NIPPON VALVE CONTROLS, INC.

Instruction manual

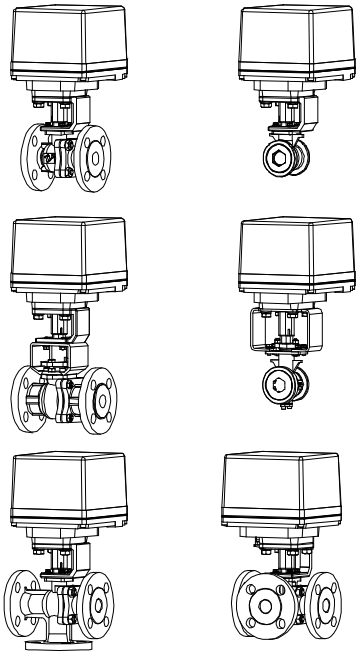
Electric Actuated Ball Valve BR BS GS BL TR LR T3 L3

SP-1531

Please read this manual before installation and use.

GENERAL

It composed of flange-end ball valve and high-power electric actuator.



Actuator

- 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)
- AE1 : For AC power
- AE2 : For AC / DC power

Valve

- BR type For various fluids and general use.
- BS type For various fluids and general use, Wafer.
- GS type For Wafer. (JIS 10K / 20K)
- BL type PTFE Linings.
- TR type For mixing / dividing.
- LR type For mixing / dividing.
- T3 type Trunnion structure. (with flow paths)
- L3 type Trunnion structure.

PRODUCT CODE

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)		(10)		(11)
BR type			B	R						-		-			
BS type	(Full port)		B	S		1				-		-			
	(Standard port)		B	S		1				R		-			
GS type	(V-port)		G	S		3	U	U		V		-			
	(Full port)		G	S		3	U	U		-		-			
	(Standard port)		G	S		3	U	U		R		-			
BL type			B	L		1		F	T	-		-			
TR type			T	R		1	T	T	P	-		-			
LR type			L	R		1	T	T	P	-		-			
T3 type			T	3		1	T	T	G	-		-		-	
L3 type			L	3		1	T	T	G	-		-			

(1) Actuator
AD1 AD2 AD0
HD1 HD2 HD0
AE1 AE2

(2) Valve
BR BS GS BL
TR LR T3 L3

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

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

(5) Connection
1 : JIS 10K
3 : JIS 20K

(6) Body material
T : SCS13A
U : SCS14A
S : SCPH2

(7) Ball material
T : SUS304 / SCS13A
U : SCS14A
F : PTFE Linings

(8) Seat material
F : F-PTFE
G : R-PTFE
R : R-F-PTFE
K : PEEK
I : API
C : R-PEEK
M : SUS316 + Stellite
T : PTFE
P : R-PTFE

(9) Size [mm]
ex. 25 A → 025

(10) Option
L0 : Auxiliary limit switch
L2 : Auxiliary limit switch
M0 : Manual lever handle

(11) Flow paths (T3)
a to d : 3 way valve flow

VALVES SPECIFICATIONS

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

BR BS type

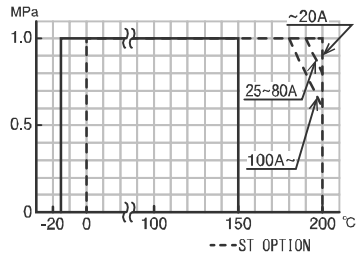
Valve type		BR			BS		
Design		2-way, Full port			2-way, Wafer		
					Full port		Standard port
Connection		JIS10K Flanged-end		JIS20K Flanged-end	JIS Flanges 10K		
Fluid							
Max pressure		1 MPa		2 MPa	1 MPa		
Size [mm]		015 to 100	015 to 150	015 to 080	015 to 080		R100 to R150
Material	Body	SCS14A	SCS13A	SCS13A	SCS13A	SCS14A	SCS13A
	Ball	SCS14A	SCS13A	SCS13A	SCS13A	SCS14A	SCS13A
	Seat	F-PTFE R-PTFE R-F-PTFE			F-PTFE R-PTFE R-F-PTFE		
Stem seal	Packing	R-PTFE			R-PTFE		
	O-ring	FKM			FKM		

The optional for steam fluids.

