

Water receiving tank and high placement water tank application

Emergency shut-off system

Type MD-71 Emergency shut-off valve

Type KS-5 Emergency shut-off valve control panel

Operation manual

Thank you very much for purchasing this product from Yoshitake. To use the purchased product on a correct and safe basis, read this text before using it. In addition, the user customer is to store this document carefully.

Responsibility for a failure of the product caused by improper handling will be assumed by the customer. In this case, the product will be replaced or repaired at the customer's expense.

----- Symbols used in this text refer to the following: -----

 **Warning**

Improper handling may cause the user to be killed or seriously injured

 **Caution**

Improper handling may cause the user to be slightly injured or the equipment to be damaged

Table of contents

1. Product application	1
2. Specifications	
2.1 Specifications for the emergency shut-off valve	1
2.2 Specifications for the emergency shut-off valve control panel	2
3. Nominal diameter selection.....	3
4. Dimensions, weight, and structure	
4.1 Emergency shut-off valve	4
4.2 Emergency shut-off valve control panel	5
5. Operational description	
5.1 Normal condition	5
5.2 In the case of an earthquake.....	6
5.3 Recovery work	6
6. Process flowchart	6
7. Installation procedure	
7.1 Sample piping diagram	7
7.2 Shut-off valve and control panel connection diagram.....	8 to 9
7.3 Warnings and cautions in installing the product	10 to 12
7.4 How to adjust the seismic detector	12 to 13
8. Operation procedure	
8.1 Warnings in operation	14
8.2 Trial running	14 to 17
9. Maintenance procedure	
9.1 Malfunctions and troubleshooting	18 to 19
9.2 Warnings and cautions in maintenance and inspection	19
9.3 Periodic inspection	19 to 21
9.4 Manual operation method	21 to 22
About after-sales service	

1. Product application

If an earthquake disaster arises to break the pipe line, precious water for living stored in the water receiving tank or high placement water tank will outflow. After the disaster, lifelines must therefore be prevented from discontinuing to secure water for living.

This product is an emergency shut-off system intended to secure water in the water receiving tank and the high placement water tank.

2. Specifications

2.1 Specifications for the emergency shut-off valve

Model		Type MD-71 (butterfly valve)	
Nominal diameter		50～200A	
Connection	Geometry	Wafer shape	
	Type	JIS 10 K	
Applicable fluid		Tap water	
Maximum usable pressure		1.0MPa	
Fluid temperature		5～60℃	
Installation posture		Installed from square to lateral direction to a horizontal pipe line	
Switching time		4 seconds or less	
Primary portion material		Main body	FCD450 or FC300
		Valve body	SCS14 or SUS F 316
		Seat	FKM
Electric actuator	Rated voltage	DC24V	
	Power consumption	50～100A:MAX. 80VA 125～200A:MAX 120VA	
	Ambient temperature	-20 to 55℃ (no frost allowed)	
	Motor protection	Current limiter type	
	Measure for dew condensation	Space heater built in	
	Manual operation	Manual operation mechanism incorporated	
	Protective structure	Rain-proof type	
	Electric wire incoming port	G1/2	

● Available with the MD-71-N, complying with the Water Works Law in Japan.

2.2 Specifications for the emergency shut-off valve control panel

Model		Type KS-5
Emergency shut-off valve control unit quantity (*1)		Two units
Input power supply		AC85~240V 50/60Hz
Ambient temperature		-10~50°C
Backup power supply		DC24V
Backup time		Approximately 5 hours
Storage battery		Made by Japan Battery Cells (PE 12 V 2.2)
Charge strategy		Constant charge strategy (float charge)
Measure for lightning damage		Surge absorber incorporated
Output terminal	Emergency shut-off valve control intent	DC24V
	Pump protection intent (*2)	No voltage contact point c (1c)
	Seismic detector External alarm intent	No voltage contact point a (1a) (ON contact point with the seismic detector in operation)
	Power supply external alarm intent	No voltage contact point a (1a) (ON contact point in the case of a power supply drop fault in the control panel)
Shut-off valve opening switch		Shut-off valve opening switch
Seismic detector	Detection direction	All horizontal directions
	Set acceleration	200 gal (equivalent to a seismic intensity of 5)
Installation site		Indoor or outdoor (equivalent to JIS C0920 IP44)
Mount strategy		Wall hanging type

*1: Those for controlling 1 unit, 3 units, and 4 units can be produced as well.

*2: Those for controlling 3 units and 4 units differ.

Caution

(1) Check the indication contents of the label (emergency shut-off valve shut-off valve control panel door back side) attached to the product and the specification contents of the type ordered.

*If the contents are inconsistent, do not use it and contact our company.

(2) Replace the storage battery cells every three years.

*If they are not replaced, the unit can possibly fail in starting up in the case of a power failure.

3.Nominal diameter selection

Select one with a nominal diameter equivalent to or more than the suction (suck) side of the pump.

If one with a smaller nominal diameter is used, the specified flow rate cannot be maintained in some cases. (The following figure shows the Cv value and calculating formula).

If the nominal diameter of the piping is selected, refer to the standard flow rate specified by the Japanese Industrial Standards (JIS) as an appropriate piping nominal diameter selection method.

Standard flow rate of the fluid

Fluid	Standard flow rate
Water or oil	2 m/s (2~4)

*This table shows the standard flow rate created with reference to the specifications of JIS F7101 (standard flow rates in the pipe lines of the seacraft engine units).

·Cv value of the emergency shut-off valve

Nominal diameter	50A	65A	80A	100A	125A	150A	200A
Cv value	159	266	457	860	1320	2020	3540

·Cv value calculating formula

$$C_v = \frac{0.365V\sqrt{G}}{\sqrt{\Delta P}}$$

P_1 : P1: Primary side pressure (MPa·A)

P_2 : Secondary side pressure (MPa·A)

ΔP : $P_1 - P_2$ (MPa)

G : Specific gravity (specific gravity to water)

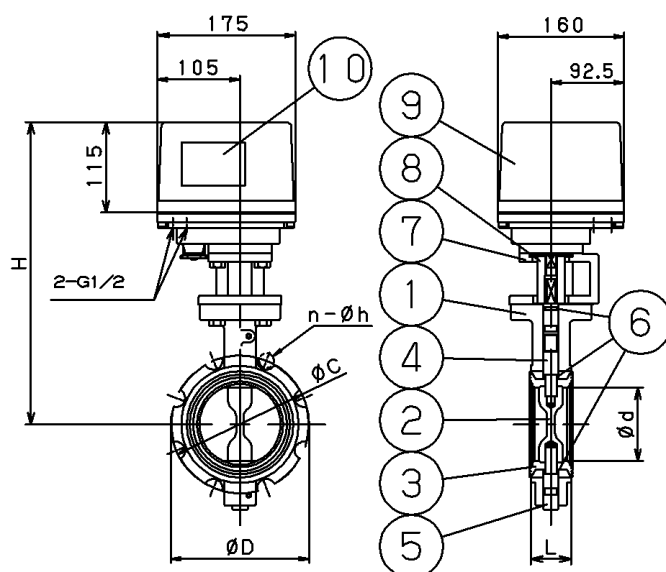
v : Maximum fluid flow rate (m³/h)

