

NO. X003-801

ISSUED: APR. 9, 2010

REVISED: _____



**HOSHIZAKI
WATER ELECTROLYZER**

MODEL ROX-10WB-E

SERVICE MANUAL

CONTENTS

PAGE

I. GENERAL INFORMATION -----	1
1. SAFETY INSTRUCTIONS -----	1
2. PRODUCT INFORMATION -----	3
[a] FEATURES -----	3
[b] MODEL NAME -----	3
3. DIMENSIONS/SPECIFICATIONS -----	4
4. PERFORMANCE DATA -----	5
II. TECHNICAL INFORMATION -----	6
1. PRINCIPLE OF ELECTROLYSIS -----	6
2. CONSTRUCTION -----	9
[a] GENERAL -----	9
[b] CONTROL BOX -----	11
3. WIRING DIAGRAM -----	12
4. WATER CIRCUIT -----	13
5. FUNCTIONS AND OPERATION -----	14
[a] NORMAL MODE -----	14
[b] SHORT MODE -----	14
[c] ADJUSTMENT MODE -----	14
[d] CHECK MODE -----	15
III. SERVICE INFORMATION -----	20
1. ERROR CODES -----	20
2. SERVICE DIAGNOSIS -----	20
3. FLOW RATE ADJUSTMENT -----	22
4. REMOVAL AND REPLACEMENT OF COMPONENTS -----	23
[a] CONTROL BOX -----	23
[b] ELECTROLYTIC CELL -----	23

In the context of this manual, the term "sanitizing water" refers to acidic water and "cleaning water" refers to alkaline water.

I. GENERAL INFORMATION

1. SAFETY INSTRUCTIONS

The following instructions contain important safety precautions and should be strictly observed. The terms used here are defined as follows:

WARNING: There is a possibility of death or serious injury to the service person and a third party or the user due to improper service operations or defects in serviced products.

CAUTION: There is a possibility of injury to the service person and a third party or the user or damage to their property* due to improper service operations or defects in serviced products.

* The term "damage to their property" here refers to extensive damage to household effects, houses and pets.

WARNING

1. When there is no need to energize the unit during disassembly or cleaning, be sure to unplug the unit or disconnect the main power supply before servicing the unit to prevent electric shocks.
2. If the unit must be energized for inspection of the electric circuit, use rubber gloves to avoid contact with any live parts, which may result in electric shocks.
3. Check for proper earth connections, and repair if necessary to prevent electric shocks.
4. Always use service parts intended for the applicable model for replacement of defective parts. Use proper tools to secure the wiring. Otherwise abnormal operation or trouble may occur and cause electric leaks or fire.
5. Check for proper part installations, wiring conditions and soldered or solderless terminal connections to avoid smoke, fire or electric shocks.
6. Be sure to replace damaged or deteriorated power cords and lead wires to prevent electric shocks, flames or smoke.
7. Lead wires using solderless terminals or the like must be bound with their closed ends up to avoid entrance of moisture that could lead to electric leaks or fire.
8. After servicing, always use a megohmmeter (500VDC) to check for the insulation resistance of minimum 1 megohm between the live part (attachment plug) and the dead

metal part (earth terminal). Negligence in checking may cause electric leaks or shocks.

9. Do not service the electrical parts with wet hands to prevent electric leaks or shocks.
10. Always ask the user to keep children away from the work area. They may be injured by tools or disassembled products.

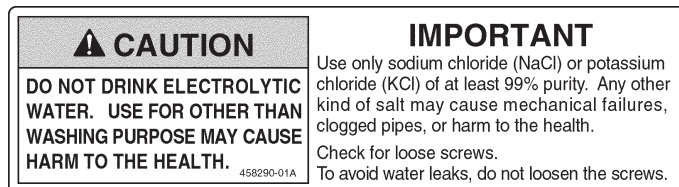
CAUTION

1. After servicing, be sure to check for water leaks from the water supply and drain lines to prevent wetting the surrounding properties.
2. After servicing, always check for proper operation.

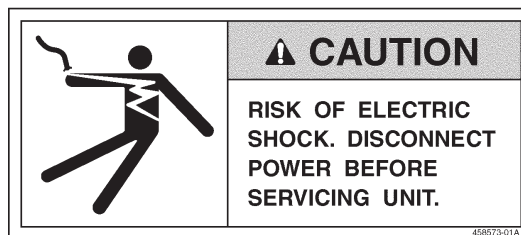
CAUTION LABEL LOCATIONS

The following caution labels are attached where special care should be taken.

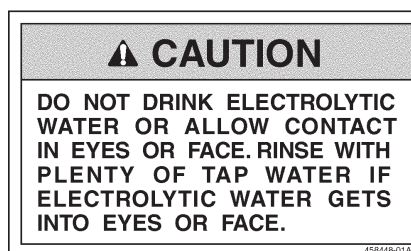
On top panel



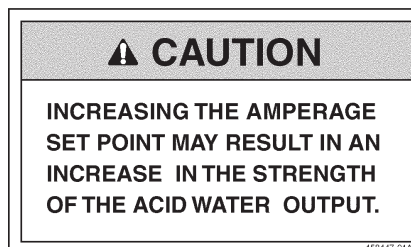
Inside door



On remote controller (option)



On bottom front of control box



2. PRODUCT INFORMATION

[a] FEATURES

1) Space saving

The compact unit (W350 x D174 x H340 mm) allows for installation on the wall.

2) Various optional parts available

Remote controller: Makes the dispensing section remotely operable at hand.

Float switch: Detects the tank water level to automatically start/stop operation.

Outlet valve: Allows use of electrolyzed water stored in the tank, as required.

3) Concentrated salt water direct injection system

Direct addition of concentrated salt water held in the salt water tank (accessory) into the water flow requires no tank for diluted salt water, resulting in reducing the space required.

4) Built-in current sensor

No salt concentration sensor is required. The built-in current sensor provides highly accurate control.

5) Constant-voltage DC power supply

Current control by a constant-voltage power supply uses the salt concentration to correct reduction of the electrolyzation efficiency, resulting in stable concentration of available chlorine.

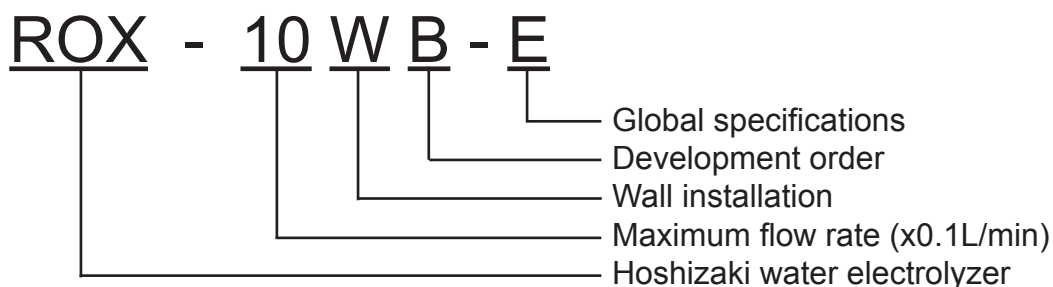
6) Available chlorine concentration 20 - 30 mg/L or more

Sanitizing water contains undissociated hypochlorous acid (HOCl) which sanitizes faster than sodium hypochlorite (NaOCl) and does not remain.

7) Built-in flow rate adjusting valve

The built-in flow rate adjusting valve automatically controls the flow rate according to the selection (low, medium, high).