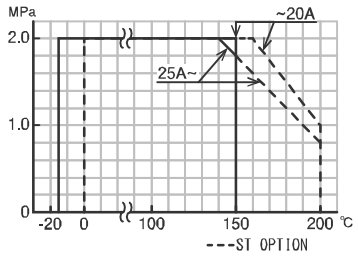
Valve type	Option code	O-ring
BR BS	ST	Replace (Steam resistant FKM)

PRESSURE & TEMPERATURE RATING

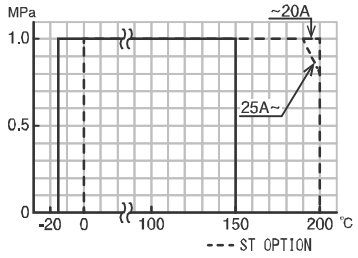
BR (JIS 10K)



BR (JIS 20K)



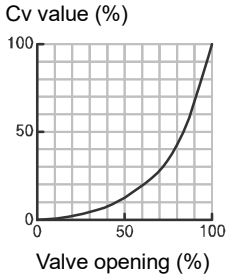
BS



Note) Insulation options are required for use with fluids more than 150 °C.

INHERENT FLOW CHARACTERISTIC (BS)

R100 to R150 mm



Range ability 30:1

VALVES SPECIFICATIONS

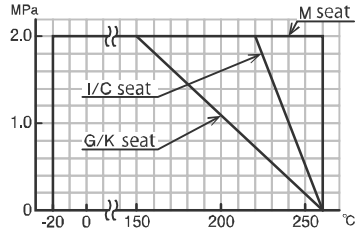
Water Oil Air, Gas Steam Chemicals Sea water Slurry Negative pressure

GS type

Valve type		GS		
Design		2-way, Wafer		
		V-port	Full port	Standard port
Connection		JIS Flanges 10K / 20K		
Fluid				
Max pressure		2 MPa		
Size [mm]		V015 to V032	015 to 080	R040 to R150
Material	Body	SCS14A		
	Ball	SCS14A (HCr plated)		
	Seat	R-PTFE PEEK API R-PEEK SUS316 + Stellite		
Stem seal	Packing	R-PTFE		

Note) API cannot be used with steam fluid.

PRESSURE & TEMPERATURE RATING

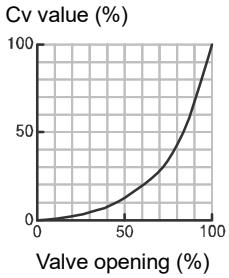


Note) • Option for use in fluid temperature more than 170 °C.
• We prefer to K seat depends on pressure or environmental conditions. Please consult us for your specifications.

SEAT LEAKAGE VOLUME (JIS B 2005-4)

	Seat material	Leakage rate	Remarks
G	R-PTFE	None	
K	PEEK		
I	API		
C	R-PEEK	10^{-4} × rated Cv value × 10^{-3} or less.	Class IV × 10^{-3} or less.
	R-PEEK (V-port)	10^{-4} × rated Cv value × 10^{-3} × 8 or less.	Class IV × 10^{-3} × 8 or less.
M	SUS316 + Stellite	10^{-4} × rated Cv value or less.	Class IV or less.
	SUS316 + Stellite (V-port)	10^{-4} × rated Cv value × 8 or less.	Class IV × 8 or less.

INHERENT FLOW CHARACTERISTIC



Range ability

GS-3UU□ V 015 to 032	50:1	(V-port)
GS-3UU□ - 015 to 080	200:1	(Full port)
GS-3UU□ R 040 to 150	100:1	(Standard port)

VALVES SPECIFICATIONS

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

BL type

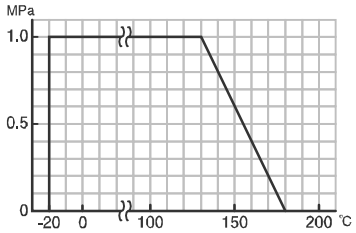
Valve type		BL	
Design		2-way, Full port	
Connection		JIS10K Flanged-end	
Fluid			
Max pressure		1 MPa	
Size [mm]		015 to 150	
Material	Body	SCS13A + PFA lined	SCPH2 + PFA lined
	Ball	SCS13A + PFA lined	
	Seat	PTFE	
Stem seal	Packing	PTFE	

Note) The inside of the valve is lined with PFA resin.

