NIPPON VALVE CONTROLS, INC.

Instruction manual

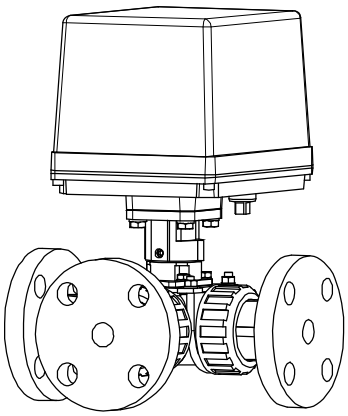
Electric Actuated Ball Valve TP LP

SP-1519

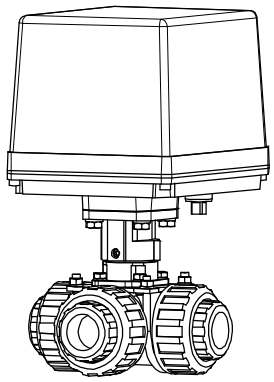
Please read this manual before installation and use.

GENERAL

A plastic ball valve and high-power electric actuator.
Various connections can be selected.
Can be used for various fluids.
(4-sided sheet structure)



J10K Flanged-end



Threaded End Rc, Socket

Actuator

AE1 : For AC power

AE2 : For AC / DC power

Valve

TP type 4 seats, 3 way (T) (with flow paths)

LP type 4 seats, 3 way (L)

PRODUCT CODE

TP type	J10K Flanged-end			T	P			1	P	P		-			-			-				
	Threaded End Rc			T	P			5	P	P		-			-			-				
	Socket			T	P			7	P	P		-			-			-				
LP type	J10K Flanged-end			L	P			1	P	P		-			-							
	Threaded End Rc			L	P			5	P	P		-			-							
	Socket			L	P			7	P	P		-			-							
		(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)		(9)			(10)			(11)			

(1) Actuator
AE1
AE2

(2) Valve
TP
LP

(3) Voltage
1 : 100 / 110 V AC
2 : 200 / 220 V AC
0 : 24 V DC

(4) Sizing code
0 : Standard
1 : Light
2 : Heavy

(5) Connection
1 : J10K Flanged-end
5 : Threaded End Rc
7 : Socket

(6) Body material
P : PVC

(7) Ball material
P : PVC

(8) Stem seal
E : EPDM
V : FKM

(9) Size [mm]
ex. 25 A → 025

(10) Option
L0 : Auxiliary limit switch
L2 : Auxiliary limit switch

(11) Flow paths (TP)
a to d : 3 way valve flow

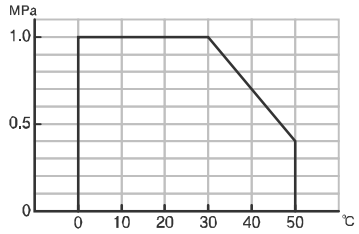
VALVES SPECIFICATIONS

Water Oil Air, Gas Steam Chemicals Sea water Slurry Negative pressure

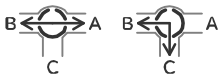
TP LP type

Valve type		TP LP
Design		3 way, Standard port
Connection		J10K Flanged-end Threaded End Rc Socket
Fluid		
Max pressure		1 MPa
Size [mm]		015 to 050
Material	Body	PVC
	Ball	PVC
	Seat	PTFE
Stem seal	O-ring	EPDM FKM

PRESSURE & TEMPERATURE RATING



FLOW PATHS (Position① / P1) (Position② / P2)

TP								LP	
Code: a		Code: b		Code: c		Code: d			
P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
									

Note) It may very small leak because of a piping pressure difference.

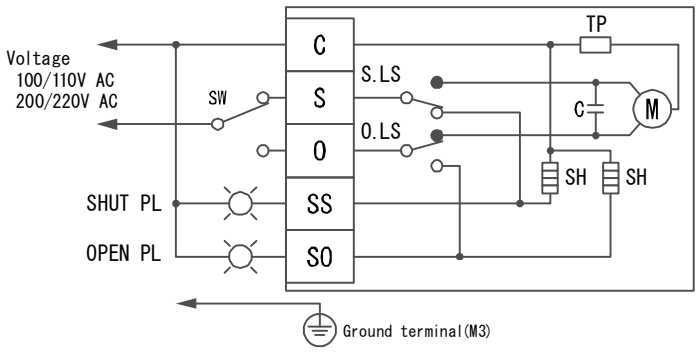
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AE1 type

