

Yamato

Water Purifier, Auto Still®

Model

WG 203

Instruction Manual

- Second Edition -

- Thank you for purchasing "Auto Still®, WG 203" of Yamato Scientific Co., Ltd.
- To use this unit properly, read this "Instruction Manual" thoroughly before using this unit. Keep this instruction manual around this unit for referring at anytime.



WARNING!:

Carefully read and thoroughly understand the important warning items described in this manual before using this unit.

Yamato Scientific Co., LTD.

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Explanation

MEANING OF ILLUSTRATED SYMBOLS

Illustrated Symbols

Various symbols are used in this safety manual in order to use the unit without danger of injury and damage of the unit. A list of problems caused by ignoring the warnings and improper handling is divided as shown below. Be sure that you understand the warnings and cautions in this manual before operating the unit.

 **WARNING!** If the warning is ignored, there is the danger of a problem that may cause a serious accident or even fatality.

 **CAUTION!** If the caution is ignored, there is the danger of a problem that may cause injury/damage to property or the unit itself.

Meaning of Symbols



This symbol indicates items that urge the warning (including the caution). A detailed warning message is shown adjacent to the symbol.



This symbol indicates items that are strictly prohibited. A detailed message is shown adjacent to the symbol with specific actions not to perform.



This symbol indicates items that should be always performed. A detailed message with instructions is shown adjacent to the symbol.

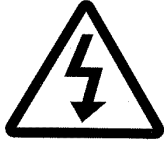
Cautions in Using with Safety

Table of Illustrated Symbols

Warning



Warning,
generally



Warning,
high voltage



Warning,
high temperature



Warning,
drive train



Warning,
explosive

Caution



Caution,
generally



Caution,
electrical shock



Caution,
scald



Caution,
no road heating



Caution,
not to drench



Caution,
water only



Caution,
deadly poison

Prohibit



Prohibit,
generally



Prohibit,
inflammable



Prohibit,
to disassemble



Prohibit,
to touch

Compulsion



Compulsion,
generally



Compulsion,
connect to the
grounding
terminal



Compulsion,
install on a flat
surface



Compulsion,
disconnect the
power plug



Compulsion,
periodical
inspection

Cautions in Using with Safety

Fundamental Matters of "WARNING!" and "CAUTION!"

WARNING!

Do not use this unit in an area where there is flammable or explosive gas

Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned on or off, and fire/explosion may result. (Refer to Page 39 "List of Dangerous Substances".)

Be sure to connect grounding wire.

Connect to grounded plug socket. If no grounded plug socket is available, be sure to connect grounding lead by use of ground adapter attached in nonstandard. Failure to do so could cause electric shock or fire.

If a problem occurs

If smoke or strange odor should come out of this unit for some reason, turn off the power key right away, and then turn off the circuit breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.

Do not use the power cord if it is bundled or tangled

Do not use the power cord if it is bundled or tangled. If it is used in this manner, it can overheat and fire may be caused.

Do not process, bend, wring, or stretch the power cord forcibly

Do not process, bend, wring, or stretch the power cord forcibly. Fire or electrical shock may result.

Do not disassemble or modify this unit

Do not disassemble or modify this unit. Fire or electrical shock or failure may be caused.

Do not touch hot portion

Boiler may be hot in some portion in operation or immediately after operation. Be aware of burns. When performing maintenance of heater etc., ensure that the boiler is cooled down beforehand.

Close the tap when unit is out of service

When unit is out of service (at night or on holiday), be sure to close the tap so as to avoid water leakage accident.

CAUTION!

During a thunder storm

During a thunderstorm, turn off the power key immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.

Exercise care in handling washing liquid (Orgazor)

Principal component of washing liquid (Orgazor) is sulfamic acid, which is acidic almost equal to water solution PH:1. Use protective tool (gloves, mask, and glasses) in handling. When it is touched by human body, immediately wash it away with clean water.

Requirements for Installation

WARNING!

1. Always ground this unit



- Connect the power plug to a receptacle with grounding connectors.



- Do not forget to ground this unit, to protect you and the unit from electrical shock in case of power surge. Choose a receptacle with grounding connectors as often as possible.
- Do not connect the grounding wire to a gas pipe, or by means of a lightning rod or telephone line. A fire or electrical shock will occur.

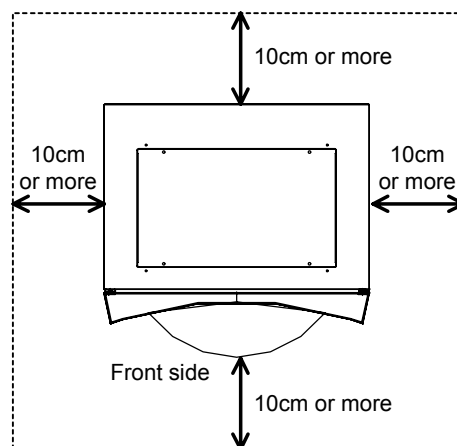
2. Choose a proper place for installation



- Do not install this unit in a place where:
 - ◆ Rough or dirty surface.
 - ◆ Flammable gas or corrosive gas is generated.
 - ◆ Ambient temperature 35°C and above or 5°C and below.
 - ◆ Ambient temperature fluctuates violently.
 - ◆ There is direct sunlight.
 - ◆ There is excessive humidity and dust.
 - ◆ There is a constant vibration.
 - ◆ Not horizontal surface.
 - ◆ The power source is instable.



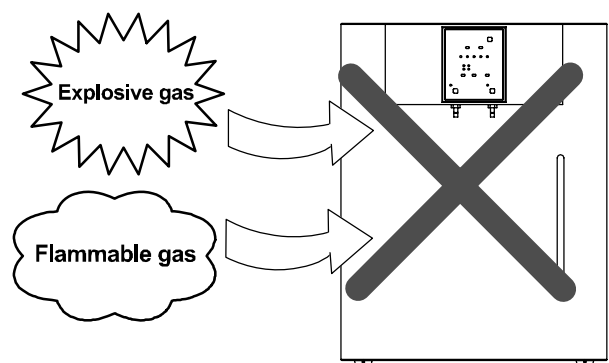
- Keep space around each product above the range shown below. Install units within sink equipment if possible.



3. Do not use this unit in an area where there is flammable or explosive gas



- Never use this unit in an area where there is flammable or explosive gas. This unit is not explosion-proof. An arc may be generated when the power switch is turned ON or OFF, and fire/explosion may result. (To know about flammable or explosive gas, refer to Page 39 "List of Dangerous Substances".)

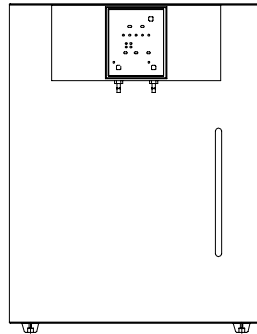


Requirements for Installation

4. Do not modify



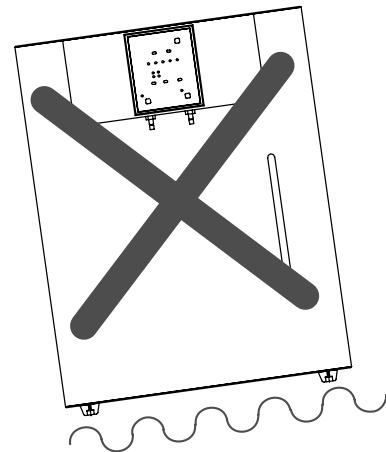
- Never disassemble this unit.
- This unit has high voltage inside in some portion, which may cause electric shock. Contact dealers or Yamato Scientific Co., Ltd. sales office for adjusting or repairing inside.
- In routine maintenance and inspection, follow the procedure described in the instruction manual. Do avoid modification by customer because it may lead to trouble.



5. Installation on horizontal surface



- Set this unit to the flattest place. Setting this unit on rough or slope place could cause the unexpectible trouble or malfunction.
- The weight of main unit is approximately 48kg. Carry and install the equipment carefully by two or more persons.



6. Choose a correct power distribution board or receptacle



- Use a plug socket conforming to electric capacity (capacity 15A or greater).
- When power capacity is insufficient, sampling of distilled water goes short, and normal control is disabled by fall of power voltage. Connect to power equipment having sufficient power capacity.

Electric capacity: 100V AC Single phase 15A

7. Handling of power code



- Do not entangle the power cord. This will cause overheating and possibly a fire.
- Do not bend or twist the power cord, or apply excessive tension to it. This may cause a fire and electrical shock.
- Do not lay the power cord under a desk or chair, and do not allow it to be pinched in order to prevent it from being damaged and to avoid a fire or electrical shock.
- Keep the power cord away from any heating equipment such as a room heater. The cord's insulation may melt and cause a fire or electrical shock.
- If the power cord becomes damaged (wiring exposed, breakage, etc.), immediately turn off the power at the rear of this unit and shut off the main supply power. Then contact your nearest dealer for replacement of the power cord. Leaving it may cause a fire or electrical shock.
- Connect the power plug to the receptacle which is supplied appropriate power and voltage.

Requirements for Installation

8. Connection of power cord



- Always ensure that breaker on power unit side is "Off" before connecting power cord. Power plug of this unit uses 3-core cord including grounding wire, and the plug is grounded type. If your plug socket is not compatible (2P), use a ground adapter attached in nonstandard. In using ground adapter, be sure to ground a grounding lead.



9. Observe the specified pressure range of raw water from waterworks



- Apply the range of city water pressure between 0.5 X 100kPa and 5 X 100kPa (0.5 - 5kgf/cm²) including nighttime.
- Range of raw water pressure is the same when "Water Supply Port Unit" (optional accessory) is used.