PRODUCT RANGE

Valve size [mm]	Body material	
	SCS13A	SCPH2
015	○	○
020	○	○
025	○	Made to order.
040	○	Made to order.
050	○	Made to order.
065	○	○
080	○	Made to order.
100	○	○
150	○	Made to order.

PRESSURE & TEMPERATURE RATING



VALVES SPECIFICATIONS

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

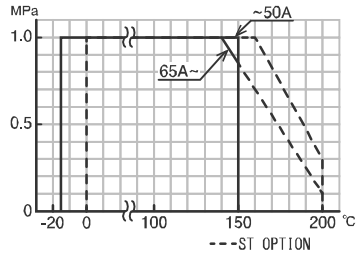
TR LR type

Valve type		TR LR	
Design		3-way, Full port	
Connection		JIS10K Flanged-end	
Fluid			
Max pressure		1 MPa	
Size [mm]		020 to 040	050 to 100
Material	Body	SCS13A	
	Ball	SUS304	SCS13A
	Seat	R-PTFE	
Stem seal	Packing	R-PTFE	
	O-ring	FKM	

The optional for steam fluids.

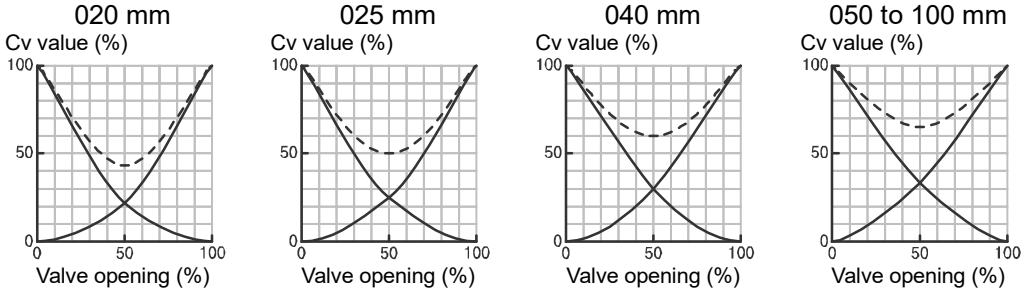
Valve type	Option code	O-ring
TR LR	ST	Replace (Steam resistant FKM)

PRESSURE & TEMPERATURE RATING



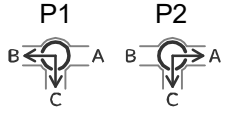
Note) Insulation options are required for use with fluids more than 150 °C.

INHERENT FLOW CHARACTERISTIC



Range ability 20:1

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



B-C ⇔ A-C

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

T3 L3 type

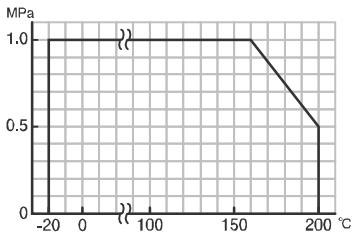
Valve type		T3 L3
Design		3-way, Full port
Connection		JIS10K Flanged-end
Fluid		
Max pressure		1 MPa
Size [mm]		025 to 150
Material	Body	SCS13A
	Ball	SCS13A
	Seat	R-PTFE
Stem seal	Packing	PTFE

The optional for steam fluids.

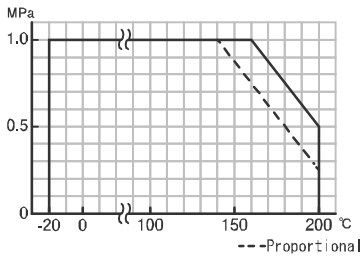
Valve type	Option code	O-ring
T3 L3	ST-VF	Add (Steam resistant FKM)

PRESSURE & TEMPERATURE RATING

T3



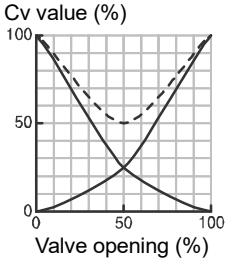
L3



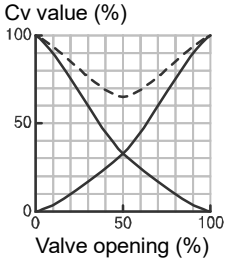
Note) Insulation options are required for use with fluids more than 170 °C.