Actuator type (☐:Voltage code)	AE1-120-☐	AE1-300-☐	AE1-600-☐	AE1-02K-☐	AE1-06K-☐
Voltage	100 / 110 V AC ±10 % 50/60 Hz (Code: 1) 200 / 220 V AC ±10 % 50/60 Hz (Code: 2)				
Rated torque [N·m]	12	30	60	200	600
Operation time [s]	10 / 8.5 (50/60 Hz)	7.2 / 6 (50/60 Hz)	15 / 12 (50/60 Hz)	30 / 25 (50/60 Hz)	
Power consumption [VA]	19	60		110	350
Motor	Synchronous motor	Reversible motor self-contained mechanical brake			
Overload protection	Thermal protector				
Method of operation	Transfer input type				
Operation	Power to S → SHUT (SHUT PL is lit.) Power to O → OPEN (OPEN PL is lit.)				
Output signal rating	Resistance load 3 A 250 V AC (Minimum 0.1 A)				
Duty cycle	20 % 15 min.				
Ambient temperature	-20 to 55 ºC				
Space heater	3 W				
Manual operation	Manual shaft				
Enclosure	Equivalent to IP65 (IEC 60529)				
Housing material	Aluminum alloy diecast (acrylic resin baking finish)				
Wire connection	Terminal Block: M3, Ground terminal: M3				
Conduct port	2-G1/2 Attachments: Cable gland (for Φ6 to 12 mm cable), plug.				

WIRING



Note) Control switch should be prepared one by one for actuator.
Do not operate two or more actuator from one switch. It might malfunction.

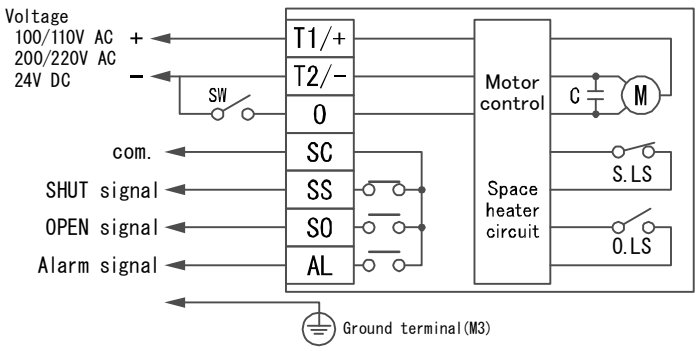
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AE2 type

Actuator type (□:Voltage code)	AE2-120-□	AE2-300-□	AE2-600-□	AE2-02K-□	AE2-06K-□	AE2-120-0
Voltage	100 / 110 V AC ±10 % 50/60 Hz (Code: 1) 200 / 220 V AC ±10 % 50/60 Hz (Code: 2)					24 V DC (Code: 0)
Rated torque [N·m]	12	30	60	200	600	12
Operation time [s]	11 / 9.5 (50/60 Hz)	8.2 / 7 (50/60 Hz)	16 / 13 (50/60 Hz)	31 / 26 (50/60 Hz)		3 to 4.5
Power consumption [VA]	26	60		110	350	Max 24
Motor	Synchro-nous motor	Reversible motor self-contained mechanical brake				DC motor
Overload protection	Timer					Current limiter
Method of operation	a-contactinput type, with built-in relay					
Operation	SW is OFF → SHUT (SHUT signal is output.) SW is ON → OPEN (OPEN signal is output.) Overtorque → Alarm signal is output					
Input signal current	9 mA (O-terminal) Leakage current in SW: less than 1 mA					
Output signal rating	Resistance load 0.5 A 125 V AC 1 A 24 V DC					
	Micro load 1 mA 5 V DC					
Alarm signal	Output when the motor protection circuit operates by the overload. (it returns by power supply OFF or reverse operating signal)					
Duty cycle	20 % 15 min.					
Ambient temperature	-20 to 55 ºC					
Space heater	3 W					
Manual operation	Manual shaft					
Enclosure	Equivalent to IP65 (IEC 60529)					
Housing material	Aluminum alloy diecast (acrylic resin baking finish)					
Wire connection	Terminal Block: M3, Ground terminal: M3					
Conduct port	2-G1/2 Attachments: Cable gland (for Φ6 to 12 mm cable), plug.					

WIRING



Note) Do not use control switch with current leakage (more than 1 mA) such as TRIAC or relay with CR.

ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

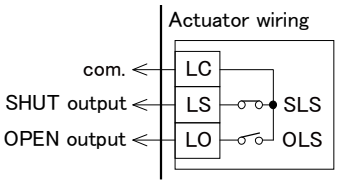
OPTIONAL PARTS

Specifications		Code No.	AE1	AE2	Remarks
Auxiliary limit switch	Select limit switch depending on the load	L0	○	○	For standard signal
		L2	○	○	For micro load signal

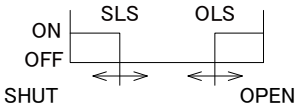
*Auxiliary limit switch: Please refer to the specifications.

WIRING (OPTION)

L0, L2	Auxiliary limit switch



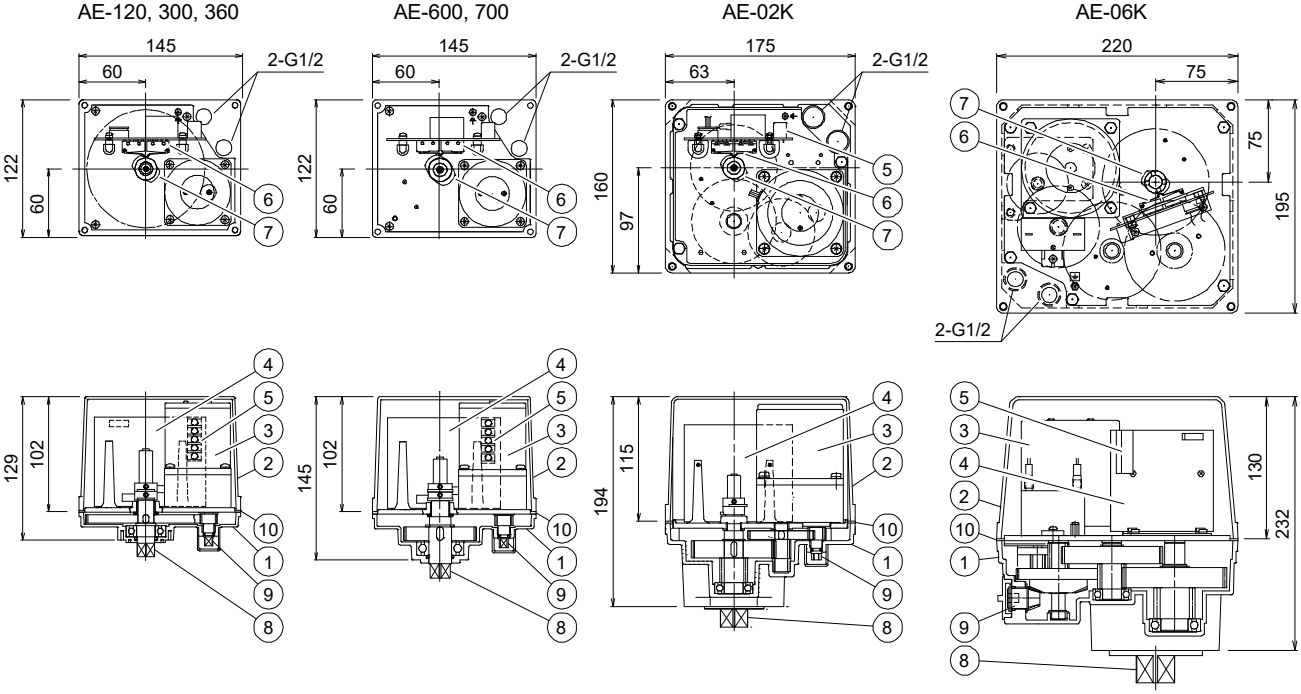
At CLOSE side, LC and LS is ON.
At OPEN side, LC and LO is ON.



ON point can be reset by adjusting the cam.

DIMENSIONS

AE



Parts name

1	Body	5	Terminal block	9	Manual shaft
2	Motor cover	6	Limit switch	10	Rubber packing
3	Motor	7	SW setting cam		
4	Control board	8	Drive shaft		

HANDLING & STORAGE

①HANDLING

Do not drop or throw the product as it may break.

②STORAGE

- Store away from dust, moisture and direct sunlight. If possible, store in the original package.
- Do not remove a dust proof cap until the piping.
- Avoid contact with any coal tar creosote, insecticides, vermicides or paint. (These chemicals may cause damage to the valve.)

③CHECKING

- Check the product code, power supply, and voltage before installation.
- Make sure that the bolts are not loose.

