NIPPON VALVE CONTROLS, INC.

# Instruction manual

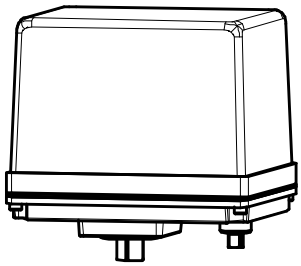
**Electric Actuator ECR**

SP-1516

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

## GENERAL

Excellent performance actuator for electric shut-off valves equipped with connector for damper shaft and bracket.
It has a new structure with ultra high capacity electric double layer capacitor.
In case of power failure, capacitor discharges electricity and operates valve.
This series can handle high frequency (over 200,000 times) operation.
When motor is not in motion, consumed electric power is less than 3W, and it is energy-saving design.



ECR : For AC power.

## PRODUCT CODE

E C R - [ ] - [ ] - [ ]
(1) (2) (3) (4)

| (1) Actuator | (2) Torque | (3) Voltage | (4) Operation mode |
|---|---|---|---|
| ECR | 120 | 1 : 100 / 110V AC | Nil : Mode A |
| | 360 | 2 : 200 / 220V AC | Q : Mode B |

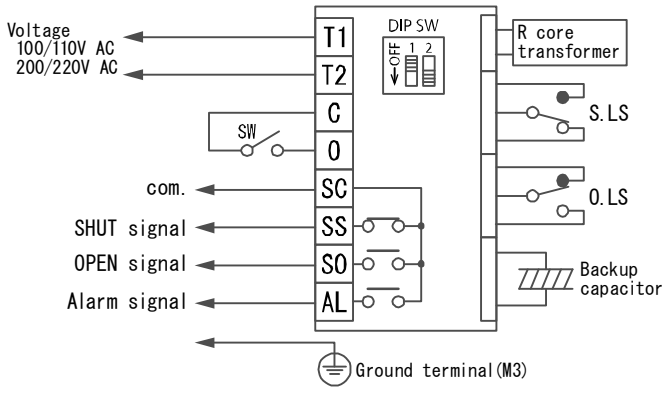
**ELECTRIC ACTUATOR SPECIFICATIONS**

3 way valve: SHUT / Position②, OPEN / Position②

| Actuator type (☐:Voltage code) | ECR-120-☐ | ECR-360-☐ |
|---|---|---|
| Voltage | 100 / 110 AC V ±5 %  50/60 Hz  (Code: 1)<br>200 / 220 AC V ±5 %  50/60 Hz  (Code: 2) | |
| Rated torque [N·m] | 12 | 36 |
| Operation time [s] | 3 to 6 | 7 to 14 |
| | When power is turned on, operation starts about 30 seconds after capacitor is charged. | |
| Charging Time [s] | 30 | 90 |
| | When the power is just turned on. | |
| Power consumption [VA] | In motion: 30 max.  Charging: 50 max.  Stop: 2.5 | |
| Motor | DC motor | |
| Overload protection | Timer | |
| Method of operation | a-contactinput type, with built-in relay | |
| Operation *1 | [Mode A] SW is OFF → SHUT , SW is ON → OPEN. (Standard)<br>[Mode B] SW is ON → SHUT , SW is OFF → OPEN. (Option: Q) | |
| Power failure | [Mode A] SHUT<br>[Mode B] OPEN | |
| Built-in power supply | Electric double layer capacitor | |
| Input signal current | 6 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. | |
| 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 50 ºC | |
| Space heater | Built in to the control board | |
| Manual operation | Manual shaft | |
| Enclosure | Equivalent to IP65 (IEC 60529) | |
| Housing material | Aluminum alloy diecast (acrylic resin baking finish) | |
| Terminal block | For bare wire 0.2 to 1.5 mm² (AWG 26 to 16) Ground terminal: M3 | |
| Conduct port | 2-G1/2 Attachments: Cable gland (for Φ6 to 12 mm cable), plug. | |

*1 Change by DIP switch. (Standard → Mode B)

WIRING




Setting with DIP SW

Mode A (Standard)  Mode B


Output signal (Common in mode A / B)

