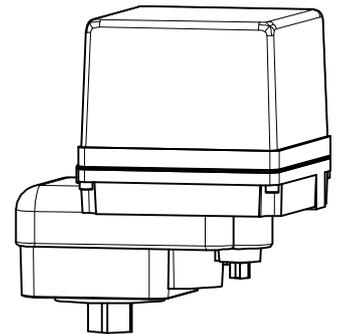
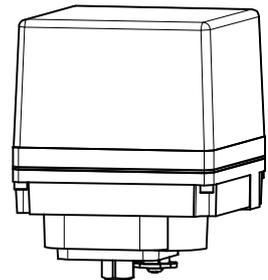
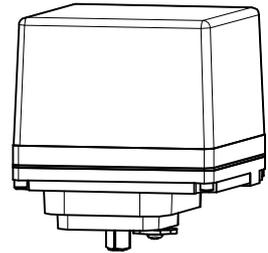


Please read this manual before installation and use.

GENERAL

AD and HD series with powerful DC motor and control board offer reliable automatic control of quarter-turn valves. These actuators provide maximum versatility in electrical control. The use of self-locking worm gear is standard and ensures positive valve position.

- AD1 : For AC power
- AD2 : For AC / DC power
- AD0 : For DC power
- HD1 : For AC power (High speed)
- HD2 : For AC / DC power (High speed)
- HD0 : For DC power (High speed)



PRODUCT CODE

AD type	A D 1 -	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
	A D 2 -	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
	A D 0 -	<input type="checkbox"/>	-	0	-	<input type="checkbox"/>
HD type	H D 1 -	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
	H D 2 -	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
	H D 0 -	<input type="checkbox"/>	-	0	-	<input type="checkbox"/>
	(1)	(2)	(3)	(4)		

(1) Actuator	(2) Torque	(3) Voltage	(4) Option
AD1 AD2 AD0	300	1 : 100 / 110 V AC	L0 : Auxiliary limit switch
HD1 HD2 HD0	700	2 : 200 / 220 V AC	L2 : Auxiliary limit switch
	02K	0 : 24 V DC	
	06K	7 : 115 / 120 V AC	
		8 : 230 / 240 V AC	

Note) The voltage cord 7 and 8 only in AD2.

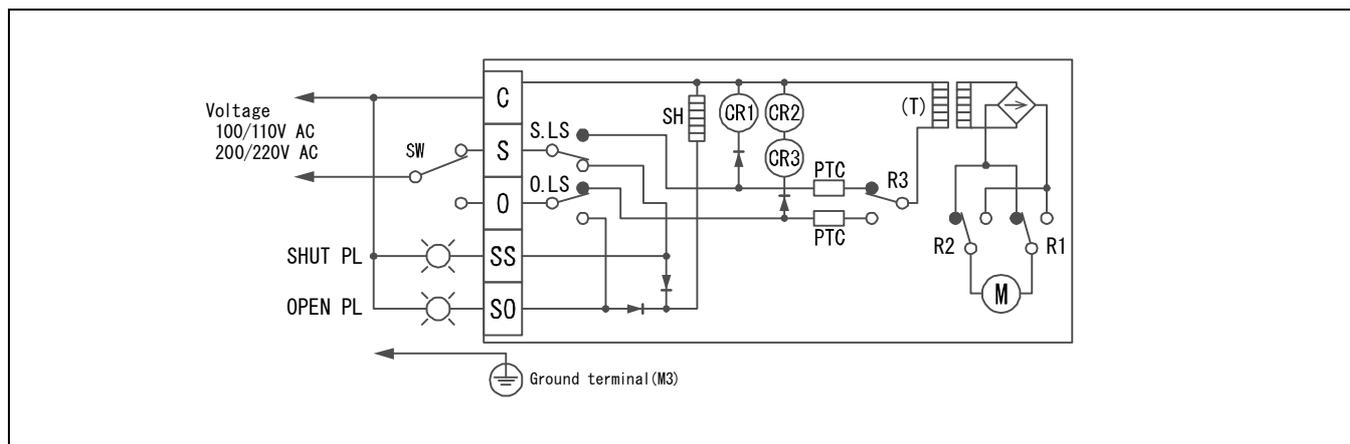
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AD1 HD1 type

