NIPPON VALVE CONTROLS, INC.

Instruction manual

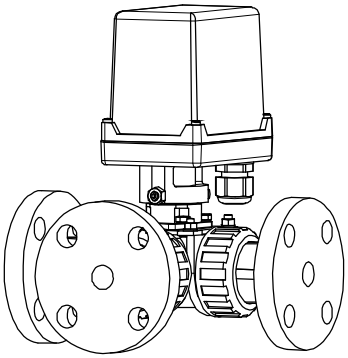
Electric Actuated Ball Valve TP LP

SP-1519

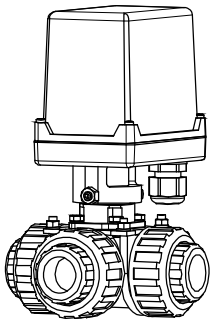
Please read this document before using these valves.

GENERAL

A plastic ball valve and compact electric actuator.
Various connections can be selected.
Can be used for various fluids.
(4-sided sheet structure)



J10K Flanged-end



Threaded End Rc, Socket

Actuator

- AM : For AC power.
- AH1 : For AC power. (High speed)
- DM : For DC power.

Valve

- TP type 4 seats, 3 way (T) (with flow paths)
- LP type 4 seats, 3 way (L)

PRODUCT CODE

TP type	J10K Flanged-end			T	P			1	P	P		-			-			-			
	Threaded End Rc			T	P			5	P	P		-			-			-			
	Socket			T	P			7	P	P		-			-			-			
LP type	J10K Flanged-end			L	P			1	P	P		-			-						
	Threaded End Rc			L	P			5	P	P		-			-						
	Socket			L	P			7	P	P		-			-						
		(1)		(2)		(3)	(4)	(5)	(6)		(7)	(8)		(9)			(10)			(11)		

(1) Actuator
AM1 AM2 AH1
DM0 DM2

(2) Valve
TP
LP

(3) Voltage
1 : 100 / 110 V AC
2 : 200 / 220 V AC
0 : 24V DC

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

(5) Connection
1 : J10K Flanged-end
5 : Threaded End Rc
7 : Socket

(6) Body material
P : PVC

(7) Ball material
P : PVC

(8) Stem seal
E : EPDM
V : FKM

(9) Size [mm]
ex. 25 A → 025

(10) Option
AK : Aluminum alloy motor cover
M1 : Manual lever
C1 : Flexible cable

(11) Flow paths (TP)
a to d : 3 way valve flow

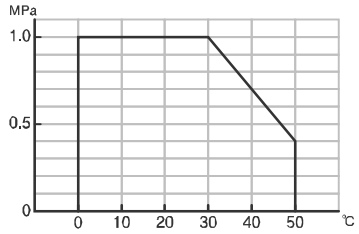
VALVES SPECIFICATIONS

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

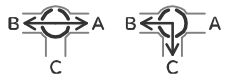
TP LP type

Valve type		TP, LP
Design		3 way, Standard port
Connection		J10K Flanged-end Threaded End Rc Socket
Fluid		
Max pressure		1 MPa
Size [mm]		015 to 025
Material	Body	PVC
	Ball	PVC
	Seat	PTFE
Stem seal	O-ring	EPDM FKM

PRESSURE & TEMPERATURE RATING



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

TP								LP	
Code: a		Code: b		Code: c		Code: d			
P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
									

Note) It may very small leak because of a piping pressure difference.

ELECTRIC ACTUATOR SPECIFICATIONS

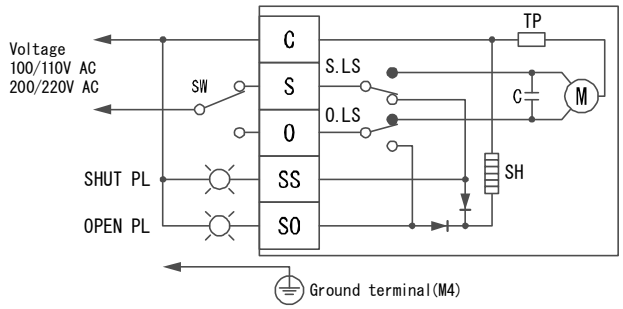
3 way valve: SHUT / Position①, OPEN / Position②