INHERENT FLOW CHARACTERISTIC (L3)

025 mm

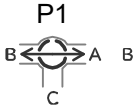
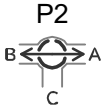
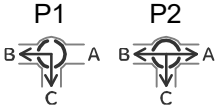
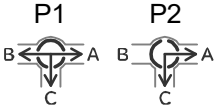
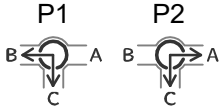


040 to 150 mm



Range ability 30:1

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

T3								L3	
Code: a		Code: b		Code: c		Code: d			
P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
									
A-B ⇔ B-C		A-C ⇔ A-B		B-C ⇔ A-B-C		A-B-C ⇔ A-C		B-C ⇔ A-C	

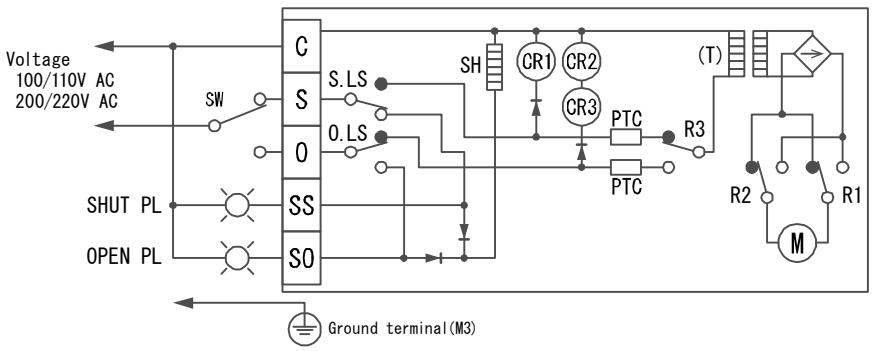
ELECTRIC ACTUATOR SPECIFICATIONS

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 ºC, 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



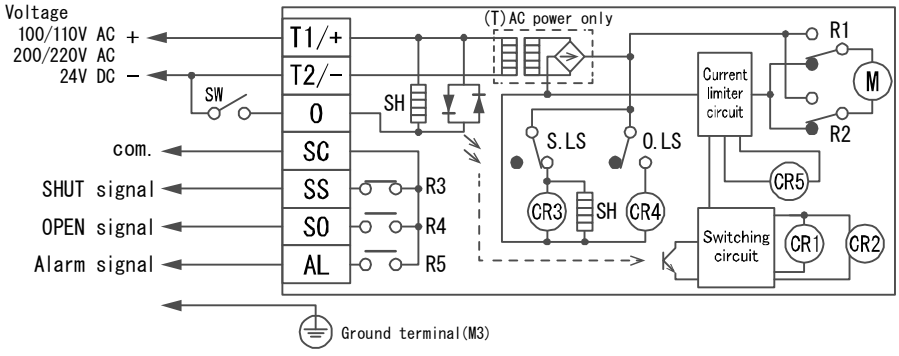
ELECTRIC ACTUATOR SPECIFICATIONS

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 (Code: 1) 200 / 220 V AC ±10 % 50/60 Hz (Code: 2) 24 V DC (Code: 0)					
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: 100 DC: 80		AC: 150 DC: 120			
Motor	DC motor					
Overload protection	Current limiter					
Method of operation	a-contact input 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 ºC, 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



Note) Leakage current in SW: less than 1 mA.

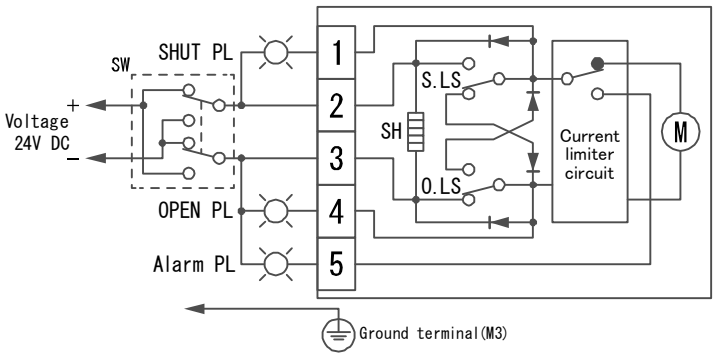
ELECTRIC ACTUATOR SPECIFICATIONS

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 ºC, 10 % 15 min.)					
Ambient temperature	-20 to 55 °C					
Space heater	3 W		Space heater			
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



