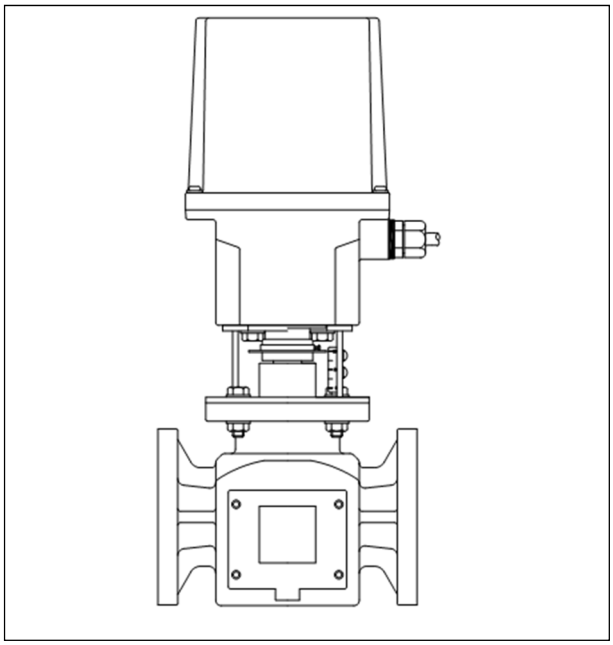
Control valve
Electric Actuated Type M
15, 25 mm (U-PVC, PVDF)
50, 80, 100 mm (U-PVC)

User's Manual



Thank you for choosing our product.
This instruction manual contains important information for safe use of our product, so please be sure to read it before handling the product.
After reading this manual, please be sure to keep it in a place where the user can see it at any time.

ASAHI YUKIZAI CORPORATION

-SAFETY PRECAUTIONS-

This instruction manual is written on the assumption that the person who handles our products has a basic knowledge of our products, electrical equipment, machinery, control, etc., and it contains technical terms depending on the handling contents.
Please read this manual carefully and fully understand the contents and observe the safety precautions for proper use.

In this manual, the warning, caution, prohibition, and enforcement are categorized together with the symbol to inform the situation and scale of human injury or property damage.
Failure to observe this precaution may result in unexpected failure or damage. Be sure to observe this precaution.

<WARNING/CAUTION indications>

Warning	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

<Prohibited/Forced display>

Prohibition	In the handling of the product, it is prohibited to do it in "Do not do it".
Forcing	In the handling of the product, it is forced by "contents to be carried out without fail".

Table of contents

1. Our product warranty coverage

Unless otherwise stated in the Contract or Specifications, etc., the warranty for the piping material products (hereinafter referred to as "applicable products") such as valves manufactured or sold by us is as follows.

Applicable to

This warranty applies only when the product is used in Japan. If you intend to use the product overseas, please contact us.

Warranty Period

The warranty period is one year after delivery.

Guaranteed range

In the event of failure or malfunction due to our responsibility during the above warranty period, we will replace or repair the product with a substitute free of charge.
Provided, however, that even within the warranty period, the warranty shall not apply to any of the following cases (charged service).

- ▶ When the storage, operating conditions, precautions, etc. described in the specifications, instruction manual, etc. are not adhered to in the construction, installation, handling, maintenance, etc.
- ▶ Defects, such as the design of the customer's equipment or software, caused by other than the target product.
- ▶ The fault is due to modification or secondary processing of the product by something other than us.
- ▶ In the case of a failure which can be deemed to have been avoided if the periodic inspection described in the instruction manual, etc. or the maintenance or replacement of consumable parts has been performed normally.
- ▶ The component is used for purposes other than the product's intended use.
- ▶ Failure or malfunction due to causes that could not be foreseen by our level of science and technology at the time of shipment.
- ▶ The fault is due to an external factor that is not our responsibility, such as natural disaster or disaster.

Disclaimer

- ▶ The warranty will not cover secondary damage (damage to equipment, loss of opportunity, loss of profit, etc.) or any other damage caused by the failure of our product.
- ▶ Although we strive to improve the quality and reliability of our products, we do not guarantee their integrity. Especially when using this product for equipment that may infringe human life, body or property, take appropriate safety design measures, etc., with full consideration of problems that may normally occur. We assume no responsibility for such use if we have not obtained our consent in advance in writing of specifications, etc.
- ▶ Please observe the product specifications and precautions when using our products. We shall not assume any responsibility for any damage to the customer caused by the customer's negligence. However, this does not apply to damage caused by a defect in our product.

2. Safety Instructions

Unpacking, Transportation and Storage

Warning	
Prohibition	**Serious injury can result.** ▶ When hanging or slinging a valve, pay sufficient attention to safety, and do not enter under the load.

Caution	
Prohibition	**The valve can be damaged, or leak..** ▶ Do not subject the product to impact by throwing, dropping or hitting. ▶ Do not scratch or pierce the product with a sharp object such as a knife or hand hook. ▶ Do not pile up cardboard boxes forcefully to prevent the load from collapsing. ▶ Avoid contact with coal tar, creosote (a wood preservative), white pesticides, insecticides, paints, etc. ▶ Do not hang the handle when transporting the valve.
Forcing	**The valve can be damaged, or leak..** ▶ Keep in cardboard until just before piping, and store indoors (at room temperature) away from direct sunlight. Also, avoid storing the product in places of high temperature. (The strength of cardboard packaging decreases when it gets wet. Be very careful when storing and handling it.) ▶ After unpacking, make sure that the product is correct and that it meets the specifications.

Product Handling

Warning	
Prohibition	**Serious injury can result.** ▶ Do not disassemble the actuator. ▶ Never touch the moving parts during operation. (Hand or arm may become entangled.)
Forcing	**There is a danger of injury.** ▶ If positive pressure gas is used for our resin piping material, a dangerous condition may occur due to the repulsive force peculiar to compressible fluids even if the pressure is the same as the water pressure. Therefore, be sure to take safety measures for the surrounding area, such as covering the piping with protective materials. If you have any questions, please contact us separately. ▶ When conducting a pipe leak test after completion of piping construction, be sure to check with water pressure. Contact us in advance if you are unavoidable to test with a gas. ▶ Check the voltage on the power supply and nameplate before use. A different voltage may cause damage or malfunction of the equipment. ▶ Perform manual operation after confirming that the actuator is not operated by the motor.

⚠Caution	
Prohibition	**The valve can be damaged, or leak.** ▶ Do not step on the valve or place heavy objects on it. ▶ Do not use the product in places where it may be submerged. ▶ Pay attention to the atmosphere where the valve is installed. Avoid locations where the product is exposed to sea breezes, corrosive gases, chemical liquids, sea water, steam, etc. ▶ Do not subject the valve to large vibrations. ▶ The surface temperature of the actuator may rise during operation. This is due to the heat generated by the internal equipment and is not a malfunction, but use above the allowable temperature may cause a malfunction. **Otherwise, the valve may be damaged, damaged, or fire may occur.** ▶ Keep away from fire and hot objects.
Forcing	**There is a danger of injury.** ▶ Secure sufficient space for maintenance and inspection when piping. **The valve can be damaged, or leak.** ▶ Keep the pressure and temperature of the fluid within the allowable range. (The maximum allowable pressure includes water hammer pressure.) ▶ Use a valve of suitable material for the operating conditions. (Depending on the type of chemical liquid, the parts may be damaged. Contact us in advance for details.) ▶ Use fluids containing crystalline material under conditions that do not recrystallize. ▶ Avoid any place where the valve is constantly exposed to splashes of water and dust, or direct sunlight, or protect the valve with a cover or the like to cover the entire area. ▶「12. Perform maintenance on a regular basis referring to "Inspection items." Pay particular attention to temperature changes and aging during long-term storage or shutdown or use. ▶ When installing a valve, provide an appropriate valve support so that excessive force is not applied to the valve and piping. ▶ Always use the product within the indicated product specifications. ▶ Avoid places with corrosive gases or poor atmospheres, and provide a cover or the like to cover the entire area. ▶ If you notice an unusual odor, heat, or smoke, immediately turn off the power supply. (There is a possibility that a fire may occur if you use the watch without feeling any abnormality. If you find any abnormality, contact your dealer or us for inspection.) ▶ When using in an explosive atmosphere, make sure that the actuator conforms to the explosion-proof specifications. ▶ Keep the ambient temperature of the installation site within the range of-5°C to 55°C.

Other Precautions

○Nominal size 15, 25mm

1) Wiring

In AC100V power supply types, if the signal-line and power-line wires are wired in the same pipe, there is no issue of induction by the power supply line if the distance is about 1.5m that comes with the product. However, if the distance is longer, induction may occur, resulting in malfunction. When wiring, use a shielded cable for the signal line, or use separate piping to prevent induction from others. Also, if the wiring is long even for DC24V power supply types, perform the same wiring.

2) Lock protection circuit

A protection circuit is incorporated to stop the power supply to the motor in about 5 seconds when adjustment or overload occurs due to foreign matter caught in the valve. To reset the unit, turn OFF the power or turn DC4mA and 20mA several times.

If the lock is frequently stopped repeatedly, it may be overloaded due to foreign matter caught in the valve or improper adjustment, etc. Check and remove the cause of the overload.

3) Electronic limiter

An electronic limiter is built-in to prevent mechanical locking when the input-signal DC4mA is lower than or equal to 20mA. Therefore, the closing side will be stopped at 3.8mA position even if the input signal drops below 3.8mA. In the same way for the open end, even if the input signal rises more than approx. 20.2mA, it will be stopped at 20.2mA position.

4) Timer function

A DC motor is used for this actuator, but DC motor draws three to five times the rated current at startup and at standstill (braking). Therefore, frequent opening and closing operations may cause the motor to overheat. A timer circuit is provided on the actuator to prevent overheating of the motor by providing an interval (variable for about 0.5 to 3 seconds) between the moment the motor enters the dead zone and the moment it stops until the next start.

5) Protection fuse

A resistor with a fuse function is incorporated for protection such as when hunting under high load or frequent lock detection is repeated. Resistance is 1 to 1.5Ω.

6) Installation location

Indoors or outdoors not exposed to direct sunlight, where the ambient temperature is-5 to +55° C.

A location with a humidity of less than 90%RH and no condensation.

○Nominal size 50, 80, 100mm

1) Abnormality detection

If the output shaft does not move even though there is a deviation between the input signal and the position signal due to overload, failure, etc., the motor is started several times at the maximum torque. If the output shaft still does not move, it is judged to be abnormal, the alarm lamp is turned on (abnormal alarm signal is output), and the power supply to the motor is stopped. To reset the unit, turn DC4mA and 20mA alternately several times or turn OFF the power. If the lock is frequently stopped repeatedly, it may be overloaded due to foreign matter caught in the valve or improper adjustment. Check and remove the cause of the overload.

