the current** **[For closing control]** ❶Confirm that the actuator indicator is ""solid yellow"". ❷Supply closing power (power between blue and red of the pre-cable) from the distribution board to the actuator. ❸After the set period of time, confirm that the actuator indicator automatically stops at ""solid red"" (**Figure 7.2-1**). **[For opening control]** ❶Confirm that the actuator indicator is ""solid red"". ❷Supply opening power (power between blue and black of the pre-cable) from the distribution board to the actuator. ❸After the set period of time, confirm that the actuator indicator automatically stops at ""solid yellow"" (**Figure 7.2-2**). 2） **End of carrier sense** Stop the power supply to the actuator and end the electric operation.

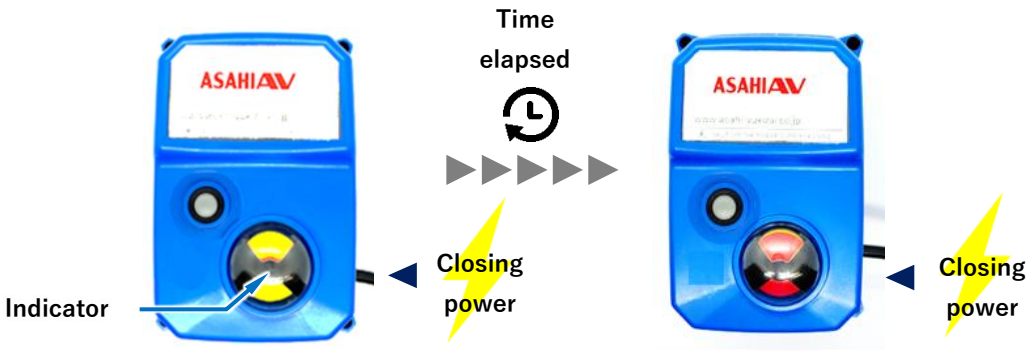


Figure 7.2-1 Closing control

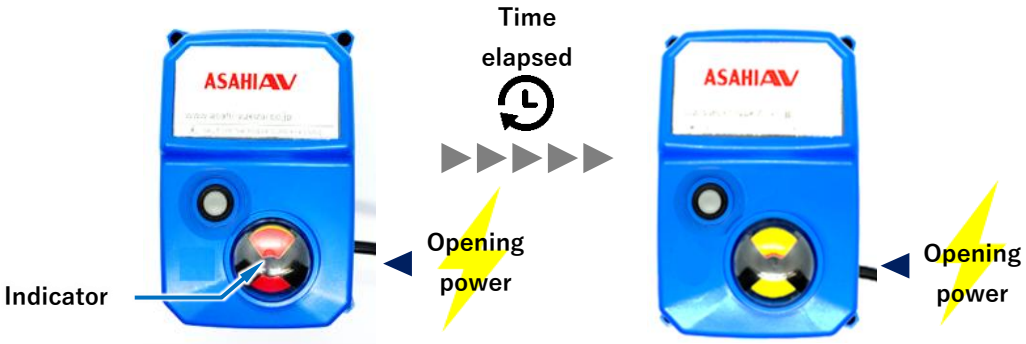
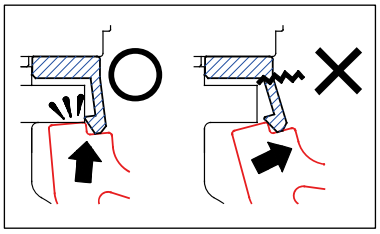
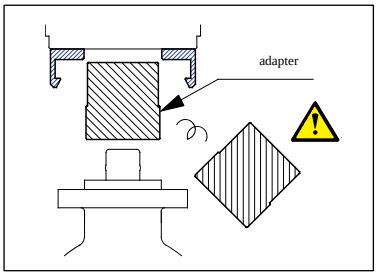


Figure 7.2-2 Opening control

7.3. Water flow test

Procedure
1) Flow fluid through the piping.
2) Supply power to the actuator and perform opening or closing control.
3) Confirm that there is no internal leakage (seat leakage) or external leakage.
4) Set to fully open or fully closed and turn off the power.
5) If leakage occurs, refer to ""**10. Causes of Problems and Remedies**"".

8. Actuator Attachment/Detachment Method

⚠ Caution	
Prohibited	**The base plate may be damaged.** ▶ When removing the base plate from the valve, do not apply excessive force to the base plate removal jig to forcibly spread the claw part. ▶ Do not repeat attachment and detachment of the base plate excessively. ▶ Do not place an excessive load on the piping or valve when attaching or removing the base plate. 
Mandatory	**The base plate may be damaged.** ▶ When removing the actuator, be sure to use the base plate removal jig. **Injury may result.** ▶ An adapter is installed between the valve and the actuator. When removing the base plate from the valve, be careful of the adapter popping out or falling. 