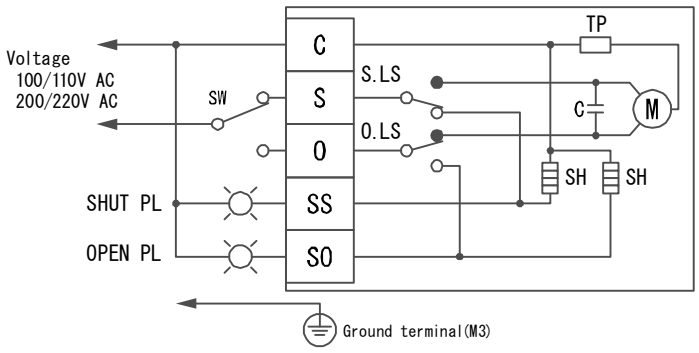
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AE1 type

Actuator type (☐:Voltage code)	AE1-120-☐	AE1-360-☐	AE1-700-☐	AE1-02K-☐	AE1-06K-☐
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]	12	36	70	200	600
Operation time [s]	10 / 8.5 (50/60 Hz)	7.2 / 6 (50/60 Hz)	15 / 12 (50/60 Hz)	30 / 25 (50/60 Hz)	
Power consumption [VA]	19	60		110	350
Motor	Synchronous motor	Reversible motor		Reversible motor self-contained mechanical brake	
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	3 W				
Manual operation	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



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

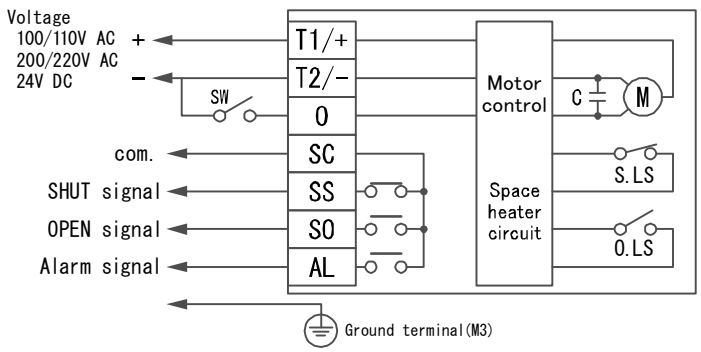
ELECTRIC ACTUATOR SPECIFICATIONS

3 way valve: SHUT / Position①, OPEN / Position②

AE2 type

Actuator type (☐:Voltage code)	AE2-120-☐	AE2-360-☐	AE2-700-☐	AE2-02K-☐	AE2-06K-☐	AE2-120-0	AE2-360-0
Voltage	100 / 110 V AC ±10 % 50/60 Hz (Code: 1) 200 / 220 V AC ±10 % 50/60 Hz (Code: 2)					24 V DC (Code: 0)	
Rated torque [N·m]	12	36	70	200	600	12	36
Operation time [s]	11 / 9.5 (50/60 Hz)	8.2 / 7 (50/60 Hz)	16 / 13 (50/60 Hz)	31 / 26 (50/60 Hz)		3 to 4.5	9 to 14
Power consumption [VA]	26	60		110	350	Max 24	
Motor	Synchro-nous motor	Reversible motor		Reversible motor self-contained mechanical brake		DC motor	
Overload protection	Timer					Current limiter	
Method of operation	a-contactinput type, with built-in relay						
Operation	SW is OFF → SHUT (SHUT signal is output.) SW is ON → OPEN (OPEN signal is output.) Overtorque → Alarm signal is output						
Input signal current	9 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						
	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.						
Ambient temperature	-20 to 55 ºC						
Space heater	3 W						
Manual operation	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



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

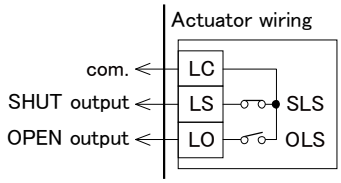
OPTIONAL PARTS

Specifications		Code No.	AD	HD	AE	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 06K)

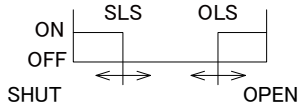
*Auxiliary limit switch: Please refer to the specifications.