Closed the valve → SHUT signal

Open the valve → OPEN signal

Overtorque → ALARM signal

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

**ELECTRIC ACTUATOR SPECIFICATIONS**

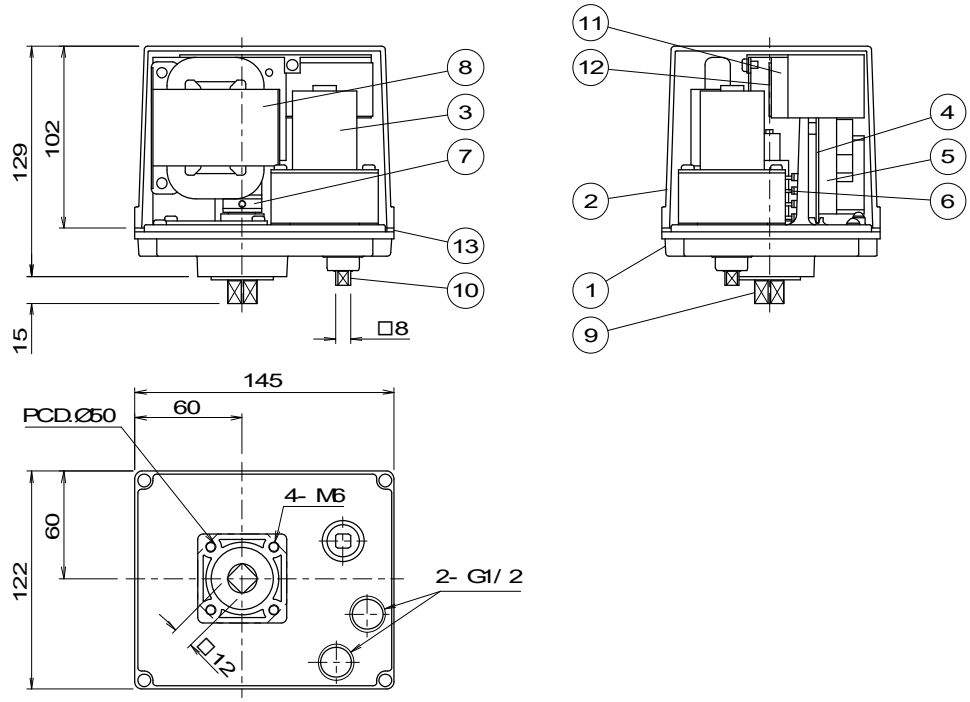
3 way valve: SHUT / Position①, OPEN / Position②

OPTIONAL PARTS

| Specifications | | Code No. | Remarks |
|---|---|---|---|
| Operation mode | SW is OFF → SHUT , SW is ON → OPEN. | Nil | Mode A (Standard) |
| | SW is ON → SHUT , SW is OFF → OPEN. | Q | Mode B |

DIMENSIONS

ECR-120 / 360




Parts name

| | | | | | |
|---|---|---|---|---|---|
| 1 | Body | 6 | Limit switch | 11 | Capacitor |
| 2 | Motor cover | 7 | SW setting cam | 12 | Capacitor control board |
| 3 | Motor | 8 | Transformer | 13 | Rubber packing |
| 4 | Control board | 9 | Drive shaft | 14 | |
| 5 | Terminal block | 10 | Manual shaft | 15 | |

## INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

### 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 50 °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. | |
|---|---|
| ECR | More than 105 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

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

### CAUTION

Since this actuator is designed for electric shut off, even the power is turned off it may still operate for about 30 minutes after power shuts off. Please follow instructions when adjusting opening angle of the valve or replacing parts.

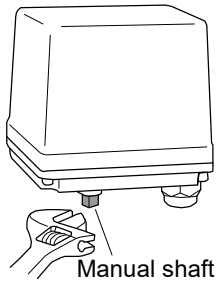
## MANUAL OPERATION

①PRECAUTIONS

- Manual operation should be a temporary operation.
- Be sure to turn off the power before manual operation.
- Actuator may operate for 15 minutes after power shuts off for ECR-120, and 30 minutes for ECR-360. When manual operation is required, follow steps below.

1) Turn manual shaft slowly with a smooth-jawed wrench.
2) When limit switch leaves from SW setting cam, actuator's motor starts. Keep it in that position.
3) In about 30 seconds, motor protect circuit starts and the motor stops. Go ahead and operate manually.

②THE WAY OF OPERATION




Turn manual shaft slowly with an adjustable wrench.

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.
- Turn off the power and check if the valve operates normally with built-in capacitor.

## 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. |
| | Capacitor is too old. | |
| Operation is unstable. | Excess surge or voltage was applied. | |
| | 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. |
| | Switch leakage current is large. | Current leakage should be less than 1 mA. |
| Stop in the mid position. | Biting of valve seat. | Manually operate an actuator and remove a foreign object. |
| | Overload protector runs because of over-torque. | Motor protection circuit returns by the signal of operation of an opposite direction. Turn on the power again. |
| Received the alarm signal. | | |

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