Actuator type (□:Voltage code)	AD1-300-□	AD1-700-□	HD1-300-□	HD1-700-□	HD1-02K-□	HD1-06K-□
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]	30	70	30	70	200	600
Operation time [s]	3 to 4	6 to 10	1 to 2	3 to 5	8 to 15	24 to 45
Power consumption (Max) [VA]	100		150			
Motor	DC motor					
Overload protection	Thermistor					
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 10 A 250 V AC (Minimum 27 mA)					
Duty cycle	20 % 15 min. (When ambient temperature is over 50 °C, 10 % 15 min.)					
Ambient temperature	-20 to 55 °C					
Space heater	0.8 W					
Manual operation	Manual over-ride with clutch. (Direct operation / 06K: Operation by 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



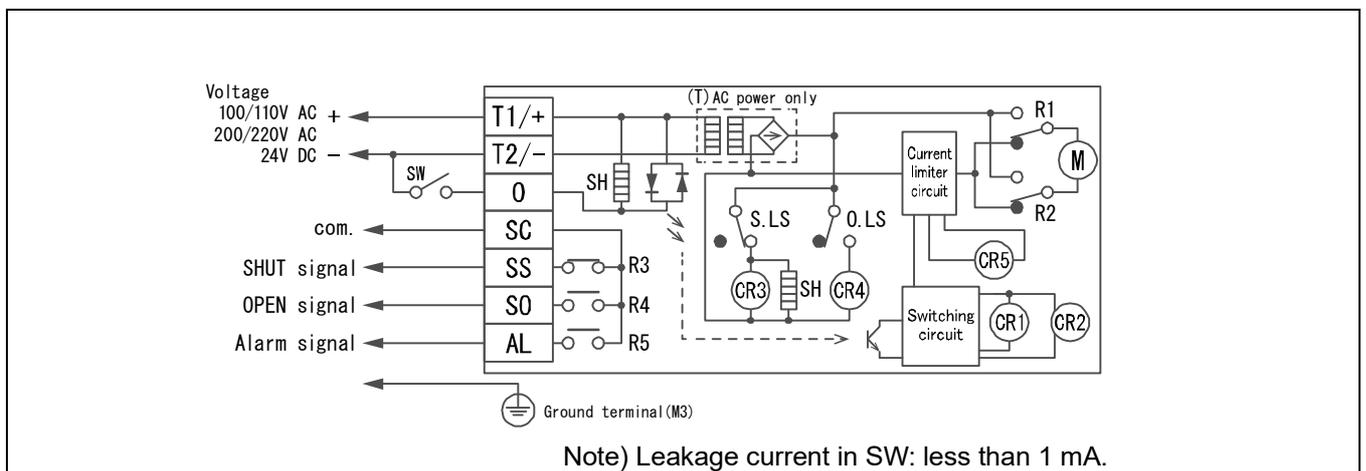
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AD2 HD2 type

Actuator type (□:Voltage code)	AD2-300-□	AD2-700-□	HD2-300-□	HD2-700-□	HD2-02K-□	HD2-06K-□
Voltage	100 / 110 V AC ±10 % 50/60 Hz (□: 1) 200 / 220 V AC ±10 % 50/60 Hz (□: 2) 24 V DC (□: 0)		100 / 110 V AC ±10 % 50/60 Hz (□: 1) 200 / 220 V AC ±10 % 50/60 Hz (□: 2) 24 V DC (□: 0)		115 / 120 V AC ±10 % 50/60 Hz (□: 7) 230 / 240 V AC ±10 % 50/60 Hz (□: 8)	
	-		-		-	
Rated torque [N·m]	30	70	30	70	200	600
Operation time [s]	3 to 4	6 to 10	1 to 2	3 to 5	AC: 8 to 15 DC: 12 to 17	AC: 24 to 45 DC: 36 to 50
Power consumption (Max) [VA]	AC power: 100 DC power: 80		AC power: 150 DC power: 120			
Motor	DC motor					
Overload protection	Current limiter					
Method of operation	a-contactinput type, with built-in relay					
Operation	SW is OFF → SHUT (R3 SW is ON) SW is ON → OPEN (R4 SW is ON) Over torque → R5 SW is ON					
Input signal current	10 mA 100 V AC / 6.5 mA 200 V AC / 38 mA 24 V DC (Leakage current in SW: less than 1 mA) *O terminal input: Photo coupler					
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. (When ambient temperature is over 50 °C, 10 % 15 min.)					
Ambient temperature	-20 to 55 °C					
Space heater	0.8 W					
Manual operation	Manual over-ride with clutch. (Direct operation / 06K: Operation by 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