WIRING (OPTION)

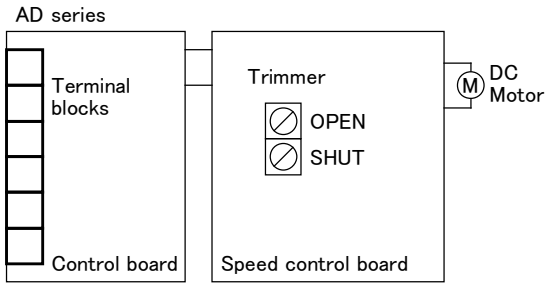
L0, L2	Auxiliary limit switch	I0	Speed control board (only for AD series)



At CLOSE side, LC and LS is ON.
At OPEN side, LC and LO is ON.



ON point can be reset by adjusting the cam.



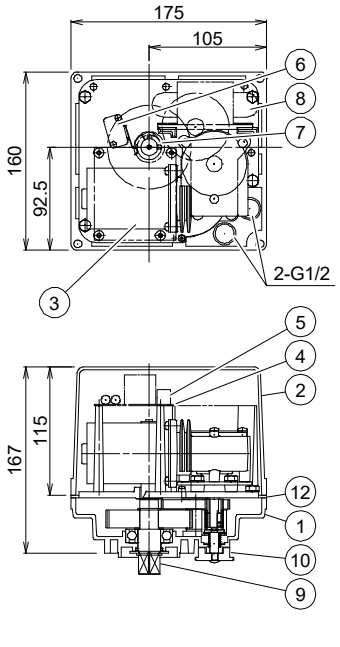
Operating speed (OPEN/CLOSE) can be adjusted by "OPEN"/"SHUT" trimmer. Turning clockwise increases the operating time.