10. Connect the water supply hose securely

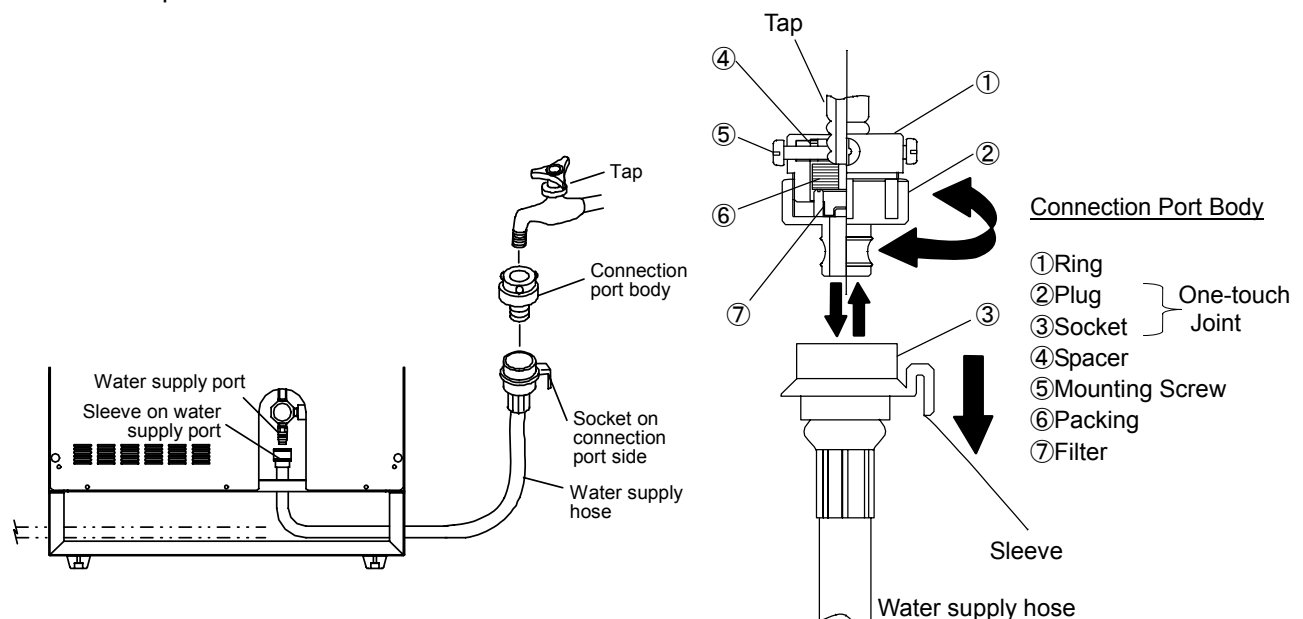


- If not connecting the water supply hose securely, the water supply hose or connection port may be disconnected, resulting in water leakage such as water bursting forth.
- Take the connection port body and supply hose out of attachments to the unit. Install the unit on a horizontal and stable place nearby tap and sink.

11. Connect the tap side



1. Slide the sleeve of socket ③ on connection port side in the arrow direction, then connection port body and water supply hose can be separated. There separate the two parts.
 2. Once loosen the plug ② from the ring ①.
 3. Tighten the 4 mounting screws ⑤ uniformly while pressing the ring ① slightly and uniformly to make the packing ⑥ in flat contact with water tap. If the tap is a chemical tap, adjust the position so that the mounting screw is located at the bottom valley of tap nipple as shown.
 4. Turn the plug ② clockwise to tighten securely. This will allow the tap and connection port to be sealed by packing ⑥.
 5. Insert the socket ③ securely to the plug ② with the sleeve slid in the arrow direction. The sleeve returns to the original position when released, and then connection is completed.
- ❖ In case that the socket is removed, the valve attached on the connection side of the main unit stops the flow of water.

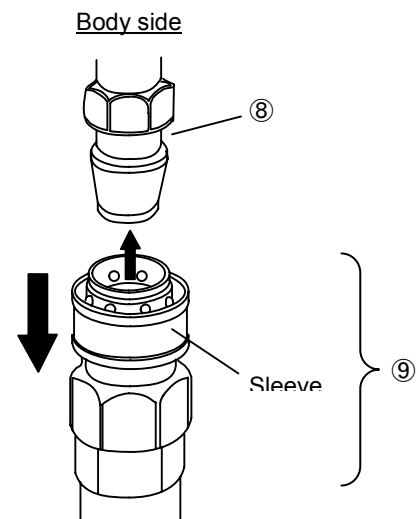


Requirements for Installation

12. Connection on body side



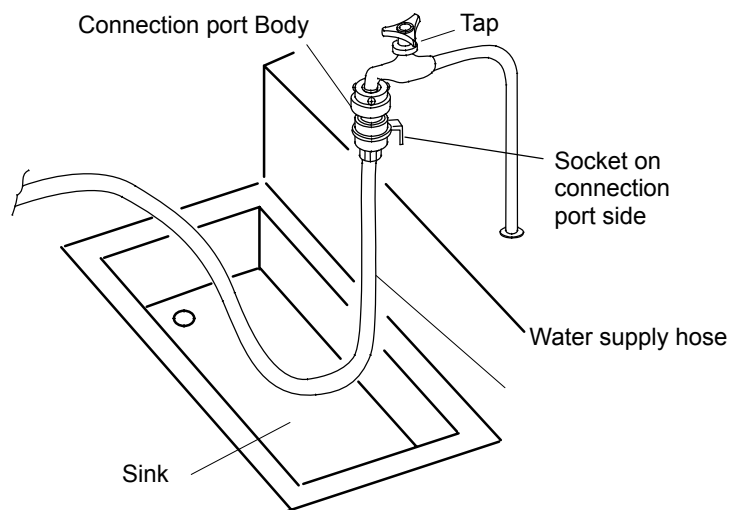
1. Remove the rubber cap from the water supply port plug ⑧.
2. Insert the socket ⑨ securely to the plug ⑧ on body side with the sleeve slid in the arrow direction. The sleeve returns to the original position when released, and then connection is completed. The socket contains a valve inside, which opens only when the socket is connected by plug; otherwise, water is not fed because this valve does not open.



13. Connect the water supply hose to the tap provided with sink equipment



- If the water supply hose is connected to a tap without sink equipment, flood damage may be caused when water supply hose is disconnected or damaged; therefore be sure to connect to a tap having sink equipment.



Requirements for Installation

CAUTION!

14. When the sink equipment is remote from water tap, use "Water Supply Port Unit" (optional accessory)



- "Water Supply Port Unit" is designed to loosen the connection to the tap harder than the set of standard water supply hoses when water pressure fluctuates.

15. In case that there is no tap

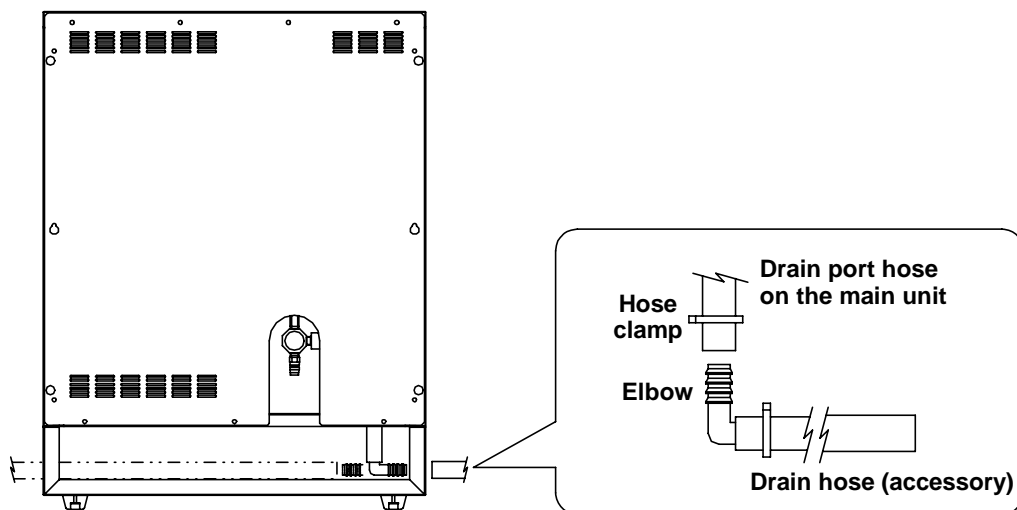


- In case that there is no tap, use appropriate joint shown in the optional "Coupler joints for feed water".

16. Connect the drain hose securely



- If the drain hose is not connected securely, it may be disconnected, leaking water in the unit, or leading to trouble of system.
1. Pick up the drain hose (with elbow) and the hose clamp from the main unit accessories.
 2. Always make sure that the earth leakage breaker of the unit is "OFF".
 3. Remove the rubber stopper from the outlet of the drain port hose on the main unit.
 4. Push the hose clamp into the elbow of the drain hose, and next, put the elbow into the drain outlet hose of the main unit, then tighten the hose clamp securely.
 5. Pull the hose out from the drain hose-end outlet at right/left or backside of the main unit.



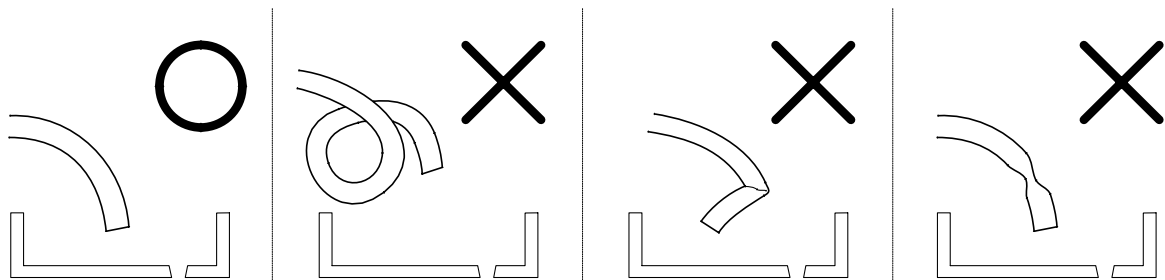
Requirements for Installation

WARNING!

17. Use care in routing of drain hose



- Do avoid making bend or projection of drain hose.
- In case that the drain hose is bent and the drain cannot be performed, back-flow or breakage of the cooling hose might occur.
- Place the drain hose lower than the drain port of this unit. Further, avoid piping which allows paddle in the hose or at the hose outlet, because it is a resistance against drain.
- Place the end of drain hose where drain is allowed. When distilled water is being prepared, cooling water is drained approx. 2 liters/min. Also drain further increases when boiler water is drained, and sufficient drain equipment is required.



18. Check the drain temperature of cooling water



- Drain temperature may exceed 60°C in drainage from boiler. Drain to a place remote from working environment not to be touched easily because there is a danger of burns.
- High-temperature cooling water could flow out. If vinyl chloride tube is used for the water drain unit of the sink, such a tube could deteriorate. Water should be drained to a place away from the drain tube of the sink. Even if VP tube (JIS K6741) is used for the vinyl chloride tube, DV-RR joint is used for the joint, and even if insert socket (JIS K6739) is used, the water drain trap in the nonstandard options should be used when the control temp. cannot be lowered (60°C or lower). Even if the drain temperature is 60°C or lower, and if the above-mentioned tubes and joint are not used, the drain trap in the nonstandard options should be used.

19. When drain temperature of sink equipment does not fall under 60°C



- Use a drain trap (optional accessory).
- Drain trap makes temperature fall by accumulating cooled drain water temporarily. Further, it mixes city water and cooled-down drain water, makes mixed water temperature fall, then lets drain to sink equipment.
- Contact your dealer or Yamato Scientific sales office for detail of drain trap.

Requirements for Installation

20. Install the ion exchange resin cartridge (CPC-S) securely



- Install the ion exchange resin cartridge (CPC-S) following the procedure shown below.
- Connect securely because insecure connection may cause water leakage.
 1. Make sure that the earth leakage breaker of this unit is "Off" and that the tap is tightened.
 2. Take the ion exchange resin cartridge out of attachments to the unit.
 3. Place the ion exchange resin cartridge taken out on the receiver within the unit. (See Fig.1.)
 4. Fix the ion exchange resin cartridge with the band of receiver. (See Fig.2.)

