



NIPPON VALVE CONTROLS, INC.

# Instruction manual

Electric Actuated Ball Valve E EG SR SH MS MH H EL TV ST SL SP-1519

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

## GENERAL

Ultra-high capacity electric double-layer capacitor.

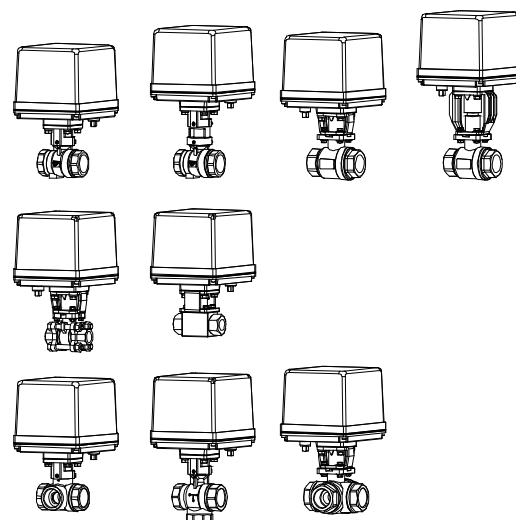
In case of power failure, electric discharge form built-in capacitor allows continued valve to operation.

### Actuator

ECR : For AC power

### Valve

- E type For general use.
- EG type For high temp. (up to 1 MPa)
- SR type For food / Corrosive fluid.
- SH type For high temp. (up to 2 MPa)
- MS type 3 piece / For heavy load.
- MH type 3 piece / For high pressure.
- H type For high pressure.
- EL type For general use.
- TV type For diversion flow and mixing.
- ST type 4 seats, 3 way. (with flow paths)
- SL type 4 seats, 3 way.



## PRODUCT CODE

E type	(Brass)	E C R E -	<input type="checkbox"/>	<input type="checkbox"/>	5	Y	Y	F	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
	(Stainless)	E C R E -	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	T	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
EG type		E C R E G	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	P	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
SR type		E C R S R	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	T	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
SH type		E C R S H	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	F	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
MS type		E C R M S	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	P	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
MH type		E C R M H	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
H type		E C R H -	<input type="checkbox"/>	<input type="checkbox"/>	5	<input type="checkbox"/>	U	D	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
EL type		E C R E L	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	T	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
TV type		E C R T V	<input type="checkbox"/>	<input type="checkbox"/>	5	T	T	P	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
ST type		E C R S T	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	F	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
SL type		E C R S L	<input type="checkbox"/>	<input type="checkbox"/>	5	U	U	F	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	

(1) Actuator  
ECR

(5) Connection  
5 : Threaded End Rc

(8) Seat material  
F : F-PTFE  
T : PTFE  
P : R-PTFE  
D : POM  
R : R-F-PTFE

(11) Operation mode  
Nil : Mode A  
Q : Mode B

(2) Valve  
E- EG SR SH  
MS MH H  
EL TV ST SL

(6) Body material  
Y : C3771BE  
U : SCS14A / SUS316Ti  
S : Carbon steel  
T : SCS13A

(9) Size [mm]  
ex. 25A → 025

(12) Flow paths (ST)  
a to d : 3 way valve flow









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

(7) Ball material  
Y : C3771BE / C3604BD  
U : SCS14A / SUS316  
T : SCS13A / SUS304




(10) Option  
SC : Seat for abnormal pressure rise  
X6 : Heat isolation  
X2 : Heat isolation

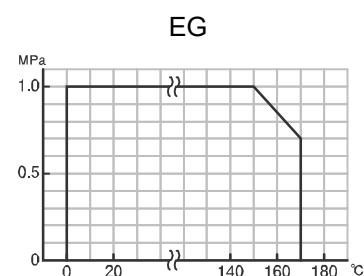
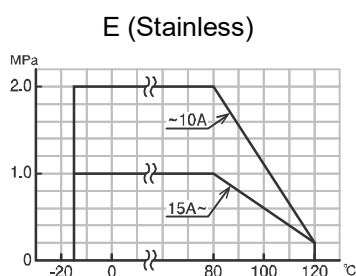
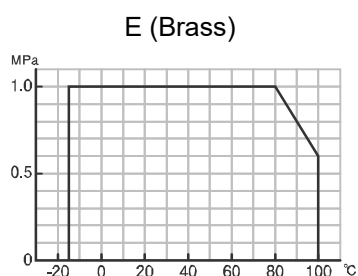
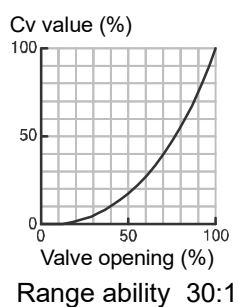
(4) Sizing code  
0 : Standard  
1 : Light  
2 : Heavy