C_v : Cv value of each nominal diameter

4. Dimensions, weight, and structure

4.1 Emergency shut-off valve (hereafter called the "shut-off valve")

4.1.1 Nominal diameters of 50 to 150 A

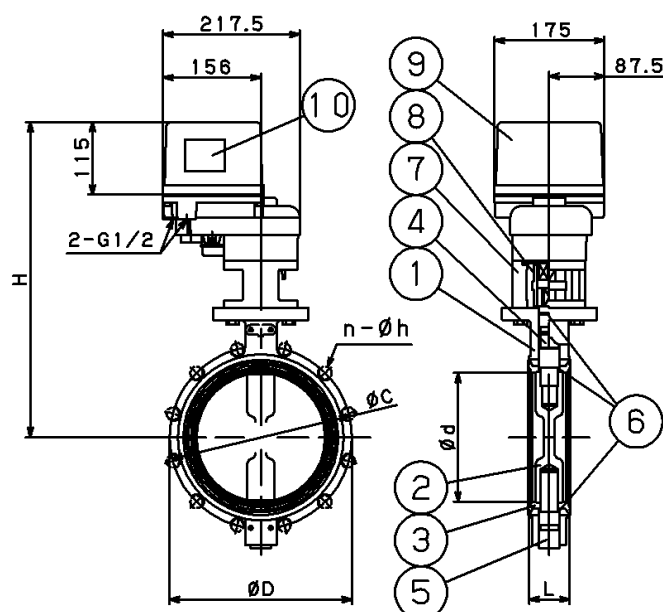


No.	Part name
1	Main body
2	Valve body
3	Seat
4	Stem
5	Pin
6	O-ring
7	Bracket
8	Connector
9	Electric actuator
10	Label

(mm)

Nominal diameter	d	L	D	H	JIS 10K(Wafer shape)		Weight (kg)
					C	n - h	
50A	52	41	102	332	120	4-19	7.7
65A	64	44	135	349	140	4-19	9.2
80A	78	44	145	356	150	8-19	9.7
100A	103	51	175	384	175	8-19	12
125A	129	54	206	406	210	8-23	15
150A	154	54	231	419	240	8-23	16

4.1.2 Nominal diameter of 200 A



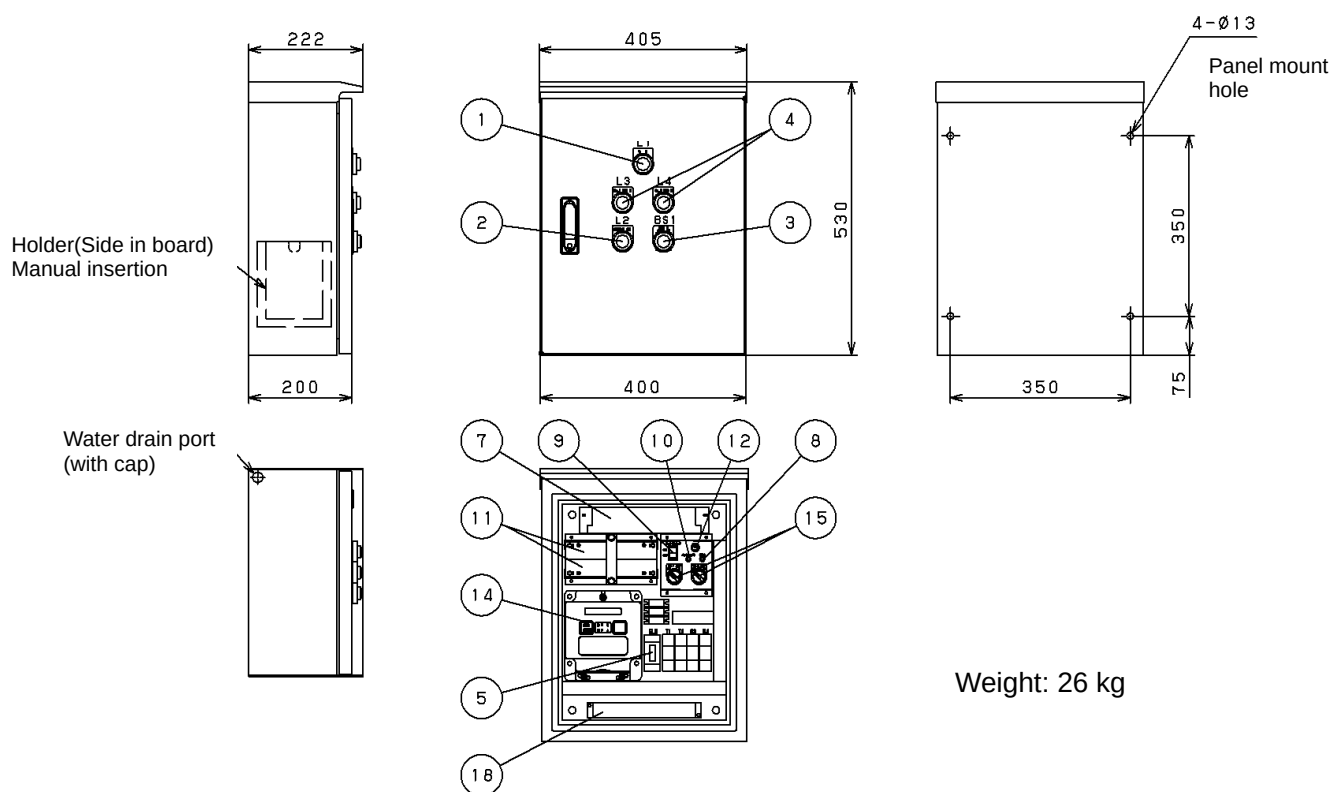
No.	Part name
1	Main body
2	Valve body
3	Seat
4	Stem
5	Pin
6	O-ring
7	Bracket
8	Connector
9	Electric actuator
10	Label

(mm)

Nominal diameter	d	L	D	H	JIS 10K(Wafer shape)		Weight (kg)
					C	n-h	
200A	200	60	256	501	290	12-23	30

4.2 Emergency shut-off valve control panel (hereafter called the "control panel")

*Those for controlling 1 unit, 3 units, and 4 units differ.



No.	Part name	Function
1	Power supply lamp (white)	When the breaker and battery switch is turned on, this comes on.
2	Seismic detector operation lamp (orange)	When the seismic detector starts working, this comes on.
3	Shut-off valve opening switch (Yellow)	When the seismic detector is in operation with the shut-off valve closed, this operates to open the shut-off valve. When the switch is pressed (3 seconds or more), the seismic detector restores and also the shut-off valve opens the valve.
4	Shut-off valve closing switch (red)	The seismic detector starts working and the shut-off valve closes the valve and then the lamp comes on. Deactivation in general.
5	Breaker	"ON" and "OFF" of the input power supply is changed over.
7	Power supply equipment	The input power supply is converted into 24 V DC.
8	In-charging lamp	When the breaker is turned on, this comes on.
9	Battery switch	When the switch is turned on, the storage battery starts charging. Turn this on in general.
10	In-backup lamp	When the battery switch is turned on, this comes on.
11	Storage battery	In the case of a power failure, this becomes the power supply.
12	Fuse	When an over current flows, this shuts off to protect the circuit.
14	Seismic detector	When the set acceleration is exceeded, this starts working.
15	Shut-off valve automatic/close selector switch	In general, this is set to "automatic." When a changeover to "close" is made, the shut-off valve closes the valve.
18	Terminal block	This table is to connect to the shut-off valve.

5. Operational description (Refer to "4.2 Control panel")

5.1 Normal condition

In general, the shut-off valve is in a valve opening condition and only the power supply lamp ① of the control panel is turned on.

(To make a switching operation with the shut-off valve in normal condition, a switching operation is available by operating the shut-off valve automatic/close selector switch ⑮ of the control panel. Also, see "6.Process flowchart *1").

