NIPPON VALVE CONTROLS, INC.

# Instruction manual

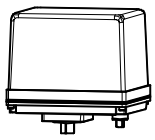
**Electric Actuator AE1 AE2**

SP-1516

**Please read this manual before installation and use.**

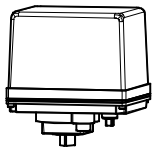
## GENERAL

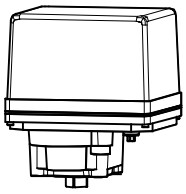
AE series with powerful motor and control board offers reliable automatic control of quarter-turn valves.
The actuator provides maximum versatility in electrical control.
AE-120 / 300 / 600 / 02K / 06K type actuators have a self-lock system, and they are suitable for butterfly valves.

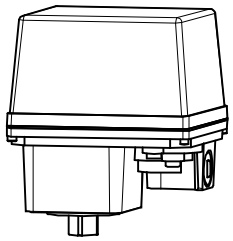


AE1 : For AC power.

AE2 : For AC / DC power.







## PRODUCT CODE

A E 1 - [ ][ ] - [ ] - [ ]
A E 2 - [ ][ ] - [ ] - [ ]
(1) (2) (3) (4)

| (1) Actuator | (2) Torque | (3) Voltage | (4) Option |
|---|---|---|---|
| AE1 | 120 | 1 : 100 / 110 V AC | L0 : Auxiliary limit switch |
| AE2 | 300 | 2 : 200 / 220 V AC | L2 : Auxiliary limit switch |
| | 360 | 0 : 24 V DC | |
| | 600 | | |
| | 700 | | |
| | 02K | | |
| | 06K | | |

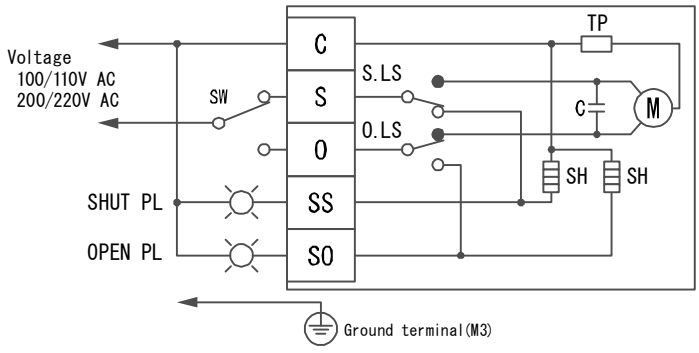
## ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AE1 type

| Classification | For Ball valve, Butterfly valve, Damper | | | | | For Ball valve | |
|---|---|---|---|---|---|---|---|
| Actuator type (□:Voltage code) | AE1-120-□ | AE1-300-□ | AE1-600-□ | AE1-02K-□ | AE1-06K-□ | AE1-360-□ | AE1-700-□ |
| Voltage | 100 / 110 V AC ±10 % 50/60 Hz (Code: 1)<br>200 / 220 V AC ±10 % 50/60 Hz (Code: 2) | | | | | | |
| Rated torque [N·m] | 12 | 30 | 60 | 200 | 600 | 36 | 70 |
| 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) | | 7.2 / 6 (50/60 Hz) | 15 / 12 (50/60 Hz) |
| Power consumption [VA] | 19 | 60 | | 110 | 350 | 60 | |
| Motor | Synchronous motor | Reversible motor self-contained mechanical brake | | | | Reversible motor | |
| Overload protection | Thermal protector | | | | | | |
| Method of operation | Transfer input type | | | | | | |
| Operation | Power to S → SHUT (SHUT PL is lit.)<br>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.

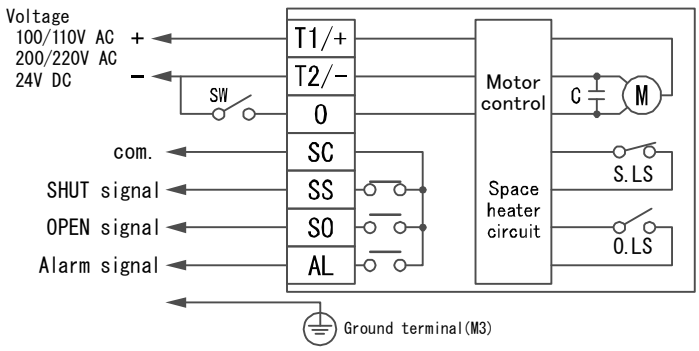
## ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AE2 type

| Classification | For Ball valve, Butterfly valve, Damper | | | | | For Ball valve | | | |
|---|---|---|---|---|---|---|---|---|---|
| Actuator type (□:Voltage code) | AE2-120-□ | AE2-300-□ | AE2-600-□ | AE2-02K-□ | AE2-06K-□ | AE2-360-□ | AE2-700-□ | AE2-120-0 | AE2-360-0 |
| Voltage | 100 / 110 V AC ±10 % 50/60 Hz (Code: 1)<br>200 / 220 V AC ±10 % 50/60 Hz (Code: 2) | | | | | | | 24 V DC (Code: 0) | |
| Rated torque [N·m] | 12 | 30 | 60 | 200 | 600 | 36 | 70 | 12 | 36 |
| 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) | | 8.2 / 7 (50/60 Hz) | 16 / 13 (50/60 Hz) | 3 to 4.5 | 9 to 14 |
| Power consumption [VA] | 26 | 60 | | 110 | 350 | 60 | | Max 24 | |
| Motor | Synchro-nous motor | Reversible motor self-contained mechanical brake | | | | Reversible motor | | DC motor | |
| Overload protection | Timer | | | | | | | Current limiter | |
| Method of operation | a-contact input type, with built-in relay | | | | | | | | |
| Operation | SW is OFF → SHUT (SHUT signal is output. )<br>SW is ON → OPEN (OPEN signal is output. )<br>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<br>Micro load 1 mA 5 V DC | | | | | | | | |
| Alarm signal | Output when the motor protection circuit operates by the overload.<br>(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