AM1 AM2 type

Actuator type (☐:Voltage code)	AM1-030-☐	AM1-070-☐	AM1-180-☐	AM2-030-☐	AM2-070-☐	AM2-180-☐
Voltage	100 / 110 V AC ±10 % 50/60 Hz (Voltage code: 1) 200 / 220 V AC ±10 % 50/60 Hz (Voltage code: 2)					
Rated torque [N·m]	3	7	18	3	7	18
Operation time [s]	5.4 / 4.5 (50/60 Hz)	15.5 / 13 (50/60 Hz)	16 / 13.5 (50/60 Hz)	5.4 / 4.5 (50/60 Hz)	15.5 / 13 (50/60 Hz)	16 / 13.5 (50/60 Hz)
Power consumption [VA]	16		19	18		19
Motor	Synchronous motor					
Overload protection	Thermal protector					
Method of operation	Transfer input type			a-contact input type, with built-in relay		
Operation	Power to S → SHUT (SHUT PL is lit.) Power to O → OPEN (OPEN PL is lit.)			SW is OFF → SHUT (SHUT signal is output.) SW is ON → OPEN (OPEN signal is output.)		
Input signal current	Nil			9 mA (O-terminal) Leakage current in SW: less than 1 mA		
Output signal rating	Resistance load 3 A 250 V AC (Minimum 0.1 A)			Resistance load 0.5 A 125 V AC 2 A 30 V DC Micro load 1 mA 5 V DC		
Duty cycle	20 % 15 min.					
Ambient temperature	-20 to 55 ºC					
Space heater	1 W					
Manual operation	Direct operation of actuator by loosening lock screw					
Enclosure	Equivalent to IP65 (IEC 60529)					
Housing material	Aluminum alloy die cast + Polycarbonate resin cover					
Terminal block	For bare wire 0.14 to 1.5 mm² (AWG 26 to 14) Ground terminal: M4					
Conduct port	G3/8 Cable gland (for Φ5 to 10.5 mm cable)					

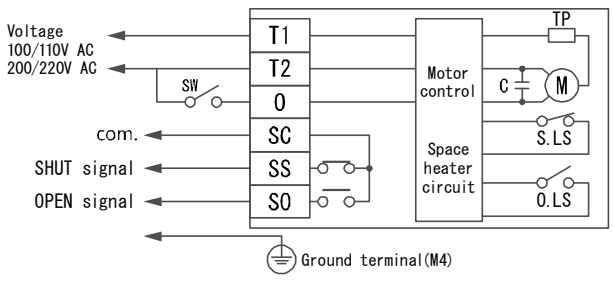
WIRING

AM1



- Control switch should be prepared one by one for actuator. Do not operate two or more actuator from one switch. It might malfunction.

AM2



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

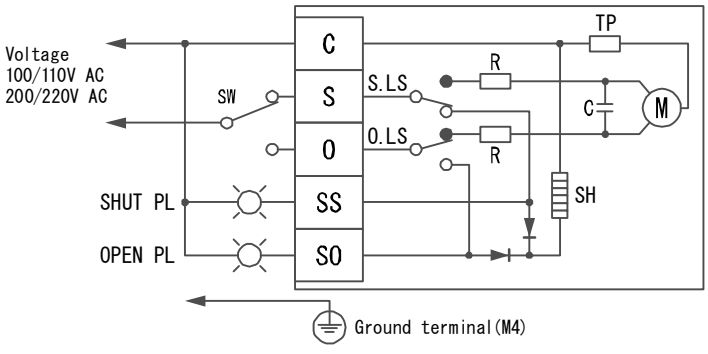
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AH1 type