[b] MODEL NAME

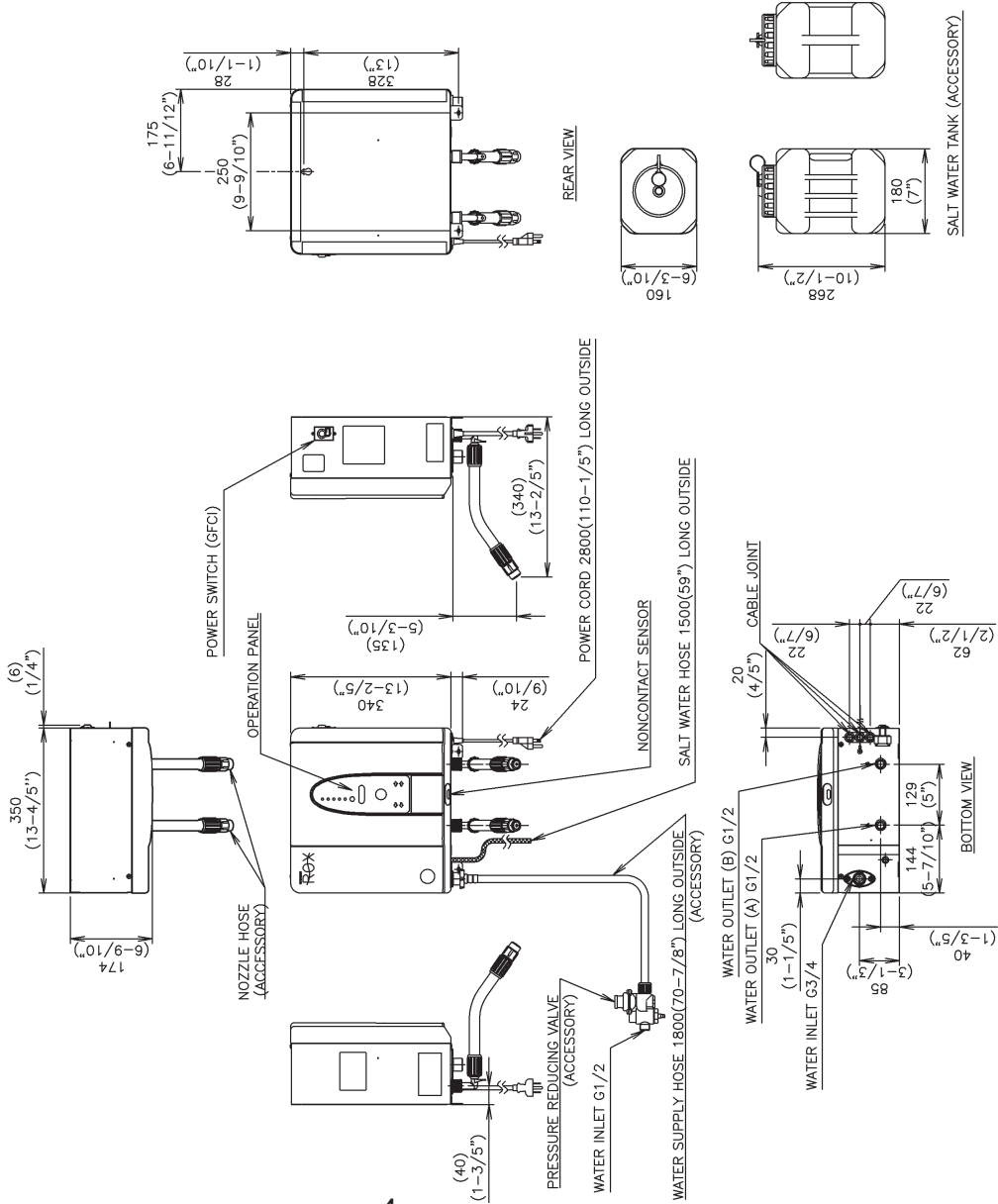


3. DIMENSIONS/SPECIFICATIONS

ITEM	Hoshizaki Water Electrolyzer	
MODEL	ROX-10WB-E	
POWER SUPPLY	1 Phase 220 – 240V 50/60Hz	
AMPERAGE	2.0A	
ELECTRIC CONSUMPTION	170W	
STANDARD PERFORMANCE	<p>PRODUCTION RATE: Acid/Alkaline Water: Approx. 1.0L/min(0.26 gal/min) Acid Water: 20 mg/kg or more(0.17 lbs x 10³ gal or more)</p> <p>Acid Water: Approx. 1.1 or more (Note) Water Temp. 25°C(77°F), Electrolytic Voltage 13V, Electrolytic Current 10A (Peachtree City Water)</p> <p>Alkaline Water: Approx. 0.7 – 1.5 L/min(0.26 – 0.4 gal/min) (Note) Water Temp. 25°C(77°F), Electrolytic Voltage 13V, Electrolytic Current 10A (Peachtree City Water)</p> <p>Alkaline Water: Approx. 0.7 – 1.5 L/min(0.26 – 0.4 gal/min) (Note) Water supply pressure at 0.15MPa(22 PSI) required to ensure 1.0 – 1.5 L/min(0.26 – 0.4 gal/min)</p>	
REFERENCE PERFORMANCE	<p>PRODUCTION RATE: Acid/Alkaline Water: Approx. 1.5 L/min(0.4 gal/min) Acid Water: Min. 10 mg/kg(0.08 lbs x 10³ gal)(Production Rate: Approx. 1.5 L/min(0.4 gal/min))</p> <p>Alkaline Water: Approx. 2.9 – 3.3, Alkaline Water: Approx. 10.5 – 11.0 (Note) Depends on raw water quality and temperature</p>	
OUTSIDE DIMENSIONS	350mm(13-4/5")W x 174mm(6-9/10") x 340mm(13-2/5")H	
EXTERIOR	Galvanized Steel (Polyester Powder Paint), ABS Plastic	
INTERIOR	Stainless Steel, Galvanized Steel (Polyester Powder Paint)	
ELECTROLYSIS SYSTEM	Membrane Technology	
DILUTE SALT WATER ADJUSTMENT SYSTEM	Direct Electromagnetic Pump Injection Method	
ELECTROLYTIC CURRENT ADJUSTMENT SYSTEM	Automatic Adjustment (with Water Temp Correction)	
PRODUCTION RATE ADJUSTMENT SYSTEM	Automatic Adjustment by Switch Operation (Low/Standard/High)	
WATER SUPPLY SYSTEM	Direct Connection to Water Main (Accessory pressure reducing valve required) G3/4 G1/2	
START/STOP	Push Button Switch, Noncontact Sensor	
DISPLAY	Operation, Ready, Add Salt Water, Replace Cell, Error, Water Outlet (Acid/Alkaline)	
CONNECTIONS	Water Inlet G3/4 (Pressure Reducing Valve G1/2), Water Outlet G1/2	
CELL POLARITY SWITCHING CONTROL	Timer-Programmable Controller (Protection for power failure)	
CELL POWER SUPPLY	Constant Voltage DC Power Supply (150W)	
CELL REPLACEMENT TIME	Timer-Programmable Controller (Protection for power failure)	
SALT WATER USAGE CONTROL	Pumping Number Counting	
DILUTE SALT WATER CONCENTRATION	Automatic Adjustment by Electrolytic Voltage and Current	
ELECTRIC CIRCUIT PROTECTION	Earth Leakage Circuit Breaker (with Overcurrent Protection), Earth Wire, Fuse (for PC Board SA)	
SAFETY DEVICE PROTECTION	Emergency Stop by Microprocessor Control	
WEIGHT	Approx. 13 kg(33 lbs) (16 kg(Gross 40 lbs))	
PACKAGE	Carton 610mm(24")W x 250mm(9-7/8")D x 452mm(17-7/8")H	
CERTIFICATION	—	
ACCESSORIES	Salt Water Tank (5L(1.3 gal)), Cop. Water Supply Hose, Nozzle Hose (x 2), pH Tester (TB, AZ), Chlorine Tester, Measuring Cup, Gasket, Pressure Reducing Valve (22 PSIG), Operation Sheet, Screw Collar, Anchor Bolt, Wood Screw, Rubber Dropper, Shower Nozzle, Straight Nozzle, O-ring, Elbow Assy Ambient Temp: 5 – 35°C(40 – 95°F) Water Temp: 5 – 30°C(40 – 86°F) Relative Humidity: Max. 85% (No condensation) Water Supply Pressure: 0.10 – 0.75MPa(22 – 109 PSI) Voltage Range: Rated Voltage±10% Installation Site: Indoor, Ventilation required Water Supply: Comply with local water and sewerage requirements, Water Softener and Filter required Salt: Min. Purity 99%	
INSTALLATION CONDITIONS		

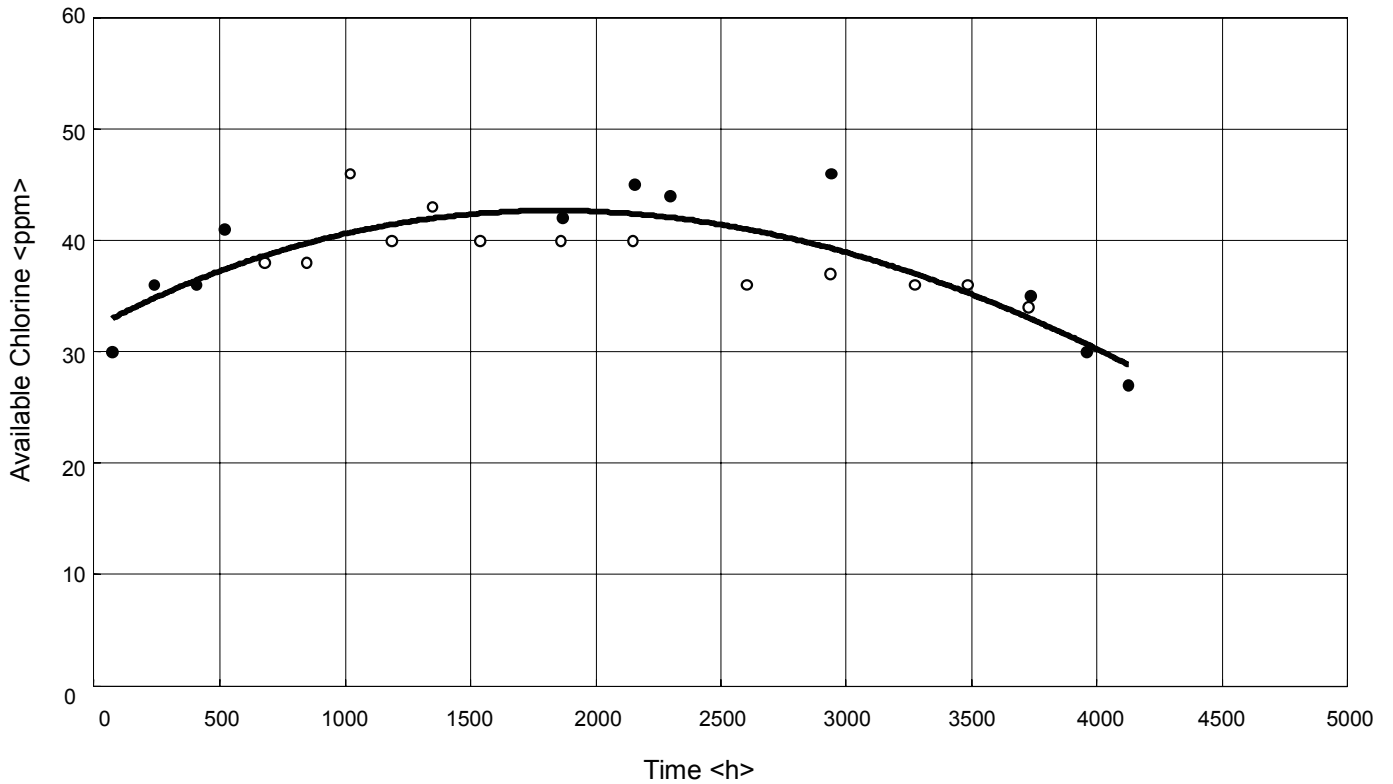
*We reserve the right to make changes in specifications and design without prior notice.