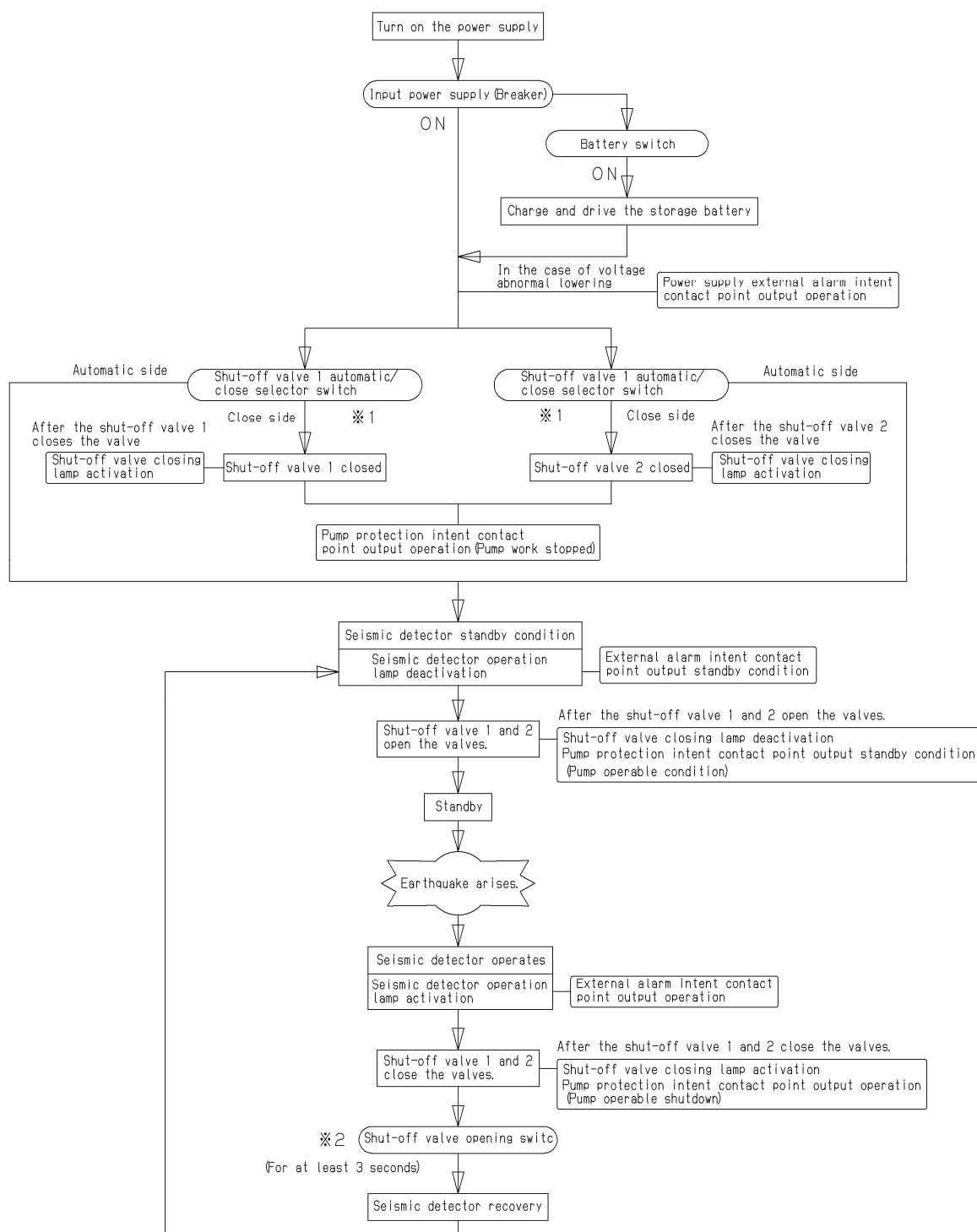
5.2 In the case of an earthquake

If the seismic detector ⑭ mounted inside the control panel detects an earthquake (equivalent to a seismic intensity of 5), the shut-off valve automatically closes the valve. At this time, the seismic detector operation lamp ② on the panel surface and the shut-off valve closing lamp ④ come on.

5.3 Recovery work

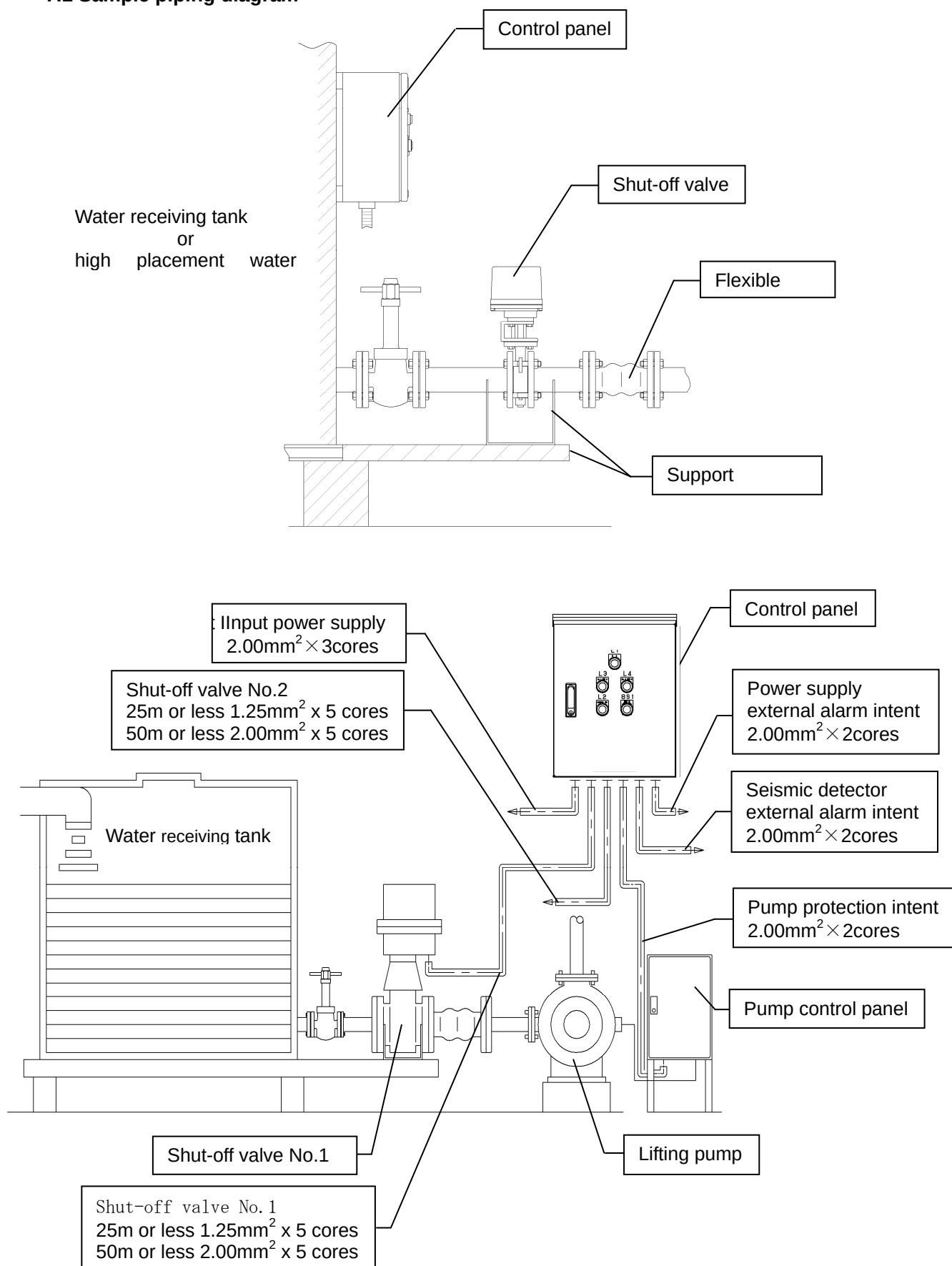
If the shut-off valve closes the valve in the case of an earthquake, make sure that no fault of the piping is found and then press the shut-off valve opening switch ③ (for at least 3 seconds) to reset the seismic detector ⑭ to "open" the shut-off valve. At this time, the seismic detector operation lamp ② and shut-off valve closing lamp ④ on the panel surface go off. ("6.Process flowchart": *2)

6.Process flowchart (for controlling two units)



7.Installation procedure

7.1 Sample piping diagram



*The other shut-off valves for controlling 3 units and 4 units are the same as the No.1 and No.2 (the others are the same as well).

7.2 Shut-off valve and control panel connection diagram

This section describes where the shut-off valves and each terminal block of the control panel are installed.

(1) Control panel terminal block (figure 1)

The terminal block is located inside the control panel.

(2) Shut-off valve terminal block (figure 2)

The terminal block is located inside the electric actuator.