Actuator type (☐:Voltage code)	AH1-030-☐	AH1-070-☐	AH1-180-☐
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]	3	7	18
Operation time [s]	3 / 2.5 (50/60 Hz)		6 / 5 (50/60 Hz)
Power consumption [VA]	19	50	
Motor	Synchronous motor	Reversible motor	
Overload protection	Thermal protector		
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 3 A 250 V AC (Minimum 0.1 A)		
Duty cycle	20 % 15 min.		
Ambient temperature	-20 to 55 ºC		
Space heater	0.5 W	1 W	
Manual operation	Direct operation of output shaft		
Enclosure	Equivalent to IP65 (IEC 60529)		
Housing material	Aluminum alloy die cast + Polycarbonate resin cover		
Terminal block	For bare wire 0.14 to 1.5 mm² (AWG 26 to 14) Ground terminal: M4		
Conduct port	G3/8 Cable gland (for Φ5 to 10.5 mm cable)		

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

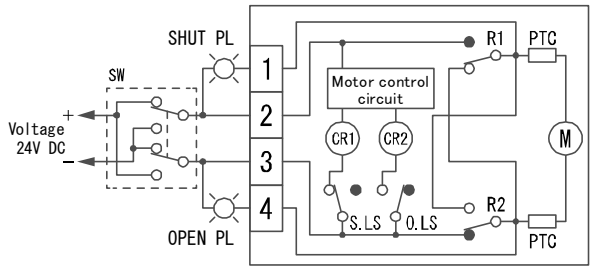
3 way valve: SHUT / Position①, OPEN / Position②

DM0 DM2 type

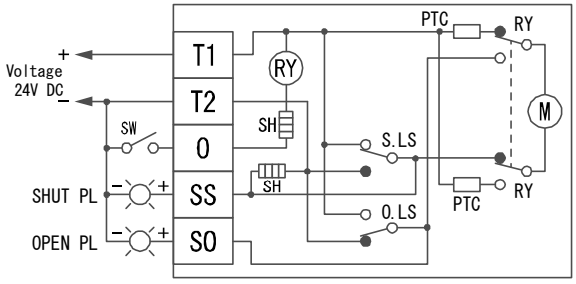
Actuator type	DM0-030-0	DM0-070-0	DM0-180-0	DM2-030-0	DM2-070-0	DM2-180-0
Voltage	24 V DC					
Rated torque [N·m]	3	7	18	3	7	18
Operation time [s]	0.8 to 1.5	2 to 3	4 to 6	2 to 3.5	2 to 3	4 to 6
Power consumption (Max) [VA]	24			10	24	
Motor	DC motor					
Overload protection	Thermistor					
Method of operation	Switching polarity type			a-contactinput type, with built-in relay		
Operation	[2] + [3] - → SHUT (SHUT PL is lit.) [3] + [2] - → OPEN (OPEN PL is lit.)			SW is OFF → SHUT (SHUT PL is lit.) SW is ON → OPEN (OPEN PL is lit.)		
Input signal current	Nil			16.2 mA (O-terminal)		
Output signal rating	Resistance load 2 A 30 A DC Micro load 1 mA 5 V DC			Resistance load : Less than 1 A 24 V DC		
Duty cycle	20 % 15 min.					
Ambient temperature	-20 to 55 ºC					
Space heater	1 W					
Manual operation	Direct operation of output shaft					
Enclosure	Equivalent to IP65 (IEC 60529)					
Housing material	Aluminum alloy die cast + Polycarbonate resin cover					
Terminal block	For bare wire 0.14 to 1.5 mm² (AWG 26 to 16)					
Conduct port	G3/8 Cable gland (for Φ5 to 10.5 mm cable)					

WIRING

DM0



DM2



ELECTRIC ACTUATOR SPECIFICATIONS

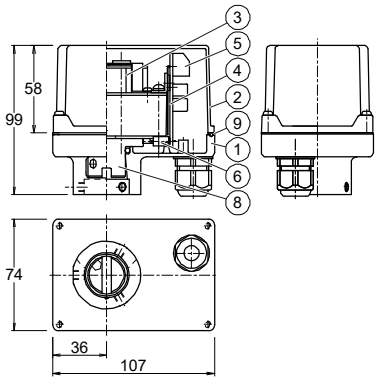
3 way valve: SHUT / Position①, OPEN / Position②