1. Proper grounding is required.
2. The installation site must be clean, dust-free and well ventilated.
3. The external piping must be insulated to prevent condensation.
4. The external piping must have equivalent resistance.
5. The rated properties are based on measurements at ambient temperature 30°C(86°F), water temperature 25°C(77°F), electrolytic voltage 13V, electrolytic current 10A and production rate 1L/min(0.26 gal/min), by using Peachtree City water.
6. The minimum water supply pressure of 0.15MPa(22 PSIG) will be required for selection of the "High" production rate.
7. Install the product properly in accordance with the instructions on location, water supply/drain connections and electrical connections stated in the instruction and installation manuals provided. Allow 10mm(0.4") extra space at the installation site to meet any installation requirements (additional spacing is also required for proper water connections).
8. Product Code: X002-D001, X002-D005, X002-D006



4. PERFORMANCE DATA

The following graph shows the electrode performance curve. The electrode life cycle depends on the free chlorine concentration as well as the raw water quality. To optimize the electrolyzed water, we recommend the electrolytic cell should be replaced every 3,000 hours of operation.



II. TECHNICAL INFORMATION

1. PRINCIPLE OF ELECTROLYSIS

Water (H₂O) we use in our daily life has a mysterious power. Adding a small amount of salt (NaCl) to water (H₂O) and electrolyzing it with special electrodes will generate "electrolytic oxidizing water (acidic water)" with strong oxidizing effects and "electrolytic reducing water (alkaline water)" with strong reducing effects. Here we explain this electrolysis process and the meaning of such terms as "pH" and "oxidization/reduction" which may sound unfamiliar.

Electrolysis Process - See the diagram on the following page for the electrolysis mechanism inside the electrolytic cell.

- 1) Electrolysis with a higher salt concentration around 5 - 20% is apt to generate chlorine gas (Cl₂) at the anode. The electrolyzer with a lower salt concentration around 0.07 - 0.15% is apt to generate hypochlorous acid (HOCl) at the anode.
- 2) At the anode, oxidization will generate hypochlorous acid (HOCl) and chlorine gas (Cl₂).
- 3) At the cathode, reduction will generate hydrogen gas (H₂) and sodium hydroxide (NaOH).

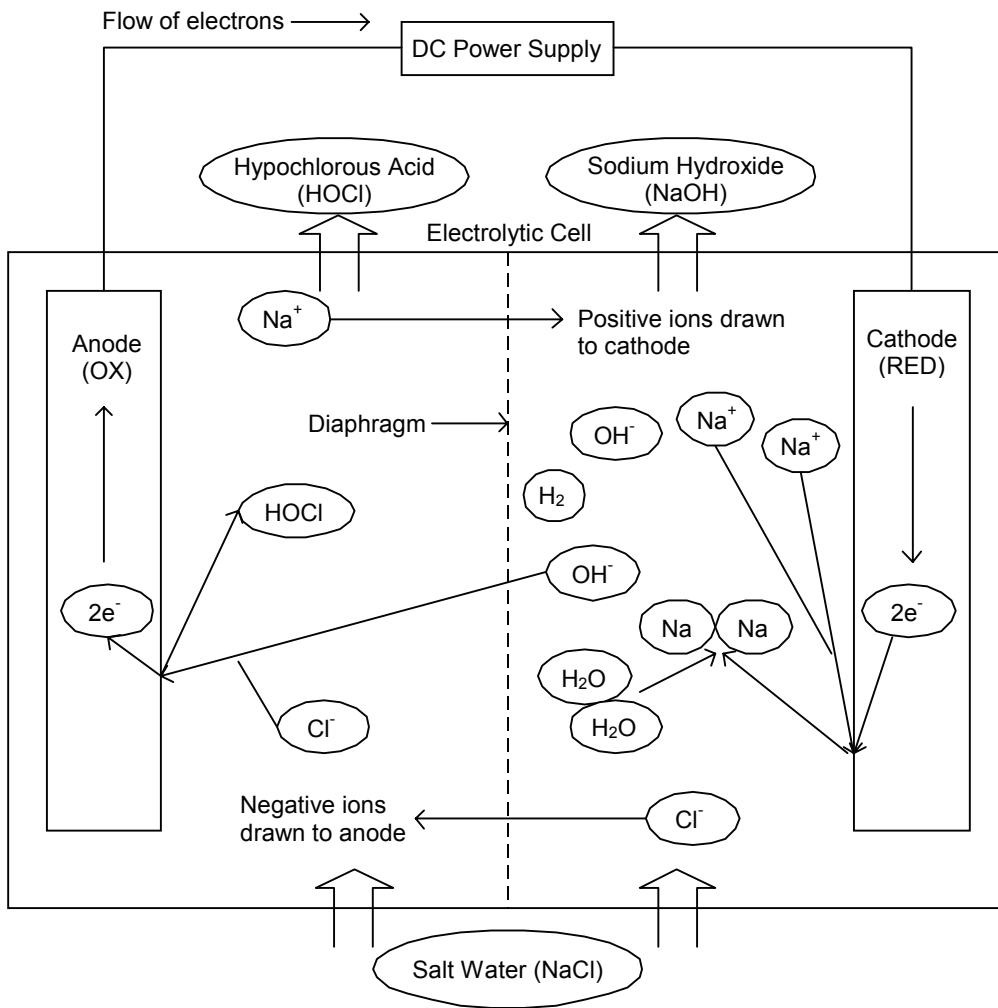
Oxidization/Reduction - Oxidization and reduction occur at the same time, while electrons are transferred.

- 1) Oxidization - Reaction of a substance to emit electrons.
- 2) Reduction - Reaction of a substance to receive electrons.

Oxidization/Reduction Potential - Degree of liability to oxidization and reduction, indicated in "mV".

- 1) Positive potential - An oxidizing agent (= a substance capable of oxidizing other substances) is contained. The higher potential shows the higher tendency to oxidize other substances.
- 2) Negative potential - A reducing agent (= a substance capable of reducing other substances) is contained. The lower potential shows the higher tendency to reduce other substances.

pH - Concentration index of hydrogen ions. pH7 means neutrality, the higher pH alkalinity, and the lower pH acidity.



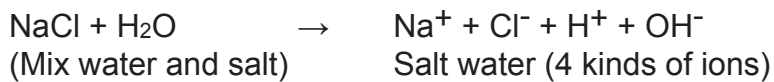
Reactions at Anode

Chloride ions (Cl⁻) and hydroxide ions (OH⁻) emit electrons (e⁻) to the anode, which become hypochlorous acid (HOCl).

Reactions at Cathode

Sodium ions (Na⁺) receive electrons (e⁻) from the cathode and become sodium metal (Na) which reacts with water (H₂O) and becomes sodium hydroxide (NaOH) and hydrogen gas (H₂).

Salt water contains four kinds of ions; sodium ions (Na^+), chlorine ions (Cl^-), hydrogen ions (H^+) and hydroxide ions (OH^-).



When two electrodes are inserted into salt water and voltage is applied:

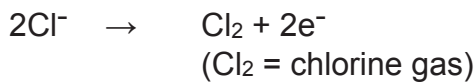
Negative ions (Cl^-) are drawn to the anode, and
Positive ions (Na^+) are drawn to the cathode.

At the anode, hydrogen chloride (HCl) and hypochlorous acid (HOCl) are generated.



Electrons (2e^-) are emitted to the anode, which means the acidic water ($\text{HCl} + \text{HOCl}$) causes oxidation. [As electrons are emitted, the oxidization/reduction potential becomes positive (+mV).]

Chlorine ions also emit electrons and become chlorine gas (Cl_2).