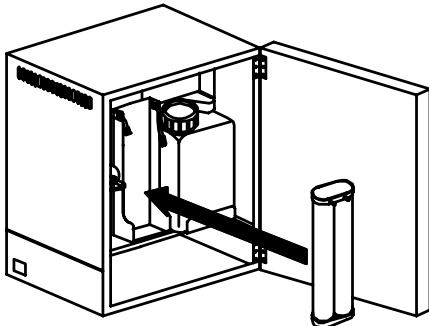


Fig.1

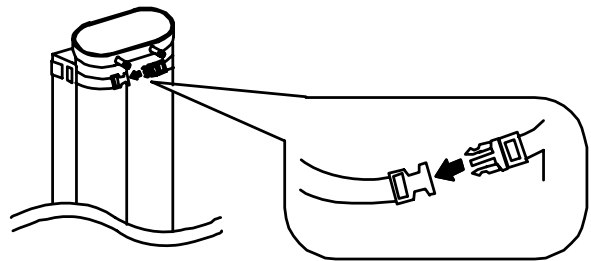


Fig.2

5. Remove the rubber cap attached to the inlet and outlet of ion exchange resin cartridge.
 6. Fit in the coupler marked with (IN) to the inlet of ion exchange resin cartridge (left) until click is heard. (See Fig.3.)
 7. Fit in the coupler marked with (OUT) to the outlet of ion exchange resin cartridge (right) until click is heard. (See Fig.3.)
- ❖ Coupler may be hard at first. When applying force in inserting, do not make it curved because insertion port may be broken.

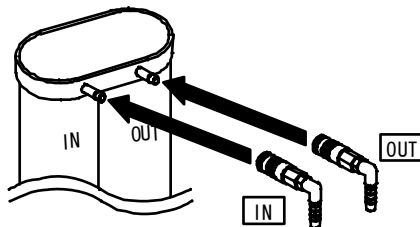


Fig.3

8. Coupler can be removed easily from the ion exchange resin cartridge by pulling it toward yourself while pushing the black part of the coupler to the depth.

Requirements for Installation

21. Secure the pre-treatment cartridge securely



- Connect the hose in the body securely following the procedure shown below.
 - Insecure connection may cause disconnection of connection hose, resulting in accident by water leakage.
1. Make sure that the earth leakage breaker of this unit is "OFF" and that the tap is tightened.
 2. Take the pre-treatment cartridge ① out of attachments to the body.
 3. Inlet and outlet of the pre-treatment cartridge ① are provided with a cap, so remove it.
 4. When the front door of this unit is opened, connection hose marked IN and OUT is found in the coupler; there make connection matching them with IN and OUT on pre-treatment cartridge ①.
 5. In connecting, mate the coupler and port of cartridge while sliding the blue portion ③ of coupler toward the hose, push in, then release the blue portion ③.
 6. When connection is finished, place the pre-treatment cartridge at the position shown on the right (near side on the left of distilled water tank) as paying attention to the bend of hose.

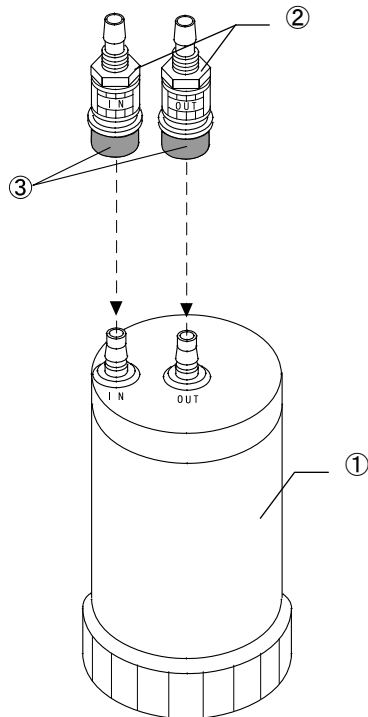


Fig.5

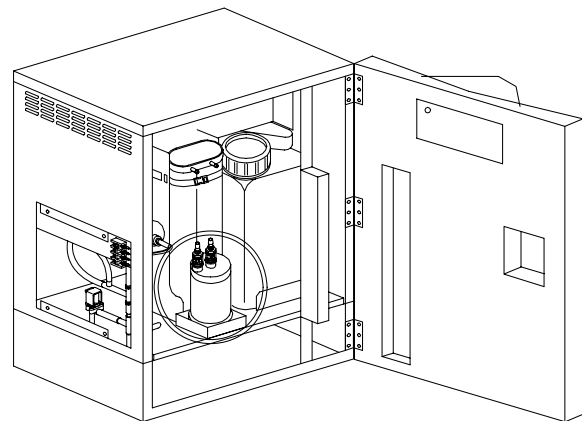


Fig.6

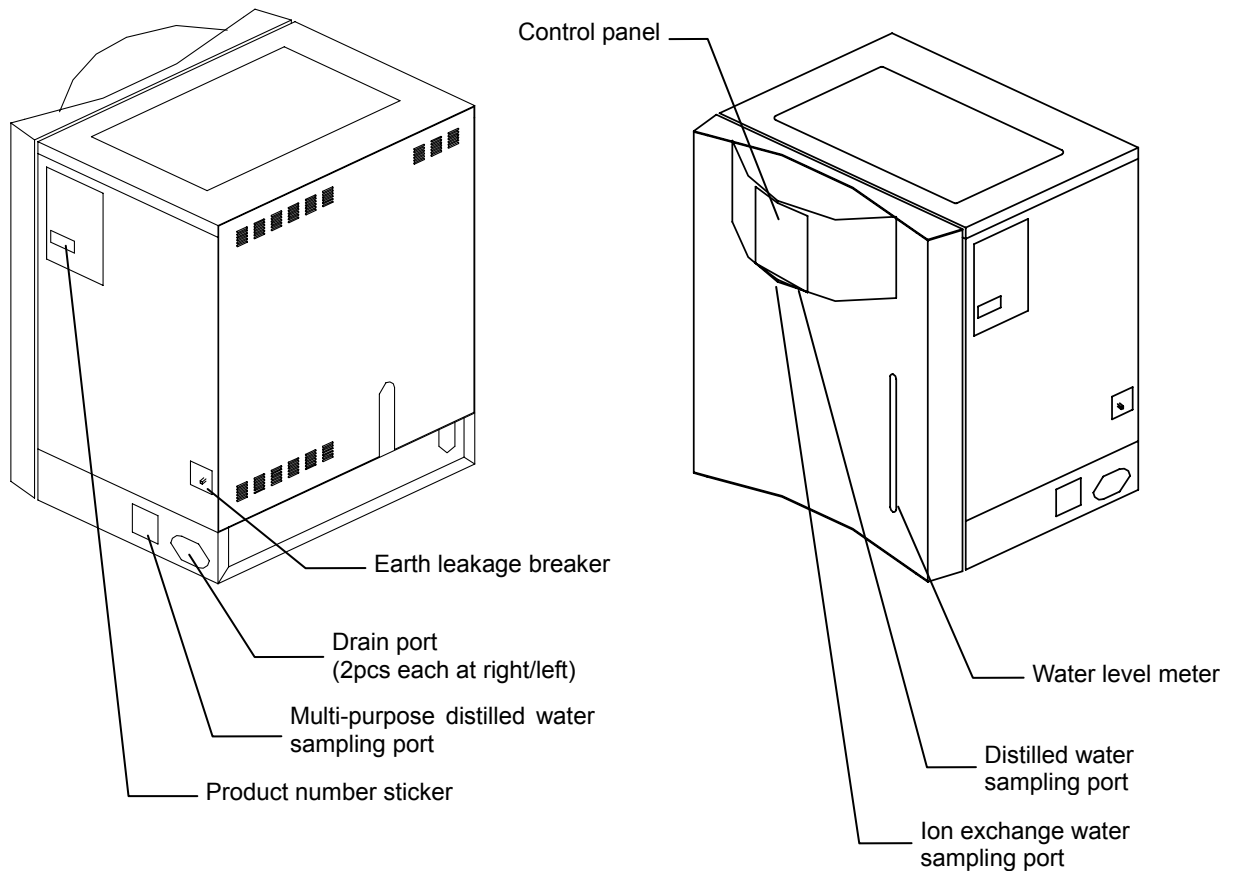
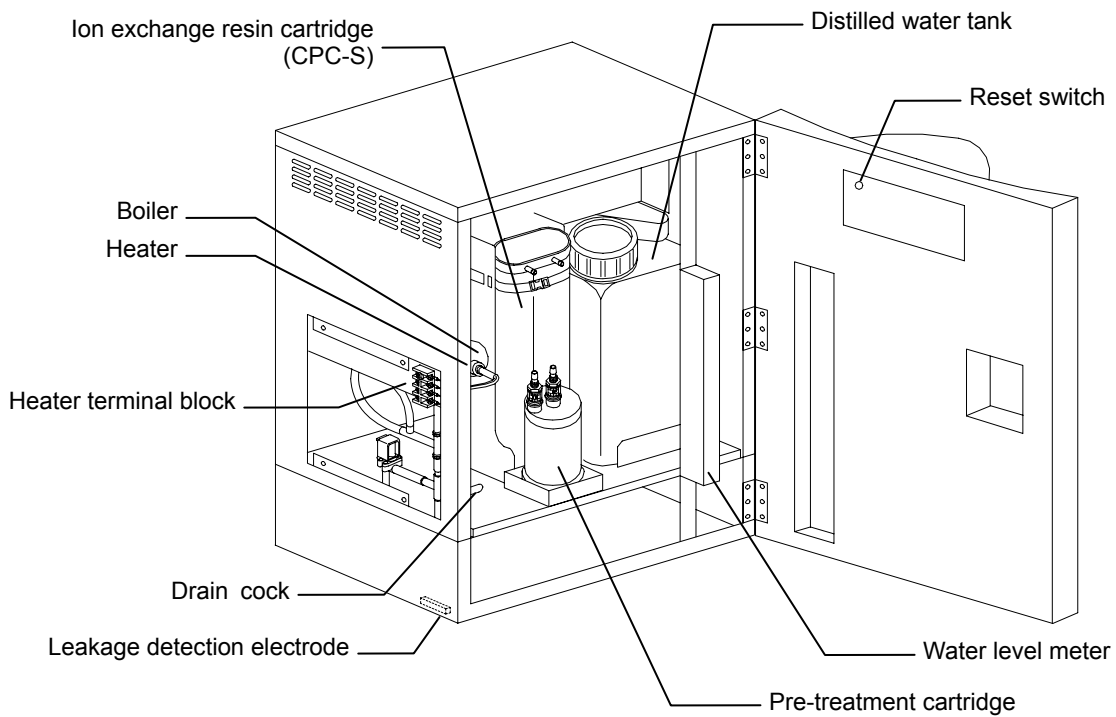
22. After installation



- This unit may topple over due to unexpected earthquake or shock causing injury. Take an appropriate measure against toppling for safety.