**VALVES SPECIFICATIONS**

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

E EG Type








Valve type	E (Brass)		E (Stainless)			EG
Design	2 way, Standard port		2 way, Standard port			2 way, Standard port
Connection	Threaded End Rc		Threaded End Rc			Threaded End Rc
Fluid						
Max pressure	1 MPa		2 MPa	1 MPa		1 MPa
Size [mm]	015 to 025	032 to 050	008 to 010	015	020 to 050	015 to 050
Material	Body	C3771BE (Plated)		SCS14A		SCS14A
	Ball	C3604BD (Plated)	C3771BE (Plated)	SUS316	SCS14A	SCS14A
	Seat	F-PTFE		PTFE		R-PTFE
Stem seal	O-ring	FKM		FKM		Steam resistant FKM

**PRESSURE & TEMPERATURE RATING****INHERENT FLOW CHARACTERISTIC**

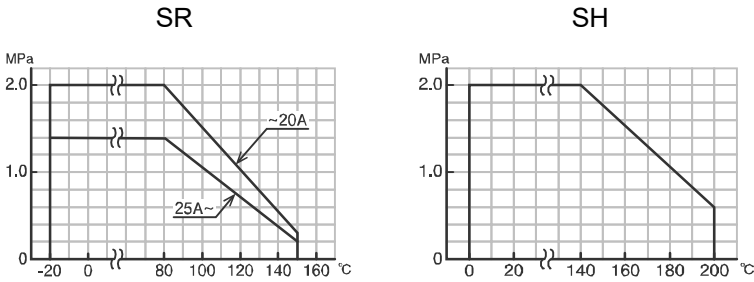
VALVES SPECIFICATIONS

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









SR SH type

Valve type		SR		SH
Design		2-way, Full port		2-way, Full port
Connection		Threaded End Rc		Threaded End Rc
Fluid		   		  
Max pressure		2 MPa	1.4 MPa	2 MPa
Size [mm]		015 to 020	025 to 040	015 to 032
Material	Body	SCS14A		SCS14A
	Ball	SCS14A		SCS14A
	Seat	PTFE		F-PTFE
Stem seal	Packing	F-PTFE		R-PTFE
	O-ring	-		Steam resistant FKM








PRESSURE & TEMPERATURE RATING



## VALVES SPECIFICATIONS

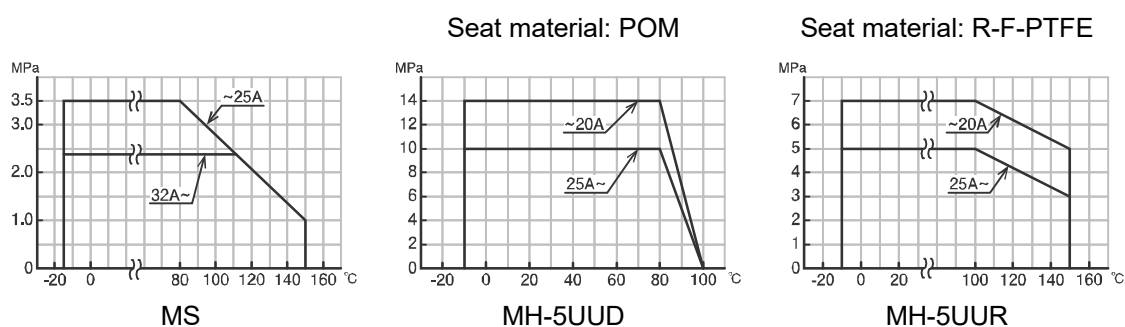
 Water
  Oil
  Air, Gas
  Steam
  Chemicals
  Sea water
  Slurry
  Negative pressure

MS MH type

Valve type		MS		MH		
Design		2-way, Full port		2-way, Full port		
Connection		Threaded End Rc		Threaded End Rc		
Fluid		   		  		
Max pressure		3.5 MPa	2.4 MPa	14 MPa	10 MPa	7 MPa
Size [mm]		010 to 025	032 to 050	010 to 020	025 to 040	010 to 020
Material	Body	SCS14A		SCS14A		
	Ball	SCS14A		SCS14A (HCr plated)		
	Seat	R-PTFE		POM		R-F-PTFE
Stem seal	Packing	R-PTFE		-		
	O-ring	FKM		FKM		

Note) It cannot be used POM seat for a water solution of more than 85 °C.