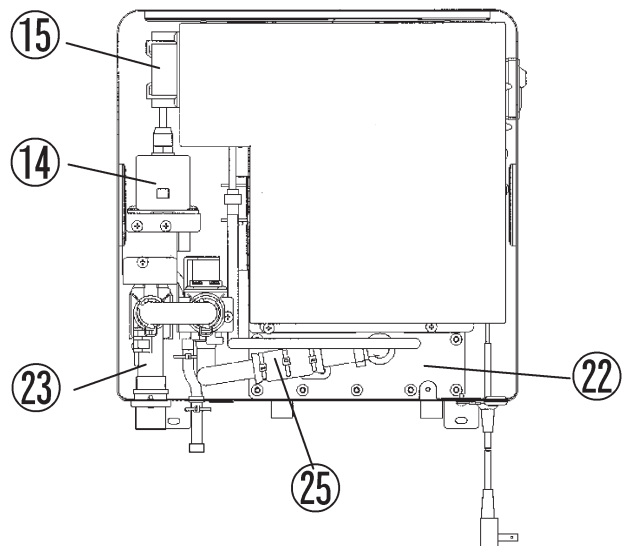
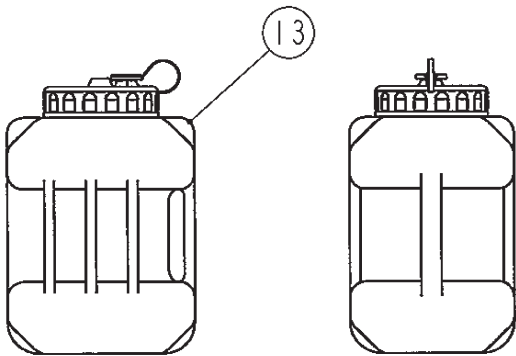
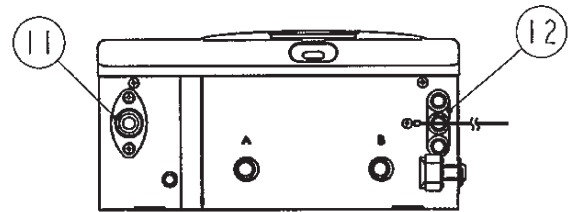
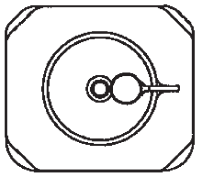
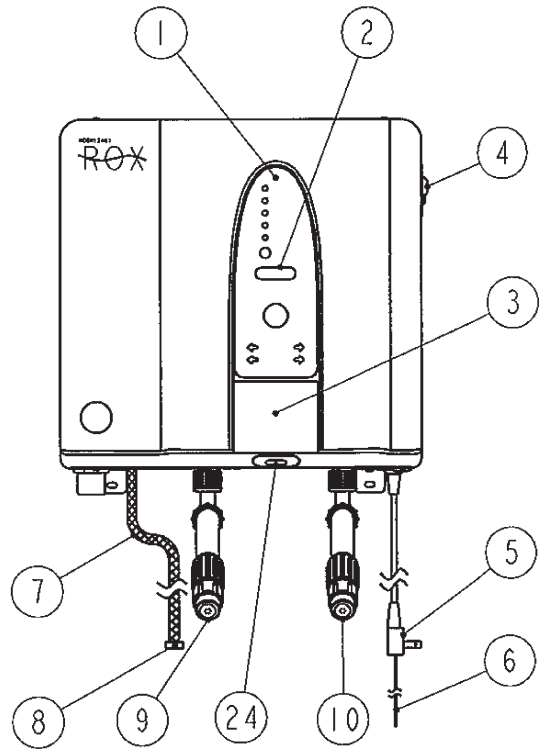
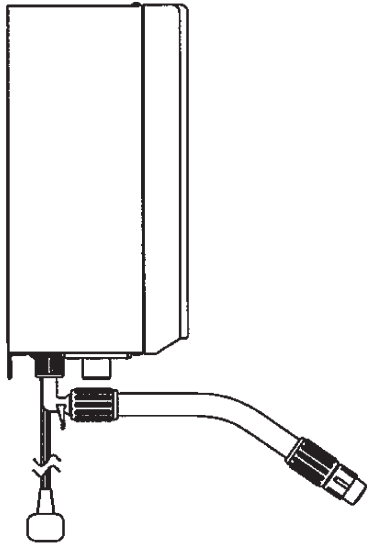
At the cathode, sodium hydroxide (NaOH) and hydrogen gas (H_2) are generated.



Electrons (2e^-) are received from the cathode, which means the alkali water (NaOH) causes reduction. [As electrons are received, the oxidization/reduction potential becomes negative (-mV).]

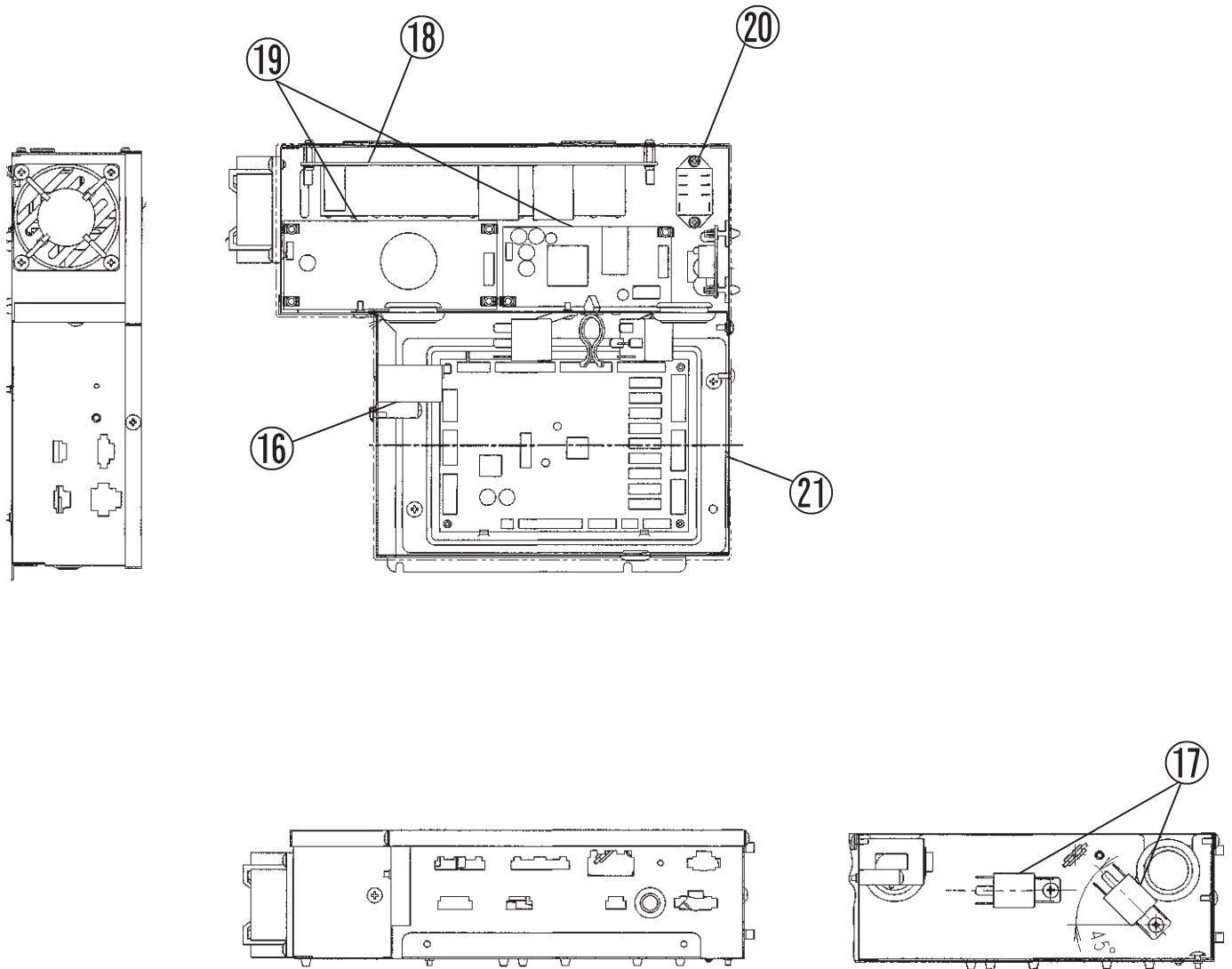
2. CONSTRUCTION

[a] GENERAL



- (1) Operation Panel [Body]
Displays the present state of the electrolyzer (more details to follow).
- (2) Display
Displays the cell run time (h) normally and the present conditions of the electrolyzer by switch operation.
- (3) Control Panel
Provided behind the cover are the buttons to adjust the operating conditions and various set values (more details to follow).
- (4) Earth Leakage Breaker
Shuts off the primary power supply in case of earth leakage or overcurrent.
- (5) Power Cord
Single phase 220 - 240V. Be careful not to jerk or pinch.
- (6) Earth Wire
Be sure to earth the electrolyzer body. Be careful not to jerk or pinch.
- (7) Salt Water Hose
Sucks in concentrated salt water in the salt water tank. Do not curve or bend by force.
- (8) Salt Water Filter
Removes foreign matter from concentrated salt water in the salt water tank. Do not clog. Clean at least once a month.
- (9) Electrolyzed Water Outlet
Dispenses sanitizing or cleaning water.
- (10) Electrolyzed Water Outlet
Dispenses sanitizing or cleaning water.
- (11) Water Supply Inlet
Should be connected with the water supply hose (G3/4) provided.
- (12) Cable Joint
Connects the remote controller.
- (13) Salt Water Tank
Makes and stores 5 L of electrolyte (concentrated salt water).
- (14) Electromagnetic Pump
Feeds a fixed amount of concentrated salt water (electrolyte) into the electrolytic cell.
- (15) Fan Motor
Cools down the control box interior.
- (22) Electrolytic Cell
Electrolyzes diluted salt water to generate sanitizing water and cleaning water.
- (23) Flow Control Valve
Located between the water supply inlet and the electrolytic cell. Adjusts the rate of water supply.
- (24) Motion Sensor
Non-contact sensor to start and stop dispensing electrolyzed water.
- (25) Thermistor
Senses the water temperature and automatically reduces the electrolytic current to prevent excessive available chlorine concentration in low temperature conditions.