Remove the hexagon socket head bolts to remove the electric actuator cover.

Inside the control panel
(without the front door)

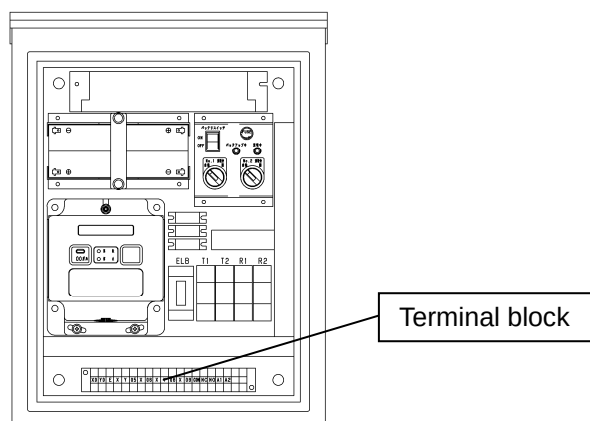


Figure 1

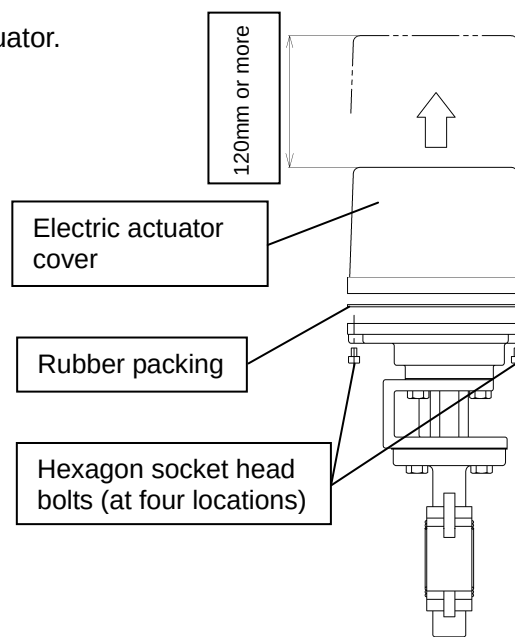
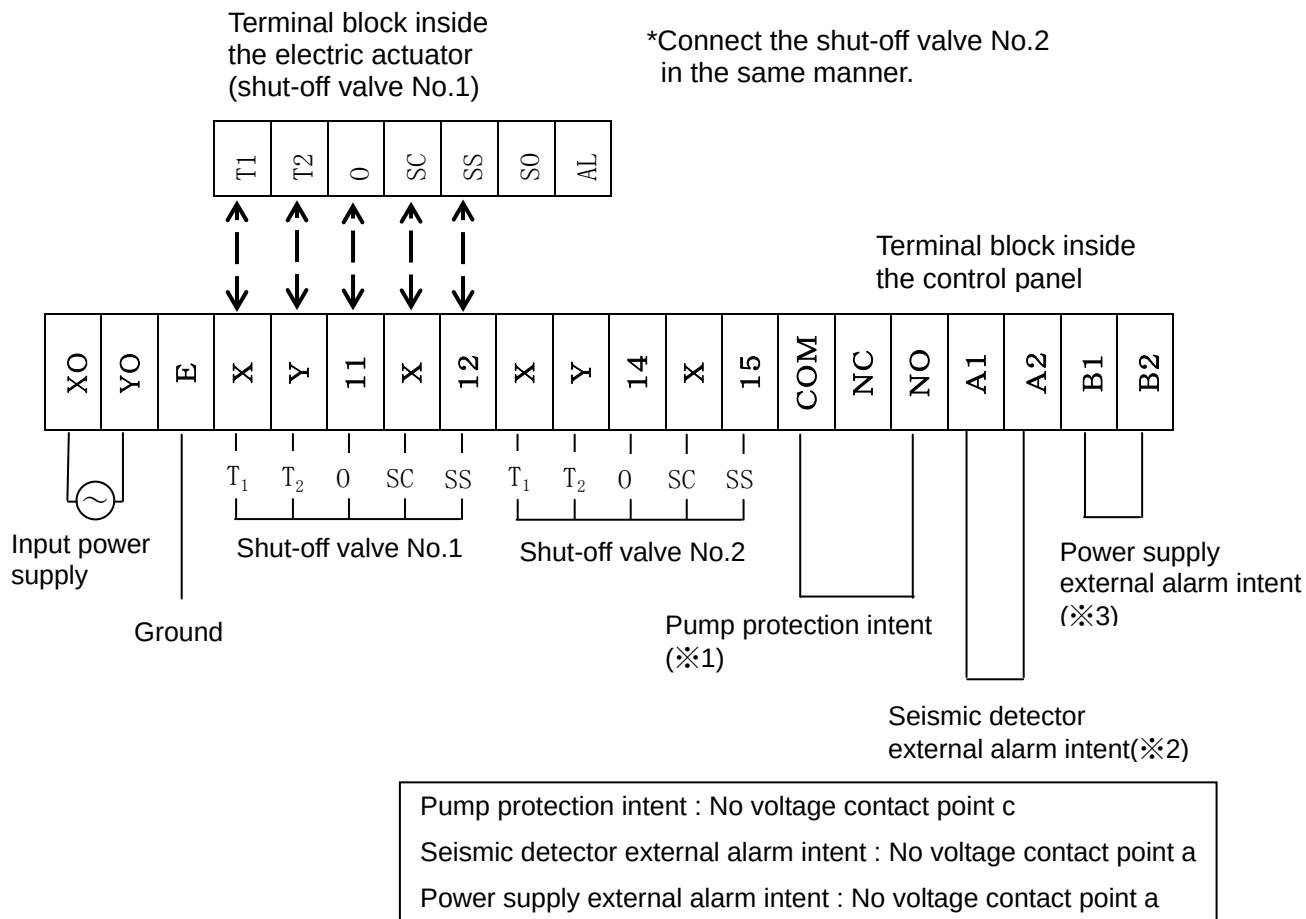


Figure 2



- ※1 Pump protection intent : It is an output terminal for the pump idling prevention with the close valve of the cutoff valve.(No voltage contact point c : for controlling two units)
Please select NC or NO together and connect COM.
NC : The point of contact opens after the close valve of the shut-off valve.
NO : The point of contact shuts after the close valve of the shut-off valve.
- ※2 Seismic detector external alarm intent : It is an output terminal when the seismic detector works.
(No voltage contact point a : The point of contact shuts after the seismic sensor works.)
(Cautions) It enters the state of the output even if there is no power supply.(The point of contact shuts)
- ※3 Power supply external alarm intent : It is an output terminal for no supply of electricity from the power supply and the storage battery.
(No voltage contact point a : The point of contact shuts when electricity is not supplied from the power supply and the storage battery.)

7.3 Warnings and cautions in installing the product

7.3.1 Warnings and cautions with the control panel and shut-off valves



Warnings

- (1) Since the control panel and the shut-off valves are heavy weights, use a hoisting device or an equivalent to definitely support the product when installing them.
 - *A drop can possibly cause an injury.
 - *A drop can possibly damage a function.
- (2) The control panel and the shut-off valves do not have an explosion-proof structure. Avoid using the unit in the atmosphere of corrosive gas or volatile gas, in an accumulation place, or in an explosive atmosphere.
- (3) Allow a skilled and specialized worker to implement the construction of electric wiring.
- (4) Before connection, make sure that the power supply is not turned on.
 - *The operator can get an electric shock.
- (5) Before connection, check the rated voltage and conduct it appropriately according to the connection instructions. (Also, see page 8).
 - *Improper connection can possibly cause an electric shock or fire.
 - *If used with any other than the specified power supply, the unit can possibly generate smoke or fire.
- (6) For the connected portion, ensure to adopt definite insulation treatment measures.
 - *Insufficient treatment can possibly cause an electric shock or fire.
- (7) If the unit is used outdoors, adopt waterproof measures on the connected portion.
 - *A short circuit can possibly occur.
- (8) Make sure that the control panel and the electric operator interior are free from water intrusion.
 - *An electric shock can possibly be given.
- (9) Avoid access to the terminal portion and connected portion out of the connection work.
 - *An electric shock can possibly be given.
- (10) Connect the pump protection intent output terminal and the pump intent control panel (interlock terminal inside the pump intent control panel) in such a manner that the pump will definitely stop running when the shut-off valve closes the valve.
 - *The pump can possibly idle without water supply to the pump inlet side to burn out the motor, resulting in a pump failure or fire.
- (11) Do not remove the electric actuator from the shut-off valve bodies when connecting the shut-off valves to the piping
 - * This can possibly cause loss of parts or a malfunction.