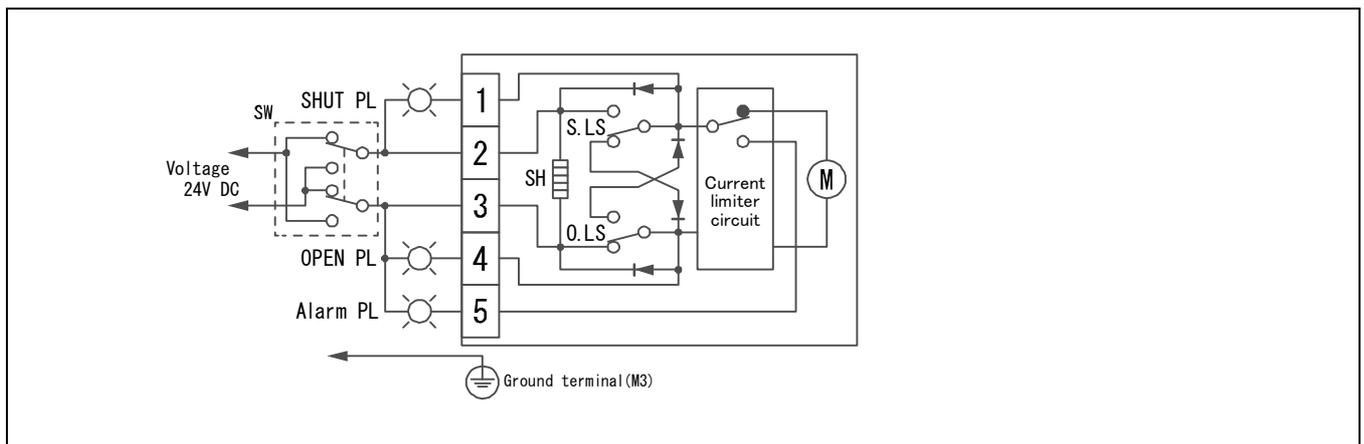


ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AD0 HD0 type

Actuator type	AD0-300-0	AD0-700-0	HD0-300-0	HD0-700-0	HD0-02K-0	HD0-06K-0
Voltage	24 V DC					
Rated torque [N·m]	30	70	30	70	200	600
Operation time [s]	3 to 4	6 to 10	1 to 2	3 to 5	12 to 17	36 to 50
Power consumption (Max) [VA]	80		120			
Motor	DC motor					
Overload protection	Current limiter					
Method of operation	Switching polarity type					
Operation	② + ③ - → SHUT (SHUT PL is lit.) ③ + ② - → OPEN (OPEN PL is lit.) Over torque → Alarm PL is lit.					
Output signal rating	Resistance load 1 A to 35 mA 24 V DC					
Duty cycle	20 % 15 min. (When ambient temperature is over 50 °C, 10 % 15 min.)					
Ambient temperature	-20 to 55 °C					
Space heater	1.6 W			3 W		
Manual operation	Manual over-ride with clutch. (Direct operation / 06K: Operation by 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

ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

OPTIONAL PARTS

Specifications	Code No.	AD	HD	Remarks
Auxiliary limit switch (Select limit switch depending on the load)	L0	○	○	For standard signal
	L2	○	○	For micro load signal
OPEN/CLOSE speed control board	I0	○		Set the operating time between 1.5 and 30 times.
Manual lever handle	M0	○	○	Mounted on the drive shaft. (except HD□-06K)

*Auxiliary limit switch: Please refer to the specifications.