2) Electronic limiter

An electronic limiter is built-in to prevent mechanical locking when the input-signal DC4mA is lower than or equal to 20mA. Therefore, the closing side will be stopped at 3.8mA position even if the input signal drops below 3.8mA. In the same way for the open end, even if the input signal rises above approx. 20.2mA, it will be stopped at 20.2mA position.

3) Timer function

To prevent the motor from overheating, an interval is provided to prevent the motor from overheating before the next start, once the motor enters the dead zone and stops. (Restart limit timer is set at 2 seconds.)

4) Protection fuse

A fuse is built in to protect the control panel and motor when excessive current flows. If the power monitor lamp does not light even though the power is on, check that it is not blown.

5) Installation

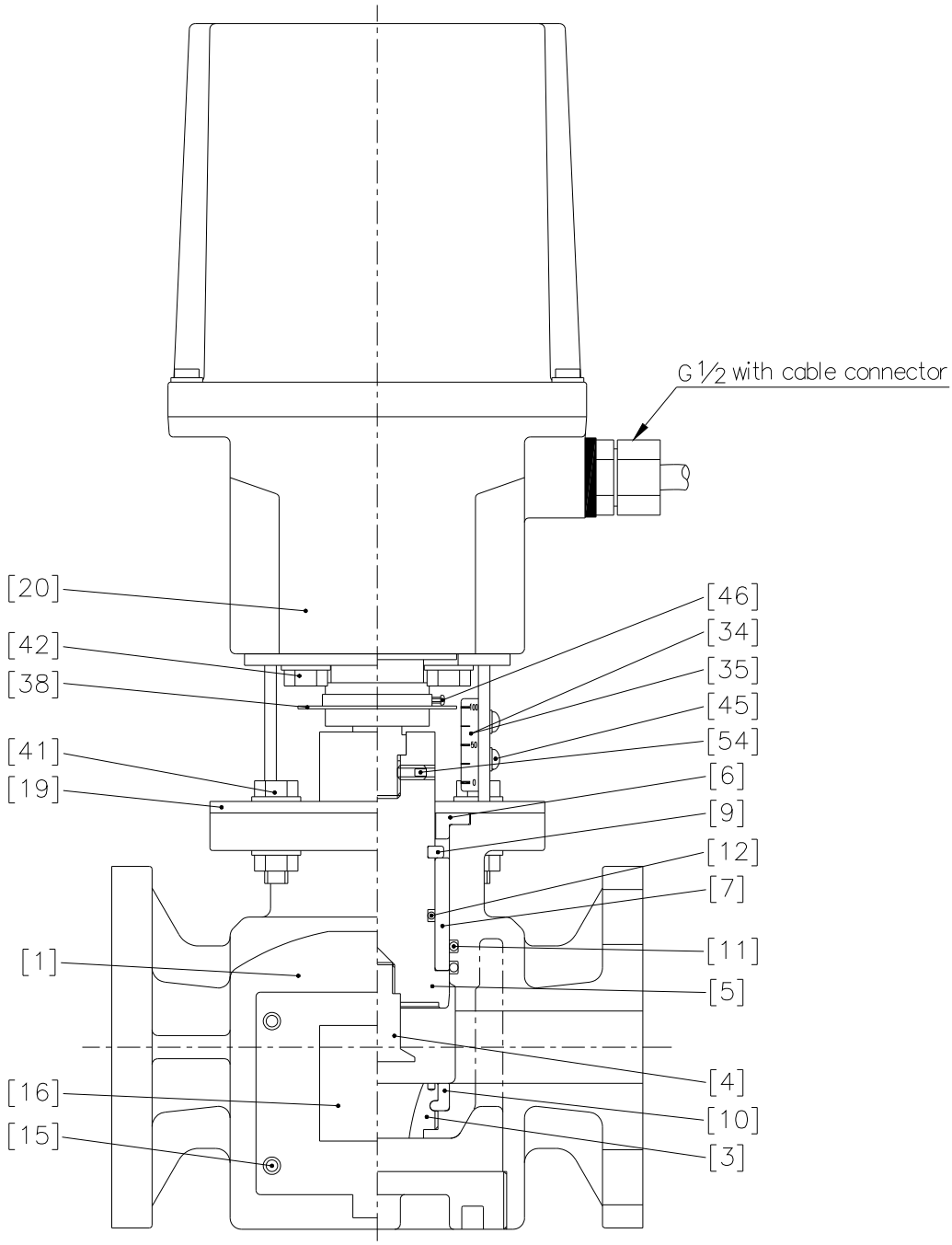
Indoors or outdoors not exposed to direct sunlight, where the ambient temperature is-15 to 55° C.
A location with a humidity of less than 90%RH and no condensation.

6) Wiring

If the signal line and power line are wired in the same piping, they may be subject to induction motion and malfunction. When wiring, use a shielded cable for the signal line, or use a separate pipe to prevent induction from others.