[b] CONTROL BOX



(16) Current Sensor

Measures the current of the electrolytic cell.

(17) Magnetic Switch

Reverses the polarity of the voltage applied to the electrolytic cell.

(18) Switching Regulator [Electrolytic Cell]

DC power supply for electrolysis in the electrolytic cell.

(19) Switching Regulator [Main Control Board]

DC power supply to drive the DC electrical components.

(20) Relay

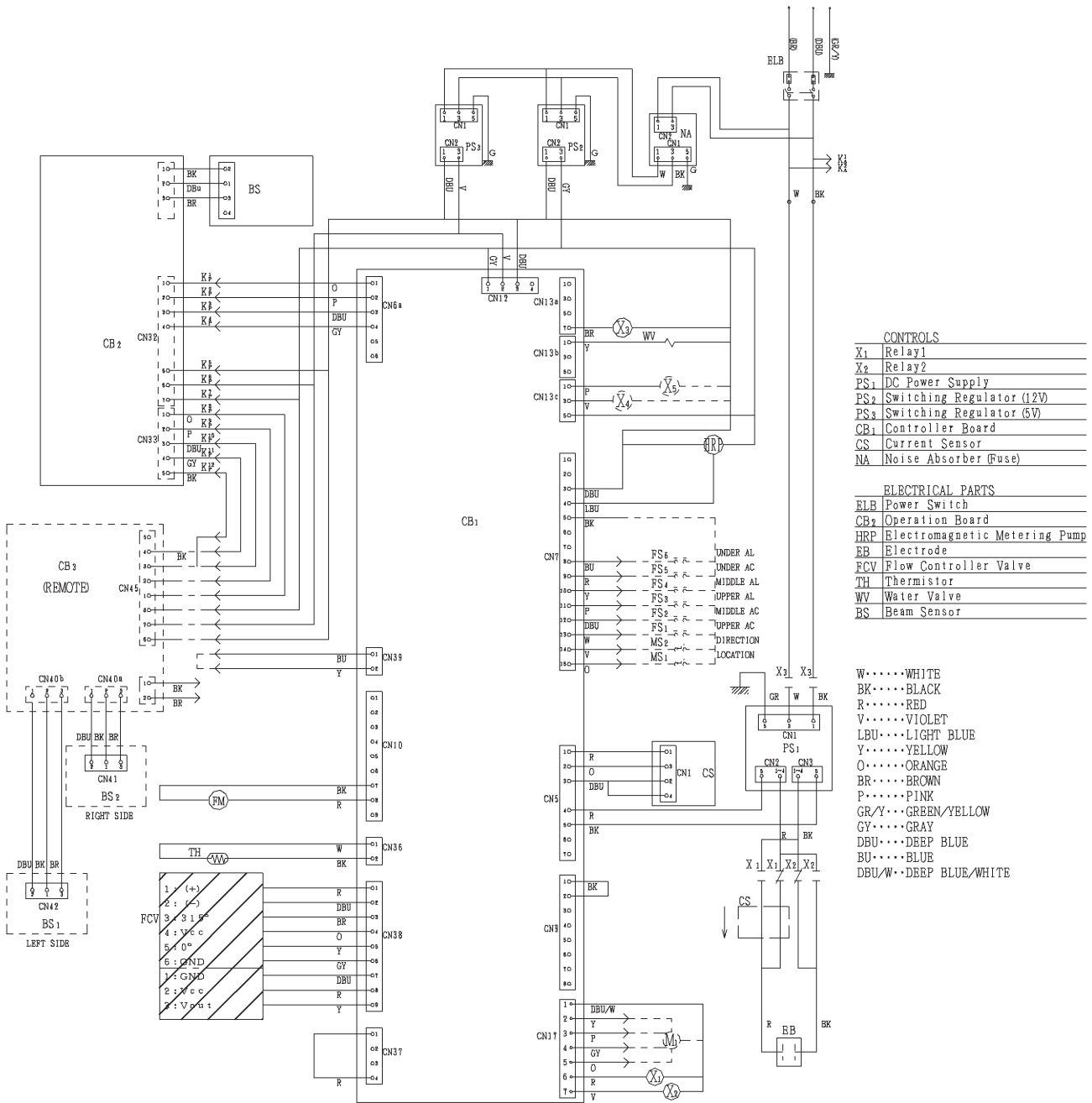
Located on the supply line of the switching regulator [electrolytic cell]. Turns on/off the switching regulator by using a make contact.

(21) Main Control Board

Functions as the brain of the controls to verify inputs and command outputs.

3. WIRING DIAGRAM

Power Supply 1Phase 220-240V



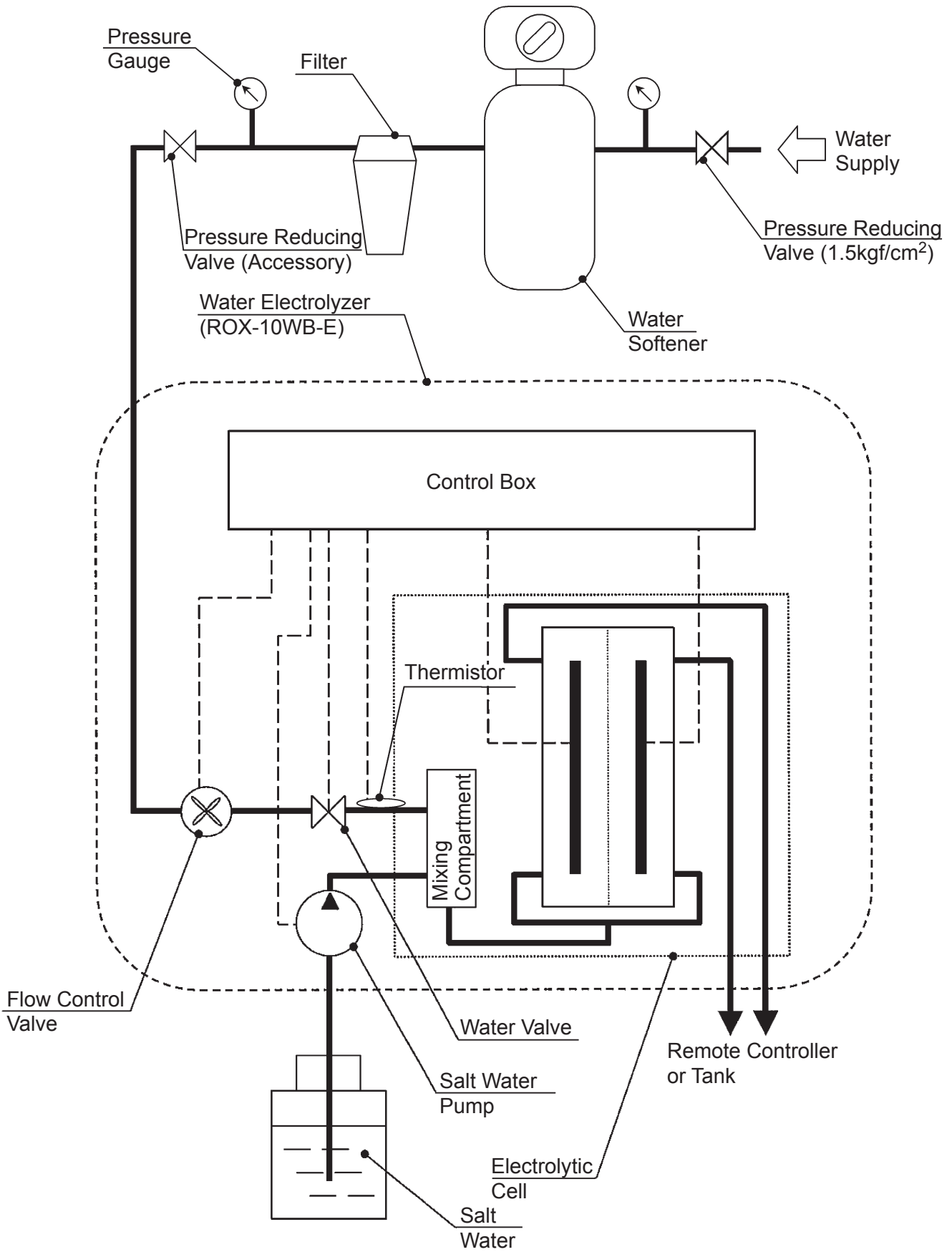
- CONTROLS**
- | | |
|-----|---------------------------|
| X1 | Relay1 |
| X2 | Relay2 |
| PS1 | DC Power Supply |
| PS2 | Switching Regulator (12V) |
| PS3 | Switching Regulator (5V) |
| CB1 | Controller Board |
| CS | Current Sensor |
| NA | Noise Absorber (Fuse) |