Cautions

- (1) Avoid disassembling the control panel and the shut-off valves.
 - *Careless disassembly prevents the product from functioning.
 - (2) Use the electric wire material as specified in "7.1 Sample piping diagram."
 - In addition, make sure that the wiring is free from an unreasonable force.
 - (3) If the unit is used outdoors, avoid connecting the lines in a rain.
 - *An electric shock can possibly be given.
 - (4) Note that the maximum wiring distance between the control panel and the shut-off valves is 50 meters.
 - *If the wiring distance exceeds 50 meters, the shut-off valves can possibly fail in working.
- (1) When wireways or Prica tubes are used, they must fully be sealed so that no rain water would intrude or dew condensation will not result.
 - (2) Adopt electric shock preventive measures such as grounding.

7.3.2 Cautions with the control panel

⚠ Cautions

- (1) Make sure that the control panel installed is free from vibration.
*Vibration or an equivalent can possibly cause a malfunction.
- (2) When installing the control panel, reserve sufficient space for maintenance, inspection, and repair.
- (3) Avoid installing the control panel in a floodable place.
- (4) Install the control panel definitely on a water tank wall surface or wall.
- (5) Please do not give a shock to internal parts.



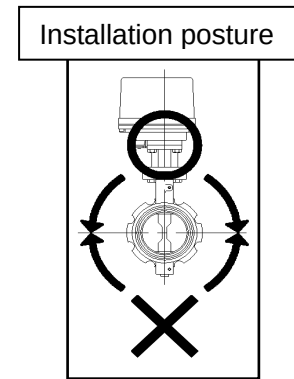
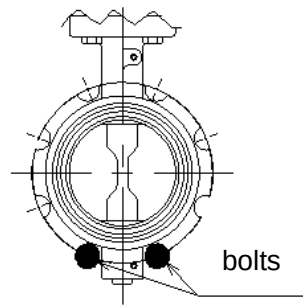
7.3.3 Cautions with the shut-off valves

Cautions

- (1) When piping the shut-off valves, ensure to remove the foreign material out of the pipes.
*If foreign materials or scales intrude the shut-off valves, the original performance will not be utilized.
- (2) In installing the shut-off valves, reserve sufficient space for maintenance, inspection, and repair. (Over the electric actuator: 120 mm or more) (See page 8).
- (3) Check the installation posture of the shut-off valve to install it. (See the following figure).
(Use a square to lateral direction but avoid an upside-down state).
- (4) If the fluid or driving unit can possibly freeze, adopt frost preventive measures.
*The function of the shut-off valve can possibly be degraded.
- (5) To prevent unreasonable force, curvature, or vibration from being transmitted to the shut-off valve, install a support platform. (See the "7.1 Sample piping diagram").
*The shut-off valve can possibly malfunction or the service life can possibly be shortened.
- (6) To the secondary side of the shut-off valve, connect a flexible fitting such as a flexible joint.
*An earthquake can possibly damage the piping for the fluid to outflow, resulting in physical damage.
- (7) On the seat surface of the shut-off valve (FKM), make sure that no machining oil or mineral concerned grease is applied.
*The function of the product can possibly be damaged.

- (1) In piping work, prevent water, sand, or dust from intruding into the electric actuator.
- (2) Accurately center align the connection flange and the shut-off valve to prevent the valve body from coming in contact with the inside of the pipe.
- (3) If the valve body can possibly come in contact with the inside of the pipe, chamfer the pipe connection inner circumference.
- (4) When connecting the shut-off valve, avoid using a flange gasket.
(This does not apply to some special parts).
- (5) Regarding bolt tightening, tighten it with a uniform force alternately on the diagonal.
- (6) In installing the shut-off valve, keep the delivery condition (with the valve body opening by 3 or 5 %) to install it directly.
- (7) If radiated heat causes surface temperature of the electric actuator cover to exceed 55°C, install appropriate shield plates.
- (8) Find two electric wire incoming ports of G1/2 below the electric actuator. Since an electric wire connector (cable tie cable intent) and a plug are attached as attachments, use them if required.
- (9) For wiring work, remove the electric actuator cover.
- (10) In wiring to the electric actuator, use an appropriate cable (φ6 to φ12) to fully seal it.
To the cut cross section of the cable, apply a filling agent to completely adopt measures for dew condensation.
- (11) If a sealant is used inside the electric actuator, use one for electric devices not adversely affecting the contact points such as limit switches.
- (12) Since no water intrudes from the outside after connection, install the rubber packing and then definitely tighten the electric actuator cover with hexagon socket head bolts. (Also, see page 7).

(13) Regarding the bolt insertion position in installing the shut-off valve to the piping, see the following figure to insert the bolt for easy installation work:



7.4 How to adjust the seismic detector

After installing the control panel, adjust the seismic detector in the following procedure. (See the following figure). For the seismic detector mounted inside the control panel, the level protractor must be adjusted. (Do not turn on the breaker and the battery switch).

(1) Loosen the main body cover mount screw ① and remove the main body cover ② close to you.

(2) To slightly touch the level protractor (bead chain) ③ to touch the reference hole ④, conduct the process from (3) to (9).

In addition, if the level protractor (bead chain the level protractor adjustment intent lock nut ⑤ and the level protractor adjustment intent screw ⑧ to conduct the process from (7) to (9).

(3) Loosen the level protractor adjustment intent screw ⑧ and the level protractor adjustment intent lock nut ⑤.) ③ is not in contact with the reference hole ④, definitely tighten

(4) By loosening or closing up the level protractor adjustment intent nut ⑦, move the adjustment plate ⑨ in the back-and-forth direction, position the level protractor adjustment intent nut ⑦ so that the level protractor (bead chain) ③ will not come in contact with the reference hole ④, and temporarily retain the level protractor adjustment intent lock nut ⑤. Next, move the adjustment plate ⑨ left and right, position the unit so that the level protractor (bead chain) ③ will not come in contact with the reference hole ④, and then temporarily retain the level protractor adjustment intent screw ⑧.

(5) Make a fine adjustment in such a manner that the level protractor (bead chain) ③ comes in the center of the reference hole ④ and definitely tighten the level protractor adjustment intent lock nut ⑤ and the level protractor adjustment intent screw ⑧.

(6) Loosen the set value indication plate retention screw ⑪. Move the set value indication plate ⑩ in the back-and-forth direction, align the reference line of the set value indication plate ⑩ with the surface of the adjustment plate ⑨, and tighten the set value indication plate retention screw ⑪.

(7) Cut off the steel ball retention intent stopper (tie wrap band) ⑭ with a pair of nippers or an equivalent and remove the steel ball retention intent stopper (tie wrap band) ⑭. (Since the sensor portion is protected from vibration or impact when the seismic detector is carried, the steel ball retention intent stopper (tie wrap band) ⑭ is installed.

(8) Raise the lever ⑬ slowly up to the uppermost end, set the steel ball ⑮ on the receiving rod ⑯,

and lower it downward. (The operation indicator ⑫ of the seismic detector becomes "green.")

(9) Install the main body cover ② and tighten the main body cover mount screw ①.

*The ⑫ is the operation indicator of the seismic detector. "Green" refers to standby of the seismic detector and "red" refers to the seismic detector in operation (with the shut-off valve closed).