ELECTRIC ACTUATOR SPECIFICATIONS

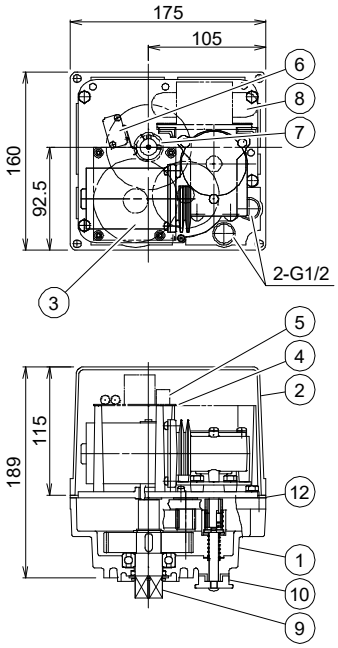
DIMENSIONS

AD, HD

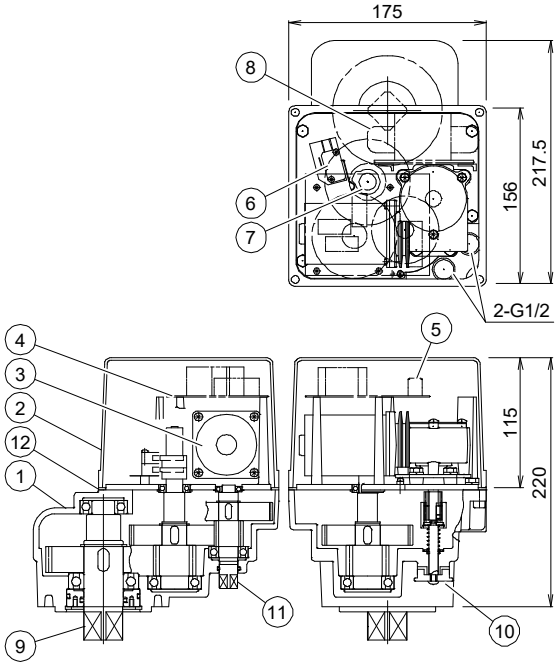
AD-300, 700 HD-300, 700



HD-02K



HD-06K

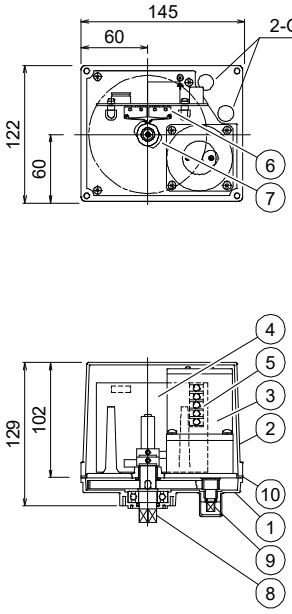


Parts name

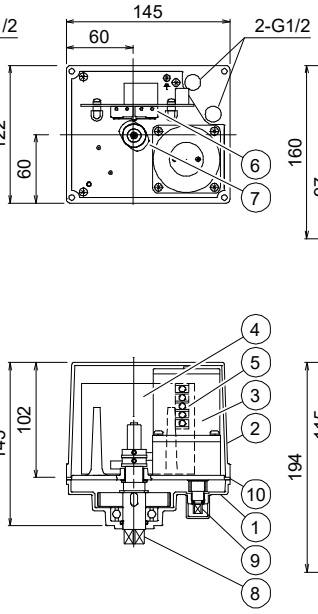
1	Body	6	Limit switch	11	Manual shaft (For 06K)
2	Motor cover	7	SW setting cam	12	Rubber packing
3	Motor	8	Transformer		
4	Control board	9	Drive shaft		
5	Terminal block	10	Manual clutch		

AE

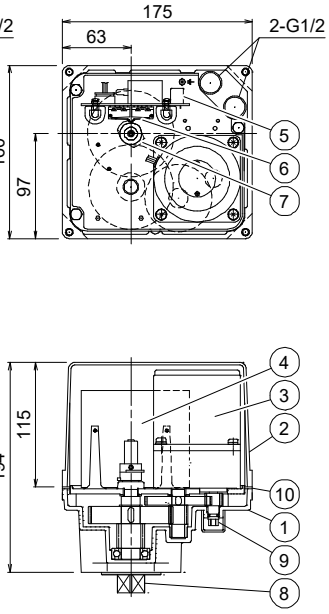
AE-120, 300, 360



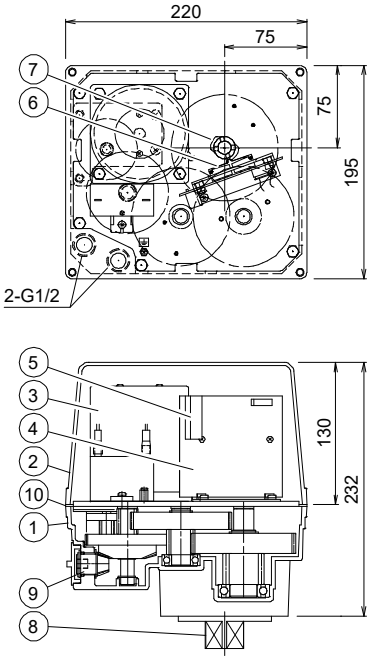
AE-600, 700



AE-02K



AE-06K



Parts name

1	Body	5	Terminal block	9	Manual shaft
2	Motor cover	6	Limit switch	10	Rubber packing
3	Motor	7	SW setting cam		
4	Control board	8	Drive shaft		

HANDLING & STORAGE

①HANDLING

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

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.

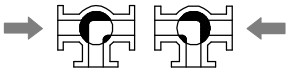
③CHECKING

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

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.
- For valves with specified flow direction (GS) 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. (TR, LR)



②PIPING FLANGES

- Gasket should be selected appropriately to suit the fluid, pressure and temperature. 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.
- Wafer type ball valve is put between two seats of flanged-end and tightened with long bolts. (BS, GS)

③CAUTION FOR THE LINING BALL VALVE (BL)

- By the time you install a valve, do not remove the dust caps.
- Use the PTFE Envelope Gasket for pipe flange.
- Use the spring washer and Bolt, Nut, Plain washer.
- Tighten the bolts and Nuts gradually with torque wrench to the specified torque level in a diagonal manner.
- Tighten the bolt according to the specification of the gasket to be used.
- However the bolts may loosen over time. Please check the tightening torque of the bolts 24 hours after the flanging or after heat cycle.

④ENVIRONMENT

- 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.