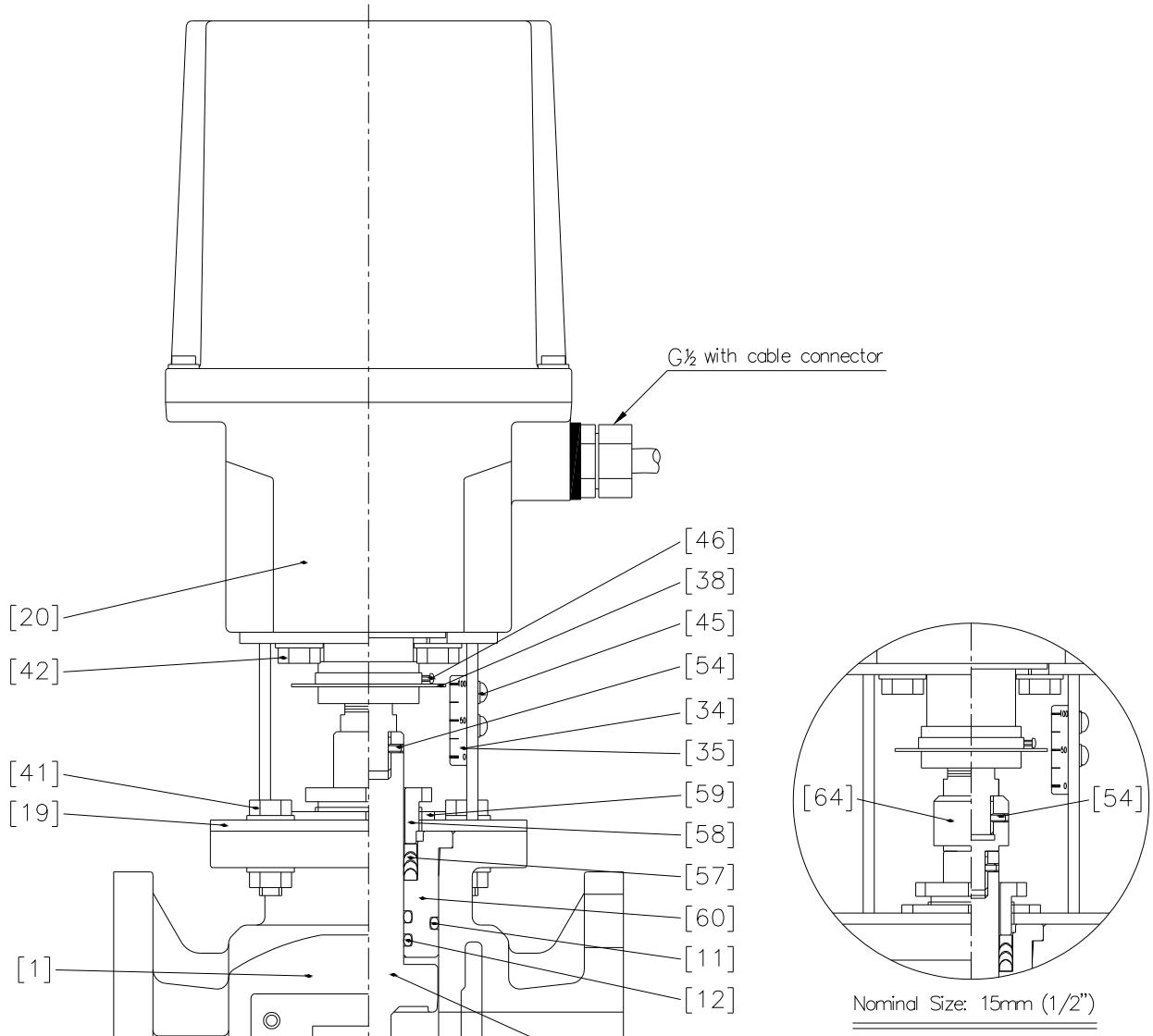
3. Name of each part

Nominal size: 15, 25mm/body material: U-PVC



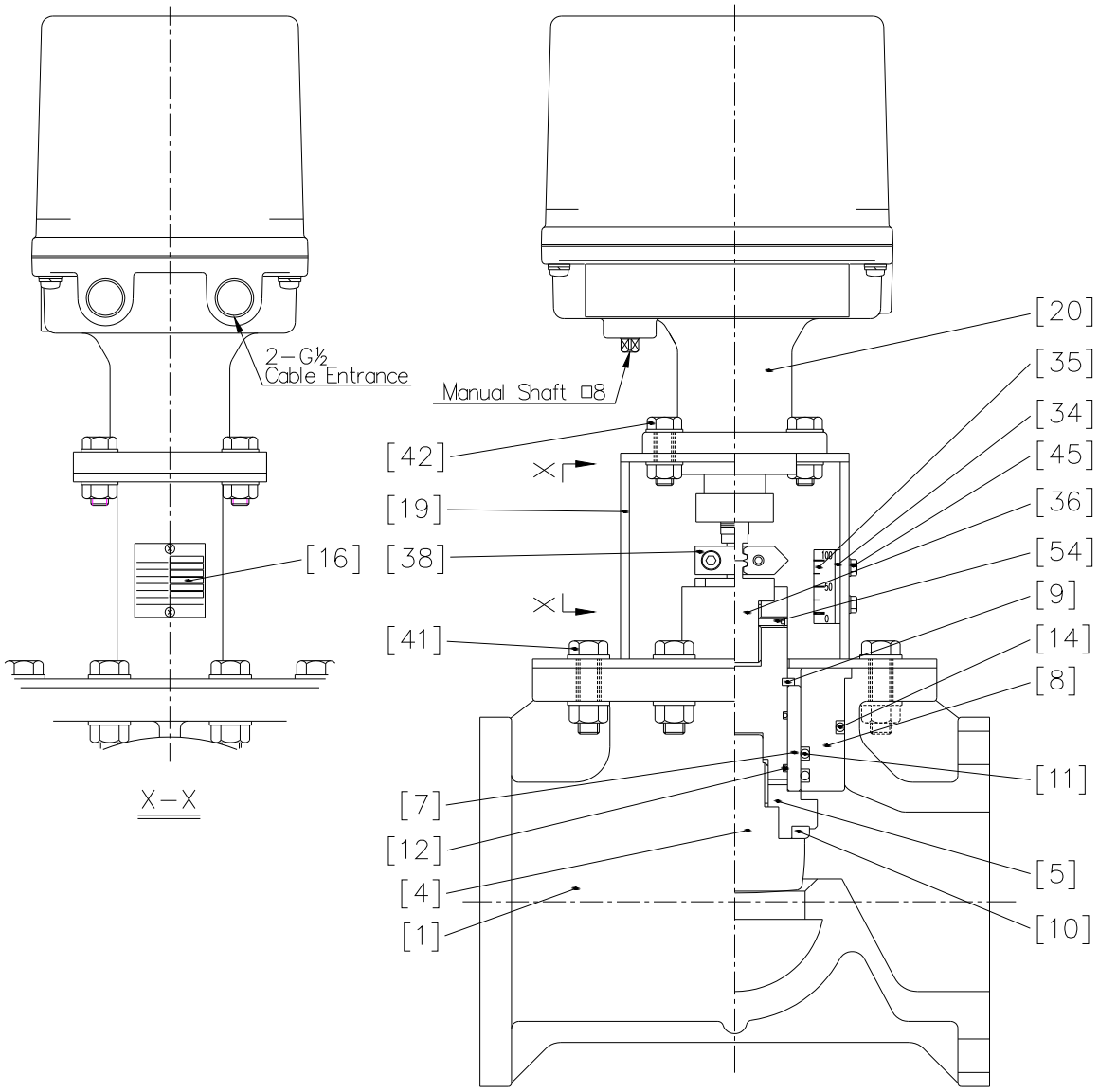
[1]	Body	[11]	O-ring (A)	[38]	Indicator
[3]	Orifice	[12]	O-ring (B)	[41]	Bolt/nut (A)
[4]	Plug	[15]	Helically Coiled Inserts	[42]	Bolt (A)
[5]	Piston (A)	[16]	Nameplate	[45]	Bolt/nut (E)
[6]	Piston holder	[19]	Stand	[46]	Screw (A)
[7]	Bush	[20]	Actuator	[54]	Screw (B)
[9]	Stop ring	[34]	Indicator Plate		
[10]	Seat	[35]	Indicator Seal		

Nominal size: 15, 25mm/body material: PVDF



[1]	Body	[19]	Stand	[46]	Screw (A)
[3]	Orifice	[20]	Actuator	[54]	Screw (B)
[5]	Piston (A)	[34]	Indicator Plate	[57]	V packing
[10]	Seat	[35]	Indicator Seal	[58]	Packing holder
[11]	O-ring (A)	[38]	Indicator	[59]	Stopper (A)
[12]	O-ring (B)	[41]	Bolt/nut (A)	[60]	Piston guide
[15]	Helically Coiled Inserts	[42]	Bolt (A)	[64]	Joint
[16]	Nameplate	[45]	Bolt/nut (E)		

Nominal size: 50, 80, 100mm/body material: U-PVC



[1]	Body	[11]	O- type retaining ring (A)	[35]	Indicator Seal
[4]	Plug	[12]	O- type retaining ring (B)	[36]	Coupling
[5]	Piston (A)	[14]	O- type retaining ring (D)	[38]	Nameplate
[7]	Bush	[16]	Nameplate	[41]	Bolt/nut (A)
[8]	Bush guide	[19]	Stand	[42]	Bolt/nut (B)
[9]	Stop ring	[20]	Actuator	[45]	Bolt/nut (E)
[10]	Seat	[34]	Indicator Plate	[54]	Screw (B)

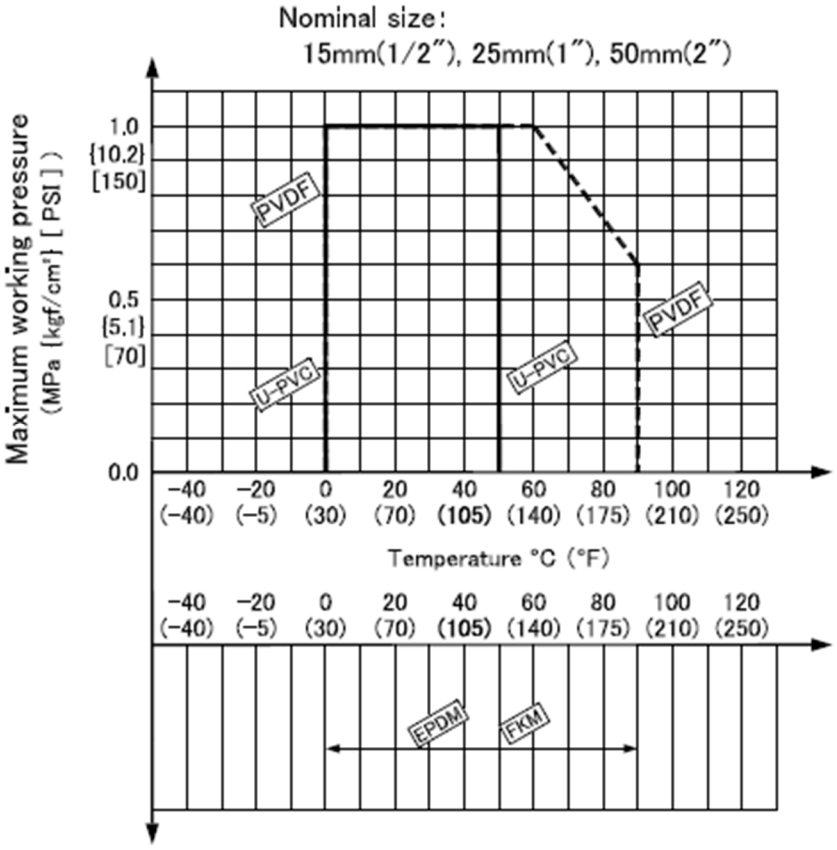
4. Product Specifications

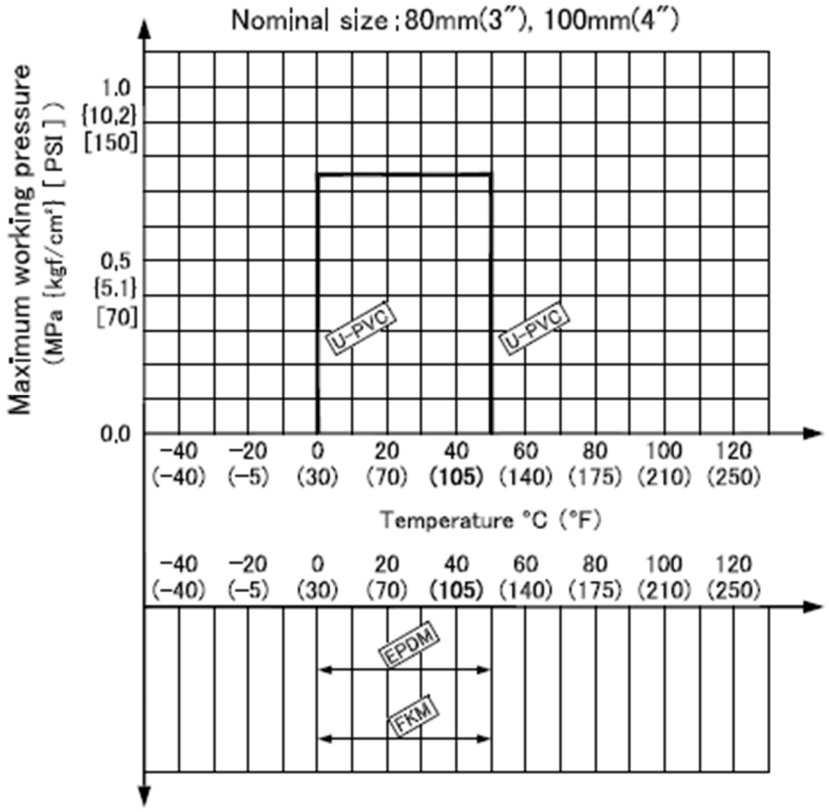
Model number table

ACTUATION	TYPE	ACTUATOR TYPE	ACTION	BODY MATERIAL	SEAL MATERIAL	CONNECTION	STANDARD	SIZE
A	C V	M	*	*	*	F	*	* * *

A AUTOMATIC	CV CONTROL VALVE	M TYPE M	1 Single-Phase 100VAC 2 Single-Phase 200VAC D DC24V	U PVC F PVDF	E EPDM V FKM	F FLANGED	1 JIS 10K D DIN A ANSI	015 15mm 025 25mm 050 50mm 080 80mm 100 100mm

Relationship between maximum allowable pressure and temperature





Valve specifications

NOMINAL SIZE (mm)	15	25	50	80	100
Model	Motor-driven single-seat control valve				
Connection standard	Flange-type JIS B 2238 (JIS10K)				
Type	Standard type Micro type	Standard type			
Cut-off differential pressure (MPa{kgf/cm^2})	0.7 {7 .1}				
Flow characteristics	Equal% or linear		Equal%		
Inherent range ability	Standard 50:1 Minute 20:1	50 : 1			
Valve seat leakage	Complete seal with soft seal				

Actuator operating principle

The actuator's control-board compares and amplifies the input signal (DC4～20mA) with the opening signal from the position detector, and drives the motor in the direction in which there is no difference. When the fully closed signal is input, the seal spring is pressed even after the valve is fully closed and stops at the set sealing pressure.