⚠ Cautions

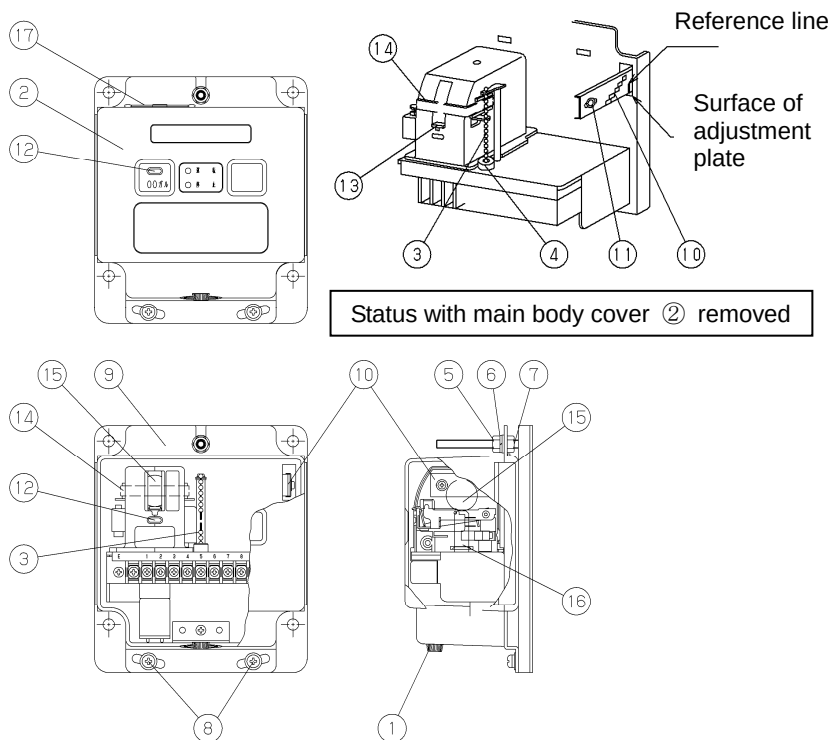
(1) Do not use the unit with the level protractor (bead chain) ③ in contact with the reference hole ④.

*This will cause a malfunction.

(2) Cut off the steel ball retention intent stopper (tie wrap band) with a pair of nippers or an equivalent to remove the steel ball retention intent stopper ⑭.

*If the steel ball retention intent stopper ⑭ is not removed, the seismic detector does not operate.

*When the shut-off valve closing switch (see page 5) is pressed without removing the steel ball retention intent stopper ⑭, the seismic detector can possibly malfunction.



No.	Part name
1	Part name
2	Main body cover mount screw
3	Level protractor (bead chain)
4	Reference hole
5	Level protractor adjustment intent lock nut
6	Spring washer
7	Level protractor adjustment intent nut
8	Level protractor adjustment intent screw
9	Adjustment plate
10	Set value indication plate
11	Set value indication plate retention screw
12	Operation indicator
13	Lever
14	Steel ball retention intent Stopper (Tie wrap band)
15	Steel ball
16	Receiving rod
17	Cotton swab (used in manual operation: see page 20).

8.Operation procedure

8.1 Warnings in operation



Warnings

- (1) Before fluid flows, make sure that no risk is anticipated even when fluid flows to the terminals of the piping.
*If high temperature fluid blows, a burn can possibly result.
*Physical damage can possibly be caused by a fluid outflow.

(2) Keep the control panel energized at all times.
*If it is not kept energized at all times, no operation will be anticipated in the case of a power failure.

(1) Since the shut-off valve has a mechanical working portion (connector unit), avoid access to the moving unit in operation.

(2) Avoid a using method where a reverse rotation signal is input in a switching operation.

*This can shorten the life time of the product.

8.2 Trial running

When a shut-off valve is installed with newly installed piping or replacement or in periodic inspection, run a trial according to "8.2.2 Trial running procedure."

8.2.1 Check before trial running

Before making a trial, ensure to check the following items:

- (1) Make sure that no mistake of the connection and input power supply specifications is found.
- (2) Make sure that the steel ball retention intent stopper (tie wrap band) of the seismic detector is removed. (See (7) of "7.4 How to adjust the seismic detector").
- (3) Make sure that the operation indicator of the seismic detector is in "green."
(See (8) of "7.4 How to adjust the seismic detector").
- (4) Make sure that the shut-off valve automatic/close selector switch is turned to the "automatic" side.



Caution

- (1) Ensure to make a check before making a trial.
*This can possibly cause a malfunction.

8.2.2 Trial running procedure

To operate the following operation procedure, see "each unit name of '4.2 Control panel' on page 5."

Since it is used for "9.3 Periodic inspection" as well, copy and use it for convenience sake.

Interlock with the pump protection intent and external alarm intent is based on both the two shut-off valves connected (those for controlling 3 units and 4 units require the unit quantity in the same manner). No.1 to No.6 are in the operation procedure in series.

NO.	Item	Operation procedure	Check contents	Judgement (OK, NG)	Measure and action in the case of NG
1	Check before trial running	Condition check	Make sure that no mistake of the connection and input power supply specifications is found.		As shown on the connection diagram.
			Make sure that the steel ball retention intent stopper (tie wrap band) of the seismic detector is removed. (See (7) of "7.4 How to adjust the seismic detector").		Remove the steel ball retention intent stopper (tie wrap band) of the seismic detector. (See (7) of "7.4 How to adjust the seismic detector").
			Make sure that the operation indicator of the seismic detector is in "green." (See (8) of "7.4 How to adjust the seismic detector").		Turn the operation indicator of the seismic detector into "green." (See (8) of "7.4 How to adjust the seismic detector").
			Make sure that the shut-off valve automatic/close selector switch ⑮ is turned to the "automatic" side.		Turn the selector switch to the "automatic" side.
			Make sure that the device operate if connected with the external alarm intent terminal.		Make a check for connection and broken wires.
			Make sure that the device operate if connected with the power supply external alarm intent terminal.		
2	Turn on the power supply. (After conducting the operation procedure from a to c, inspect the check contents).	a. Connect the input power supply.	Make sure that the power supply lamp ① is turned on.		Check the input power supply.
		b. Turn on the breaker ⑤.	Make sure that the shut-off valve closing lamp ④ is turned off.		Press the shut-off valve opening switch ③ (for at least 3 seconds).
			Make sure that the seismic detector operation lamp ② is turned off.		
		c. Turn on the battery switch ⑨.	Make sure that the shut-off valve opens the valve.		Make a check for connection and broken wires.
			Make sure that the device doesn't operate if connected with the external alarm intent terminal.		
			Make sure that the device doesn't operate if connected with the power supply external alarm intent terminal.		
			d. Make sure that the pump stops running if connected with the pump protection intent terminal.		