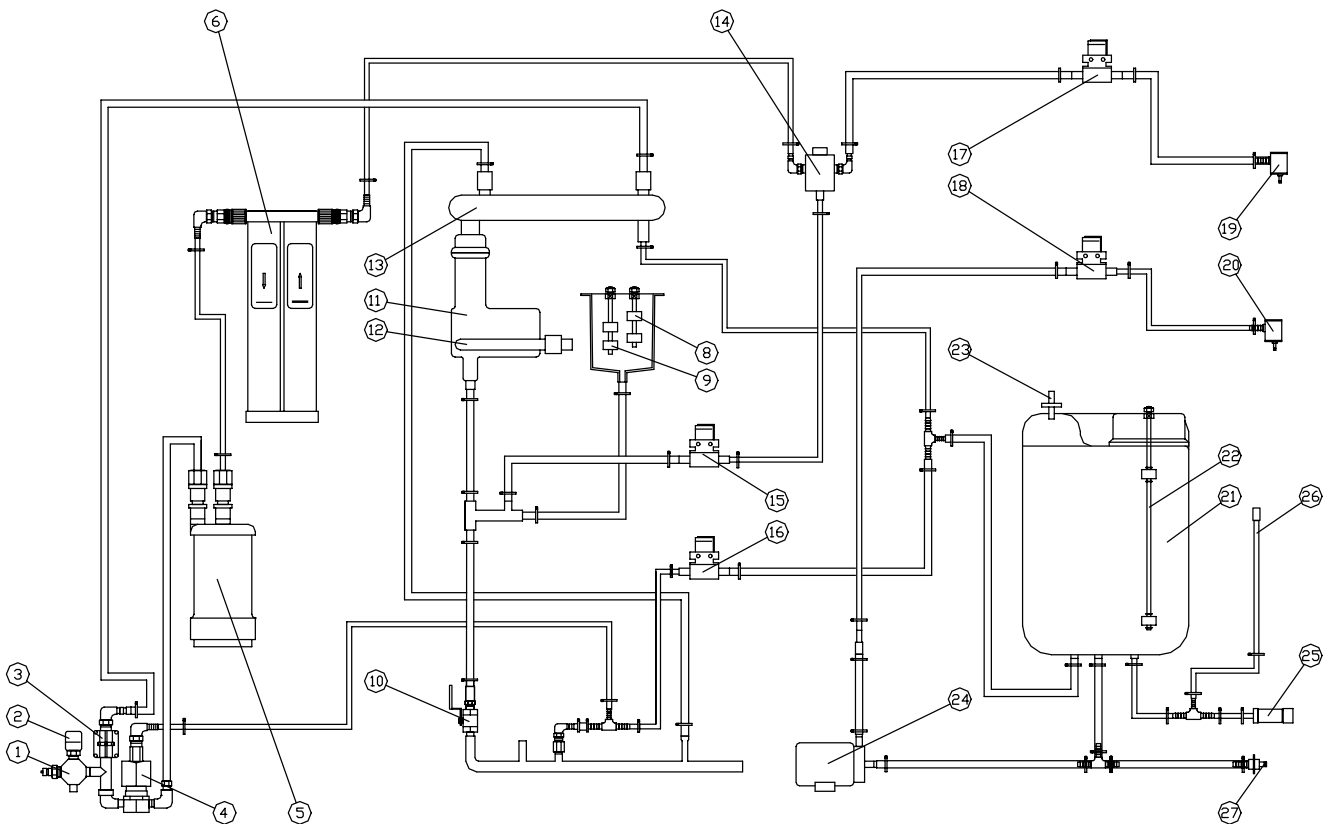
Description and Function of Each Part

Main Unit



Description and Function of Each Part

Piping System View

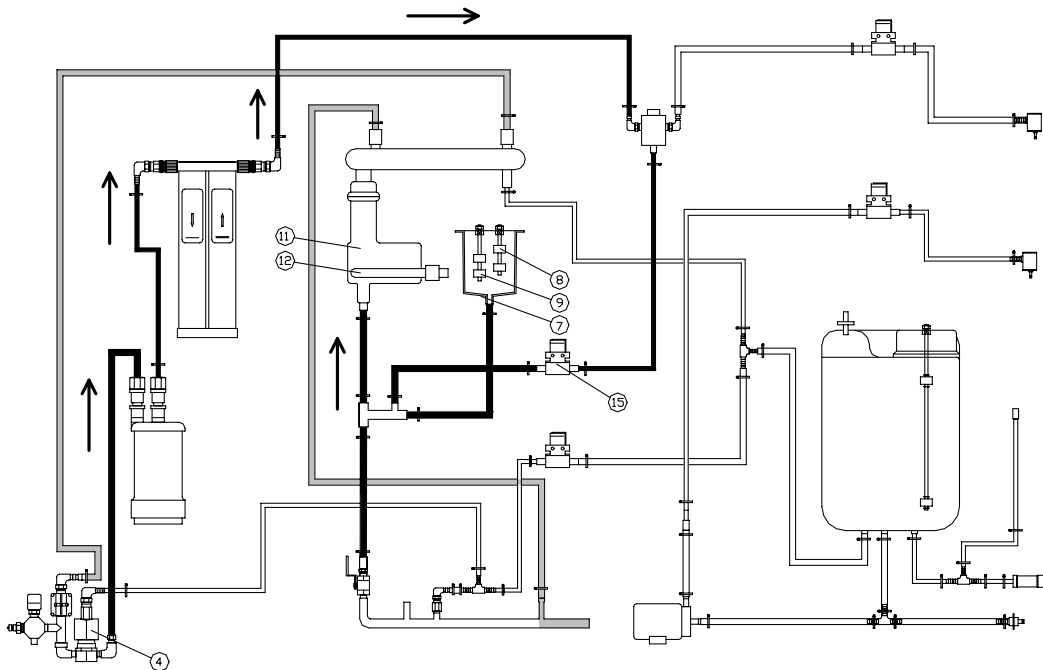


1	Pressure reduction valve	15	Boiler water supply solenoid valve
2	Pressure switch	16	Initial accumulated water drain solenoid valve
3	Cooling water solenoid valve	17	Ion exchange water sampling solenoid valve
4	Raw water supply solenoid valve	18	Distilled water sampling solenoid valve
5	Pre-treatment cartridge	19	Ion exchange water sampling port
6	Ion exchange resin cartridge (CPC-S)	20	Distilled water sampling port
7	Float cylinder	21	Distilled water tank
8	Float switch 1	22	Float switch 3
9	Float switch 2	23	Air filter
10	Boiler drain cock	24	Distilled water sampling pump
11	Boiler	25	Distilled water tank drain port
12	Heater	26	Water level meter
13	Condenser	27	Multi-purpose distilled water sampling port
14	Ion exchange water quality gauge electrode		

Description and Function of Each Part

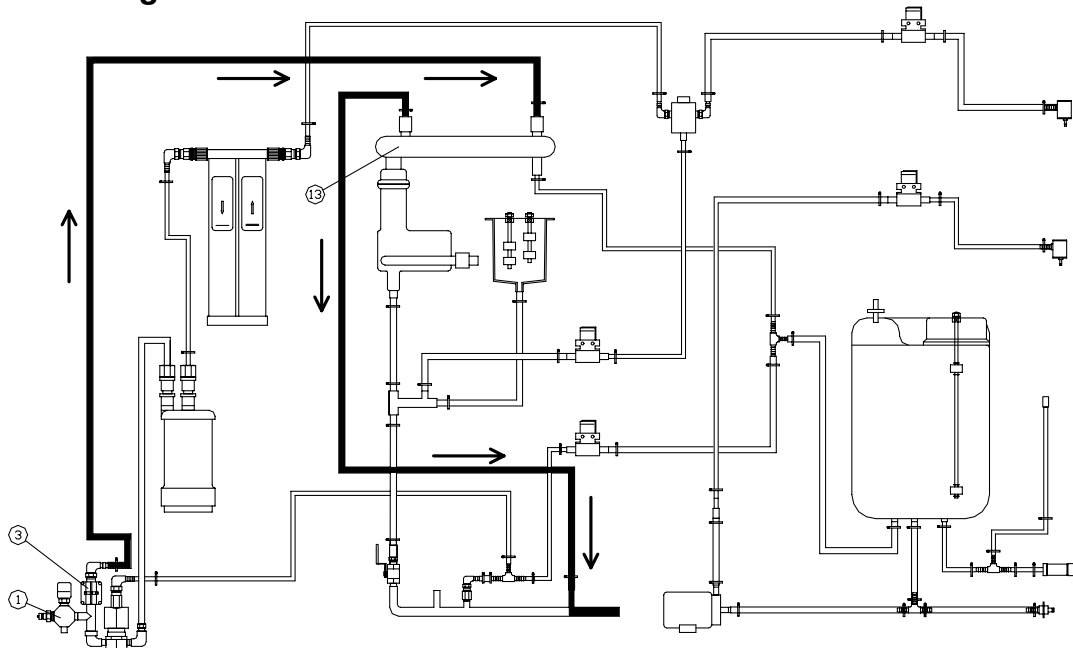
Principle of Operation

1. Boiler Water Supply and Distilling Operation



Turn ON the earth leakage breaker, and press the power switch. Then, the raw water supply solenoid valve (4) and the boiler water supply solenoid valve (15) open at the same time to supply water to the boiler (11). When the float switch 1 (8) in the float cylinder (7) detects water level, the heater (12) is energized to start distillation. The water supply to the boiler is controlled by the raw water supply solenoid valve (4) and the boiler water supply solenoid valve (15) both opened/closed by the float switch 2 (9).

2. Flow of Cooling Water

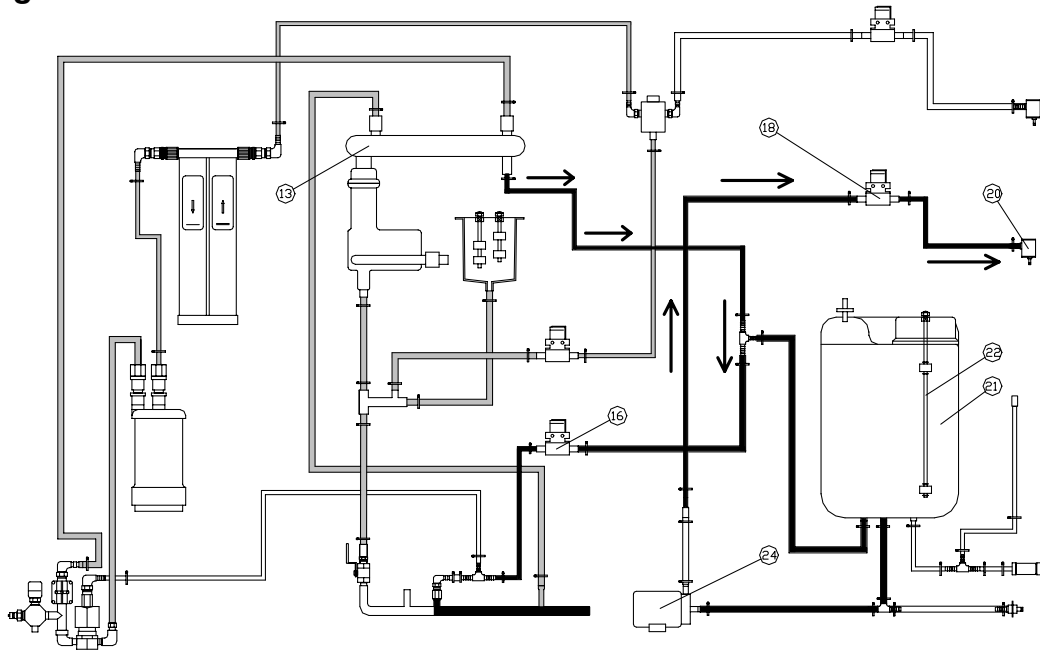


During distillation, water is supplied and discharged in the order: (1) pressure-reducing valve, (3) cooling water solenoid valve and condenser (13). When the distilled water tank is full, or when ion exchanged water is sampled, distillation is stopped, and the cooling water is also stopped automatically.