OPTIONAL PARTS

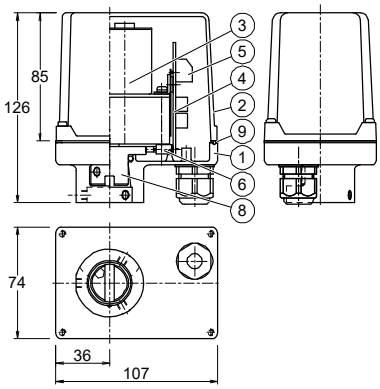
Specifications	Code No.	AM	AH1	DM	Remarks
Aluminum alloy motor cover	AK	○	○	○	
Manual lever	M1		○	○	Detachable lever
Flexible cable (Approx. 300 mm long)	C1	○	○	○	

DIMENSIONS

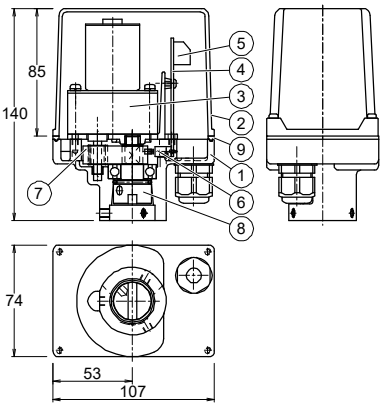
AM (030 / 070) DM2 (030)



DM0 (030) DM (070) AH1 (030 / 070)



AM (180) DM (180) AH1 (180)



Parts name

1	Body	4	Control board	7	Drive gear
2	Motor cover	5	Terminal block	8	Drive shaft
3	Motor	6	Limit switch	9	Rubber packing

HANDLING & STORAGE

①HANDLING

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

②STORAGE

- 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.
- Avoid contact with any coal tar creosote, insecticides, vermicides or paint. (These chemicals may cause damage to the valve.)

③CHECKING

- Check the product code, power supply, and voltage before installation.
- Make sure that the bolts are not loose.

④WARNING

- Do not use the valve to fluid containing slurry. (The valve will not operate properly.)
- Do not use the valve in conditions where the fluid may have crystallized. (The valve will not operate properly.)
- Regarding the ball valve type, we recommend that you use fully open or fully closed. This is because the edge of the ball opening remains on the seat (PTFE) when used at an intermediate opening, so that the sealing performance temporarily deteriorates at the time of full closing.
- Keep the valve out of direct sunlight, water and dust. Use cover to shield the valve. (The valve will not operate properly.)
- Using a positive-pressure gas with our plastic piping may pose a dangerous condition due to the repellent force particular to compressible fluids even when the gas is under similar pressures used for liquids. Therefore, be sure to take the necessary safety precautions such as covering the piping with protective material.
- For conducting a leak test on newly installed piping, be sure to check for leaks under water pressure. If absolutely necessary to use a gas in testing, please consult your nearest service station beforehand.
- Certain liquid such as H2O2, NaClO, etc may be prone to vaporization (Off-Gassing) which may cause irregular pressure increases, which may destroy the valve.

INSTALLATION

①PRECAUTIONS

- Flush the pipeline carefully before installing the valve. Foreign particles, such as sand or pieces of welding electrode, will damage the ball and seats.
- It may very small leak because of a piping pressure difference.

②PIPING (Flanged-end)

- Use only rubber gasket for plastic flange.
- Use spring washer to prevent from decreasing surface pressure gasket when the temperature change happens frequently.
- Tighten all bolts using crossover method to load the joint evenly.
- If the mating flange is metal, use a flat face flange.

③PIPING (Threaded End Rc)

- Please remove and thrust the screw receiving window part of a valve from a valve main part in screw connection.
- Since the screw receiving window of a valve is a product made of resin, please do not join to a metal screw.
- A seal should use a seal tape fundamentally, and please roll it 2 to 3 and carry out it.
- A liquefied seal has a possibility of causing material deteriorates of a valve.
- Please give it by 2/1 to 1 rotation threaded (RC) by the belt wrench etc, after thrusting screwing firmly single hand.