④WARNING

- Do not use the valve to fluid containing slurry. (The valve will not operate properly.)
- Do not use the valve in conditions where the fluid may have crystallized. (The valve will not operate properly.)
- Regarding the ball valve type, we recommend that you use fully open or fully closed. This is because the edge of the ball opening remains on the seat (PTFE) when used at an intermediate opening, so that the sealing performance temporarily deteriorates at the time of full closing.
- Keep the valve out of direct sunlight, water and dust. Use cover to shield the valve. (The valve will not operate properly.)
- Using a positive-pressure gas with our plastic piping may pose a dangerous condition due to the repellent force particular to compressible fluids even when the gas is under similar pressures used for liquids. Therefore, be sure to take the necessary safety precautions such as covering the piping with protective material.
- For conducting a leak test on newly installed piping, be sure to check for leaks under water pressure. If absolutely necessary to use a gas in testing, please consult your nearest service station beforehand.
- Certain liquid such as H2O2, NaClO, etc may be prone to vaporization (Off-Gassing) which may cause irregular pressure increases, which may destroy the valve.

INSTALLATION

①PRECAUTIONS

- Flush the pipeline carefully before installing the valve. Foreign particles, such as sand or pieces of welding electrode, will damage the ball and seats.
- It may very small leak because of a piping pressure difference.

②PIPING (Flanged-end)

- Use only rubber gasket for plastic flange.
- Use spring washer to prevent from decreasing surface pressure gasket when the temperature change happens frequently.
- Tighten all bolts using crossover method to load the joint evenly.
- If the mating flange is metal, use a flat face flange.

③PIPING (Threaded End Rc)

- Please remove and thrust the screw receiving window part of a valve from a valve main part in screw connection.
- Since the screw receiving window of a valve is a product made of resin, please do not join to a metal screw.
- A seal should use a seal tape fundamentally, and please roll it 2 to 3 and carry out it.
- A liquefied seal has a possibility of causing material deteriorates of a valve.
- Please give it by 2/1 to 1 rotation threaded (RC) by the belt wrench etc, after thrusting screwing firmly single hand.

PIPING (Socket solvent joint / Fusion joint)
In adhesion and fusion splicing arrival junction, please protect each basic work of the method certainly. See each method of piping according to joint and material.

④CONNECTION WITH UNION NUT

- Be sure to keep the valve in closed position when tightening union nut.
- Tighten union nut to the body in proper torque to prevent distortion of the valve.

Valve size [mm]	Recommended torques [N·m]
015 to 025	5 to 10 (Tighten by one hand)
032 to 050	20 to 40 (Tighten by both hands)

⑤SUPPORT

Use proper support to prevent distortion of the valve.

⑥ENVIRONMENT

- Do not install in place where corrosive gas is present or where vibration is heavy (0.5 G or more).
- When radiant heat causes the surface temperature of the control unit to exceed 55 °C, provide an appropriate shielding plate.
- If there is a possibility that the fluid and drive part freeze, please take measures to prevent freezing.

⑦POSITIONING

Should be positioned through 90° upward from horizontal. Provide space around the product to allow manual operation, inspection and replacement work.

Maintenance space for upper part of actuator.	
AE (120 / 360 / 700)	More than 105 mm
AE (02K / 06K)	More than 120 mm

⑧OTHER NOTES

Until the wiring is completed there must be no condensation or flooding in the interior of the actuator, after piping. Protective caps on the cable gland are not waterproof.

WIRING

①PRECAUTIONS

- Remove the actuator cover before wiring.
- Two G1/2 electrical connections are provided with a cable gland and plug. Usable cable size is Φ6 to 12 mm.
- When using a flexible tube, dew condensation may occur inside the actuator due to respiration from the inside of the tube and malfunction may result. Seal the flexible tube connector part with a sealant.
- Sealants that affect the electrical contacts should not be used inside the electric actuator.
- If long distance wiring or low voltage operation, check that terminal voltage is in the proper range.

②CONNECTION

- Do not wiring outdoors on a rainy day.
- Check the power supply and voltage.
  Connect the signal as shown in the wiring diagram.
  Do not connect unnecessarily terminal.
- Actuator should be electrically grounded.
  Use the terminal marked (⏚) inside the actuator.

PREVENT DEW CONDENSATION

- When installing the cover after wiring, perform the bolt by the temporary tightening procedure and the permanent tightening procedure to tightly and securely tighten the rubber packing so that water does not enter from the outside.
- Tighten the cable gland nut so that there is no leakage from the wire entrance.

CONTROL

①AE1

Each control switch should be prepared one by one. Do not operate two or more from one switch at the same time.