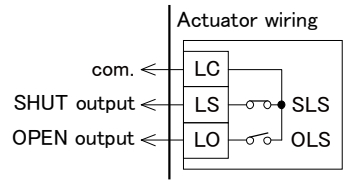
OPTIONAL PARTS

| 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 |

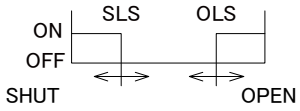
*Auxiliary limit switch: Please refer to the specifications.

WIRING (OPTION)

| L0 / L2 | Auxiliary limit switch |
|---|---|

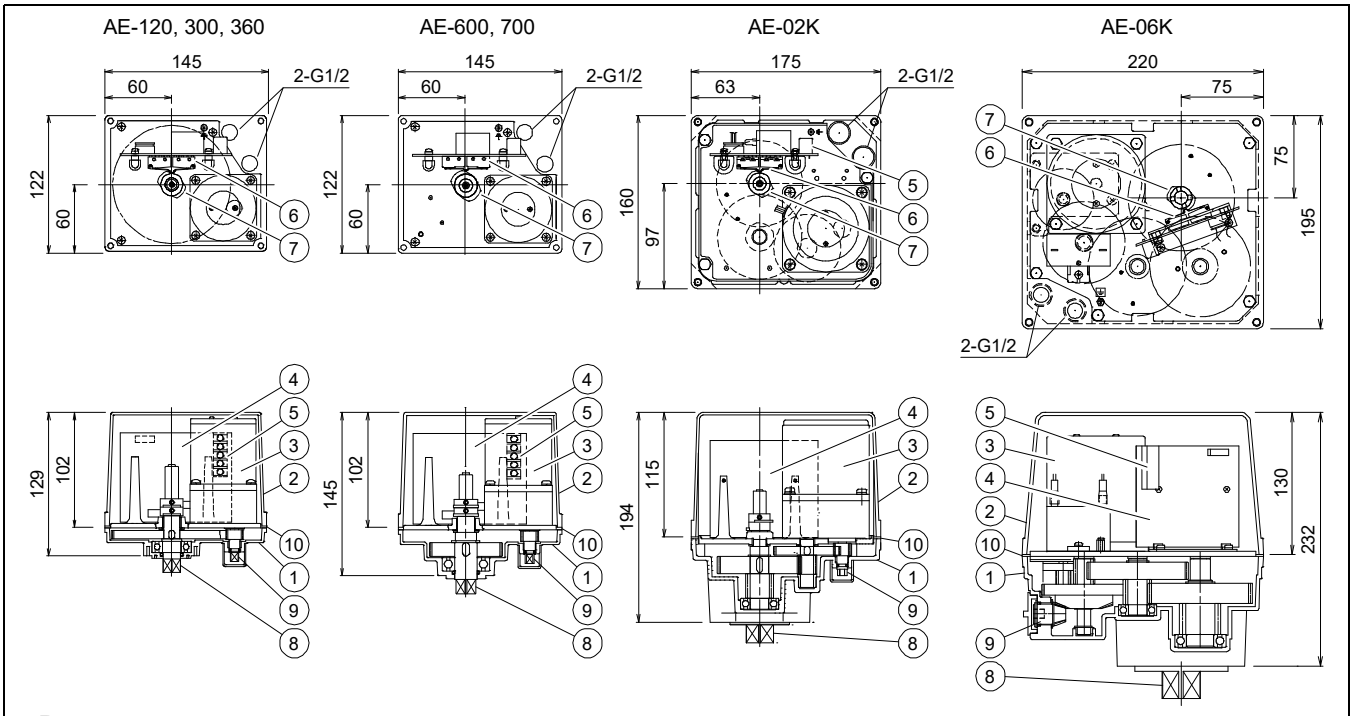



At CLOSE side, LC and LS is ON.
At OPEN side, LC and LO is ON.




ON point can be reset by adjusting the cam.

DIMENSIONS




Parts name

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

## HANDLING & STORAGE

①HANDLING

Proper care in handling the actuator should be taken to prevent damage. Do not drop or throw it.

②STORAGE

Store the actuator in the protected area from dust, moisture, and direct sunlight. If possible, actuator should be kept in the original packaging.

③CHECKING

Check the product code, power supply, and voltage before installation.

## INSTALLATION

①ENVIRONMENT

- 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.

②POSITIONING

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 / 300 / 360)<br>AE (600 / 700) | More than 105 mm |
| AE (02K / 06K) | More than 120 mm |

③OTHER 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

- 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

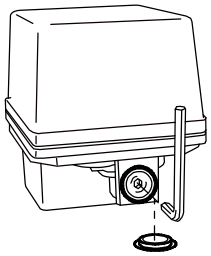
- Keep power supplied for built-in space heater to prevent condensation inside actuator.
- Do not touch the moving parts of actuator in operation.
- Do not insert a reverse signal during operation. It may shorten the life of product.
- Never put anything on the actuator or make it into a foothold.

## MANUAL OPERATION

①PRECAUTIONS

- Manual operation should be a temporary operation.
- Be sure to turn off the power before manual 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.

## 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)<br>• Replace the actuator. |
| | Rainwater entered the actuator. | • Dry the inside.<br>• 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. | 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) | | |

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