8.1. Removal

Things to prepare	▶ Removal jig (sold separately: see photo on right) 

Procedure

1) Set the pressure inside the piping to zero.
2) Control the actuator to open or close, then turn off the power.
3) Press the tip of the removal tool against the tip of the base plate claw between the actuator and valve, and move the removal tool to push up the base plate claw from below using the valve body as a fulcrum to disengage the claw.
   ・For valve nominal size 13-20 mm, position the removal tool with the ""13-20"" mark facing downward.
   ・For valve nominal size 25-50 mm, position the removal tool with the ""25-50"" mark facing downward.
   ※If the removal tool is used in an incorrect direction, excessive force will be applied to the base plate claw, which may cause problems such as cracking of the claw.
4) Perform step 3) on the base plate claw on the opposite side as well, and confirm that both claws are disengaged (**Figure 8.1-1, Figure 8.1-2**).
5) Lift the actuator vertically and remove it from the valve (**Figure 8.1-3**).

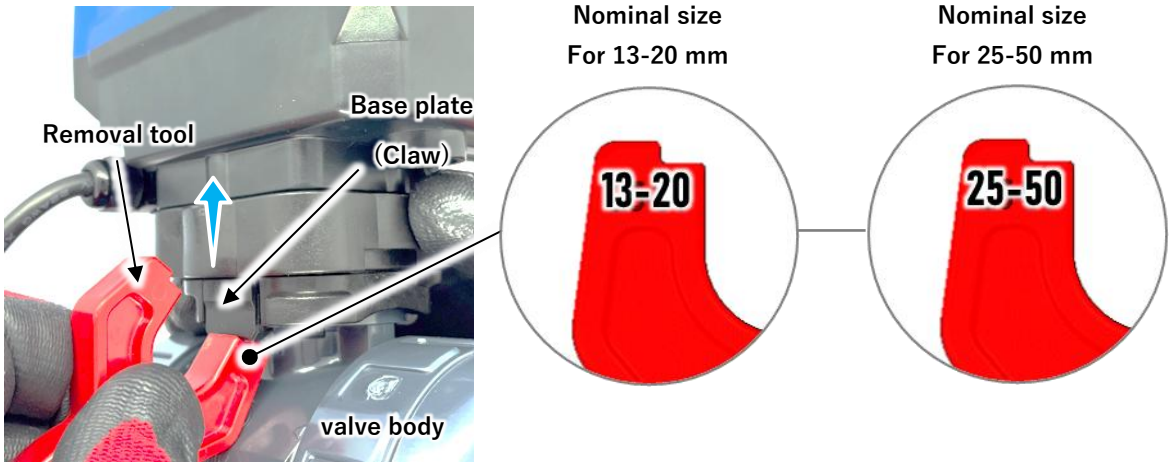


Figure 8.1-1

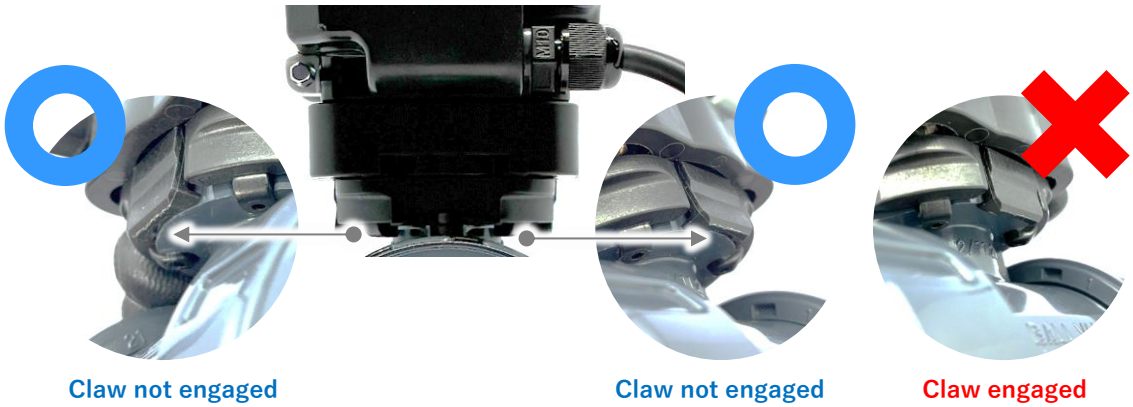