NO.	Item	Operation procedure	Check contents	Judgement (OK, NG)	Measure and action in the case of NG
3	Operation check through manual operation (Interlock with the pump requires the pump in a running state).	a. Turn the shut-off valve automatic/close selector switch ⑮ to the "close" side.	a. Make sure that the shut-off valve closes the valve.		Make a check for connection and broken wires.
			a. Make sure that the shut-off valve closing lamp ④ comes on.		
			a. Make sure that the electric actuator unit does not make an abnormal noise.		Make a check for loosened screws or wear caused rattling.
		b. Turn the shut-off valve automatic/close selector switch ⑮ to the "automatic" side.	b. Make sure that the shut-off valve opens the valve.		Make a check for connection and broken wires.
			b. Make sure that the shut-off valve closing lamp ④ goes off.		
		d. Turn the shut-off valve automatic/close selector switch ⑮ to the "close" side for both the two units (those for controlling 3 units and 4 units require the unit quantity in the same manner).	d. Make sure that the shut-off valve closes the valve.		Make a check for connection and broken wires.
			d. Make sure that the shut-off valve closing lamp ④ comes on.		
			d. Make sure that the pump stops running if connected with the pump protection intent terminal.		
4	Operation check with the seismic detector (Interlock with the pump requires the pump in a running condition).	a. Condition check	a. Make sure that the shut-off valve automatic/close selector switch ⑮ is turned to "automatic."		Set it to the "automatic" side.
			a. Make sure that the shut-off valve opens the valve.		Press the shut-off valve opening switch ③ (for at least 3 seconds).
		b. Drop a steel ball. See "9.4 Manual operation method and 9.4.1 Seismic detector."	b. Make sure that the shut-off valve closes the valve.		Make a check for connection and broken wires.
			b. Make sure that the shut-off valve closing lamp ④ comes on.		
			b. Make sure that the seismic detector operation lamp ② comes on.		
			b. Make sure that the pump stops running if connected with the pump protection intent terminal.		Check the pump for connection and broken wires.
			b. Make sure that the device operates if connected with the external alarm intent terminal.		Make a check for connection and broken wires.
		c. Press the shut-off valve opening switch ③ (for at least 3 seconds).	c. Make sure that the shut-off valve opens the valve.		Make a check for connection and broken wires.
			c. Make sure that the shut-off valve closing lamp ④ goes off.		
			c. Make sure that the seismic detector operation lamp ② goes off.		
			c. Make sure that the pump is in a restartable or startable condition if connected with the pump protection intent terminal.		
			c. Make sure that the device doesn't operate if connected with the external alarm intent terminal.		

NO.	Item	Operation procedure	Check contents	Judgement (OK, NG)	Measure and action in the case of NG
5	Operation check in a power failure	a. Turn off the breaker ⑤ to set a power failure condition to operate in the same manner as the above-mentioned No.4 "Operation check with the seismic detector."	a. Make sure that the "check contents" of the above-mentioned No.4 are fulfilled.		See the above-mentioned No.4.
6	Final check after trial running(After conducting the operation procedure from a to b, inspect the check contents).	a. Turn on the breaker ⑤. b. Turn on the battery switch ⑨.	Make sure that the input power supply is energized at all times.		Check the input power supply.
			Make sure that the shut-off valve automatic/close selector switch ⑮ is turned to "automatic."		Turn it to the "automatic" side.
			Make sure that the shut-off valve opens the valve.		Press the shut-off valve opening switch ③ (for at least 3 seconds).
			Make sure that the electric actuator unit is not abnormally heated.		Review the ambient temperature.
			Make sure that no leak is found from the stem portion of the shut-off valve.		Replace the shut-off valve.

9. Maintenance procedure

9.1 Malfunctions and troubleshooting

If the shut-off valves and control panel do not operate as specified, see "each part name of '4.2 Control panel' on page 5" to adopt measures according to the following table:

Failure condition	Cause of the failure	Troubleshooting and means
The power supply lamp ① is turned off.	1. The breaker ⑤ is turned "off." 2. The battery switch ⑨ is not turned on. 3. The fuse ⑫ has blown. 4. The input power supply voltage is inconsistent with the control panel power supply specification.	1. Turn "on" the breaker ⑤. 2. Turn on the battery switch ⑨. 3. Replace the fuse ⑫. 4. Check the power supply specifications printed left inside the control panel to supply correct voltage.
Even when the shut-off valve automatic/close selector switch ⑮ is operated to the "close" side, the shut-off valve does not work.	Factors of the control panel 1. The input power supply, breaker ⑤, and battery switch ⑨ are not turned on. 2. The connection of the control panel and shut-off valve is incorrect.	1. Turn on each switch to energize the unit. 2. Connect the wires as instructed on the connection diagram.
	Factors of the shut-off valve 1. Due to rain water intrusion or an equivalent, the substrate and contact points are corroded. 2. The manual clutch knob is set on the manual side. 3. Foreign material is trapped, resulting in a lock.	1. Replace the electric actuator. 2. Set it to the automatic side. 3. Remove the foreign material.
Even when the shut-off valve opening switch ③ is pressed, the shut-off valve does not open the valve.	Factors of the control panel 1. The input power supply, breaker ⑤, and battery switch ⑨ are not turned on. 2. The connection of the control panel and shut-off valve is incorrect. 3. The pushing time of the shut-off valve opening switch ③ is short. 4. The steel ball retention intent stopper (tie wrap band) is not removed. See "7.4 How to adjust the seismic detector."	1. Turn on each switch to energize the unit. 2. Connect the wires as instructed on the connection diagram. 3. Press the shut-off valve opening switch ③ for at least 3 seconds. 4. Remove the steel ball retention intent stopper (tie wrap band). Also, see "7.4 How to adjust the seismic detector." If the unit does not start running even when the stopper is removed, contact our company.
	Factors of the shut-off valve 1. Due to rain water intrusion or an equivalent, the substrate and contact points are corroded. 2. The manual clutch knob is set on the manual side. 3. Foreign material is trapped, resulting in a lock.	1. Replace the electric actuator. 2. Set it to the automatic side. 3. Remove the foreign material.
The operation of the shut-off valve is unstable.	1. High frequency noise is injected from the outside, such as an inverter pump. 2. Induction noise is injected.	1. Install each optional noise filter from the inverter manufacturer. Shield the wiring to earth. 2. Set apart the power wiring, such as a 3-phase motor. Shield the wiring to earth.
The operation of the shut-off valve stops in a middle position. (Unstable operation)	1. As valve torque increases, the protective circuit is activated. The connector unit or seat portion traps foreign material.	1. Remove the foreign material.

Failure condition	Cause of the failure	Troubleshooting and means
The electric actuator unit of the shut-off valve is abnormally heated.	1.Ambient temperature is out of the specification range.	1.Set the ambient temperature within the specification range.
The electric actuator unit of the shut-off valve makes an abnormal noise.	1.Screws are loosened.	1.Retighten the fasteners. If wear causes rattling, replace the shut-off valve.
A leak is found from the stem portion of the shut-off valve.	1.The stem seal is worn.	1.Replace the shut-off valve. (Note)
A leak is found from the valve body (seat) of the shut-off valve.	1.The seat is worn or permanently set.	1.Replace the shut-off valve. (Note)

(Note)Undisassemblable. If you have any question when replacing the shut-off valve or the electric actuator, contact our company.

9.2 Warnings and cautions in maintenance and inspection

Warnings

(1)Before maintenance or inspection, make sure that the product and piping inner pressure is at the atmospheric pressure and, in addition, cool down the product main body to a bare-handed accessible temperature to conduct it.

*The residual pressure in the product or piping can possibly injure or burn the operator.

(2)If the product is used for a high-temperature fluid, avoid directly touching it.

*A burn can possibly result.

(3)Before replacing the storage battery cells, make sure that the input power supply is turned off and the power supply to the equipment is turned off.

*An electric shock can possibly be given.

Caution

(1)To maintain the functions and performance of the product, complete periodic inspection.

*General users are to ask a specialized facility or construction contractor to work.

9.3 Periodic inspection

To maintain performance of this system, complete periodic inspection.

*In inspection, the water supply is supposed to be shut off. Centralized control is recommended by completing inspection at the same time as a periodic inspection of the water receiving tank and the high placement water tank.

9.3.1 Operation check (at least once a year)

Use the procedure in "8.2 Trial running" to make an implementation check.

9.3.2 Set acceleration check on the seismic detector (at least once per three years)

Use the following procedure to make a check.

For part numbers, see the diagram in "7.4 How to adjust the seismic detector" on page 12.



Warning

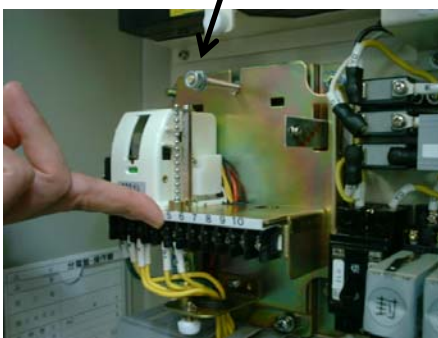
(1) Make sure that the power supply is turned off and then start this procedure.

*An electric shock can possibly be given.