## PRESSURE &amp; TEMPERATURE RATING



VALVES SPECIFICATIONS

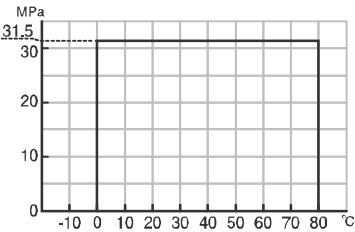
 Water  Oil  Air, Gas  Steam  Chemicals  Sea water  Slurry  Negative pressure

H type

Valve type		H (Carbon steel)	H (Stainless)	
Design		2-way, Full port	2-way, Full port	
Connection		Threaded End Rc	Threaded End Rc	
Fluid		 	 	
Max pressure		31.5 MPa	31.5 MPa	30 MPa
Size [mm]		008 to 020	008 to 015	020
Material	Body	Carbon steel (Plated)	SUS316Ti	
	Ball	SUS316Ti (HCr plated)	SUS316Ti (HCr plated)	
	Seat	POM	POM	
Stem seal	O-ring	FKM	FKM	

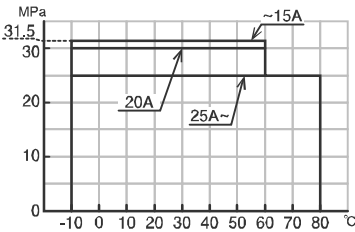
PRESSURE & TEMPERATURE RATING

Body material: Carbon steel











H-5SUD

Body material: Stainless









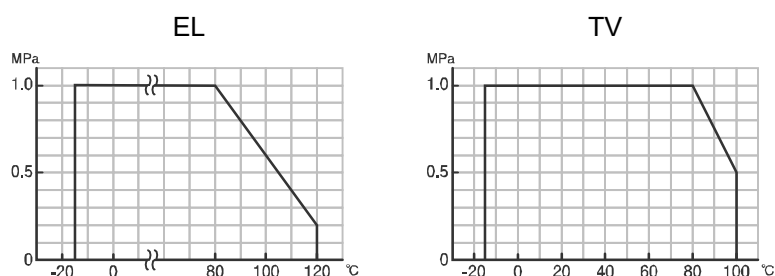
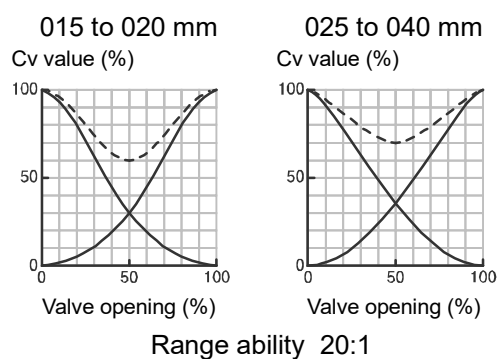
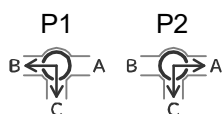
H-5UUD

**VALVES SPECIFICATIONS**

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

EL TV type

Valve type	EL		TV	
Design	3 way, Standard port		3 way, Standard port	
Connection	Threaded End Rc		Threaded End Rc	
Fluid	  		  	
Max pressure	1 MPa		1 MPa	
Size [mm]	008 to 015	020 to 050	015 to 025	032 to 040
Material	Body	SCS14A		SCS13A
	Ball	SUS316	SCS14A	SUS304
	Seat	PTFE		R-PTFE
Stem seal	O-ring	FKM		FKM





**PRESSURE & TEMPERATURE RATING****INHERENT FLOW CHARACTERISTIC (TV)****FLOW PATHS (Position① / P1) (Position② / P2)**

Note) When a closed path is exposed to high pressure, it may leak slightly to an open path.