Description and Function of Each Part

Principle of Operation

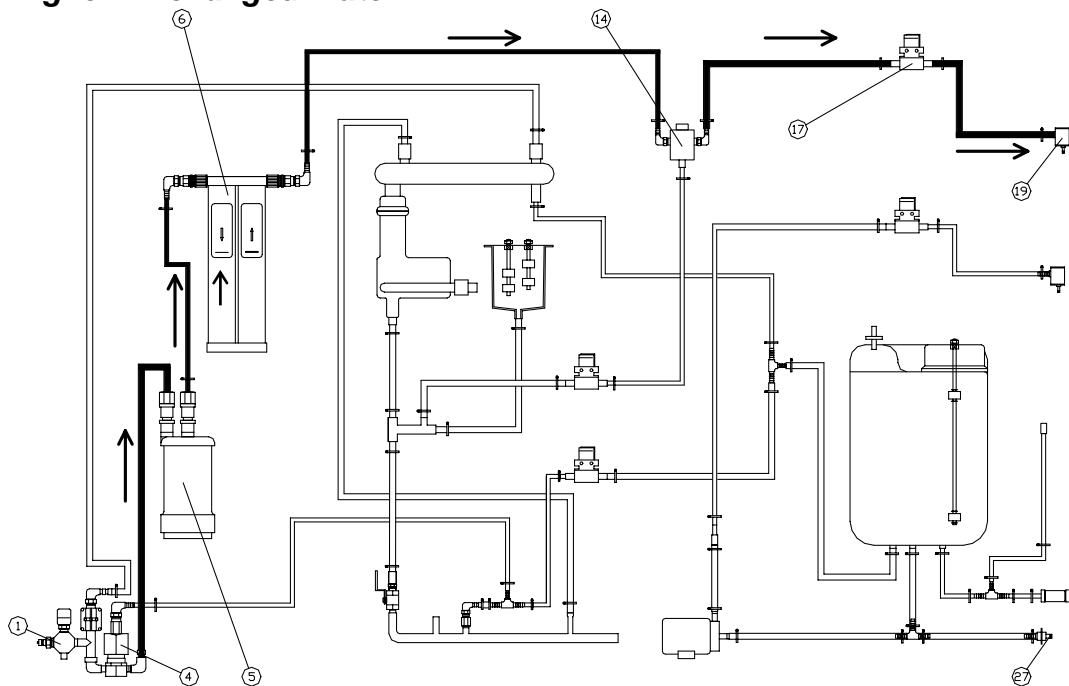
3. Sampling of Distilled Water



The distilled water condensed in the condenser (13) is stored in the distilled water tank (21) after discharging the initial boiled water via the initial boiled water discharge solenoid valve (16) for about 10 min. after power switch is turned ON. If the float switch (22) on top of the tank trips, it is deemed as Full Tank, and the distillation is stopped. When any specified amount of distilled water is sampled and consumed, distilled water is produced automatically.

The distilled water so stored is sampled by way of the distilled water sampling solenoid valve (18) and the distilled water sampling port (20) by the distilled water sampling pump (24).

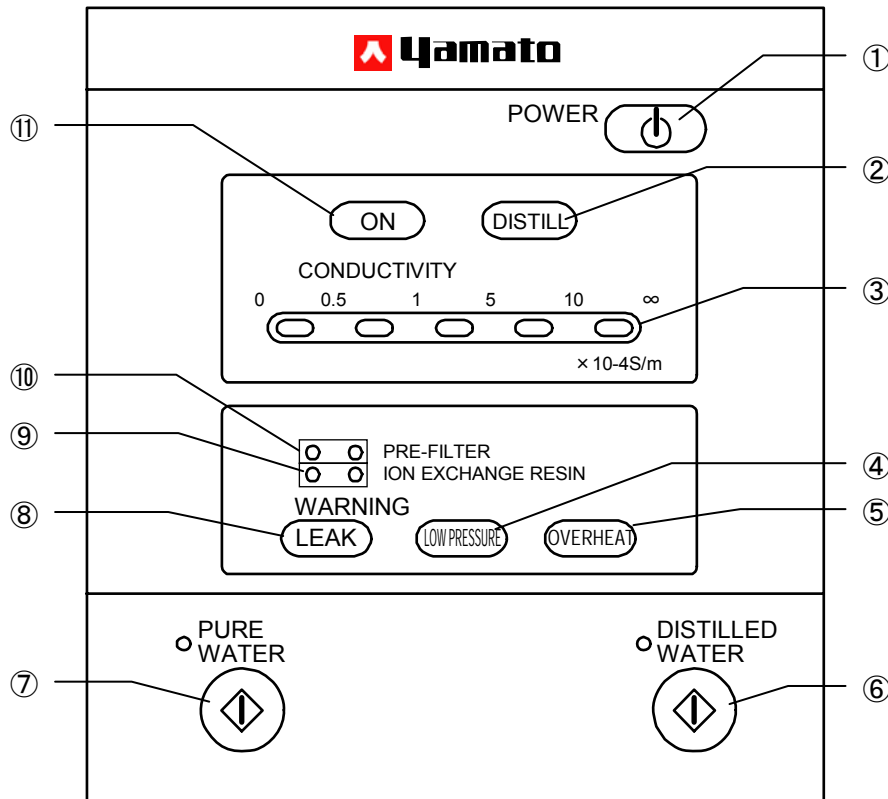
4. Sampling Ion Exchanged Water



Ion exchange water is sampled by way of the pressure-reducing valve (1), raw water supply solenoid valve (4), pre-treatment cartridge (5), ion exchange resin cartridge (6), ion exchange water quality electrode (14), ion exchange water sampling solenoid valve (17) and ion exchange water sampling port (19).

Description and Function of Each Part

Control Panel



①	POWER key	Turns on/off the power of the controller.
②	DISTILL lamp	Lights up during distillation.
③	CONDUCTIVITY indicator	Lights up when the conductivity of pure water keeps between 0.0 to ∞μS/cm.
④	LOW PRESSURE lamp	Blinks when low pressure error is detected.
⑤	OVERHEAT lamp	Blinks when overheat of the heater is detected.
⑥	DISTILLED WATER key	Starts/stops drawing distilled water.
⑦	PURE WATER key	Starts/stops drawing pure water.
⑧	LEAK lamp	Blinks when water leakage is detected.
⑨	ION EXCHANGE RESIN exchange indication	Lights up when the conductivity of the ion exchange resin enters the caution area (orange), and blinks when it enters the warning area (red).
⑩	PRE-FILTER exchange indication	Lights up when the conductivity of the pretreatment filter enters the caution area (orange), and blinks when it enters the warning area (red).
⑪	ON lamp	Lights up while the power of the controller is turned on.

Setup and Check before Use

WARNING!

1. Check of water supply

- Check that the water supply hose is securely connected.
- Open the tap.
- Check that water does not leak from connection of water supply hose.

2. Check of drain

- Check that the drain hose is securely connected.
- Check that the drain hose is free from bend or projection.
- When the drain hose is bent or the like, system does not operate normally, and in addition, it may lead to water leakage accident. Inspect from time to time, and ensure that water is drained properly.

3. Check of power supply

- Check that the power cord is connected to appropriate plug socket.

4. Before operation

- Turn on the earth leakage breaker, then, perform calibration before pressing POWER key. Perform calibration operation at first-time using this unit (refer to page 18) and when changing the heater of the boiler (refer to page 27). Press POWER key while holding PURE WATER key and DISTILLED WATER key. Perform calibration operation (all of ON, DISTILL, PURE WATER, and DISTILLED WATER lamps blink at the same time) for about five minutes, after then, distillation (ON and DISTILL lamps light up) starts automatically. Key operation becomes disable while calibration operation. In case that power failure occurs while calibration operation, please perform calibration again.

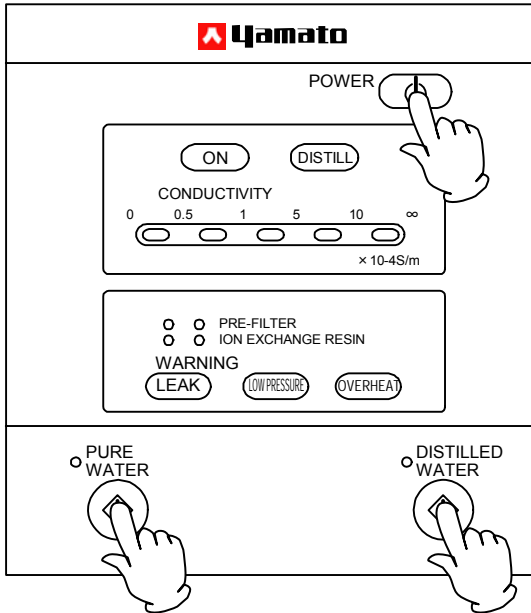
5. Caution at initial operation

- In sampling distilled water in initial energization and drain from distilled water storage tank, air is contained in the pump and piping, and it takes time until sampling is started.
- In sampling ion exchanged water immediately after changing pre-treatment cartridge or ion exchange resin cartridge, it also takes time until sampling is started. Further, when each cartridge is changed, drain about 5 liters in order to remove initial impurities.

Operation Procedure

When operation is set up, follow the procedure below for operation:

1. Turning on power



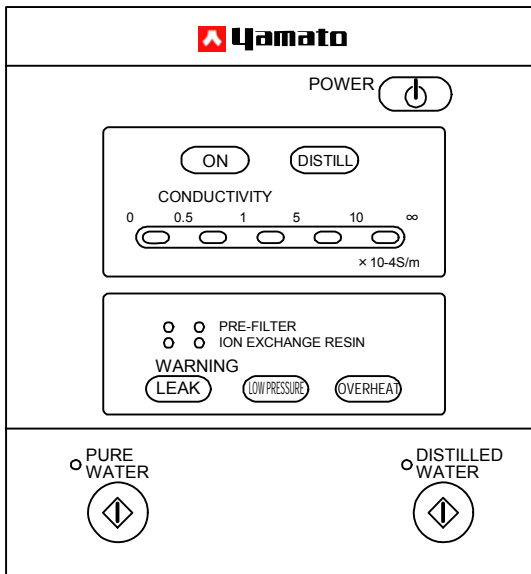
When first-time using the unit, perform calibration operation.