- ELECTRICAL PARTS**
- | | |
|-----|-------------------------------|
| ELB | Power Switch |
| CB2 | Operation Board |
| HRP | Electromagnetic Metering Pump |
| EB | Electrode |
| FCV | Flow Controller Valve |
| TH | Thermistor |
| WV | Water Valve |
| BS | Beam Sensor |

- W.....WHITE
 BK.....BLACK
 R.....RED
 V.....VIOLET
 LBU.....LIGHT BLUE
 Y.....YELLOW
 O.....ORANGE
 BR.....BROWN
 P.....PINK
 GR/Y...GREEN/YELLOW
 GY.....GRAY
 DBU.....DBBP BLUE
 BU.....BLUE
 DBU/W...DBBP BLUE/WHITE

373258L01A

4. WATER CIRCUIT



5. FUNCTIONS AND OPERATION

[a] NORMAL MODE

The following menus are available in the normal mode. The display shows from 1 to 3 every time the display select button is pressed.

No.	Menu	Description
1	Cell run time (h)	Total electrolytic cell run time at present.
2	Current (A)	Current flowing in electrolytic cell at present as measured by current sensor.
3	Voltage (V)	Voltage provided on electrolytic cell at present as measured by main control board.

[b] SHORT MODE

Use this mode to change the polarity every 2 minutes.

- 1) While the earth leakage breaker is off, hold down the flush button and set/reset button.
- 2) Turn on the earth leakage breaker.
- 3) After 5 seconds, release the flush button and set/reset button.

Note: The operation lamp flashes while the short mode is selected.

[c] ADJUSTMENT MODE

The following menus are available in the adjustment mode.

No.	Menu	Factory default	Adjustable range/increments
A1	Current (A)	Lo: 10, Std: 10, Hi: 10	5.0 to 18.0/0.1 (wt=25°C)
A2	Voltage (V)	Lo: 12, Std: 12, Hi: 12	7.0 to 18.0/0.1
A3	Total flow rate (L/min)	Lo: 3.0, Std: 4.0, Hi: 6.0	1.5 to 8.0/0.1
A4	Combination	1	Main: 1, Sub: 2
A5	Portion control time (min)	1	1 to 60/1
A6	Cleaning water dispensing time for hand washing (s)	30	15 to 120/5
A7	Sanitizing water dispensing time for hand washing (s)	30	15 to 120/5
A8	Cell run time/reversal time reset	N/A	Display present run time, then hold down set/reset button (10s) to reset
A9	Initial flash time (s)	Std	Std, 0 to 20/1
A10	Cell replacement time (h)	3000	1500 to 9000/100
A11	Cell reversal time (h)	12	0.033 (check), 1 to 150/1

No.	Menu	Factory default	Adjustable range/increments
A12	Continuous dispensing protection time (min)	Cont	Cont, 10 to 720/10
A13	Single nozzle	2	Single: 1, Std: 2
A14	Water temperature correction factor	4	0 to 8/1
A15	Flow rate adjustment factor, operation time factor	0.3	0.1 to 2.0/0.1
A16	Skip	N/A	Skip
A17	Flow rate correction value (L/min)	0	-0.5 to 0.5/0.1
A18	Water softener regeneration output cycle (h)	0	0 to 100/1
A19	Salt water supply factor, feedback	1.0	1.0 to 5.0/0.1
A22	Salt water supply factor, initial non-electrolysis time (s)	5	1 to 10/1
A23	Salt water supply factor, feedback cycle	1.0	1.0 to 5.0/0.1
A25	Salt water supply factor, stroke subtraction after reaching set point (times/s)	N/A	Skip
A26	Reset	N/A	Display "rSET", then hold down set/reset button (10s) to reset
A27	Flow control valve open/closed	N/A	Display current status

* Basically do NOT adjust the menus in gray.

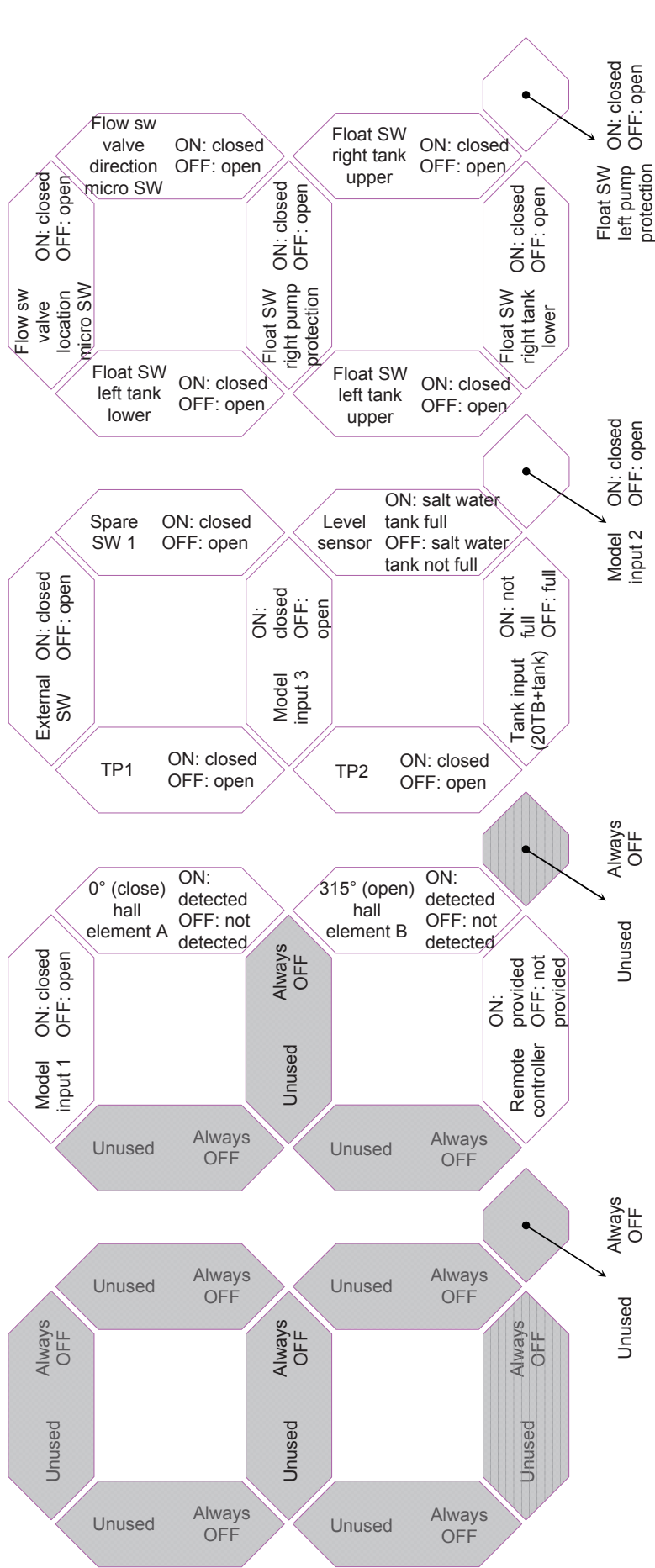
[d] CHECK MODE

The following menus are available in the check mode.