Actuator specifications

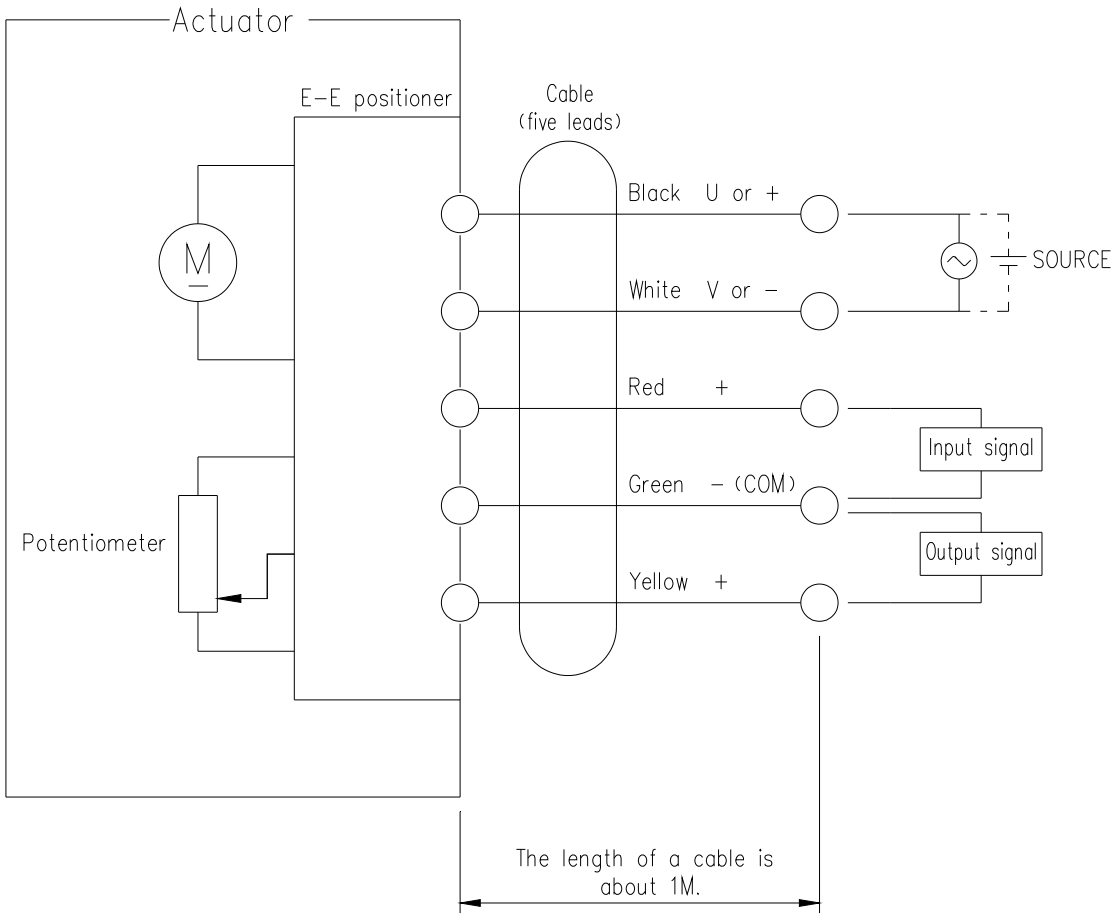
Specifications List

Applicable Nominal size (mm)		15mm	25mm	50mm	80mm	100mm
Actuator model		MSP6-□4	MSP6-□6	PSN1		PSN3
Open/close time (sec)		10 ～ 35		18～21	20～22	28～32
Degree of protection		IP55				
Power consumption (Current consumption)	100VAC～120VAC	About 25VA		About 240VA		
	200VAC～240VAC	About 25VA		About 240VA		
	24VAC±10%	About 0.6A		About 3A		
Vibration		Below 0.5G		Below 2G		
Cable connector Nominal size		G 1/2		2-G 1/2		
Motor insulation type		Class E				
Motor rated time		Continuous				

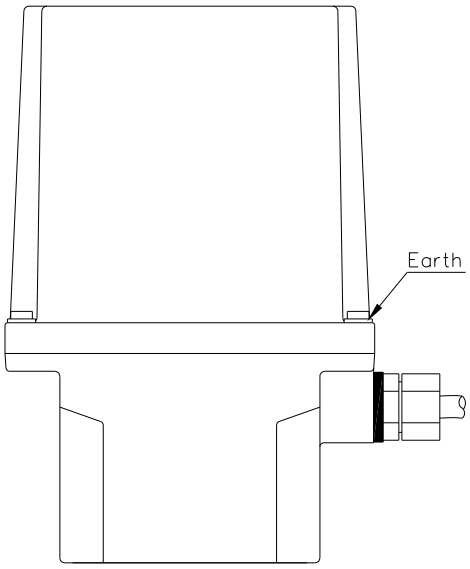
Wiring Diagram

○Nominal size 15, 25mm

Operating voltage	Frequency	Input signal	Output signal
☐ 100VAC single phase ☐ 200VAC single phase ☐ 24VDC	☐ 50Hz ☐ 60Hz	☐ DC 4～20mA ☐ 1～5VDC	☐ 1～5VDC

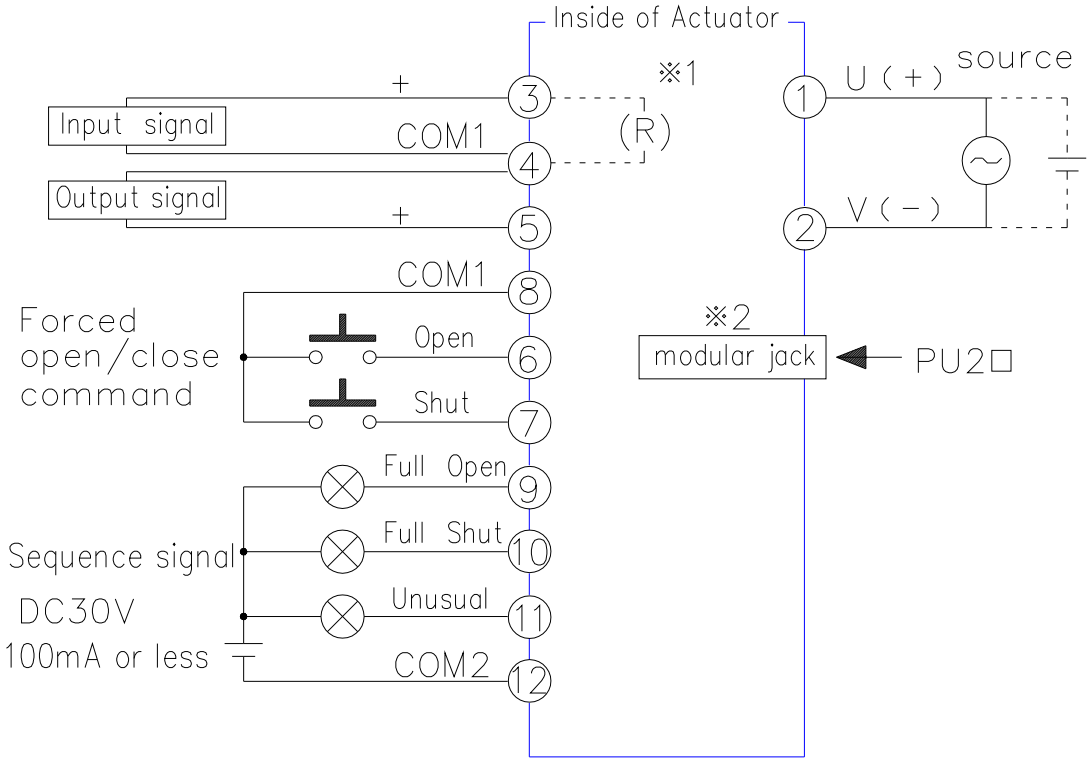


Ground location



○Nominal size 50, 80, 100mm

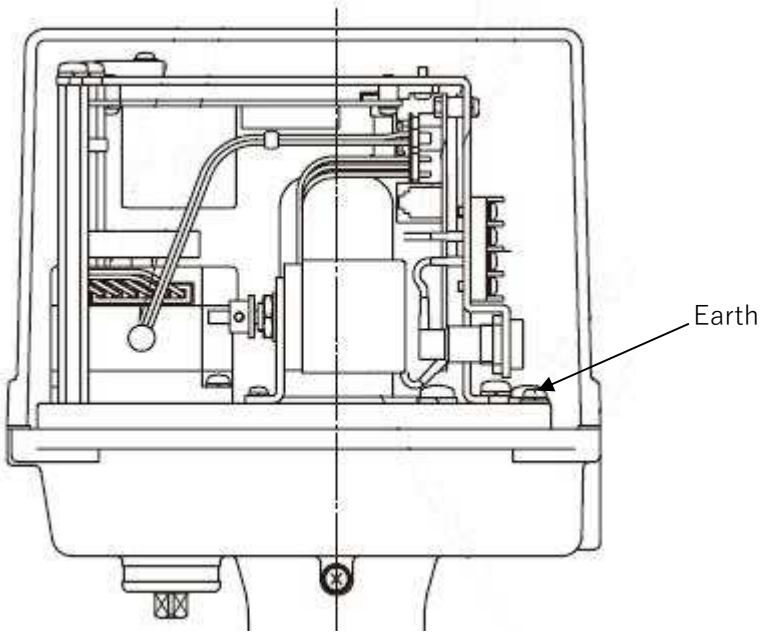
Operating voltage	Frequency	Input signal	Output signal
☐ 100VAC single phase ☐ 200VAC single phase ☐ 24VDC	☐ 50Hz ☐ 60Hz	☐ DC 4～20mA ☐ 1～5VDC	☐ DC 4～20mA



※1 For current input type, an input resistor (R) is attached to the internal circuit of the actuator.

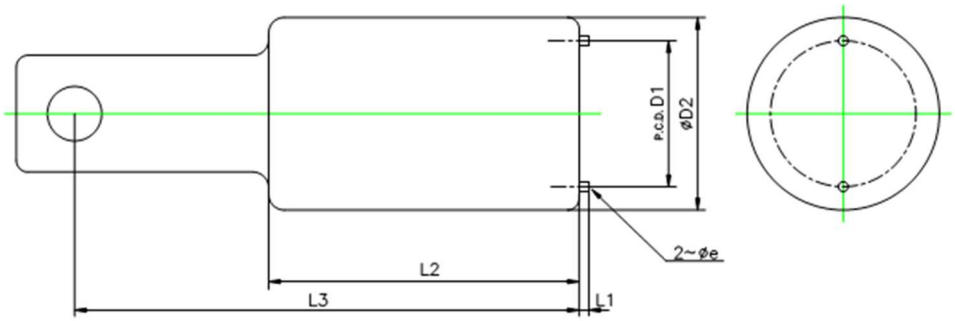
※2 The modular jack is not normally used.