WIRING (OPTION)

L0 / L2	Auxiliary limit switch	I0	Speed control board (only for AD series)
	<p>Actuator wiring</p> <p>com. ← LC SHUT output ← LS OPEN output ← LO</p> <p>SLS OLS</p> <p>At CLOSE side, LC and LS is ON. At OPEN side, LC and LO is ON.</p> <p>ON OFF</p> <p>SHUT ↔ SLS ↔ OLS ↔ OPEN</p> <p>ON point can be reset by adjusting the cam.</p>		<p>AD series</p> <p>Terminal blocks</p> <p>Control board</p> <p>Trimmer</p> <p>OPEN SHUT</p> <p>Speed control board</p> <p>DC Motor</p> <p>Operating speed (OPEN/CLOSE) can be adjusted by "OPEN"/"SHUT" trimmer. Turning clockwise increases the operating time.</p>

DIMENSIONS

AD-300, 700	HD-300, 700	HD-02K	HD-06K																														
<p>Parts name</p> <table border="1"> <tr> <td>1</td> <td>Body</td> <td>6</td> <td>Limit switch</td> <td>11</td> <td>Manual shaft (For 06K)</td> </tr> <tr> <td>2</td> <td>Motor cover</td> <td>7</td> <td>SW setting cam</td> <td>12</td> <td>Rubber packing</td> </tr> <tr> <td>3</td> <td>Motor</td> <td>8</td> <td>Transformer</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>Control board</td> <td>9</td> <td>Drive shaft</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>Terminal block</td> <td>10</td> <td>Manual clutch</td> <td></td> <td></td> </tr> </table>				1	Body	6	Limit switch	11	Manual shaft (For 06K)	2	Motor cover	7	SW setting cam	12	Rubber packing	3	Motor	8	Transformer			4	Control board	9	Drive shaft			5	Terminal block	10	Manual clutch		
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3	Motor	8	Transformer																														
4	Control board	9	Drive shaft																														
5	Terminal block	10	Manual clutch																														

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 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.

AD	HD	More than 120 mm
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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 $\Phi 6$ 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 (\oplus) 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.

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS**CONTROL**

①AD2, HD2

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

②DC 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.

③USE 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

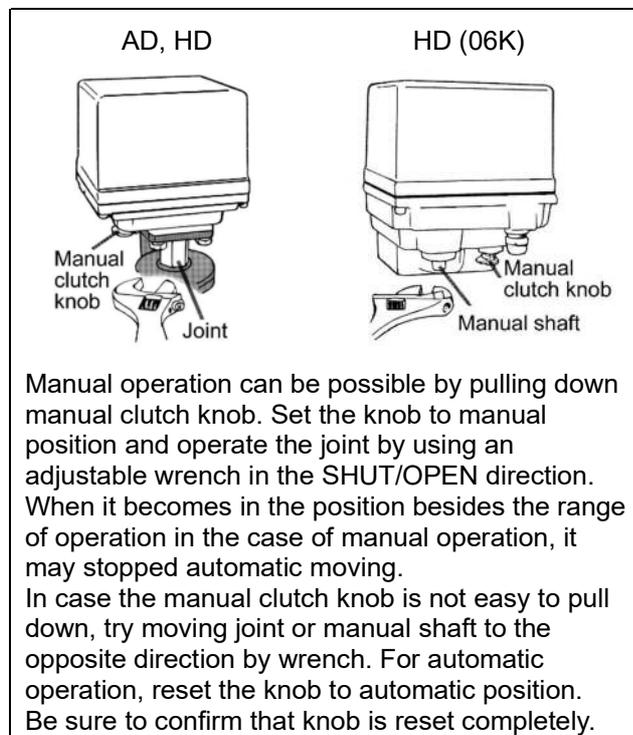
- Keep power supplied for built-in space heater to prevent condensation inside actuator.
- Do not touch the moving parts of actuator in operation.
- Do not insert a reverse signal during operation. It may shorten the life of product.
- Never put anything on the actuator or make it into a foothold.

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



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.

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS**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.	<ul style="list-style-type: none"> • Replace the control board or limit switch. (Repair in our factory) • Replace the actuator.
	Rainwater entered the actuator.	<ul style="list-style-type: none"> • 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.
	Switch leakage current is large. (AD2 HD2)	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. (AD1 HD1)
Received the alarm signal. (AD2 HD2)		Motor protection circuit returns by the signal of operation of an opposite direction. Turn on the power again. (AD2 HD2) (AD0 HD0)
Stop automatic moving after manual operation.	Manual clutch knob is not reset.	Reset manual clutch knob.
	Out of operating range. (06K)	Reset by manual operation.

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