No.	Menu
C1	Inputs
C2	Inputs
C3	Outputs
C4	Salt water pump stroke (spm)
C5	Total flow rate (L/min)
C6	Water temperature (°C)
C7	Set current at present water temperature (A)
C8	Corrected current (A)
C9	Elapsed cell reversal time (min)
C10	Elapsed time after regeneration output (h)
C11	Last error number

No.	Menu
C12	Cell run time at last error
C13	Cell reversal time at last error
C14	Current at last error
C15	Voltage at last error
C16	Total flow rate at last error
C17	Salt water pump stroke at last error (spm)
C18	Water temperature at last error (°C)
C19	Set current at water temperature at last error (A)
C20	Corrected current at last error (A)
C21	Second from last error number
C22	Cell run time at second from last error
C23	Cell reversal time at second from last error
C24	Current at second from last error
C25	Voltage at second from last error
C26	Total flow rate at second from last error
C27	Salt water pump stroke at second from last error (spm)
C28	Water temperature at second from last error (°C)
C29	Set current at water temperature at second from last error (A)
C30	Corrected current at second from last error (A)
C31	Third from last error number
C32	Cell run time at third from last error
C33	Cell reversal time at third from last error
C34	Current at third from last error
C35	Voltage at third from last error
C36	Total flow rate at third from last error
C37	Salt water pump stroke at third from last error (spm)
C38	Water temperature at third from last error (°C)
C39	Set current at water temperature at third from last error (A)
C40	Corrected current at third from last error (A)
C41	Model configuration (1: ROX-10WB-E, 3: ROX-10WB-E with remote controller)
C42	Control board version

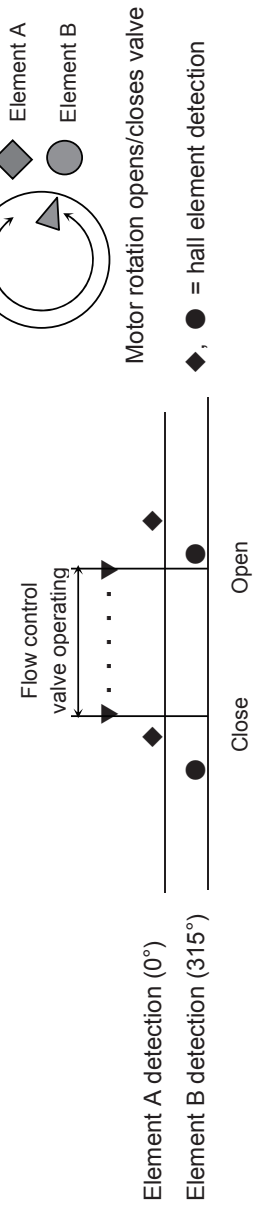
C1 Display



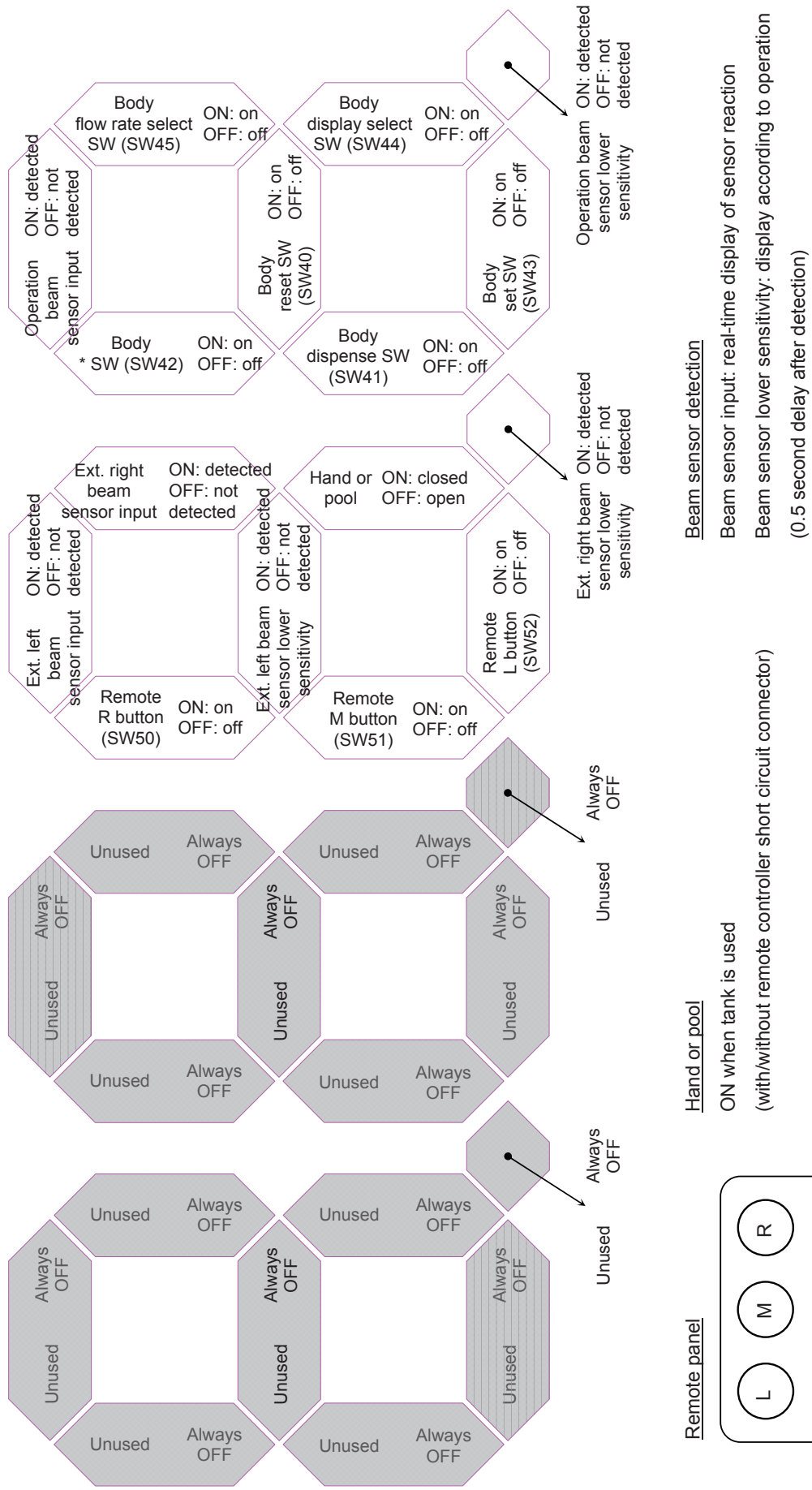
Model inputs

- 1: ON when ROX-10WB-E is used
- 2: ON when ROX-20TB-E is used
- 3: ON when ROX-20TB-E with tank is used

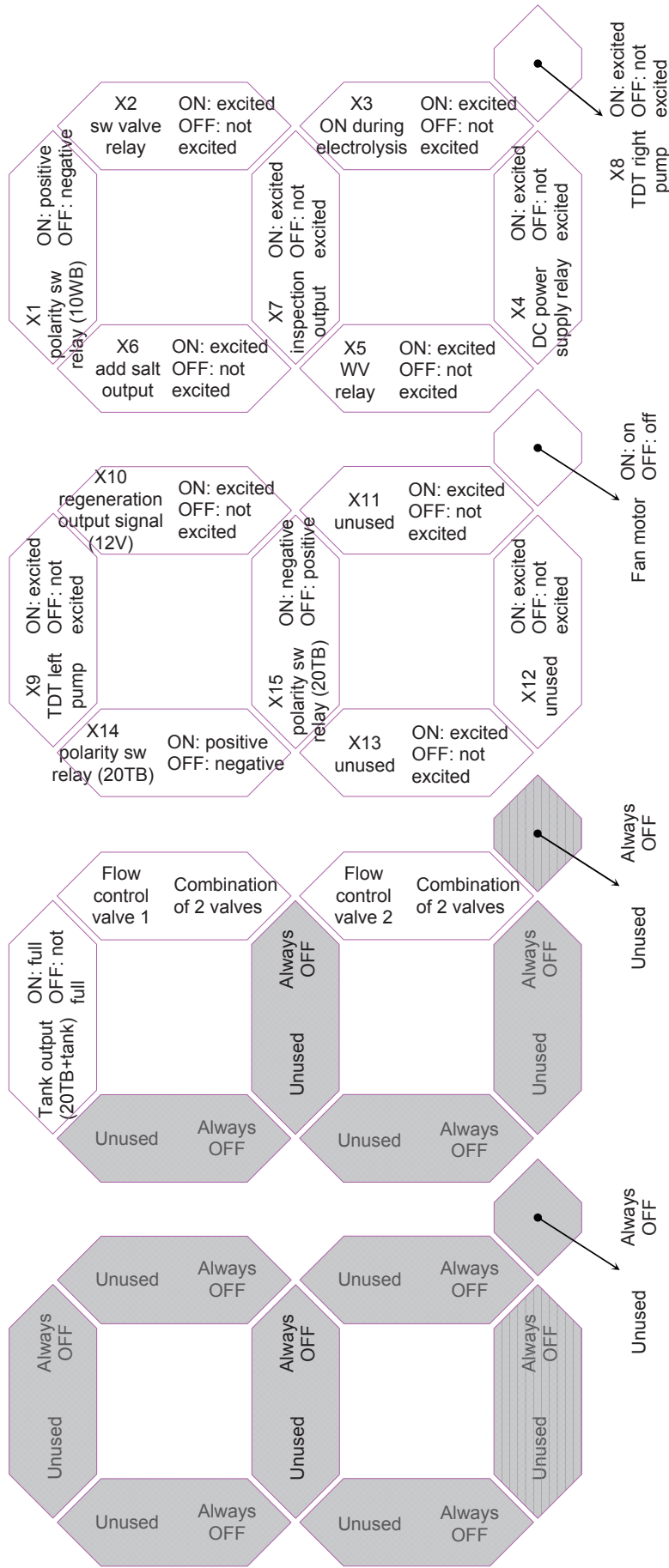
Flow control valve mechanism



C2 Display (ROX-10WB-E)



C3 Display



Flow control valve outputs

	Brake	Close	Open	Stop
Flow control valve 1	b2	ON	OFF	OFF
Flow control valve 2	C2	ON	OFF	OFF

