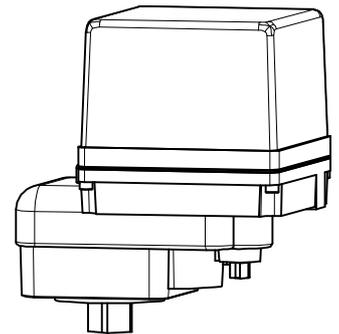
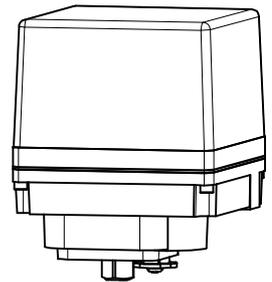
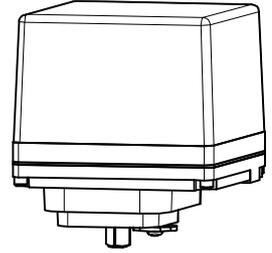


**Please read this document before using these valves.**

### GENERAL

High frequency ON-OFF operating actuator with high speed brushless DC motor.  
This series can be substitute for AD / HD series.

PHR : For AC / DC power.



### PRODUCT CODE

P H R -  -  -  -   
 (1)      (2)      (3)      (4)      (5)

(1) Actuator	(2) Torque	(3) Voltage	(4) Option	(5) Operation mode
PHR	300	1 : 100 / 110 V AC	L0 : Auxiliary limit switch	Nil : Mode A
	700	2 : 200 / 220 V AC	L2 : Auxiliary limit switch	Q : Mode B
	02K	0 : 24 V DC		V : Mode C
	06K	3 : 24 V AC		

**ELECTRIC ACTUATOR SPECIFICATIONS**

3 way valve: SHUT / Position①, OPEN / Position②

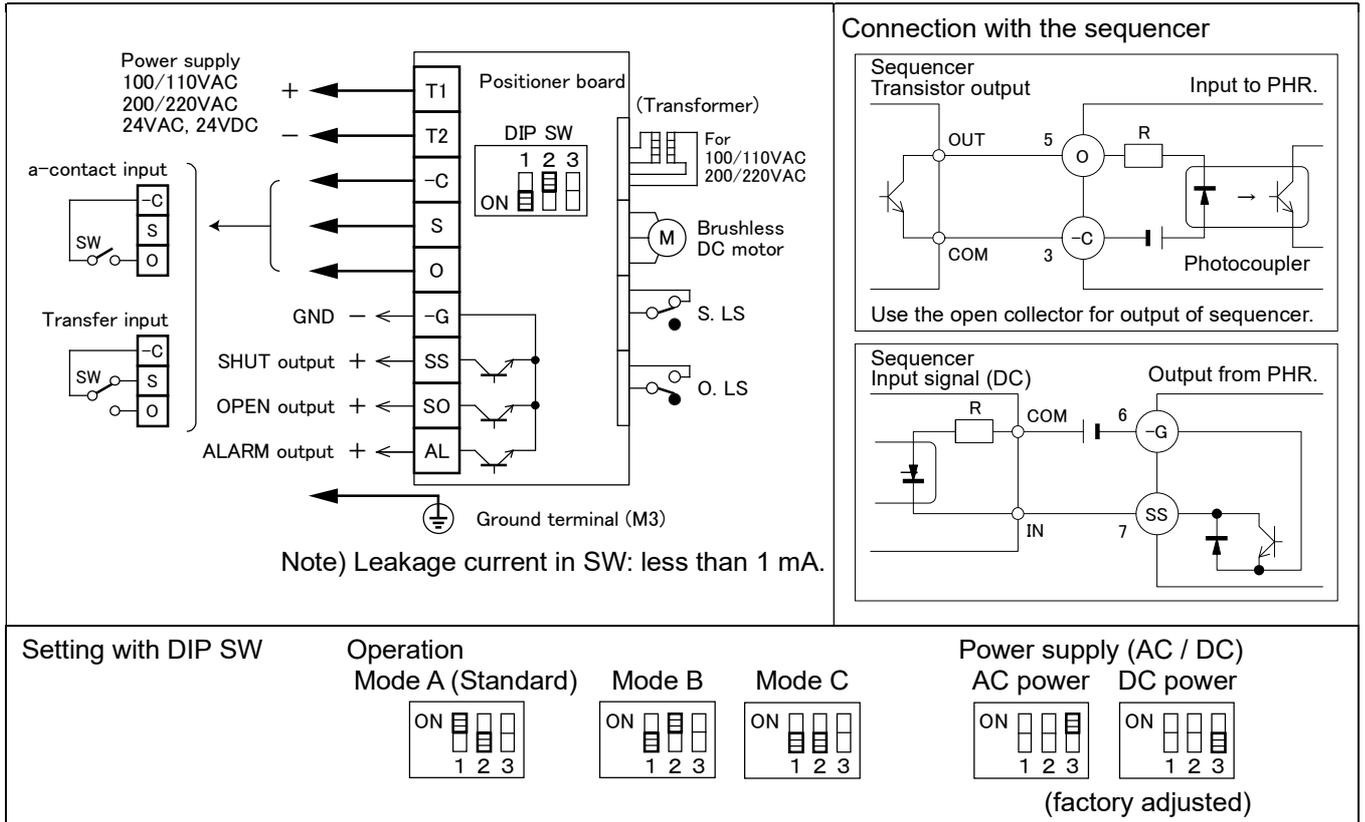
Actuator type (□:Voltage code)	PHR-300-□	PHR-700-□	PHR-02K-□	PHR-06K-□
Voltage	100 / 110 V AC ±10 % 50/60 Hz (Code: 1) 200 / 220 V AC ±10 % 50/60 Hz (Code: 2) 24 V AC ±10 % 50/60 Hz (Code: 3) 24 V DC (Code: 0)			
Rated torque [N·m]	21	50	140	400
Operation time [s]	1.5 to 2.5	AC: 4 to 7 DC: 5 to 7	AC: 13 to 18 DC: 16 to 18	AC: 38 to 50 DC: 45 to 58
Power consumption (Max) [VA]	120			
Motor	Brushless DC motor (PWM control)			
Overload protection	Current limiter			
Method of operation	a-contact input type, with built-in relay [Mode A] [Mode B]		Transfer input type, transistor output signal [Mode C]	
Operation *1	Mode A	SW is OFF → SHUT. SW is ON → OPEN. (Standard)		
	Mode B	SW is ON → SHUT. SW is OFF → OPEN. (Option: Q)		
	Mode C	C-S is ON → SHUT. C-O is ON → OPEN. If both OFF / both ON → HOLD. (Option: V)		
Input signal current	6 mA 15 V DC (O-terminal) *Can use a transistor. Leakage current in SW: less than 1 mA			
Output signal rating (Max)	30 mA 50 V DC Transistor output (Open collector)			
Alarm signal	Output when the motor protection circuit operates by the overload. (it returns by power supply OFF or reverse operating signal)			
Duty cycle	100 % (Continuous)			
Ambient temperature	-20 to 55 °C			
Space heater	100 / 110, 200 / 220 V AC: 4 W		24 V AC: 2 W	24 V DC: 1.5 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 die cast (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.			