Figure 8.1-2

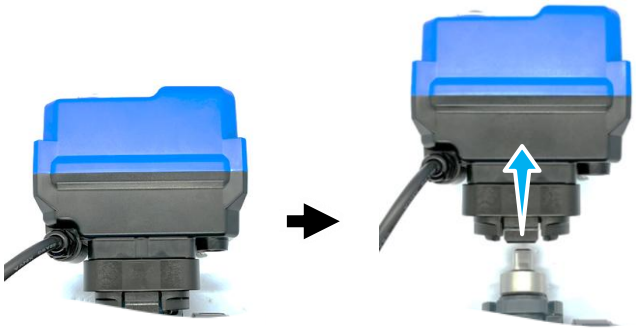


Figure 8.1-3

8.2. Installation

Procedure
1) Confirm that the ""Pre-cable"" side of the actuator and the ""AV mark"" side of the valve are on the same side, and that the adapter is attached to the valve (**Figure 8.2-1**). ・Push in both claws until they click into place. ・Confirm that both claws are fully engaged (**Figure 8.2-2**).

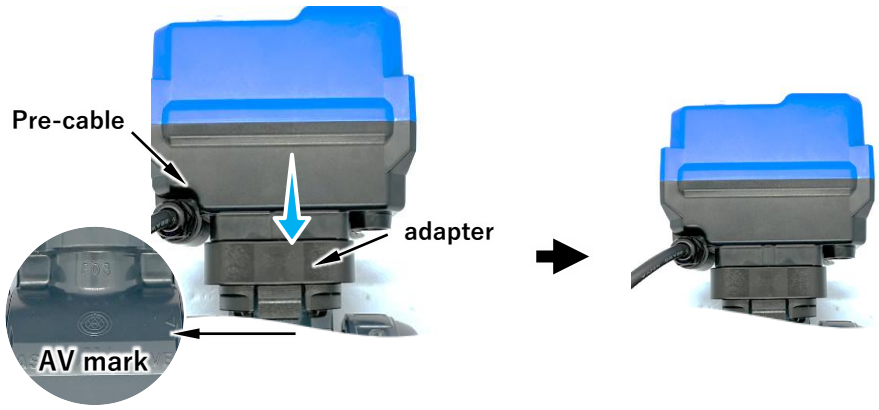


Figure 8.2-1

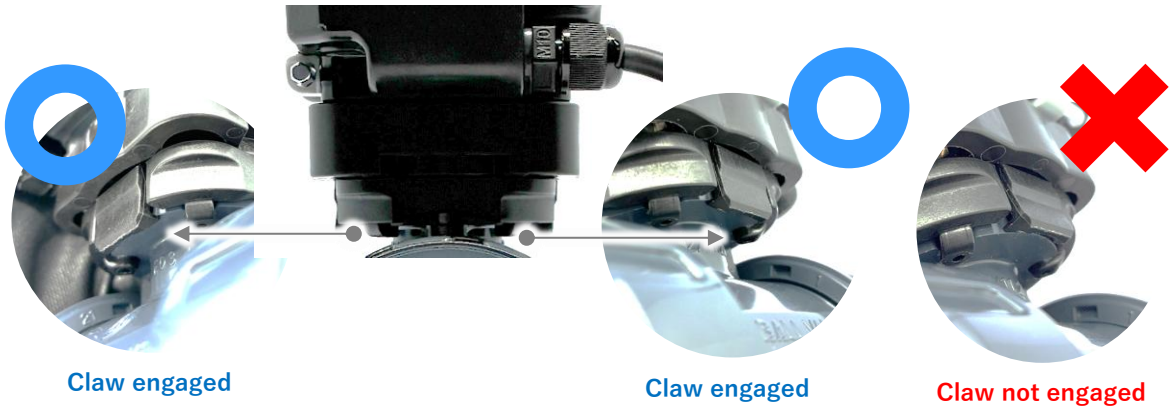


Figure 8.2-2

9. Inspection items

⚠ Caution	
Mandatory	**Fluid may leak from the valve, or the actuator may malfunction.** ► To maintain normal condition and ensure long-term use, perform maintenance approximately every 3 to 6 months. Pay particular attention to long-term storage, shutdown periods, temperature changes during use, and changes over time. **Electric shock or injury may occur.** ► When removing the valve from piping to replace the valve or parts, completely drain the fluid from the piping before performing the work. ► When a malfunction is confirmed, refer to ""**10. Causes of Malfunctions and Corrective Actions**"" for corrective measures.