⑤POSITIONING

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

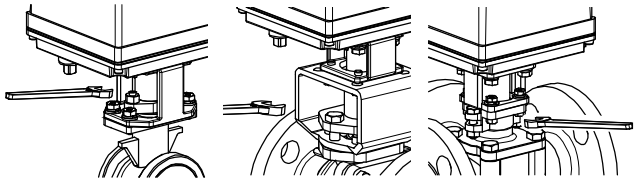
Maintenance space for upper part of actuator.		
AE (120 / 360 / 700)		More than 105 mm
AE (02K / 06K)	AD HD	More than 120 mm

⑥OTHER 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.

⑦CAUTIONS FOR MAINTENANCE (GS, BL, T3, L3)

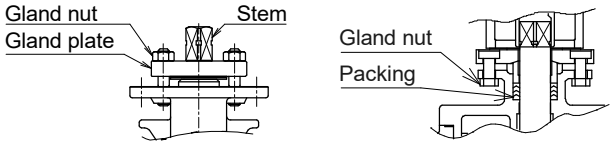
Do not keep warm for maintenance of the valve gland.



GS BL T3, L3

TIGHTEN THE GLAND NUTS (GS, BL, T3, L3)

- Check that there is no leakage from the gland packing.
- If it leakage, tighten gland nuts by alternately. Do not over-tighten the gland nuts. (BL: Gland bolts.)



GS T3 L3

Valve size [mm]					Recommended torques [N·m]
GS			T3	L3	
V015 V020	015 020	-	-	-	2
V025 V032	025 032	R040	025	025	3.5
-	040 050	R050 R065	040	040 050	7
-	065 080	R080 R100	050 065	065 080	10
-	-	R125 R150	080 100	100 125	14
-	-	-	125 150	150	20

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

①AE1

Each control switch should be prepared one by one. Do not operate two or more from one switch at the same time.

②AD2, HD2, AE2

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

③DC 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.

④USE 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

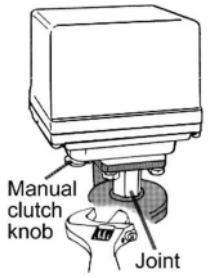
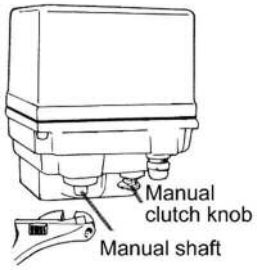
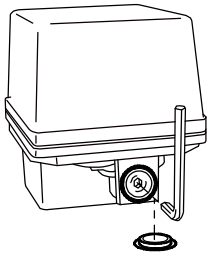
- Keep power supplied for built-in space heater to prevent condensation inside actuator.
- Do not touch the moving parts of actuator in operation.
- Do not insert a reverse signal during operation. It may shorten the life of product.
- Never put anything on the actuator or make it into a foothold.

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

AD HD	HD (06K)
	
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.	
AE	AE (06K)
	
Turn manual shaft slowly with an adjustable wrench.	Remove the cap. Turn manual shaft solely with M8 hexagon socket screw keys.

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.
- Confirm the fluid temperature or pressure.
- Confirm the leak from valve stem.
- Confirm the bolt tightening torque.
- Make sure that there is no liquid leakage from the sealing surface of the flange. (BL type)

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.	• Replace the control board or limit switch. (Repair in our factory) • Replace the actuator.
	Rainwater entered the actuator.	• 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.
	Two or more valves operated by the same switch. AE1	Each control switch should be prepared one by one.
	Switch leakage current is large. AD2 HD2 AE2	Current leakage should be less than 1 mA.

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. AD1 HD1 AE1
		Motor protection circuit returns by the signal of operation of an opposite direction. Turn on the power again. AD2 HD2 AE2 AD0 HD0
Received the alarm signal. AD2 HD2 AE2		
Stop automatic moving after manual operation. AD HD	Manual clutch knob is not reset.	Reset manual clutch knob.
	Out of operating range. (06K)	Reset by manual operation.
Leakage from valve body	• Valve cap get loose. • Valve body is damaged.	Replace the valve.
Leakage from valve seat	Seat is worn or damaged.	Replace the valve.
		Replace the seat. (except BL)
Leakage from valve stem	Stem packing is worn or distorted.	Replace the valve.
		Replace the packing. (except BL)
Leakage from valve gland	Gland packing is worn or distorted.	Tighten the gland nut. (BL: Gland bolts.)
GS BL T3 L3		Replace the gland packing. (except BL)

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

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