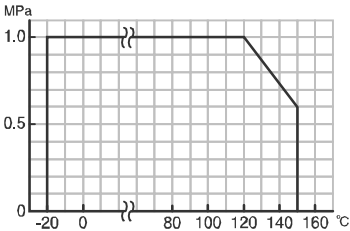
VALVES SPECIFICATIONS

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

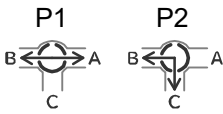
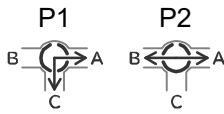
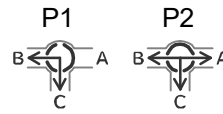
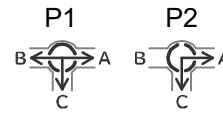
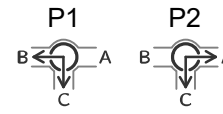
ST SL type

Valve type		ST SL
Design		3 way, Standard port
Connection		Threaded End Rc
Fluid		   
Max pressure		1 MPa
Size [mm]		015 to 032
Material	Body	SCS14A
	Ball	SCS14A
	Seat	F-PTFE
Stem seal	Packing	F-PTFE

PRESSURE & TEMPERATURE RATING



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

ST				SL
Code: a	Code: b	Code: c	Code: d	
 A-B ⇔ B-C	 A-C ⇔ A-B	 B-C ⇔ A-B-C	 A-B-C ⇔ A-C	 B-C ⇔ A-C

Note) When a closed path is exposed to high pressure, it may leak slightly to an open path.

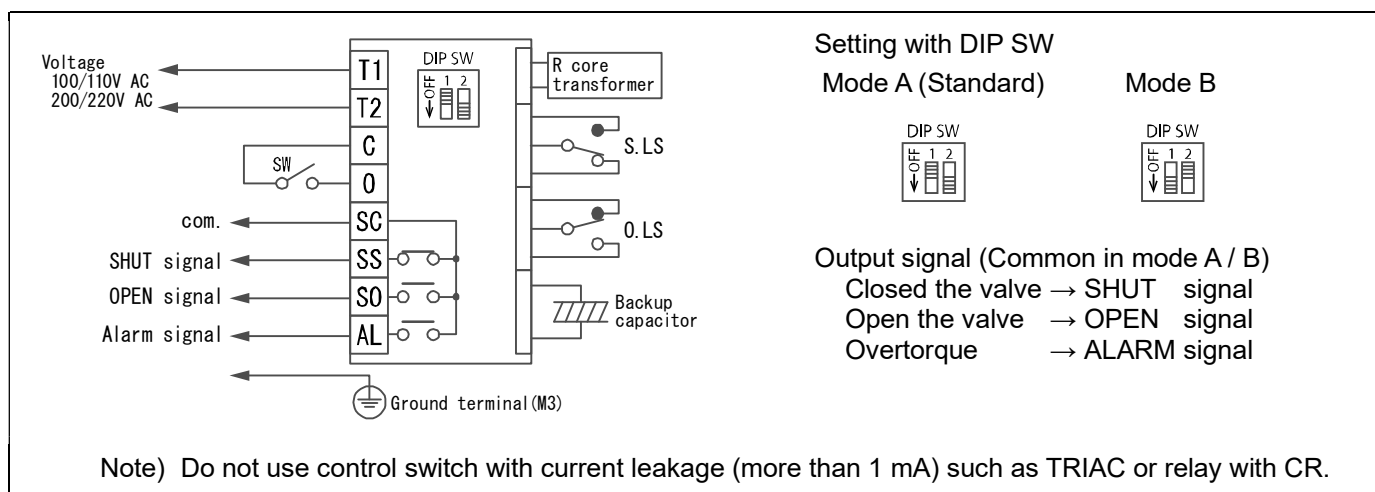
**ELECTRIC ACTUATOR SPECIFICATIONS**

3 way valve: SHUT / Position②, OPEN / Position②

ECR type

Actuator type (□:Voltage code)	ECR-120-□	ECR-360-□
Voltage	100 / 110 AC V $\pm 5\%$ 50/60 Hz (Code: 1) 200 / 220 AC V $\pm 5\%$ 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) [Mode B] SW is ON → SHUT, SW is OFF → OPEN. (Option: Q)	
Power failure	[Mode A] SHUT [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. (it returns by power supply OFF or reverse operating signal)	
Duty cycle	20 % 15 min.	
Ambient temperature	-20 to 50 °C	
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 mm <sup>2</sup> (AWG 26 to 16) Ground terminal: M3	
Conduct port	2-G1/2 Attachments: Cable gland (for $\Phi 6$ to 12 mm cable), plug.	

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

**WIRING**



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

Technical drawings of the ECR electric actuator showing dimensions and part callouts.