Brake: valve stopping, Close: decreasing flow rate, Open: increasing flow rate, Stop: valve OFF

III. SERVICE INFORMATION

1. ERROR CODES

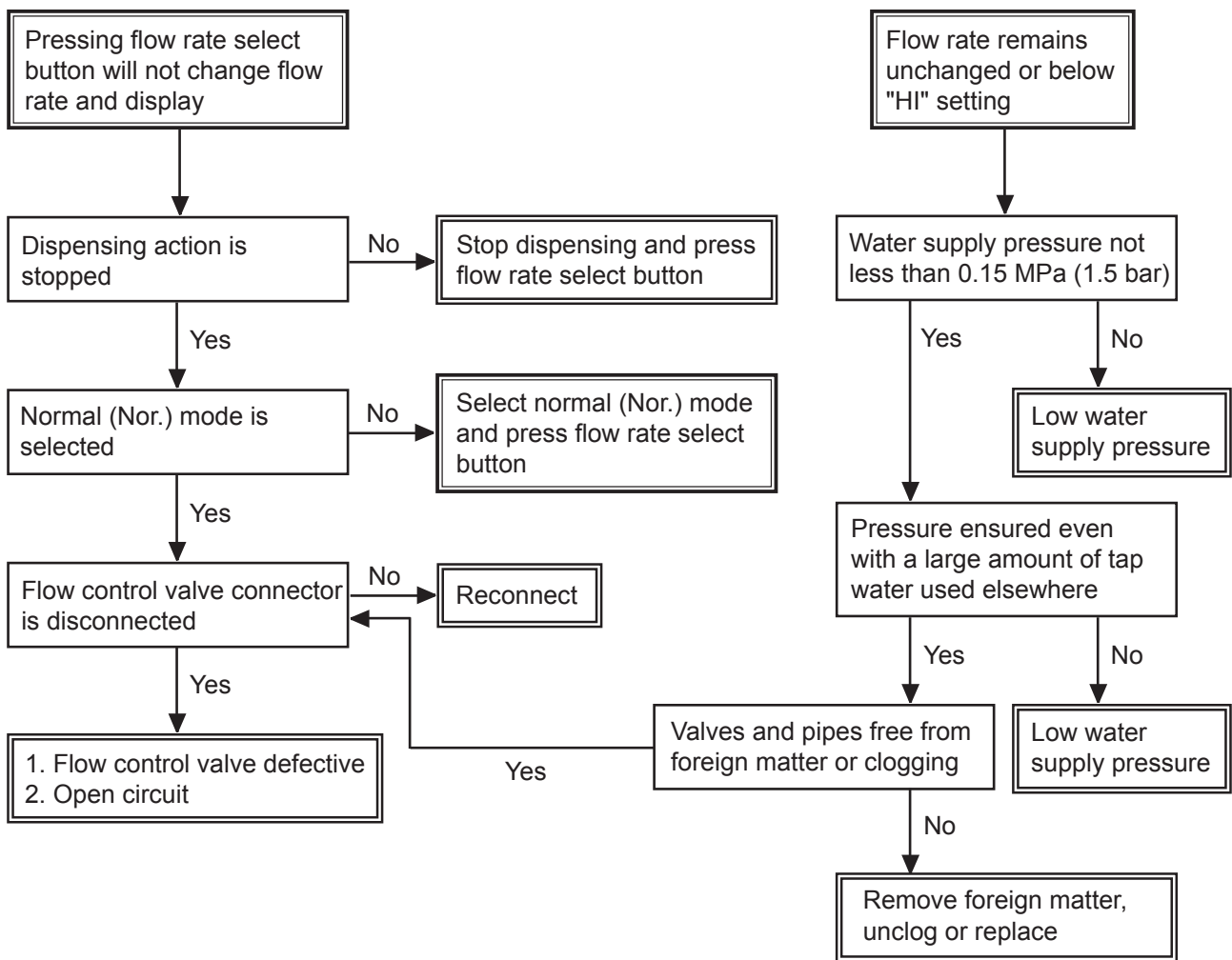
Lamp	No.	Error	Problem	Operation	Control panel display
Error	E11	Low water	Flow rate stayed below 0.5L/min for 10 sec with water valve on	Production stops after water valve turns off two times	Error no.
Error	E14	Water shutoff	Flow rate stayed above 0.5L/min for 10 sec with water valve off	Production stops after water valve turns on two times	Error no.
Error	E53	Contactor supply	Current stayed below 0.5A for 2 sec	Production stops after contactor switches three times	Error no.
—	E74	Thermistor	Open circuit (-30°C) or short circuit (60°C)	Production continues as 5°C (open circuit) or 30°C (short circuit)	Alternate between normal display and error no.
Add salt water	—	Salt water level	Salt water pump stayed at 700 spm for 90 sec	Production stops	(Add salt lamp on)
—	EE1	Model setting	Model setting connector lost or wrong	Production stops	Error no.
Error	EF0	Control board	EEPROM error	Production stops	Error no.

2. SERVICE DIAGNOSIS

Lamp	Error code	Problem	Check	Possible cause	Remedy
Add salt water	—	Salt water pump stayed 700 spm for 90 sec	Salt water tank	Low salt water concentration	Add salt in salt water tank
			Salt water hose	Loose connection to salt water tank	Reconnect
				Clogged	Unclog
				Vapor lock	Unlock
			Filter	Dirty	Clean
			Switching regulator (electrolytic cell)	Defective	Repair or replace
				DC supply line open circuit	Correct
Magnetic switch	Defective	Repair or replace			
	Bad contacts	Repair			
Add salt water	—	(Continued)	Relay	Defective	Repair or replace
				Bad contacts	Repair
			Current sensor	Defective	Repair or replace
			Salt water pump	Defective	Repair or replace
				Improper stroke dial setting	Set to "E" (far to left)
				Supply line open circuit	Correct
				Signal line open circuit	Correct

Lamp	Error code	Problem	Check	Possible cause	Remedy
Error	E11	Flow control valve (flow rate sensor) detected flow rate below 0.5L/min for 10 sec with water valve on	Water supply line	Water failure	Recover water supply
			Electrolyzed water outlet	Blocked	Unblock
			Joint hose	Crushed or bent	Correct
				Scaled	Replace
			Filter	Clogged	Unclog
			Water valve	Defective	Repair or replace
				Clogged	Unclog
				Supply line open circuit	Correct
			Flow rate sensor	Defective	Repair or replace
				Clogged	Unclog
Signal line open circuit	Correct				
Error	E14	Flow rate sensor detected flow rate above 0.5L/min for 10 sec with water valve off	Water valve	Defective	Repair or replace
				Clogged	Unclog
			Flow rate sensor	Defective	Repair or replace
Error	E53	Electrolytic current stayed below 0.5A for 2 sec	Current sensor	Defective	Repair or replace
				12V line open circuit	Correct
				Signal line open circuit	Correct
			Switching regulator	Defective	Repair or replace
			Main control board	Defective	Repair or replace
				Loose chip insertion	Correct
—	E74	Thermistor open circuit (-30°C) or short circuit (60°C) was detected	Thermistor	Defective	Repair or replace
—	EE1	Model setting connector lost or wrong	Main control board	Incorrect wiring connector	Correct
—	EF0	EEPROM memory element error	Main control board	Defective	Replace

3. FLOW RATE ADJUSTMENT



Note: The actual flow rate may differ from the setting depending on variation of the flow rate sensor in the flow control valve.
 e.g. Total flow rate setting [standard 2.0L/min] --> actual flow rate [2.5L/min]

If the difference is too large, use the adjustment mode (AdJ.) to adjust the total flow rate (A3).
 e.g. Total flow rate setting [1.5L/min] --> actual flow rate [2.0L/min]

4. REMOVAL AND REPLACEMENT OF COMPONENTS

[a] CONTROL BOX

CAUTION

To prevent electric shock, be careful not to crush or drag the pipes or wires when removing the control box.

- 1) Turn off the earth leakage breaker, and unplug the unit.
- 2) Remove the four M4 screws securing the top and bottom of the front panel.
- 3) Disconnect all the connectors coming from the control box.
- 4) Remove the two M4 screws securing the bottom of the control box.
- 5) Slide out the control box towards you.
- 6) To replace, reverse the above procedure.

[b] ELECTROLYTIC CELL

CAUTION

1. To prevent electric shock, be careful not to crush or drag the pipes or wires when removing the electrolytic cell.
2. To prevent water leaks resulting in wetting the surrounding properties, be sure to drain water before removing the electrolytic cell.

- 1) Turn off the earth leakage breaker, and unplug the unit.
- 2) Remove the control box according to "[a] CONTROL BOX".
- 3) Remove the two union nuts from the water outlets of the electrolytic cell.
- 4) Disconnect the salt water hose from the electrolytic cell.
- 5) Remove the union nut from the water inlet of the electrolytic cell.
- 6) Remove the four M5 screws securing the electrolytic cell and the control box basket.
- 7) Slide out the electrolytic cell towards you.
- 8) To replace, reverse the above procedure.