Ground location



Valve disassembly and assembly tool specifications

Orifice turning tool



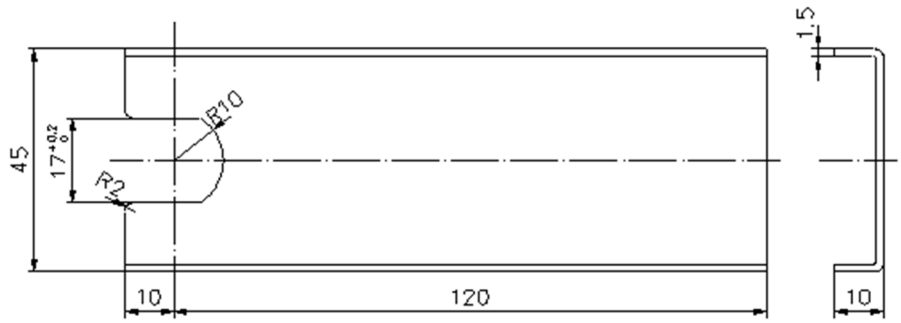
Dimension table

Units: mm

Nominal size		D_1	D_2	L_1	L_2	L_3	E
15mm	1/2"	23.5	35.5	2.5	60	115	2.5
25mm	1"	37.5	49.5	2.5	80	125	2.5

Drive unit output shaft fixing wrench

[Used when disassembling/assembling MSP6 (body material U-PVC only)]



5. Mounting method

⚠Warning	
Prohibition	**Serious injury can result.** ▶ When hanging or slinging a valve, pay sufficient attention to safety, and do not enter under the load.
Forcing	**There is a danger of injury.** ▶ Be sure to perform safety inspections of the machine tool and power tool beforehand. ▶ Wear appropriate protective equipment according to the type of work being performed. **The valve can be damaged, or leak.** ▶ Before the water flow test, be sure to check that the bolts are fully squeezed.

⚠Caution	
Prohibition	**The valve can be damaged, or leak.** ▶ Be careful not to overtighten the pipe support when you remove it with a U band or the like. ▶ Since foreign matter such as sand may remain in the pipeline even after the valve is installed, open and close the valve after cleaning the inside of the pipe. ▶ Use a connection flange with a full-face seat.
Forcing	**The valve can be damaged, or leak.** ▶ Check that there is no difference in mutual flange standards. ▶ Be sure to use the sealing gaskets (AV packing), bolts, nuts and washers to tighten them with the specified tightening torques. (The tightening torque will change if the gasket is not a AV gasket.) ▶ For DC power specifications, the signal line and power line are not isolated. If insulation is required, install an isolator on the signal line. ▶ When wiring with a length greater than or equal to the attached cable (excluding the length 1m and terminal box), store the power line and signal line in a separate duct or conduit, or use shielded wires for the signal line.

Preparations	▶ Torque Wrench	▶ AV packing

[Procedure]

1) Set AV packing between the flanges.
2) Insert a washer and a bolt from the connecting flange side. Insert a washer and a nut from the valve side and tighten temporarily by hand.

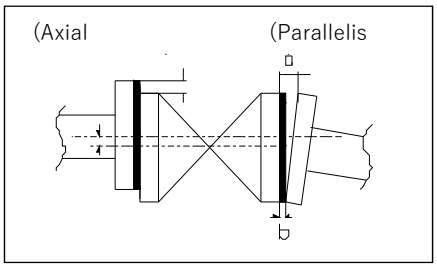
⚠Caution

Forcing

Otherwise, stress may be applied to the piping, resulting in damage.

▶ Flange surface parallelism and shaft misalignment should be less than the values shown in the table below.

Nominal size	Shaft misalignment	Parallelism (a-b)
15, 25mm	1.0mm	0.5mm
50, 80mm	1.0mm	0.8mm
100mm	1.0mm	1.0mm



3) Gradually tighten to the specified torque value diagonally (see Fig. 1) with a torque wrench.

⚠Caution

Forcing

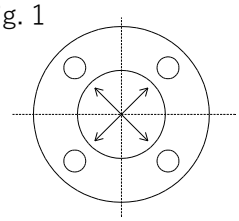
Damage or leakage may occur.

▶ Tighten the bolts and nuts of the connection flange diagonally to the specified torque.

Specified torque value Units: N•m {kgf・cm}

NOMINAL SIZE (mm)	15	25	50	80, 100
PTFE・PVDF (coated)	17.5{179}	20.0{204}	22.5{250}	30.0{306}
Rubber	8.0{82}	20.0{204}	22.5{250}	30.0{306}

Fig. 1



6. Support installation method

⚠Caution	
Prohibition	**The valve can be damaged, or leak.** ▶ Do not cause large vibrations to the valve by the piping around the pump. ▶ Be careful not to overtighten the pipe support when you remove it with a U band or the like.
Forcing	**The valve can be damaged, or leak.** ▶ Install a valve support. (Excessive force is applied to the valve body and piping, which may cause damage.)

Preparations	▶ Spanner ▶ U-band (with bolt) ▶ Rubber seat

Horizontal piping

Place the frame under the valve.

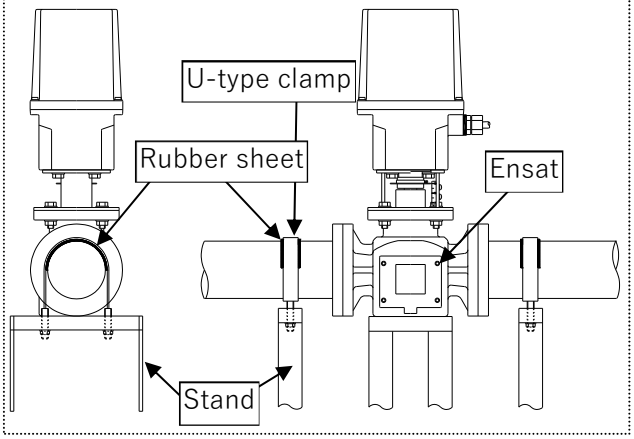
Only the Nominal size 15, 25mm can be bolted to the Stand and to the entertainment section on the side of the body.

Bolt Size (Ensat)

Valve Nominal size	15, 25mm
Wrench Nominal	M6

Place a rubber sheet between the pipe and the U-band and secure it with the U-band.

Level installation

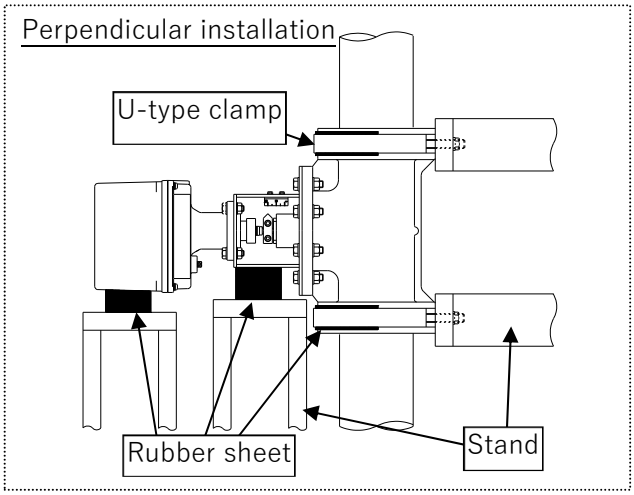


Vertical piping

Place the platform under the actuator and Stand.

Only the Nominal size 15, 25mm can be bolted to the Stand and to the entertainment section on the side of the body. Refer to the table above for bolt size.

Place a rubber sheet between the pipe and the U-band and secure it with the U-band.



7. Electrical Wiring

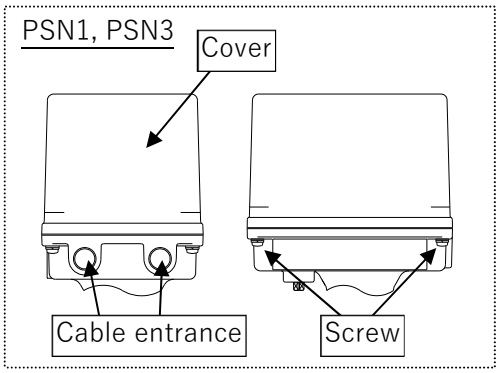
⚠ Warning	
Prohibition	**Serious injury can result.** ▶ Do not connect or separate lines when the power is on. Also, do not touch any other parts on the board or the terminal block wiring part. (risk of electric shock or damage to equipment)
Forcing	**Poor grounding may cause electric shock or fire due to electric leakage.** ▶ Be sure to connect the ground wire. **Electrical shock or equipment damage may occur.** ▶ Keep hands free of moisture and oil when adjusting or checking.

⚠ Caution	
Prohibition	**The valve can be damaged or leak.** ▶ Do not connect multiple (two or more) motorized valves in series. In addition, open/close switches (or relay contacts) should be provided for each electric valve. ▶ Do not use the product near high-voltage lines, inverters, or other objects that generate noise or magnetism. (Doing so may cause malfunction or failure.)
Forcing	**The valve can be damaged or leak.** ▶ Check that there is no insulation defect when performing wiring work. ▶ Securely tighten the covers of each part. (Rainwater, dust, etc. may penetrate and cause malfunction.) ▶ Be sure to connect the wires correctly as shown in the wiring diagram. After wiring, be sure to check that the connection is secure, and then turn on the power. (Failure to do so may cause malfunction or failure.) ▶ Each lid part is sealed by an O-ring. When removing and reinstalling the cover, such as when wiring, be sure to confirm that the O-ring is set in place and securely sealed. (If the seal is insufficient, rainwater or other liquid may enter the actuator and cause electric shock or malfunction.) ▶ If the actuator is used outdoors or in a location where it will be exposed to rainwater or water drops, make sure that rainwater does not enter the actuator through the wiring port. (Rainwater or other liquid may enter the actuator, causing electric shock or malfunction.) ▶ If you notice an unusual odor, heat, or smoke, immediately turn off the power supply. (There is a possibility that a fire may occur if you use the watch without feeling any abnormality. If you find any abnormality, contact your dealer or us for inspection.)

Preparations	▶ Phillips screwdriver ▶ wire stripper ▶ crimp terminal ▶ terminal crimp tool

MSP6 has an attached cable. Wire it according to the wiring diagram on page 17. The following describes how to connect PSN1 and PSN3.

[Step] (PSN1, PSN3 only)



1) Loosen the bolts holding the actuator cover with a Phillips screwdriver and remove the actuator cover.
2) Remove the protective equipment from the lead entry.
3) Attach the connector to the lead entry and pass the cable through.
4) Peel off the outer skin of the cable with a wire stripper.
5) Use a terminal crimping tool to attach the crimping terminal to the lead wire.
6) Wire the terminal block with a Phillips screwdriver as shown in the wiring diagram on page 18.
7) Tighten the bolts holding the actuator cover with a Phillips screwdriver to attach the actuator cover.