1. Turn on the earth leakage breaker.
2. Press POWER key while holding PURE WATER key and DISTILLED WATER key.
3. After five minutes passed, distillation starts automatically.
 - ON lamp lights up.
 - CONDUCTIVITY lamp which indicates the conductivity of pure water lights up.

From the second time using:

- ① Turn on the earth leakage breaker.
- ② Press POWER key.

2. Distillation starts after supplying water to the boiler



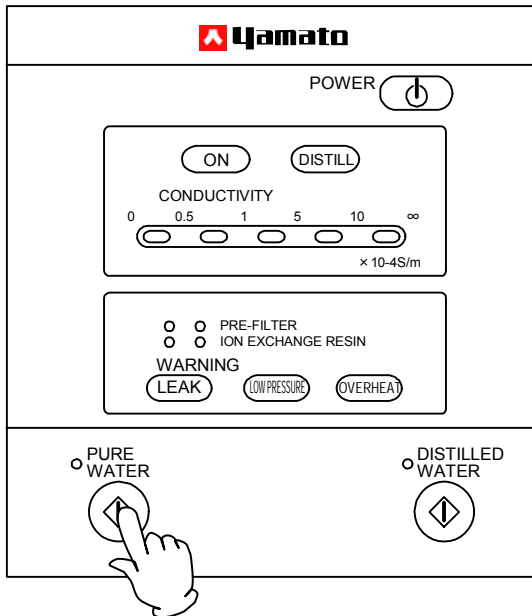
- DISTILL lamp lights up.

3. Distillation stops when the distilled water storage tank is full

- DISTILL lamp goes OFF.

Sampling of Pure Water

Sampling of Ion Exchange Water



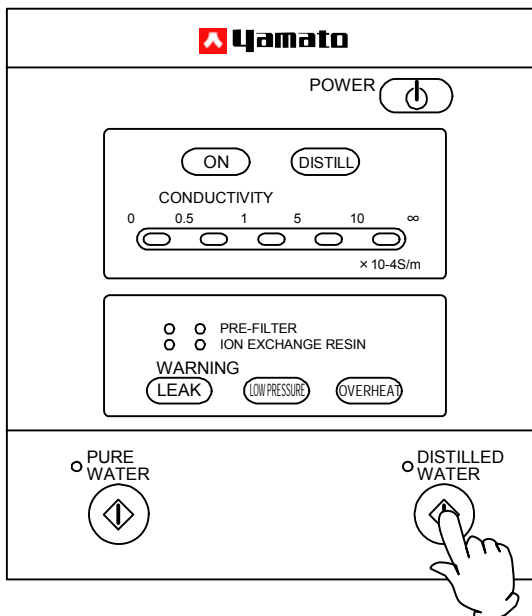
When pressing PURE WATER key:

- DISTILL lamp goes OFF.
- The pure water filling indication lamp lights up.

Pure water can be sampled by way of the pure water sampling port.

Pressing PURE WATER key again turns off the pure water filling indication lamp, and stops filling pure water.

Sampling of Distilled Water



When pressing DISTILLED WATER key:

- Distilled water filling indication lamp lights up.

Distilled water can be sampled by way of the distilled water sampling port.

Check if 5 liters or more is stored in the tank by using water level gauge.

If 5 liters or less is stored, water cannot be sampled.

Pressing DISTILLED WATER key again turns off the distilled water filling indication lamp, and stops filling distilled water.

Display of Water Quality

Measurement of Electric Conductivity

The lamp of the water quality meter on the control panel indicates the electric conductivity at the outlet of the ion exchange resin cartridge. Use this indication as the reference for the timing of replacing the ion exchange resin cartridges. Be sure to read the indication when the electrodes dip in water; namely while the ion exchange water passes. In the following cases, the electrodes do not dip in water and air bubbles affect the operation, thus causing incorrect readings.

1. In the initial stage of operation, and when the system is stopped
2. Immediately after replacing the pre-treatment cartridge or ion exchange resin cartridge

Electric conductivity

- Electric conductivity is a value indicating easiness of flowing of electricity. In the case of water, electricity flows the more easily when the more electrolyte i.e. impurity is solved, so the value of conductivity is the greater; when the less electrolyte is solved, the smaller is the value.
- When the value of electric conductivity is the smaller, the better is purity of pure water.
- Here, electric conductivity indicates only electrolyte, and does not indicate content of non-electrolyte (such as organic substance, colloid substance, dissolved gas, and microorganism), and it is just an index indicating purity of pure water, and it does not represent all of purity.
- Specific resistivity indicates the same contents as electric conductivity. Specific resistivity is inversely related to electric conductivity, and when the value is the greater, the better is purity.
- When obtaining specific resistivity from electric conductivity, where specific resistivity is R and electric conductivity ρ ,

$$R [\Omega \cdot m] = \frac{1}{\rho [S/m]} \quad \text{or} \quad R [\times 10^4 \Omega \cdot m] = \frac{1}{\rho [\times 10^{-4} S/m]}$$

So the theoretical value of pure water is as follows:

$$R = 18.3 \times 10^4 \Omega \cdot m \quad (18.3 M\Omega \cdot cm) \quad 25^\circ C$$

$$\rho = 0.055 \times 10^{-4} S/m \quad (0.055 \mu S/cm) \quad 25^\circ C$$

Quality of ion exchange water and distilled water

- Ion exchange water and distilled water have the following features respectively. Distinguish them as necessary in use.

It is ideal to use pure water immediately after sampling; therefore be sure to drain water in distilled water tank if it is out of use for a long time. If water has been stored in distilled water tank for a long time, drain once, then store in distilled water tank newly before use.

1. Ion exchange water

Most of electrolyte in water is removed, and water with the lowest electric conductivity is obtained. However, non-electrolyte cannot be removed. In addition, slight fall of purity is found while resin is new and when water is fed again after halt of system.

If the conductivity of ion exchange resin exceeds $1 \times 10^{-4} S/m$, the caution lamp (orange) of exchange indication lights up. Then, when it exceeds $10 \times 10^{-4} S/m$, the warning lamp (red) blinks. In that case, exchange the ion exchange resin. After exchange and the conductivity of the ion exchange resin recovered, the warning lamp (red) turns off and auto-recovery starts.


2. Distilled water

Electrolyte and non-electrolyte can be removed in average except for low boiling point substance such as ammonia. However, carbon dioxide gas in the atmosphere is absorbed and carbon oxide is generated in the process of manufacturing (condensing/storing), and so the electric conductivity is worse than ion exchange water, that is 1 to $2.5 \times 10^{-4} S/m$ (1 to $2.5 \mu S/cm$) at $25^\circ C$, and represents weak acid (pH5 to 6).


See "2 - Common item (11) Water" of JIS K0102 (Plant drain test procedure) for removal of dissolved gas (oxygen and carbon dioxide) in pure water.

WARNING!


If a problem occurs

-  If smoke or strange odor should come out of this unit for some reason, turn off the power key right away, and then turn off the circuit breaker and the main power. Immediately contact a service technician for inspection. If this procedure is not followed, fire or electrical shock may result. Never perform repair work yourself, since it is dangerous and not recommended.


During a thunder storm

-  During a thunderstorm, turn off the power key immediately, then turn off the circuit breaker and the main power. If this procedure is not followed, fire or electrical shock may be caused.


Take enough care in handling detergent (liquid)

- 
 - In storing detergent (liquid), store in enclosable container avoiding high temperature and humidity.
 - Principal component of detergent (liquid) Orgazor 10 is sulfamic acid (acidic with pH of water solution approx. 1).
 - In handling this detergent (liquid), use protective tools (gloves, mask, and glasses).
 - When it is in contact with human body, wash it away with clean water.
 - Neutralize the liquid with neutralizer (such as sodium hydroxide) after washing.
 - Ensure neutralization with pH test paper, etc.
 - Do not use empty container for beverage.
 - Do not allow detergent to directly flow into agricultural irrigation canal or fields because it causes withering of rice crop.


Do not step on this unit

-  Do not step on this unit. It will cause injury if this unit fall down or break.

Do not put anything on this unit

-  Do not put anything on this unit. It will cause injury if fall.

In power failure

-  When system has halted during operation due to power failure etc. and is provided with power again, system is brought to standby status. When restarting operation, start from (Page 18 "1. Turning on power").

Daily Inspection and Maintenance

Timing of maintenance and inspection
(Perform daily inspection for stable use of product.)

Maintenance/check items	Reference for timing	Remarks
Replacement of pre-treatment cartridge	Approx. 6 months Indicates on exchange indication lamp.	Throughput: About 5000 liters of city water in Tokyo If the quality of raw water is not good, perform this maintenance as soon as possible.
Replacement of ion exchange Resin cartridge	When red lamp lights up on exchange indication lamp	Throughput: About 700 liters of the raw water of 200 x 10-4S/m
Cleaning of distiller	3 months	If the quality of raw water is not good, start the operation as soon as possible.
Cleaning of water supply hose filter	6 months	
Replacement of hose	2 years	Connections shall be checked monthly.
Drainage of distilled water tank	3 months	If not used for a long time, drain water from the tank.
Drainage of boiler	Once-daily	If not used for a long time, drain water from the tank.

Replacement of Pre-treatment Cartridge

- See Page 11 "21. Secure the pre-treatment cartridge securely" for replacement procedure.
- When the cartridge is put to use without replacement, life span of ion exchange resin cartridge becomes short.
- Please dispose used cartridge as noncombustibles. When it is sent back to our company, fill in the designated invoice attached to a new cartridge, and send it with the used cartridge to us.
- In the case of consecutive operation, the caution lamp (orange) of the pretreatment filter lights up after about five months passed after starting to use, and the warning lamp (red) blinks after six months passed. For its recovery, after exchange, press and hold the reset switch on backside of the door for two seconds, then, a beep sounds and the warning lamp (red) turns off.

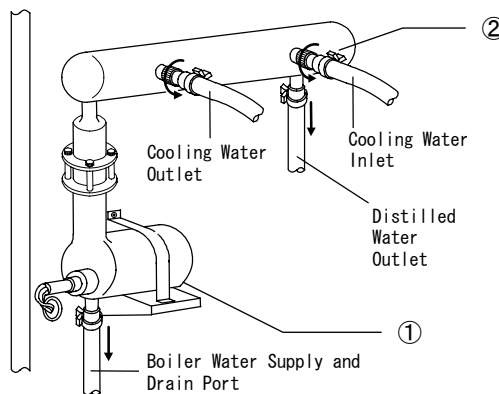
Replacement of Ion Exchange Resin Cartridge

- When a cartridge is stored for a long time, deterioration of water quality and fall of processing capacity are found; therefore prepare a spare cartridge in a planned manner for replacement timing. Standard for storage is about 4 months.
- In replacement, see Page 10 "20. Install the ion exchange resin cartridge (CPC-S) securely".
- When a cartridge is used without replacement, much scale is deposited on boiler and heater, which causes decrease of distilled water sampling and damage to heater.
- Please dispose used cartridge as noncombustibles. When it is sent back to our company, fill in the designated invoice attached to a new cartridge, and send it with the used cartridge to us.
- We promote the reasonable disposal, collection, and recycling of cartridge for environmental protection.