②AE2

When using control switch with current leakage (more than 1 mA) such as TRIAC or relay with CR, it can cause malfunction.

③DC POWER SUPPLY (AE2)

- Battery or full wave rectification can be used.
- Consider an inrush current of motor.
  (It is 1.5 to 3 times of consumed current.)
- When using a DC voltage, be selected the wire thickness by the wiring distance.
- Do not use power supply that require more than 1 second with rise and fall time.

④USE OF OPEN/SHUT SIGNALS

Use signals within the capacity of output signal rating.

OPERATION

①TESTING

- Make sure that power supply voltage is correct. Also check operating position, wiring, speed and signals.
- During trial operation, check that valve movement and OPEN and SHUT signals are correct.

②DUTY CYCLE

Confirm that the operation frequency is within the specified duty cycle.
Use beyond the load time rate range will affect product life. Also, it may cause burnout.

> Duty cycle is a value that regulates the opening / closing frequency of the actuator. The meaning of 20 % 15 minutes for Duty cycle is that 3 minutes (20 % of 15 minutes) operation is possible.
> The calculated value obtained by dividing 3 minutes by the operation time is the number of times of operation within 15 minutes.

③ATTENTION

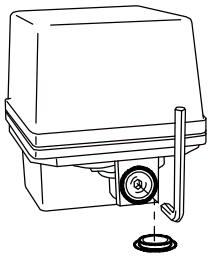
- Keep power supplied for built-in space heater to prevent condensation inside actuator.
- Do not touch the moving parts of actuator in operation.
- Do not insert a reverse signal during operation.
  It may shorten the life of product.
- Never put anything on the actuator or make it into a foothold.

MANUAL OPERATION

①PRECAUTIONS

- Be sure to turn off the power before manual operation.
- Operate manually with reference to the opening degree label. Do not turn beyond the fully open / fully closed position. Operation failure may occur during automatic operation.

②THE WAY OF OPERATION

AE	AE (06K)
	
Turn manual shaft slowly with an adjustable wrench.	Remove the cap. Turn manual shaft solely with M8 hexagon socket screw keys.

Before automatic operation, be sure to remove wrench.

MAINTENANCE

- To prevent electric shock, be sure to turn off the power when removing the actuator cover.
- Do the routine maintenance at least once in half a year.

Inspection items

- Confirm operation of opening and closing.
- Confirm that an actuator is not hot excessively.
- Confirm existence of abnormal noise and vibration during operation.
- Confirm whether screws are loose or not.
- Confirm that water or condensation no remains in the actuator.
- Confirm the fluid temperature or pressure.
- Confirm the leak from valve stem.

TROUBLE SHOOTING

Problem	Cause	Solution
Actuator does not move.	Faulty wiring.	Correct the wiring.
	No voltage is coming.	Check the voltage.
	Incorrect voltage.	When it's burned out by excess voltage, replace the actuator.
	Short the circuit, contact failure.	Review wires and connection.
	Motor is too old.	Replace the actuator. Repair in our factory.
Operation is unstable.	Excess surge or voltage was applied.	• Replace the control board or limit switch. (Repair in our factory) • Replace the actuator.
	Rainwater entered the actuator.	• Dry the inside. • Replace the actuator.
	Added high harmonics noise from an inverter.	Attachment a filter for each inverter maker option.
	Effect of high level noise.	Use the shielded wire and ground the wiring. Separate signal wire from power line.
	Two or more valves operated by the same switch. AE1	Each control switch should be prepared one by one.
	Switch leakage current is large. AE2	Current leakage should be less than 1 mA.

Problem	Cause	Solution
Stop in the mid position.	• Biting of valve seat. • The scale has adhered to the valve ball.	Remove a foreign object.
	Overload protector runs because of over-torque.	Turn off the power for about 3 minutes to remove a heat from motor protection circuit. AE1
		Motor protection circuit returns by the signal of operation of an opposite direction. Turn on the power again. AE2
Received the alarm signal. AE2		
Leakage from valve body	• Valve cap get loose. • Valve body is damaged.	Replace the valve.
Leakage from valve seat	Seat is worn or damaged.	
Leakage from valve stem	Stem packing is worn or distorted.	

For more information contact
NIPPON VALVE CONTROLS, INC. for consultation.

NIPPON VALVE CONTROLS, INC.
1-21-19 Meieki minami, Nakamura-ku, Nagoya 450-0003 JAPAN
TEL: 81-52-582-6435 FAX: 81-52-582-6439