Warning	
Prohibition	**Serious injury can result.** ▶ Do not connect or separate lines when the power is on. Also, do not touch any other parts on the board or the terminal block wiring part. (risk of electric shock or damage to equipment) ▶ Be sure to connect the ground wire. (Poor grounding may cause electric shock, fire, etc. due to electric leakage.) ▶ Never touch the moving parts during operation. (Hand or arm may become entangled.) ▶ Keep hands free of moisture and oil when adjusting or checking. (risk of electric shock or damage to equipment) ▶ Perform manual operation after confirming that the actuator is not operated by the motor.

Caution	
Prohibition	**The valve can be damaged or leak.** ▶ Do not connect multiple (two or more) motorized valves in series. In addition, open/close switches (or relay contacts) should be provided for each electric valve. ▶ Do not use the product near high-voltage lines, inverters, or other objects that generate noise or magnetism. (Doing so may cause malfunction or failure.)
Forcing	**The valve can be damaged or leak.** ▶ Check that there is no insulation defect when performing wiring work. (Danger of damage to wiring) ▶ Securely tighten the covers of each part. (Rainwater, dust, etc. may penetrate and cause malfunction.) ▶ Be sure to connect the wires correctly as shown in the wiring diagram. After wiring, be sure to check that the connection is secure, and then turn on the power. (Failure to do so may cause malfunction or failure.) ▶ Each lid part is sealed by an O-ring. When removing and reinstalling the cover, such as when wiring, be sure to confirm that the O-ring is set in place and securely sealed. (If the seal is insufficient, rainwater or other liquid may enter the actuator and cause electric shock or malfunction.) ▶ If the actuator is used outdoors or in a location where it will be exposed to rainwater or water drops, make sure that rainwater does not enter the actuator through the wiring port. (Rainwater or other liquid may enter the actuator, causing electric shock or malfunction.) ▶ If you notice an unusual odor, heat, or smoke, immediately turn off the power supply. (There is a possibility that a fire may occur if you use the watch without feeling any abnormality. If you find any abnormality, contact your dealer or us for inspection.)

Manual operation
Nominal size: 50, 80, 100mm (PSN1, PSN3) only

Preparations	▶ Spanner (8mm)

[Procedure]

1) Fit a hexagon wrench to the manual operation shaft at the bottom of the actuator.
2) Slowly turn the hex wrench with the operating-torque 1.8N of m or less.
   Rotate Right (Clockwise) → Open direction
   Left Rotation (Counterturn) → Closing direction
   ※Do not forcibly turn the handle further from the fully opened and closed positions. (It will malfunction.)
3) Fully open or fully closed while looking at the valve travel indicator hand, and then remove the manual handle from the operation axis.

Electric operation

⚠Caution	
Prohibition	**Serious injury can result.** ▶ Do not leave the actuator cover open. (If the terminal is touched, an electric shock will occur.)
Forcing	**Serious injury can result.** ▶ Check that the manual override shaft is not equipped with a hex wrench. (There is a risk of injury if the hand handle is touched.)

[Procedure]

1) Remove the handwheel if it is fitted to the manual override shaft (PSN1, PSN3 only).
2) Turn on the operation power, input the input signal, and check that the valve operates normally.
3) Fully open or closed to turn off the power.

9. How to adjust the actuator

⚠ Warning	
Prohibition	**Serious injury can result.** ▶ Do not connect or separate lines when the power is on. Also, do not touch any other parts on the board or the terminal block wiring part. (risk of electric shock or damage to equipment)
Forcing	**Serious injury can result.** ▶ Be sure to connect the ground wire. (Poor grounding may cause electric shock, fire, etc. due to electric leakage.) ▶ Never touch the moving parts during operation. (Hand or arm may become entangled.) ▶ Keep hands free of moisture and oil when adjusting or checking. (risk of electric shock or damage to equipment) ▶ Perform manual operation after confirming that the actuator is not operated by the motor.

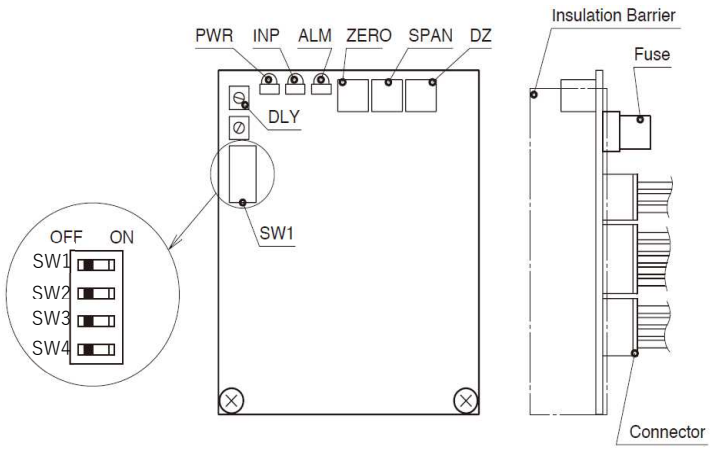
⚠Caution	
Prohibition	**The valve can be damaged or leak.** ▶ Do not connect multiple (two or more) motorized valves in series. In addition, open/close switches (or relay contacts) should be provided for each electric valve. ▶ Do not use the product near high-voltage lines, inverters, or other objects that generate noise or magnetism. (Doing so may cause malfunction or failure.)
Forcing	**The valve can be damaged or leak.** ▶ Check that there is no insulation defect when performing wiring work. (Danger of damage to wiring) ▶ Securely tighten the covers of each part. (Rainwater, dust, etc. may penetrate and cause malfunction.) ▶ Be sure to connect the wires correctly as shown in the wiring diagram. After wiring, be sure to check that the connection is secure, and then turn on the power. (Failure to do so may cause malfunction or failure.) ▶ Each lid part is sealed by an O-ring. When removing and reinstalling the cover, such as when wiring, be sure to confirm that the O-ring is set in place and securely sealed. (If the seal is insufficient, rainwater or other liquid may enter the actuator and cause electric shock or malfunction.) ▶ If the actuator is used outdoors or in a location where it will be exposed to rainwater or water drops, make sure that rainwater does not enter the actuator through the wiring port. (Rainwater or other liquid may enter the actuator, causing electric shock or malfunction.) ▶ If you notice an unusual odor, heat, or smoke, immediately turn off the power supply. (There is a possibility that a fire may occur if you use the watch without feeling any abnormality. If you find any abnormality, contact your dealer or us for inspection.)

Preparations	▶ Current generator (DC4～20mA) ▶ Small precision Phillips screwdriver ▶ Small precision flat-blade screwdriver

The actuator is adjusted at the factory. It is not necessary to readjust the actuator. However, if you want to change the opening or if adjustment is necessary after disassembling or assembling the valve, adjust the actuator while paying attention to the following points.

Nominal size: 15, 25mm

This explanation is based on the reverse-operation in which the actuator's output shaft reaches the maximum lower limit at DC4mA of the input-signal. Adjust the signal value in [] for the direct operation. The functions and lamp indications of the switches are shown below.



ZERO: Zero Adjustment
SPAN: Span Adjustment
DZ: Dead-band Adjustment
DLY: Restarting Timer
SW1: Stop/ Extend/ Retract Switch
(Operation at abnormally low input)
SW2: Stop/ Extend/ Retract Switch
(Operation at abnormally low input)
SW3: Direct/ Reverse Action
SW4: It is not used.
PWR: Power Indicator (Green with power supplied.)
INP: Input Indicator (Green with input supplied.)
ALM: Status Indicator
(Red flashes in 2 sec. intervals,
flashes in 0.5 sec. intervals with mechanical look detected.)

1) Setting the operation of the output axis when input signal error drops

To change the operation, change the DIP switch referring to Fig. 2 and the table below.
(Input signal abnormal drop refers to when a signal lower than DC approx. 1.5mA is input to the actuator.)

Setting the operation of the output axis when input signal error drops

Operation mode	SW1	SW2
Stop	※1	ON
Fully open	OFF	OFF
Fully closed	ON	OFF

※The setting of SW1 at stopping is ignored.

2) Direct/reverse action switching

To change the operation, change the DIP switch referring to Fig. 2 and the table below.

Direct/reverse action switching

Operation	SW3	Operation
Direct action	ON	Input-signal DC4mA fully open
Reverse action	OFF	Fully closed by input signal DC4mA

3) Adjusting the zero span

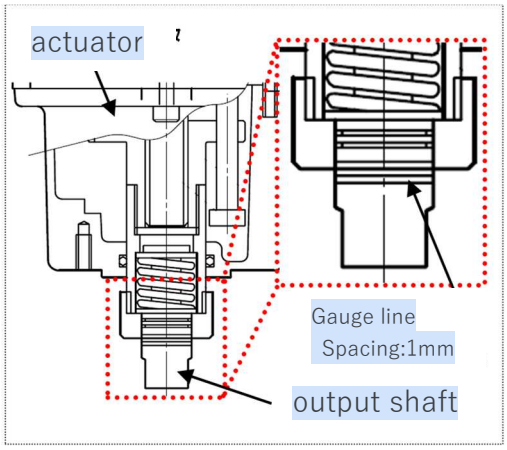
Adjust in the order of zero/span adjustment, seal spring adjustment, and sensitivity adjustment.

1. Turn the zero adjustment clockwise and the span adjustment counterclockwise completely.
2. Apply power and DC4mA〔20mA] and zero-adjust counterclockwise to obtain the required end position CLOSED.
   Turn it.
3. Enter DC20mA〔4mA and turn the span-adjustment clockwise to obtain the required full-open position.
4. Enter DC4mA〔20mA again to confirm that the required fully closed position has been obtained.
   If not obtained, repeat steps 2) to 3).

(When the zero adjustment is turned, the stroke changes by about 25% at maximum.)

4) Adjusting the seal spring

Adjust in the order of zero/span adjustment, seal spring adjustment, and sensitivity adjustment.
Adjust the sealing force when fully closed by turning the zeroing adjustment so that the output shaft is pushed in as far as 1mm when inputting DC4mA〔20mA].