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

**ELECTRIC ACTUATOR SPECIFICATIONS**

3 way valve: SHUT / Position①, OPEN / Position②

**WIRING**

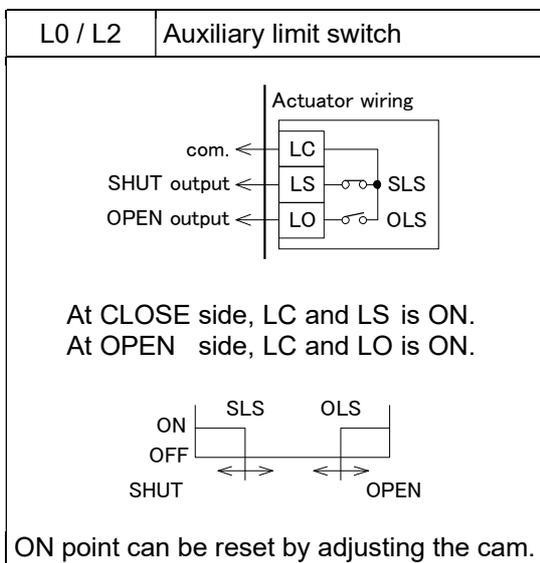


**OPTIONAL PARTS**

Specifications	Code No.	Remarks
SW is OFF → SHUT. SW is ON → OPEN.	Nil	Mode A (Standard)
SW is ON → SHUT. SW is OFF → OPEN.	Q	Mode B
C-S is ON → SHUT. C-O is ON → OPEN. If both OFF / both ON → HOLD.	V	Mode C
Auxiliary limit switch	L0	For standard signal
	L2	For micro load signal
Manual lever	M0	(except 06K)

\*Auxiliary limit switch: Please refer to the specifications.