PIPING (Socket solvent joint / Fusion joint)
In adhesion and fusion splicing arrival junction, please protect each basic work of the method certainly. See each method of piping according to joint and material.

④CONNECTION WITH UNION NUT

- Be sure to keep the valve in closed position when tightening union nut.
- Tighten union nut to the body in proper torque to prevent distortion of the valve.

Valve size [mm]	Recommended torques [N·m]
015 to 025	5 to 10 (Tighten by one hand)
032 to 040	20 to 40 (Tighten by both hands)

⑤SUPPORT

Use proper support to prevent distortion of the valve.

⑥ENVIRONMENT

- 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.

⑦POSITIONING

Should be positioned through 90° upward from horizontal. Provide space around the product to allow manual operation, inspection and replacement work.

Margin required around the actuator for maintenance	
AM (030 / 070) DM2 (030)	More than 65 mm
AM AH1 DM	More than 90 mm

⑧OTHER 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

- 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.
- Use suitable flexible cable (Φ5 to 10.5 mm).
  Lock and seal the cable completely to prevent condensation inside the actuator.
- Built-in terminal block can clamp up to 1.5 mm² in diameter without using solderless terminal.
- Allow proper cable slack for maintenance.
- 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

①AM1, AH1

Control switch should be prepared one by one for actuator. Do not operate two or more actuator from one switch. It might malfunction.

②AM2

- Two or more actuators can be operated with one control switch.
- When using control switch with current leakage (more than 1 mA) such as TRIAC or relay with CR, it can cause malfunction.
- When wiring is long distance or handling a weak current signal, it may be affected by induced voltage or noise. In this case, please use countermeasures such as using a shielded wire, separating it from other power cables.

③DC POWER SUPPLY (DM0, DM2)

- It is usable with a battery and full-wave rectification circuit.
- Consider an inrush current of motor.
  (It is 1.5 to 3 times of consumed current.)
- They may cause malfunction with decreasing voltage by the long wiring.
- Do not use power supply that require more than 1 second with rise and fall time.

④USE OF OPEN/SHUT SIGNALS (AM, AH, DM)

Use signals within the capacity of output signal rating.

OPERATION

①TESTING

- Make sure that power supply voltage is correct.
- Check operating position and wiring.

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.

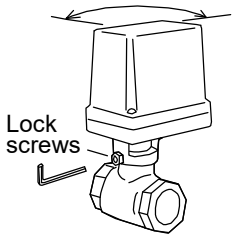
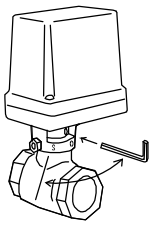
MANUAL OPERATION

①PRECAUTIONS

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

②NOTE

For manual operation, do not give more than the rated torque and make at a slow rate. Actuator might be damaged if excessive force is added.

AM	AH1　DM
	
Actuator can be easily removed from the valve by loosing 3 lock screws, and that allows direct operation of the valve. After operation, be sure to put back the actuator to the original position and lock.	Put an allen wrench (5 mm) or a lever (Φ5.7) into the hole on drive shaft and turn slowly. Manual lever is optional.

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

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.
Operation is unstable.	Excess surge or voltage was applied.	Replace the actuator.
	Rainwater entered the actuator.	
	Switch leakage current is large. AM2	Current leakage should be less than 1 mA.
Stop in the mid position.	Continuous irregular stop will shorten the motor life and wear the gear. Turn off the power and check. AM1 AM2 AH1-030	

Problem	Cause	Solution
Stop in the mid position.	• Biting of valve seat. • The scale has adhered to the valve ball.	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.
Leakage from valve body	• Valve cap get loose. • Valve body is damaged.	Replace the valve.
Leakage from valve seat	Seat is worn or damaged.	
Leakage from valve stem	Stem packing is worn or distorted.	

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

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