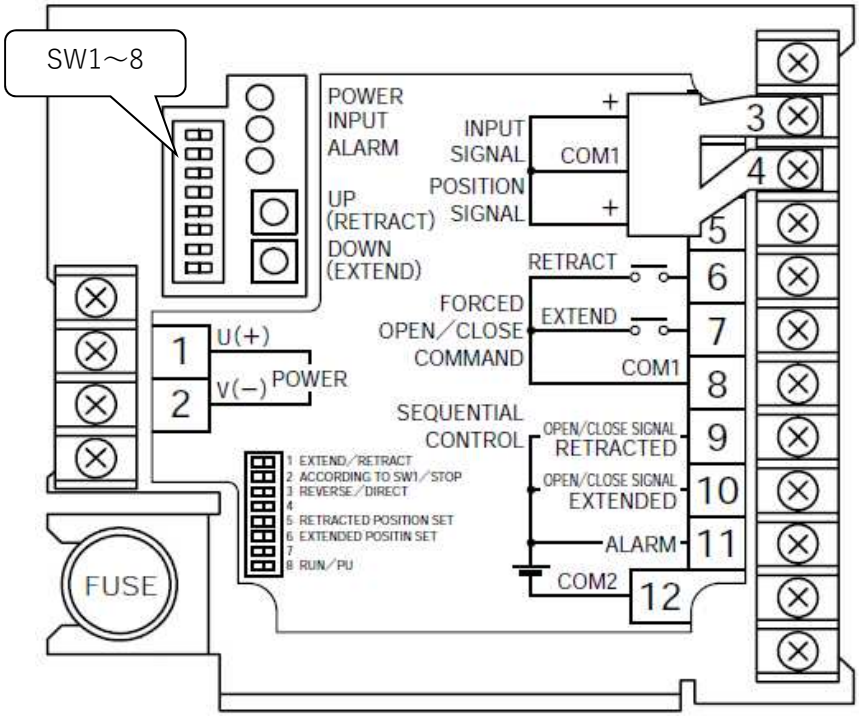
Model	Spring Amount of indentation	Sealing force
MSP6-□4 (for Nominal size 15mm)	1.0mm	1170N
MSP6-□6 (for Nominal size 25mm)	1.5mm	2350N

5) Sensitivity adjustment (dead band adjustment)

Adjust in the order of zero/span adjustment, seal spring adjustment, and sensitivity adjustment.
When the input signal is changed, the motor repeats a small inversion (hunting), and if it does not stop completely, turn the dead band adjustment clockwise to widen the dead band width.

Nominal size: 50, 80, 100mm

This explanation is based on the reverse-operation in which the actuator's output shaft reaches the maximum lower limit at DC4mA of the input-signal. Adjust the signal value in [] for the direct operation. The functions and lamp indications of the switches are shown below.



Power: Power LED
(Green light turns on when applied.)
INPUT: Input LED
(Green light turns on when applied.)
ALARM: Alarm LED
(Red light turns on with alarm)
UP: UP Control Button
DOWN: Down Control Button
SW1: Operation at abnormally Low Input
SW2: Operation at abnormally Low Input
SW3: Direct/ Reverse Action
SW4: It is not used.
SW5: Full Open Position Set
SW6: Full Close Position Set
SW7: It is not used.
SW8: Local Calibration mode
(When the switch is ON,
the input signal is disregarded.)

1) Setting the operation of the output axis when input signal error drops

To change the operation, change the DIP switch referring to Fig. 3 and the table below.
(Input signal abnormal drop refers to when a signal lower than DC approx. 1.5mA is input to the actuator.)

Setting the operation of the output axis when input signal error drops

Operation mode	SW1	SW2
Stop	※1	ON
Fully open	OFF	OFF
Fully closed	ON	OFF

※The setting of SW1 at stopping is ignored.

2) Direct/reverse action switching

To change the operation, change the DIP switch referring to Fig. 3 and the table below.

Direct/reverse action switching

Operation	SW3	Operation
Direct action	ON	Input-signal DC4mA fully open
Reverse action	OFF	Fully closed by input signal DC4mA

3) Full-open/closed position adjustment

The full-open and full-closed positions are adjusted as necessary after switching to the local setting mode.

1. Set SW8 to ON to shift to local setting.
   (Input signal is ignored in the local setting mode.)
2. Turn ON SW5 to enter the full-open position.
3. Use UP/DOWN to adjust the fully open position.
4. Set SW5 to OFF to exit the full-open position.
   (The actuator memorizes the fully open position when the switch is turned OFF.)
5. Set SW6 to ON to shift to the setting mode of the fully closed position.
6. Adjust the end position with UP/DOWN.
7. Set SW6 to OFF to exit the full-closed position.
   (The actuator memorizes the fully closed position when the switch is turned OFF.)
8. Turn OFF SW8 to exit local configuration.
   (When the switch is turned OFF, the unit enters the RUN mode. The unit operates according to the input signal.)
9. Make sure that the full-open and full-closed positions are as set.
   (The optimum fully closed position refers to the position at which the fluid starts to leak delicately when a signal of DC4mA〔20mA] is input and a signal of the degree of 4.4mA〔19.6mA] is input.)

10. How to disassemble/assemble parts for replacement

⚠ Warning	
Prohibition	**Serious injury can result.** ▶ Do not disassemble the actuator. ▶ Do not connect or separate lines when the power is on. Also, do not touch any other parts on the board or the terminal block wiring part. (risk of electric shock or damage to equipment)
Forcing	**There is a danger of injury.** ▶ Be sure to perform safety inspections of the machine tool and power tool beforehand. ▶ When installing piping, be sure to wear the appropriate protective equipment according to the operation details. **The valve can be damaged, or leak.** ▶ Completely drain the fluid in the piping when replacing the valve or replacing parts. If the fluid does not escape, reduce the fluid pressure to zero.

⚠ Caution	
Forcing	**The valve can be damaged, or leak.** ▶ Securely tighten the covers of each part. (Rainwater, dust, etc. may penetrate and cause malfunction.) ▶ The actuator is adjusted at the factory before shipment. However, if the setting needs to be changed or adjusted, perform the adjustment properly as described in the instruction manual. (Failure to do so may cause malfunction or failure.) ▶ Each lid part is sealed by an O-ring. When removing and reinstalling the cover, such as when wiring, be sure to confirm that the O-ring is set in place and securely sealed. (If the seal is insufficient, rainwater or other liquid may enter the actuator and cause electric shock or malfunction.)

Nominal size 15, 25mm/body material: U-PVC, PVDF

Preparations	▶ Protective gloves ▶ Eye protector ▶ Oil-based pen ▶ Wrench ▶ Hex Wrench ▶ Flat-blade screwdriver (used in PVDF of the main unit material) ▶ Orifice turning tool ▶ Drive unit output shaft fixing wrench

<**Disassembly**>

[**Procedure**]

1) Completely drain the fluid in the piping.

2) Leave the control valve in the half-open state to remove the electrical wiring.
※Turn off the power before turning off the input signal.

3) Loosen and remove the bolts and nuts on the pipe flange.

4) Remove the valve from the piping.

5) Apply an alignment mark between the actuator [20] and the Stand [19] and between the body [1] and the Stand [19] with an oil pen.

6) Loosen and remove the connecting bolts and nuts (A) [41] on the body [1] and Stand [19].

7) Lift up the actuator [20] with its Stand [19] and remove it from the body [1].
※When lifting the actuator [20], do it vertically slowly.
(There is a risk of scratching the sealing surface.)

8) Loosen screws (B) [54].

9) Turn the piston (A) [5] counterclockwise to remove it so as not to damage it.

10) Loosen and remove the connecting bolts (A) [42] of the actuator [20] and the Stand [19].

For main unit material U-PVC

11) Remove the piston retainer [6] from the piston (A) [5].

12) Remove stop ring [9] from piston (A) [5].

13) Pull out bush [7] from piston (A) [5].
※The plug [4] is screwed into the piston (A) [5] after applying adhesive, so it cannot be removed.

14) Loosen and remove orifice [3] with orifice turning tool.

For main unit material PVDF

11) Pull out piston guide [60] from piston (A) [5].

12) Loosen the stopper [59] by turning it counterclockwise while fixing the packing retainer [58].

13) Turn packing retainer [58] counterclockwise to remove from Stand [19].

14) Loosen and remove orifice [3] with orifice turning tool.

<**Assembly**>

[**Procedure**]

1) Prior to assembly, apply silicone grease (fluorine grease is recommended for chlorinated fluid) to the sliding parts and sealing parts such as the body [1], piston (A) [5], bush [7] (body material: U-PVC), piston guide [60] (body material: PVDF), and O-rings.

2) Assemble in reverse order from disassembly procedure 14).
※Finally, when fixing the body [1] and the Stand [19] with the bolts and nuts (A) [41], temporarily tighten them. After performing the 2 to 3-degree open/close operation, check that there are no abnormalities, and then tighten them completely.

Nominal size 50, 80, 100mm/body material: U-PVC

Preparations	▶ Protective gloves ▶ protective goggles ▶ wrench ▶ Allen key ▶ Oil-based pen

<**Disassembly**>
[**Procedure**]

1) Completely drain the fluid in the piping.
2) Leave the control valve in the half-open state to remove the electrical wiring.
※Turn off the power before turning off the input signal.
3) Loosen and remove the bolts and nuts on the pipe flange.
4) Remove the valve from the piping.
5) Apply an alignment mark between the actuator [20] and the Stand [19] and between the body [1] and the Stand [19] with an oil pen.
6) Loosen and remove the connecting bolts and nuts (A) [41] on the body [1] and Stand [19].
7) Lift up the actuator [20] with the Stand [19] and remove it from the body [1].
※When lifting the actuator [20], do it vertically slowly.
(There is a risk of scratching the sealing surface of the bush [7], etc.)
8) Loosen the bolts securing the nameplate [38] and remove the coupling [36] from the drive shaft.
9) Loosen screws (B) [54].
10) Turn coupling [36] counterclockwise to remove from piston (A) [5].
11) Pull out bush guide [8] from piston (A) [5].
12) Remove stop ring [9] from piston (A) [5].
13) Pull out bush [7] from piston (A) [5].
※The plug [4] is screwed into the piston (A) [5] after applying adhesive, so it cannot be removed.
Forcibly removing it will damage it.

<**Assembly**>
[**Procedure**]

1) Before assembly, apply silicone grease (fluorine grease is recommended for chlorine-based fluids) to the sliding parts and sealing parts such as the body [1], piston (A) [5], bush [7], bush guide [8], and O-rings of each part.
2) Assemble in reverse order from disassembly procedure 13).
※Finally, when fixing the body [1] and the Stand [19] with the bolts and nuts (A) [41], temporarily tighten them. After performing the 2 to 3-degree open/close operation, check that there are no abnormalities, and then tighten them completely.