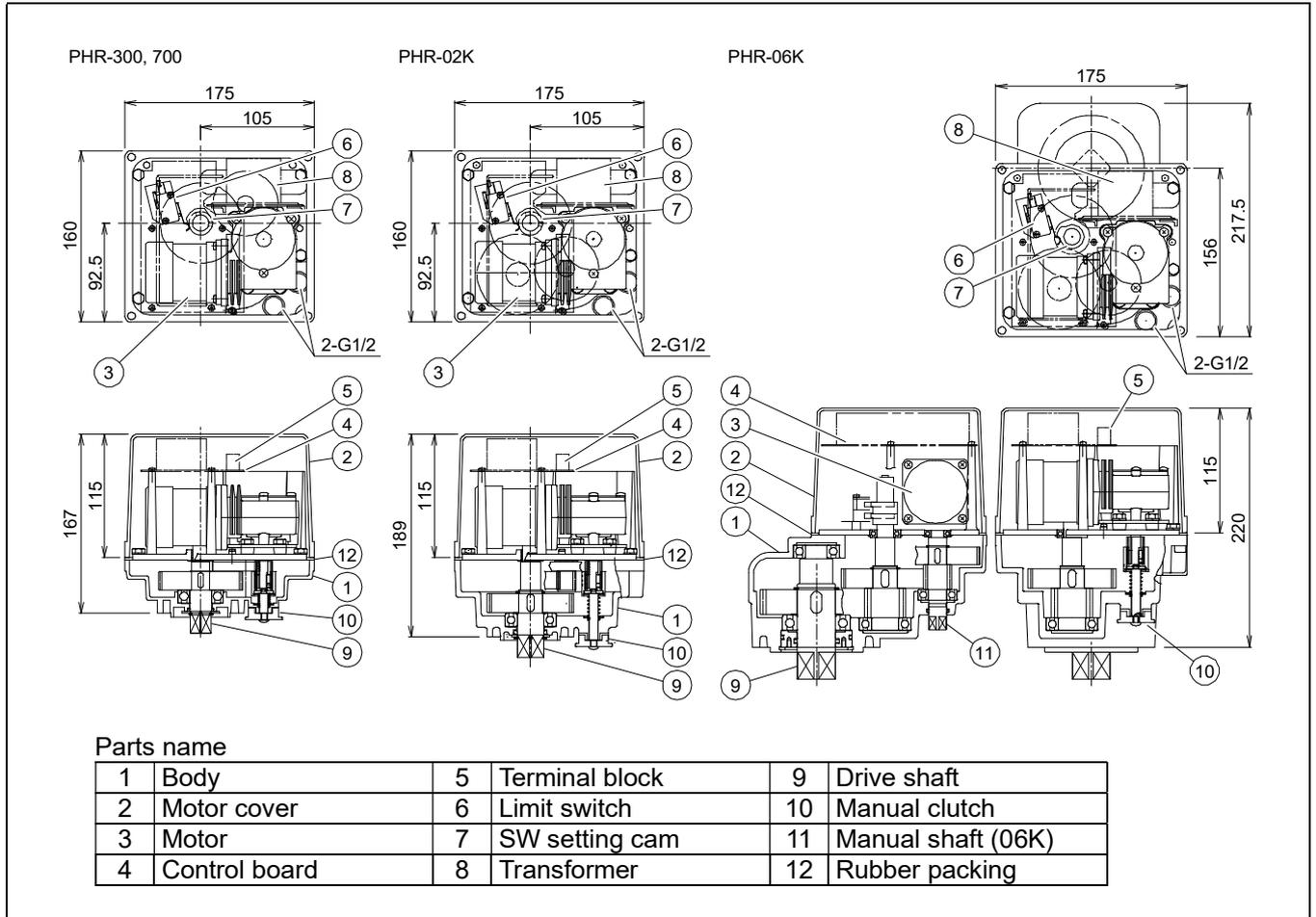
**WIRING (OPTION)**



**ELECTRIC ACTUATOR SPECIFICATIONS**

3 way valve: SHUT / Position①, OPEN / Position②

**DIMENSIONS**



**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, should be kept in the original packaging.

**③CHECKING**

- Check the product code, power supply, and voltage before installation.
- Set the dip switch before turning on the power.

**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.

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Maintenance space for upper part of actuator.

PHR	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.
- Check that the dip switches on the circuit board are correct.
- 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.

**CONTROL****① OPEN and SHUT signals**

When using control switch with current leakage (more than 1mA) 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.

**④OPERATION MODE**

The input signal and operation mode are set as follows. (Factory shipped)

Operation mode	Mode A
Operation	SW is OFF → SHUT SW is ON → OPEN

**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.

**②ATTENTION**

- Do not change an unnecessary dip switch.
- 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.

**INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS**

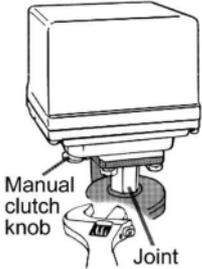
**MANUAL OPERATION**

① PRECAUTIONS

- 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.

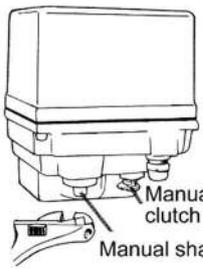
② THE WAY OF OPERATION

PHR



Manual clutch knob  
Joint

PHR (06K)



Manual clutch knob  
Manual shaft

Manual operation can be possible by pulling down manual clutch knob. Set the knob to manual position and operate the joint by using an adjustable wrench in the SHUT/OPEN direction. When it becomes in the position besides the range of operation in the case of manual operation, it may stopped automatic moving. In case the manual clutch knob is not easy to pull down, try moving joint or manual shaft to the opposite direction by wrench. For automatic operation, reset the knob to automatic position. Be sure to confirm that knob is reset completely.

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.	<ul style="list-style-type: none"> <li>• Replace the control board or limit switch. (Repair in our factory)</li> <li>• Replace the actuator.</li> </ul>
	Rainwater entered the actuator.	<ul style="list-style-type: none"> <li>• Dry the inside.</li> <li>• Replace the actuator.</li> </ul>
	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.
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.		
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.