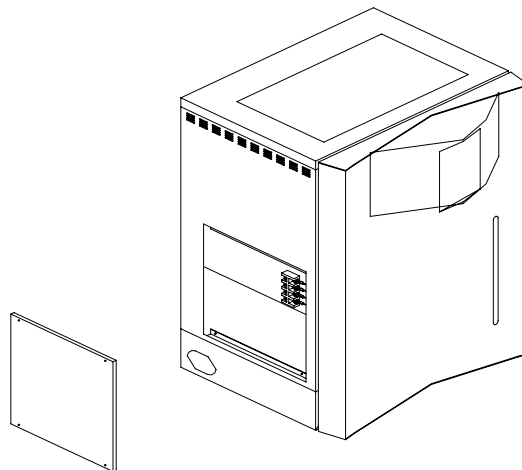
Washing of Distiller

Dismounting of Distiller

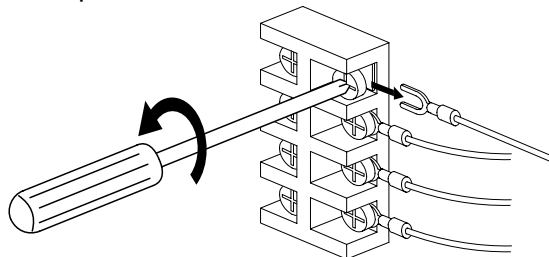
1. Turn "OFF" the earth leakage breaker of the unit.
2. Close the tap.
3. Check that the boiler is not hot (longer than 30 minutes after the breaker is turned "OFF"), then open the front door of the unit, and open the boiler water drain cock.
4. Disconnect the hose connected to the boiler ① and condenser ②. In disconnecting from the distilled water outlet and boiler water supply and drain port, turn the hose band by use of tool and displace the engaged portion (serrated portion). Take care in disconnecting because excessive force applied to glass may cause damage.



5. Disconnect the hole plug at left plate, remove four screws with a screw driver, then remove the left plate.



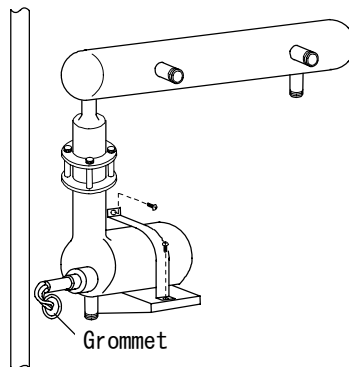
6. Loosen 4 screws on the right of terminal block located at the right top of the body frame with left side plate dismounted by use of Phillips screwdriver, and disconnect the heater lead terminal.



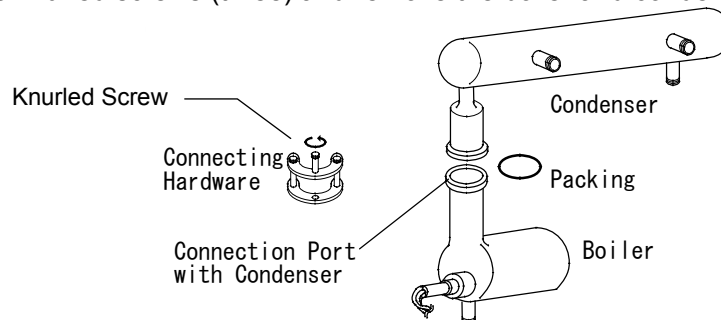
Washing of Distiller

7.

- 1) Disconnect the heater lead wire from grommet.
Note that, do not bend or pull the heater lead wire more than necessary.
- 2) Remove the two screws of boiler securing band with a Phillips screwdriver, and take the boiler and condenser out of the body.



- 3) Loosen the knurled screws (three) and remove the boiler and condenser.



Washing of boiler

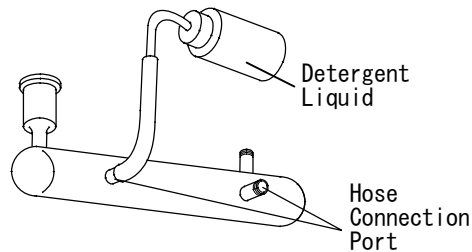
1. Adjust detergent liquid.
 - 1) Prepare approx. 2 liters of hot water at 50 to 60°C.
 - 2) Add attached scale detergent (Orgazor) approx. 200g to hot water prepared in 1) and agitate well.
2. Seal the hose connection port at the bottom of boiler (boiler supply and drain port) by use of rubber stopper, etc.
3. Secure the boiler at a stable position to prevent washing liquid from spilling.
4. Pour in washing liquid through connection port with condenser with heater turned on.
Most scale is removed in 4 to 5 hours approximately. Drain washing liquid in the boiler. If much scale is distiller deposited, pour in washing liquid newly, and repeat washing
 - 1) When scale-removing work is finished, take the heater out of boiler and wash each of them enough with city water. Here, in washing the heater with water, be sure to fill a larger beaker with water and wash the heater inside so that lead wire and its routing port are not wet by water. Avoid washing the heater directly with water from tap.
 - 2) If solid scale distiller remains after washing by washing liquid, follow the remedy below:
Boiler: Scrub with brush etc. for removing.
Heater: Scrub with something soft such as wood piece or plastic.

In this connection, remove scale on the heater uniformly in general, never leaving solid scale in part. In an extreme case, only such part has a great heat resistance, causing damage to the heater.

Washing of Distiller

Washing of Condenser

1. Pour detergent liquid into the cooling pipe of condenser.
(See Page 24 "Washing of boiler" for formulating detergent liquid.)



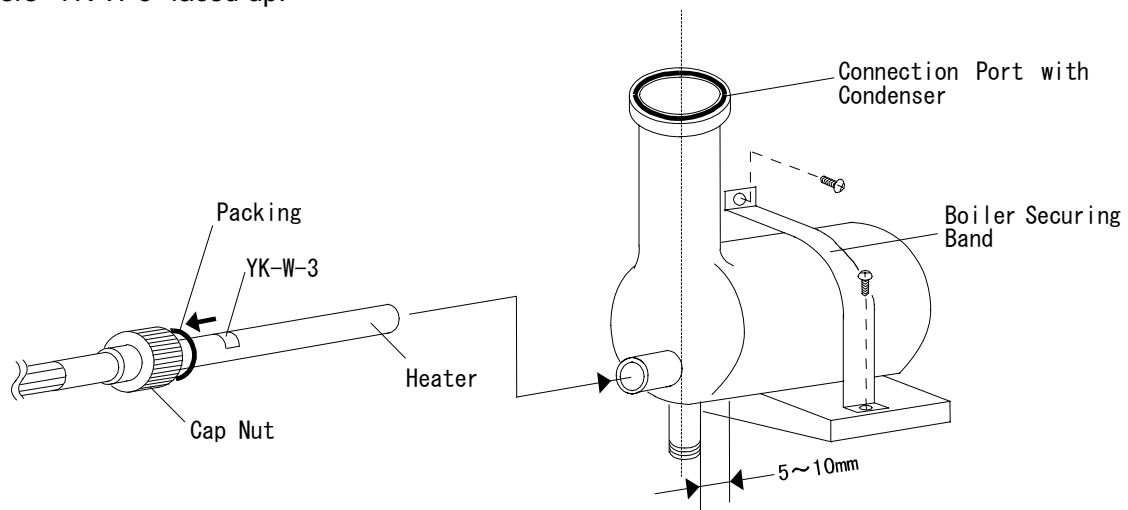
2. If detergent liquid should flow out of hose connection port, seal with rubber stopper. Most fur can be removed in 4 - 5 hours approximately.
3. Drain detergent liquid, and then wash enough with city water.

Handling of Detergent Liquid (also refer to Page 21 "Handling Precautions")

1. Wash the boiler and heater sooner. If the more scale is deposited, the more difficult is its removal, which may cause decrease of distilled water sampling and damage to heater.
2. When washing is finished, drain detergent liquid out of the unit, and apply neutralization by neutralizer (such as sodium hydroxide). In neutralization, check that it is neutral by use of pH test paper, etc. (Principal component of scale detergent: Sulfamic acid and pH of water solution: Acidic approximately 1)
3. In storing this detergent, seal the agent and store in cold and dark place avoiding high temperature and humidity.
4. In handling this detergent, be sure to use protective tools (gloves, mask, and glasses).
5. When it is in contact with human body, wash it away with clean water.
6. Do not use empty container for beverage.
7. Do not allow detergent to directly flow into agricultural irrigation canal or fields because it causes withering of rice crop.

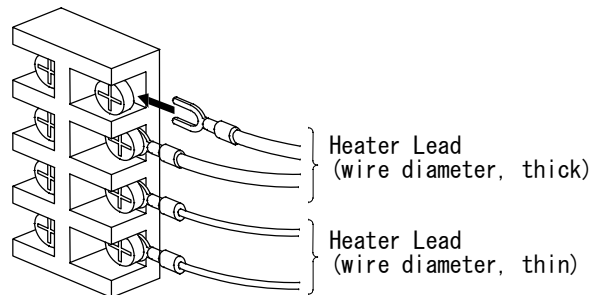
Installation of boiler

1. Secure the boiler with the boiler securing band so that connection port of condenser is horizontal. Check that the packing is contained in the cap nut, and then install the heater into the boiler with letters "YK-W-3" faced up.



Washing of Distiller

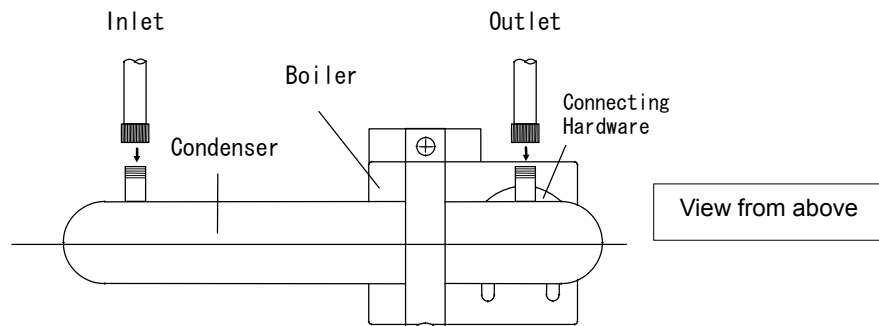
2. Attach 4 heater lead terminals to the terminal block.