11. Retightening of V-packing (Body material: PVDF only)

Warning	
Forcing	**The valve can be damaged, or leak.** ▶ Retightening of the V-packing may be an emergency measure against leakage from the piston sliding part. Inspect and replace consumable parts as a permanent measure.

Caution	
Prohibition	**The valve can be damaged, or leak.** ▶ Do not over-tighten the stopper or packing retainer.
Forcing	**The valve can be damaged, or leak.** ▶ Perform maintenance periodically by referring to "12. Inspection items". Pay particular attention to temperature changes and aging during long-term storage or shutdown or use.

Preparations	▶ Protective gloves ▶ protective goggles ▶ flat-blade screwdriver

[Procedure]

1) Insert a flathead screwdriver into the slit part of the stopper [59] and loosen it by turning it counterclockwise.
2) Insert a flathead screwdriver into the slit part of the packing retainer [58], and tighten the V packing by turning it clockwise.
3) Using a flathead screwdriver, fix the stopper [59] by turning it clockwise while holding the packing retainer [58].

12. Inspection item

⚠Caution	
Forcing	**The valve can be damaged, or leak.** ▶ Maintenance should be performed every 3 to 6 months as a guide in order to keep the watch in normal condition and use it for a long time. Pay particular attention to temperature changes and aging during long-term storage or shutdown or use. ▶ When removing the valve from the piping when replacing the valve or parts, completely remove the fluid from the piping before starting work. ▶ If any trouble is found, take the appropriate action referring to "13. Cause of malfunction and remedy".

Daily inspection

Inspection items and inspection methods	Guideline of judgment	Check point	Treatment method
External leakage (visual inspection)	No leakage	[Flange type] Pipe flange connection	① Retighten the pipe bolts to the specified torque. ② Remove the valve from the pipe and re-tighten the pipe bolts. (Ref: 5. Mounting method [Flange type])
		Top flange of the valve	Remove the valve from the piping and replace the valve or defective part. (Ref: 10. How to disassemble for parts replacement)
		Surface of the entire valve	Remove the valve from the pipe and replace the valve. (Ref: 10. How to disassemble for parts replacement)
Internal leakage (visual and measurement)	No leakage	Leakage to secondary side when valve is fully closed	Remove the valve from the piping and replace the valve or defective part. (Ref: 10. How to disassemble for parts replacement)
		Measured values of flowmeters, pressure gauges, etc.	Remove the valve from the piping and replace the valve or defective part. (Ref: 10. How to disassemble for parts replacement)
Abnormal noise (hearing)	No abnormal noise	Valves and actuators	Remove the valve from the pipe and replace the valve or actuator. (Ref: 10. How to disassemble for parts replacement)
		Piping around the valve	Reconfirm the conditions of use (Ref: 2. Handling Precautions)
Odor ※1) (sniffing)	No odor	Valves and actuators	Remove the valve from the pipe and replace the valve or actuator. (Ref: 10. How to disassemble for parts replacement)

※1) Failure to do so may result in burnout or fire.

Periodic inspection

●Guideline for the inspection cycle: 3 months

Inspection items and inspection methods	Guideline of judgment	Check point	Remedy for malfunctions
Operating time (Measurement)	Error within ±1 second	Actuator opening display	Check the power supply voltage (±10%). (Ref: Actuator nameplate)
			Remove the valve from the pipe and replace the valve or actuator. (Ref: 10. How to disassemble for parts replacement)
Vibration (palpation)	No different from other parts	Valves and actuators	Recheck the operating conditions and remove the source of vibration. (Ref: 2. Handling Precautions)
			Remove the valve from the pipe and replace the valve or actuator. (Ref: 10. How to disassemble for parts replacement)
		Piping around the valve	Recheck the operating conditions and remove the source of vibration. (Ref: 2. Handling Precautions)

Periodic inspection

●Guideline of the inspection cycle: 6 months

Inspection items and inspection methods	Guideline of judgment	Check point	Remedy for malfunctions
Looseness of bolts (visual and palpation)	No Loose	For Stand + valve	Retighten the mounting bolts
		For Stand + actuator	Retighten the mounting bolts
		For fixing the actuator cover	Retighten the screws with the following torque
		For flange piping	Retighten the pipe bolts to the specified torque. (Ref: 8. Mounting [Flange Type])
Water-intrusion ※1) (visual inspection)	No intrusion	Inside the actuator	Replace the actuator (Ref: 10. How to disassemble for parts replacement)
Intrusion ※1) of foreign objects (visual inspection)	No intrusion	Inside the actuator	Replace the actuator (Ref: 10. How to disassemble for parts replacement)
Measured ※1) of the isolation resistance (Measurement)	Must be 50MΩ or more	Inside the actuator	Replace the actuator (Ref: 10. How to disassemble for parts replacement)
Corrosion Or rust ※1) (visual inspection)	No corrosion or rust	Appearance of the product and in the actuator	Remove the valve from the pipe and replace the valve or actuator. (Ref: 10. How to disassemble for parts replacement)
Product damage	No scratches, cracks, or deformation	Appearance of the product	Remove the valve from the pipe and replace the valve or actuator. (Refer to P24_14. Disassembly method for replacing parts)

※1) Failure to do so may result in burnout or fire.

13. Cause of malfunction and remedy

Failure phenomenon	Possible cause	Measures and measures
Electric operation does not start.	Electricity is not coming to the operation panel	Checking the Power Supply
	Wrong wiring	Recheck wiring for correct wiring
	The wiring is disconnected or no part of the wiring is inserted.	
Fluid leaks from valve to outside	O-ring deterioration, damage	Reconfirm the material and replace
Fully closed not completely sealed	Foreign matter is caught.	Remove foreign matter
	Not fully closed	Adjust the stroke
	Sheet deterioration, damage	Replace the sheet

CAUSE OF FAILURE AND HOW TO REMEDY (continued)

Failure phenomenon	Possible cause	Measures and measures
Do not open or close with electric operation	The power is off.	Check the voltage and turn on the power.
	Wiring to the terminal block is disconnected.	Stop operation immediately and recheck the connection status. (Ref: 7. Wiring diagram for actuator specifications)
	The cable or the connection inside the actuator is broken.	Replace the cable or the actuator. (Ref: 10. How to disassemble for parts replacement)
	Simultaneous switching energizing or incorrect wiring to the terminal block	Stop operation immediately and recheck the connection status. (Ref: 7. Wiring diagram for actuator specifications)
	The power supply voltage is different.	Check the voltage with a tester to obtain the correct voltage.
	Power supply voltage is low.	Check the voltage with a tester to obtain the correct voltage.
	Foreign matter caught in valve	Remove the valve from the piping, disassemble it, and remove foreign matter. (Ref: 10. How to disassemble for parts replacement)

CAUSE OF FAILURE AND HOW TO REMEDY (continued)

Failure phenomenon	Possible cause	Measures and measures
Do not open or close with electric operation	Piping stress is applied to the valve.	Remove the piping stress
	The torque of the valve has increased due to the effects of the fluid (temperature, components, pressure, etc.)	Reconfirm the conditions of use (Refer to P2_2. Handling Precautions)
	The thermal protector is activated.	Stop using the product immediately, and lower the ambient temperature or the opening/closing frequency.
	The capacitor is burnt out (punctured).	Stop using the product immediately and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
	Water or foreign matter has entered the actuator causing a short circuit.	Stop using the product immediately and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
	The actuator does not move due to external corrosion of the actuator.	Stop using the product immediately and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
	The insulation resistance of the actuator has dropped.	Stop operation immediately, check the insulation resistance, and replace the actuator. (Ref: 10. How to disassemble for parts replacement)

Failure phenomenon	Possible cause	Measures and measures
Fluid leaks even when fully closed (internal leak)	High fluid pressure	Use below the maximum allowable pressure (Ref: 10. How to disassemble for parts replacement)
	Missing parts	Remove the valve from the piping and attach the relevant part or replace the valve. (Ref: 10. How to disassemble for parts replacement)
	Foreign matter caught in valve	Remove the valve from the piping, disassemble it, and remove foreign matter. (Ref: 10. How to disassemble for parts replacement)
	Piping stress is applied to the valve.	Remove the piping stress

CAUSE OF FAILURE AND HOW TO REMEDY (continued)

Failure phenomenon	Possible cause	Measures and measures
Fluid leaks from valve (external leak)	O-ring is scratched, worn, melted, or altered	Stop using the product immediately, remove the valve from the piping, replace the relevant part, or replace the valve. (Ref: 10. How to disassemble for parts replacement)
	Scratches or wear are found on the sliding or fixing surfaces of the O-ring.	Stop using the product immediately, remove the valve from the piping, replace the relevant part, or replace the valve. (Ref: 10. How to disassemble for parts replacement)
	Valve is cracked or broken	Stop using the product immediately, remove the valve from the piping, and replace the valve. (Ref: 4. How to disassemble for parts replacement)
Actuator is operating but valve is not open or closed	The plug, piston or stem is damaged.	Stop using the product immediately, remove the valve from the piping, replace the relevant part, or replace the valve. (Ref: 10. How to disassemble for parts replacement)

Failure phenomenon	Possible cause	Measures and measures
The actuator emits a bad smell, heat, or smoke.	Actuator is defective	Stop using the product immediately, remove the valve from the piping, and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
	Wrong connection to the terminal block	Stop using the product immediately, remove the valve from the piping, and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
	An overcurrent is flowing to the actuator	Stop using the product immediately, remove the valve from the piping, and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
	The actuator is affected by lightning.	Stop using the product immediately, remove the valve from the piping, and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
Actuator is corroded	The watch is exposed to water, chemical liquids, or other liquids.	Stop using the product immediately, remove the valve from the piping, and replace the actuator. (Ref: 10. How to disassemble for parts replacement)
Valve is corroded or deformed	The watch is exposed to water, chemical liquids, or other liquids.	Stop using the product immediately, remove the valve from the piping, and replace the valve. (Ref: 10. How to disassemble for parts replacement)

14. Disposal method of residual materials and waste materials

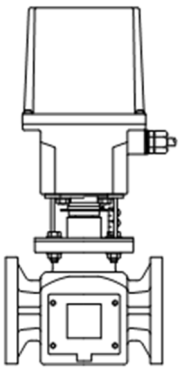
⚠ Warning	
Forcing	**When burnt, toxic gas is generated.** ▶ When disposing of the product or parts, please dispose of them according to the guidelines of each local authority by a professional disposal company.

Inquiries

Contact the nearest dealer, our sales office, or our web website for inquiries about this product.

[User's Manual]

Motorized M-type control valve
[Automatic valve]



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

Please note that the content of this manual is subject to change without notice. **April 2024**