Dimensions:

- Overall height: 129
- Mounting hole spacing: 102
- Base width: 145
- Base height: 122
- Mounting hole diameter: PCD.Ø50
- Base hole diameter: Ø8
- Base hole spacing: 60
- Base hole spacing: 60
- Base hole spacing: 122
- Base hole spacing: 145

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

#### ① HANDLING

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

#### ② STORAGE

- 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.

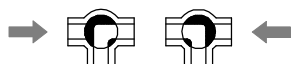
#### ③ CHECKING

- Check the product code, power supply, and voltage before installation.
- Make sure that the bolts are not loose.
- The DIP switch should be set up before the power is turned on. Do not touch unnecessary switches.

### INSTALLATION

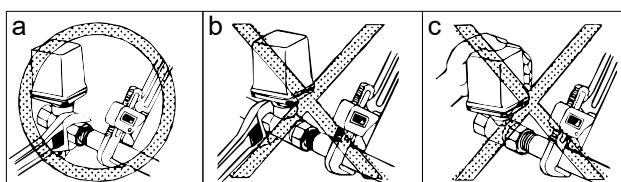
#### ① PRECAUTIONS

- Flush the pipeline carefully before installing the valve. Foreign particles, such as sand or pieces of welding electrode, will damage the ball and seats.
- For valves with specified flow direction (EG, SH) or with ST / SC option, check the arrows on the product before piping.
- When the flow path is subjected to a high pressure from arrow, it may leak slightly to the low pressure port. (EL, TV, ST, SL)



#### ② PIPING

- Using a pipe with too long a thread will damage the valve.
- If sealing tape or sealant gets inside the valve, the valve seat leaks or malfunctions.
- To prevent the valve from being damaged by stress, always hang a wrench on the end of the valve on the side where the pipe is to be connected when screwing in the pipe or when unscrewing it after correcting the angle (Fig a and b) and do not use a pipe wrench on the valve. Do not apply force to the actuator when working on the piping. (Fig. c)



- Refer to the recommended tightening torque table and do not apply excessive torque.

Valve size [mm]	Torque [N·m]
008 to 010	15 to 20
015	25 to 35
020	40 to 50
025	50 to 60
032	60 to 80
040	75 to 85
050	90 to 110

#### ③ ENVIRONMENT

- 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.

#### ④ POSITIONING

- Should be positioned through 90° upward from horizontal. Provide space around the product to allow manual operation, inspection and replacement work.
- Maintenance space more than 105 mm upward from the actuator is required.

#### ④ POSITIONING

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
-----	------------------

#### ⑤ OTHER 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.

**INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS****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 ( $\equiv$ ) 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.

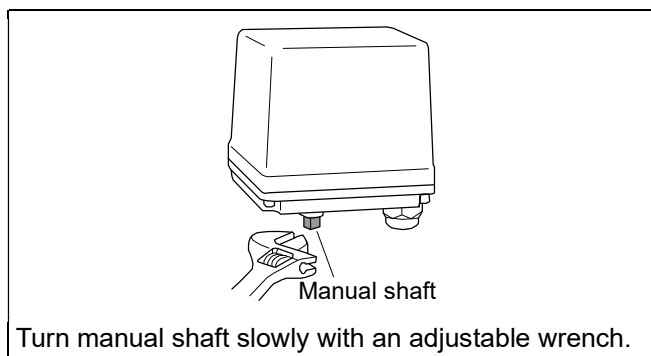
**CAUTION**

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.

**INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS****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**

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.
- Confirm the fluid temperature or pressure.
- Confirm the leak from valve stem.

**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.
	Capacitor is too old.	
Operation is unstable.	Excess surge or voltage was applied.	
	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.	<ul style="list-style-type: none"> <li>• Biting of valve seat.</li> <li>• The scale has adhered to the valve ball.</li> </ul>	Manually operate an actuator and remove a foreign object.
		Clean or replace valve parts. MS MH
	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.		

Problem	Cause	Solution
Leakage from valve body	<ul style="list-style-type: none"> <li>• Valve cap get loose.</li> <li>• Valve body is damaged.</li> </ul>	Replace the valve.
Leakage from valve seat	Seat is worn or damaged.	Replace the valve.
		Replace the seat. MS MH
Leakage from valve stem	Stem packing is worn or distorted.	Replace the valve.
		Replace the packing. MS
		Replace the o-ring. MH

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