9.1. Daily inspection

Inspection items and Inspection method	Judgment criteria	Inspection location	Corrective action
external leakage (Visual inspection)	Leakage None	[Socket type] Adhesive bonding area	Remove the valve from piping and redo the adhesive bonding (Refer to: **5.2 Socket type (Adhesive bonding)**)
		【Threaded end】 Threaded connection	Remove the valve from piping and redo the threaded connection (Refer to: **5.1 Threaded end type**)
		Valve top flange portion	Remove the valve from piping and replace the valve or defective parts
		Entire valve surface	Remove the valve from piping and replace the valve
Internal leakage (Visual inspection and measurement)	Leakage None	Leakage to secondary side when valve is fully closed	Remove the valve from piping and replace the valve or defective parts
		Measurements of flow meters, pressure gauges, etc.	Remove the valve from piping and replace the valve or defective parts
Abnormal noise (sound detection)	Abnormal noise None	Valve and actuator	Remove the valve from piping and replace the valve or actuator
		Piping around the valve	Reconfirm the operating conditions (Refer to: **2. Safety Precautions**)
Abnormal odor *1) (Smell)	Abnormal odor None	Valve and actuator	Remove the valve from piping and replace the valve or actuator

***1) Items that may lead to burnout or fire if abnormality is present.**

9.2. Periodic inspection

● Recommended inspection interval: 3 months

Inspection items and Inspection method	Judgment criteria	Inspection location	Corrective action for malfunctions
opening and closing Operating time (Measuring)	Error within ±1 second	Actuator indicator	confirm the power supply voltage (Refer to: Actuator nameplate)
			Remove the valve from piping and replace the valve or actuator
Vibration (Touch inspection)	Difference from other locations None	Valve and actuator	Reconfirm the operating conditions and eliminate the vibration source (Refer to: **2. Safety Precautions**)
			Remove the valve from piping and replace the valve or actuator
		Piping around the valve	Reconfirm the operating conditions and eliminate the vibration source (Refer to: **2. Safety Precautions**)

● Recommended inspection interval: 6 months

Inspection items and Inspection method	Judgment criteria	Inspection location	Corrective action for malfunctions
Manual handle Operability (feel)	Smoothly Rotates	Manual operation unit	Remove the valve from piping and replace the valve or actuator
measuring of insulating resistance ***1**) (Measuring)	10MΩ GB or more Present	Inside the actuator	Replace the actuator
Corrosion or rust ***1)** (Visual inspection)	Corrosion or Rust None	Product exterior and inside the actuator	Remove the valve from piping and replace the valve or actuator
Product damage	No scratches, cracks, or deformation	Product exterior	Remove the valve from piping and replace the valve or actuator

***1) Items that may lead to burnout or fire if abnormality is present.**

10. Causes of malfunctions and corrective actions

⚠ Caution	
Mandatory	**Electric shock or injury may occur.** ▶ When a malfunction is confirmed, immediately stop use and take corrective action. ▶ When removing the valve from piping to replace the valve or parts, completely drain the fluid from the piping before performing the work.

Malfunction	Probable cause	Countermeasure/Corrective action
During manual operation, the hex wrench does not turn (or cannot be turned)	Foreign matter is caught in the valve	Remove the valve from piping, disassemble, and remove the foreign matter
	Piping stress is applied to the valve	Remove the piping stress
	Valve torque has increased due to fluid effects (temperature, composition, pressure, etc.)	Reconfirm the operating conditions (Refer to: **2. Safety Precautions**)
Full open/close signal is not output	The limit switch inside the actuator is malfunctioning	Replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
	The wiring between the actuator and the distribution panel is disconnected	Recheck the wiring
	The wiring between the actuator and the distribution panel is incorrect	Recheck the wiring and correct it (Refer to: **4.4. Wiring diagram**)
	The cable between the actuator and the distribution panel is disconnected	Replace the cable
Electrical control is not possible	No power is supplied to the actuator	Recheck the distribution panel and supply power to the actuator
	The wiring between the actuator and the distribution panel is disconnected	Recheck the wiring
	The wiring between the actuator and the distribution panel is incorrect	Recheck the wiring and correct it (Refer to: **4.4. Wiring diagram**)
	The cable between the actuator and the distribution panel is disconnected	Replace the cable

Causes of malfunctions and corrective actions (continued)