No.	Description	Check item	Check(vcheck) or judgement	
1	Check the switches.	Make sure that the automatic/close selector switch is turned to "automatic."		
2	Check the power supplies.	Make sure that the power supply is not turned on. (Turn off the breaker and the battery switch).		
3	Loosen the main body cover mount screw ① of the seismic detector to remove the main body cover ②.			
4	Sufficiently loosen the level protractor adjustment intent screw ⑧.			
5	Retain the adjustment plate ⑨ with your hands to loosen the level protractor adjustment intent lock nut ⑤ to the limit of the screw. (See picture 1). Keep supporting the adjustment plate ⑨ with your hands to tilt it close to you. (See picture 2). Check the adjustment plate ⑨ position when the steel ball ⑮ drops for the operation indicator ⑫ to turn into "red" by means of the set value indication plate ⑩. (To make a recheck, return the adjustment plate ⑨ to the original position, slowly raise the lever ⑬ upward, and set the steel ball ⑮ on the receiving rod ⑯).	Use the set value indication plate ⑩ to make sure that the set acceleration range is fulfilled. If the set acceleration range is not met, replace the seismic detector.	OK	NG
6	Return the adjustment plate ⑨ to the original position.	Make sure that the level protractor is matched. If it is no matched, see "7.4 How to adjust the seismic detector" to make an adjustment t.	OK	NG
7	Tighten the level protractor adjustment intent screw ⑧ and the level protractor adjustment intent lock nut ⑤.			
8	Slowly raise the lever ⑬ upward all the way to set the steel ball ⑮ on the receiving rod ⑯ and then lower it downward.	Make sure that the operation indicator ⑫ turns into "green." If it does not turn into "green," the seismic detector seems to have been improperly installed or at an unacceptable level. See "7.4 How to adjust the seismic detector" to make an adjustment.		
9	Install the main body cover ② of the seismic detector and tighten the main body cover mount screw ①.			
10	Turn on the power supply.	Make sure that the power supply lamp is turned on, the seismic detector operation lamp and the shut-off valve closing lamp are turned off. If the seismic detector operation lamp and the shut-off valve closing lamp are turned on, press the shut-off valve opening switch (for at least 3 seconds).	OK	NG

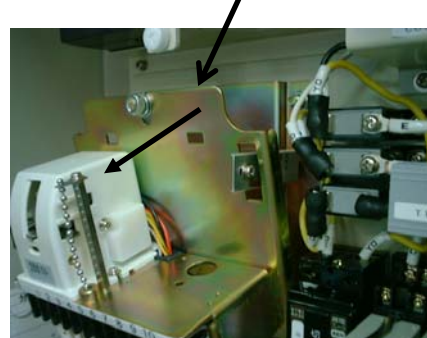
Loosen the level protractor adjustment intent lock nut (5) to the limit of the screw.

(Also, bring the spring washer (6) and flat washer close to you).



Picture 1

Keep supporting the adjustment plate (9) with your hands to tilt it close to you.



Picture 2

9.3.3 Replacing the storage battery (once per three years)

When to replace : Replace the storage battery cells every three years. When to replace them is printed on the sticker on the back of the door of the control panel.

Storage battery cell type : Since they are general-purpose lead storage battery cells, they are commercially available. (Standard product: Made by GS YUASA(NP2.3-12 or aequivalent))

Replacement procedure

- (1) Turn off the breaker and the battery switch.
- (2) Remove the battery cell connectors and the storage battery cell retention fittings to take out the storage battery.
- (3) Place new storage battery by reversing the procedure of ② and then attach the retention fittings and the battery connectors.
- (4) Turn on the breaker and the battery switch and charge the battery for approximately 30 minutes.
- (5) According to the procedure of "8.2 Trial running" on pages 14 to 17, make a trial to make an operation check.
- (6) Complete the battery cell replacement label stuck on (the back of the door of) the control panel with this replacement time and the next replacement year and month.

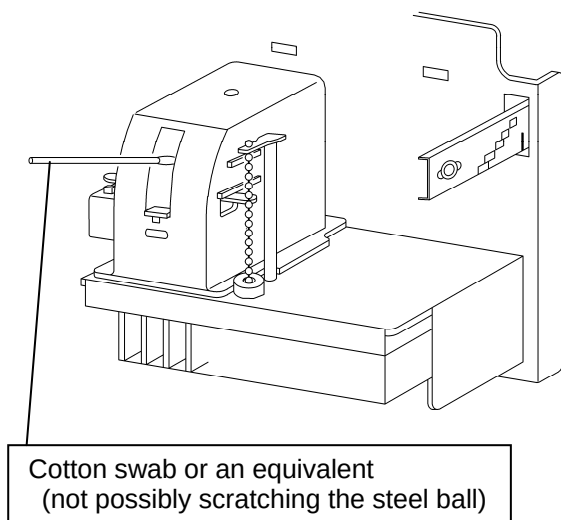
9.4 Manual operation method

9.4.1 Seismic detector

 Caution

(1) When dropping the steel ball from the receiving rod, avoid scratching the steel ball.

*If the steel ball is scratched, a malfunction can possibly result.



Remove the main body cover ② of the seismic detector close to you and, as shown in this figure, use a cotton swab (not possibly scratching the steel ball ⑮) or an equivalent to softly press the steel ball ⑮ to release it from the receiving rod ⑮. (See "7.4 How to adjust the seismic detector" on page 12).

Allow the seismic detector to activate by dropping the steelball⑮ from the receiving rod ⑮.

9.4.2 Shut-off valve

⚠ Warning

(1) Make sure that the power supply is not turned on and then start this procedure.

*An electric shock can possibly be given.

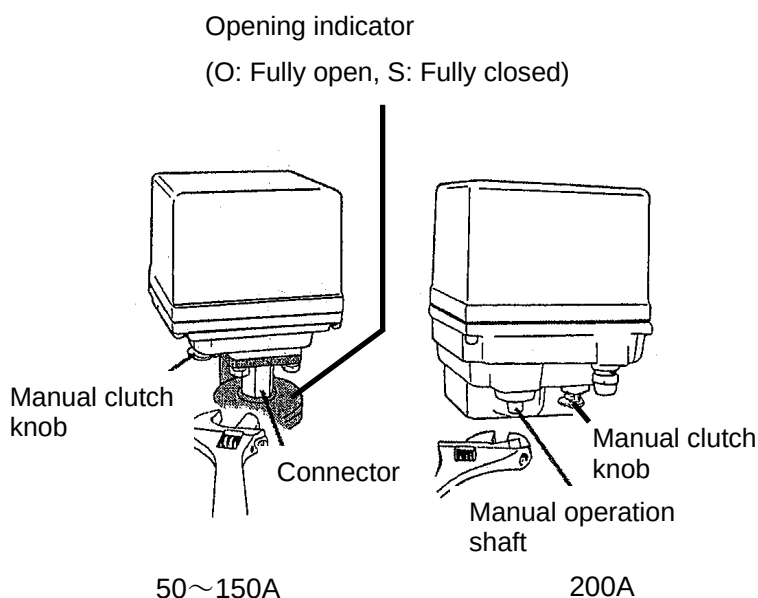
⚠ Cautions

(1) Keep watching an opening indicator or an equivalent to conduct a manual operation and check the wide open and fully closed positions to prevent them from being exceeded.

*If they are exceeded, the product will be damaged.

(2) Make sure that the power supply is not turned on and then start this procedure.

*The product can possibly be broken.



Lower the manual clutch knob below the electric operation machine and turn it by 90 degrees clockwise or counterclockwise.

(The connection to the motor comes off to allow a manual operation).

Engage a monkey wrench or an equivalent with the hexagon of the connector portion (two facets of the manual operation shaft for 200A) to conduct a switching operation.

To return to an automatic operation, return the manual clutch knob to the original condition. In this case, make sure that the manual clutch knob has returned to the original condition.

If it does not return to the original condition, slightly move the connector or the manual operation shaft.

Before proceeding to an automatic operation, ensure to remove the monkey wrench and the manual handle.