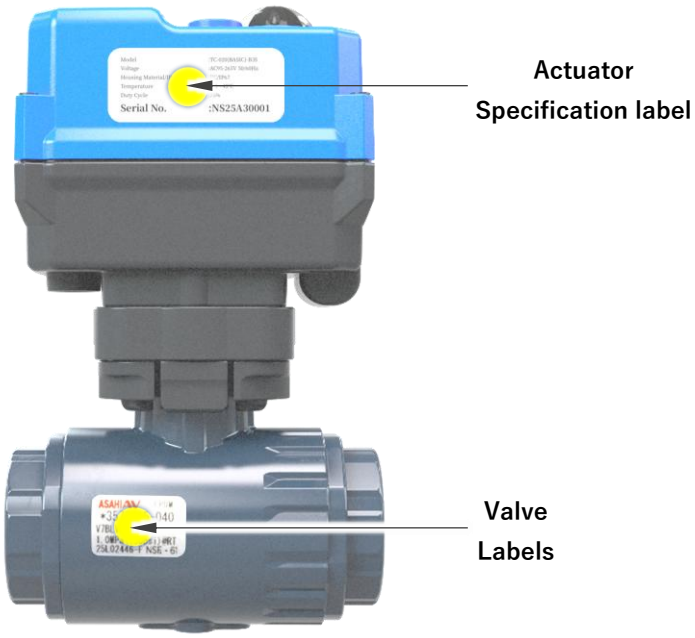
Malfunction	Probable cause	Countermeasure/Corrective action
Electrical control is not possible	Open and close signals are energized simultaneously	Recheck the distribution panel
	The wiring is short-circuited	Recheck the wiring
	The power supply voltage to the actuator is low	Check the distribution panel voltage with a tester and supply the correct power to the actuator
	The wiring length between the actuator and the distribution panel is too long	Keep the wiring length between the actuator and the distribution panel to 50 m or less (as a guideline)
	Foreign matter is caught in the valve	Remove the valve from piping, disassemble, and remove the foreign matter
	Piping stress is applied to the valve	Remove the piping stress
	Valve torque has increased due to fluid effects (temperature, composition, pressure, etc.)	Reconfirm the operating conditions (Refer to: **2. Safety Precautions**)
	Water or foreign matter has entered the actuator causing a short circuit	Replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
	The insulation resistance of the actuator has decreased	Check the insulation resistance value and replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
Fluid leaks even when fully closed (internal leakage)	The seat is worn	Replace the valve
	There are scratches on the seat or ball	Replace the valve
	Foreign matter is caught	Open and close the valve several times to flush out the foreign matter
	Power to the actuator is turned OFF upon receiving the full close signal output	Do not turn OFF power to the actuator upon receiving the full close signal output

Causes of malfunctions and corrective actions (continued)

Malfunction	Probable cause	Countermeasure/Corrective action
Fluid leaks from the valve (external leakage)	Scratches or wear are observed on the O-ring	Immediately stop use and replace the valve
	On the sliding surface or fixed surface of the O-ring Scratches or wear are observed	Immediately stop use and replace the valve
The actuator is operating but the valve is not opening/closing	The coupling is damaged	Replace the coupling
	The fitting between the stem and ball is damaged (continued)	Replace the valve
There is abnormal odor, heat generation, or smoke from the actuator	The actuator is malfunctioning	Immediately stop use, remove the valve from piping, and replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
	The wiring is incorrect	Immediately stop use, remove the valve from piping, and replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
	Overcurrent is flowing to the actuator	Immediately stop use, remove the valve from piping, and replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
	The actuator is affected by lightning strike	Immediately stop use, remove the valve from piping, and replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
The actuator is corroded	Exposed to liquids such as chemicals	Immediately stop use, remove the valve from piping, and replace the actuator (Refer to: **8. Actuator attachment / detachment method**)
The valve is corroded or deformed	Exposed to liquids such as chemicals	Immediately stop use, remove the valve from piping, and replace the valve

11. How to inquire about malfunctions or replacements

If the problem is not resolved after implementing countermeasures or corrective actions, or if parts replacement is required, check the specification label affixed to the side of the actuator and the valve label affixed to the side of the valve, and contact your nearest dealer or our sales office.



12. Disposal method for residual materials and waste

⚠Warning	
Mandatory	**Burning will generate toxic gas.** ▶ When disposing of products or parts, please follow the guidelines of your local authority and have them processed by a disposal specialist.

13. Contact us

For inquiries about this product, please contact your nearest distributor, our sales office, or the ""Contact us"" section on our website.

[Instruction Manual]
Compact Ball Valve Type 23 Electric actuated Type TC
13–50mm

https://www.asahi-yukizai.co.jp/en/

Please note that the contents of this document are subject to change without notice. May 2026