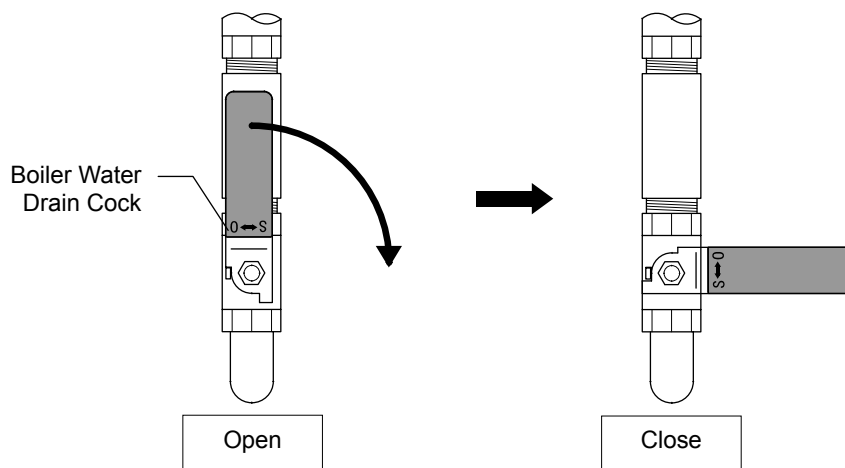
3. Install the left side plate on the body.
4. Insert the hose to the boiler water supply and drain port, and secure with the hose band.

Installation of condenser

1. Place packing in the connection port of boiler with condenser, and secure with connecting hardware so that the boiler and condenser are placed in the same direction.

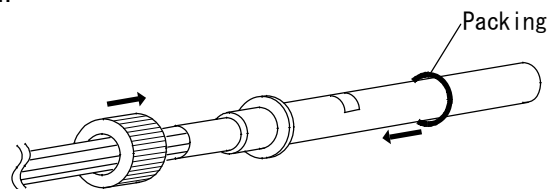


2. Connect the hose respectively to the cooling water inlet, outlet, and distilled water outlet of condenser.
3. Close the boiler water drain cock.



Replacement of Heater

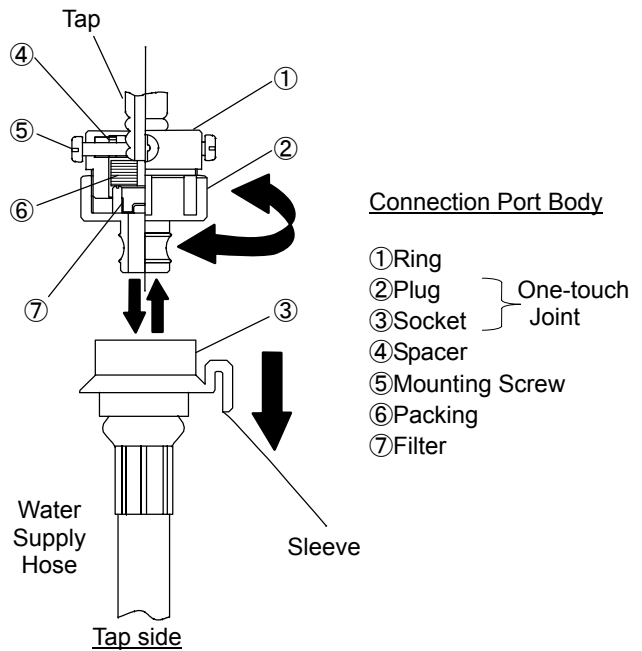
- If the heater should be disconnected or damaged due to deposit of scale, replace it by the procedure below. (Also refer to Page 23 "Washing of Distiller" in working.)
1. Turn "OFF" the earth leakage breaker of this unit.
 2. Close the tap.
 3. Turn "OFF" earth leakage breaker, and when more than 30 minutes has passed, open the front door of this unit, and open the boiler water drain cock.
 4. Open the left side plate of the body, loosen the four screws on the right of the terminal block, and disconnect the heater lead terminal.
 5. Pull the heater lead out of the grommet.
 6. Remove the cap nut of heater, and pull out the heater.
 7. Remove the packing and cap nut from the damaged heater.
 8. Install the packing and cap nut on the new heater. At that time, do not touch with bare hand in order to prevent soiling by hand.



9. Install on the boiler so that "YK-W-3" mark of the heater is faced up.
10. Feed the heater lead wire through the grommet, check the heater lead wire attaching position, and secure to the terminal block.
11. Mount the left side plate.
12. Close the boiler water drain cock.
13. Close the front door, and then open the tap.
14. Turn on the earth leakage breaker.
15. Press POWER key while holding down PURE WATER key and DISTILLED WATER key. Perform calibration operation (all of ON, DISTILL, PURE WATER, and DISTILLED WATER lamps blink at the same time) for about five minutes, after then, distillation (ON and DISTILL lamps light up) starts automatically. Key operation becomes disable while calibration operation. In case that power failure occurs while calibration operation, please perform calibration again.

Washing of Water Supply Hose Filter

1. After turning off the earth leakage breaker on this unit, turn the tap off, slide the sleeve to the direction of the arrow, then, remove the water supply hose from the connection port.
2. Remove the plug ② from ring ① as turning.
3. Cleanse filter ⑦ attached to the packing with water.
4. Wash the filter with spray, etc.
5. Assemble by reversing the procedure.



Replacement of Hose

- Be sure to use a hose specified by Yamato Scientific for replacement.

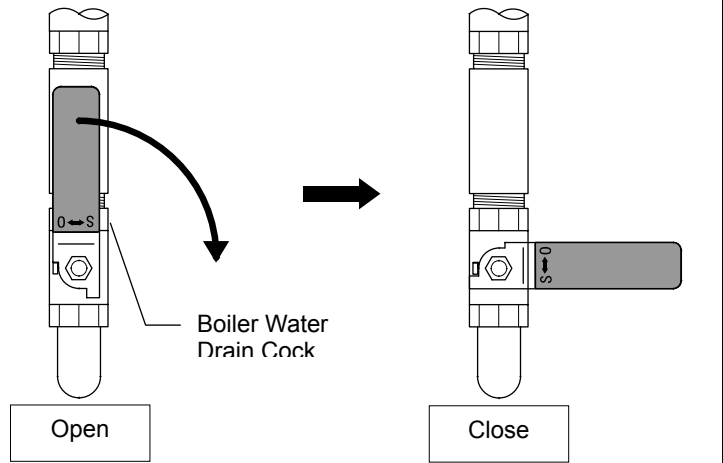
When not using this unit for long term / When disposing



- If this unit is to be put out of service for a long time, be sure to turn off the earth leakage breaker of this unit for safety, and close the tap. Water in the boiler and distilled water tank, if stored as it is, will deteriorate in quality due to generated bacteria or algae. Drain water by the procedure below:

Boiler Water Drain

1. In draining boiler water, turn off the earth leakage breaker, ensure that the tap is closed, then wait for 30 minutes or more, and open the front door.
2. Open the boiler water drain cock.
3. Make sure that all water in the boiler and float cylinder is drained.
4. Be sure to close the boiler water drain cock. If boiler water drain cock is opened in next use, water is not fed into the boiler, and distillation is not started.



Long storage and disposal

When not using this unit for long term / When disposing

WARNING!

When disposing...



- Keep out of reach of children.
- Treat as large trash.

When the unit is out of service at night and on holidays



- Turn off the earth leakage breaker.
- Be sure to close the tap.
- Fluctuation of city water pressure may cause unexpected accident such as water leakage.
- In use in winter at a severely cold place, beware of freezing in the tank, boiler, condenser, etc. while system is stopped.

Environmental protection should be considered

We request you to disassemble this unit as possible and recycle the reusable parts considering to the environmental protection. The feature components of this unit and materials used are listed below.

Component Name	Material
Main Components of Exterior	
Exterior	Made of iron, bonded steel plate, melamine resin baking finish
Exterior rear plate	Made of iron, bonded steel plate, melamine resin baking finish
Door	Made of iron, bonded steel plate, melamine resin baking finish
Door rear plate	Stainless steel plate SUS 304
Mounting plate (painted)	Made of iron, bonded steel plate, melamine resin baking finish
Mounting plate (unpainted)	Stainless steel plate SUS 304
Electric parts mounting plate	Aluminum
Hinge	Stainless steel plate SUS
Rubber foot	Synthetic rubber
Mounting tabs	Stainless steel plate SUS 304
Production plates	Polyester
Main Components of Water Circuit System	
Boiler	Hard glass
Condenser	Hard glass
Float cylinder	Polypropylene
Pure water tank	Polyethylene
Drain port	Polypropylene
Water supply port	Brass
Float cylinder branch pipe	Polypropylene
Electrode holder	Polypropylene
Water sampling port	Polypropylene
Control panel	ABS resin
Resin cylinder case	Polypropylene

Long storage and disposal

When not using this unit for long term / When disposing

Component Name	Material
Main Components of Water Circuit System	
Ion exchange resin	Polystyrene Resin
Water quality gauge electrode	Titanium
Heater	Ceramic
Heater mounting nut	Teflon
Main Components of Piping System	
Water supply hose	Vinyl chloride
Drain hose	Ethylene propyne
Hose (transparent)	Vinyl
Hose (milky transparent)	Silicon
Hose clamp	Polyacetal
Hose nipple (resin black)	Polyamide
Hose nipple (resin white)	Polypropylene
Hose nipple (metal)	Brass
Main Components of Electric System	
Pump	Casing: Polypropylene Impeller: Polypropylene Magnet: Ferrite magnet Motor case: Iron Rotor: Iron
Solenoid Valve	Made of metal: Body, brass Made of resin: Body, polyacetal
Float Switch	Polypropylene
Power Cord, Wiring Material, etc.	Wiring material and board coated by synthetic rubber and resin

Failure indication and Its Contents

When the following error signs appear, memorize the sign and turn the tap off immediately. If an error occurs, part change or unit check becomes required. Please call the shop from which you made a purchase or our customer support center. In that case, please notify them of the error sign.

Safety device	Indication			Cause	Symptom	Countermeasure
	LEAK	LOW PRESSURE	OVER HEAT			
Burnout of heater	Lights up	Lights up	Blinks	When temperature of the heater did not rise after certain time passed during distillation	All controls of the heater and solenoid valve are turned OFF.	Change the heater.
Water level error of boiler	Turns off	Lights up	Turns off	When the heater operation water level input kept OFF even if the time for required to evaluate the boiler water level error passed after starting water supply to the boiler		Check whether manual drain cock is opened or not. Also check the feedwater solenoid valve and the feedwater path.
Coolant error	Turns off	Turns off	Lights up	When the state of the boiler water overflow input ON in the float pipe continued longer than coolant error judgment time		Check the coolant solenoid valve and the coolant path.
Water level meter error	Lights up	Blinks	Lights up	When the condition of the float contacting points in the float pipe becomes abnormal.		Change the float switch.
Tank water level meter error	Blinks	Lights up	Lights up	When the condition of the float contacting points in the tank water level meter becomes abnormal		Turn the breaker on again. If the trouble persists, please call our customer service center.
Pure water conductivity meter error	Lights up	Lights up	Lights up	When the state of breakage or shortage of the thermistor sensor for pure water conductivity meter continues longer than error judgment time		Change the pure water conductivity sensor.
Overheat of heater	Turns off	Turns off	Blinks	When the temperature at the heater exceeds the error judgment value, or when breakage or shortage occurs on the temperature sensor		Change the heater.
Water leakage error	Blinks	Turns off	Turns off	When the resistance value of the water leakage sensor input becomes less than the water leakage error judgment value		Turn the breaker off and check the piping parts. For details, refer to page 34.

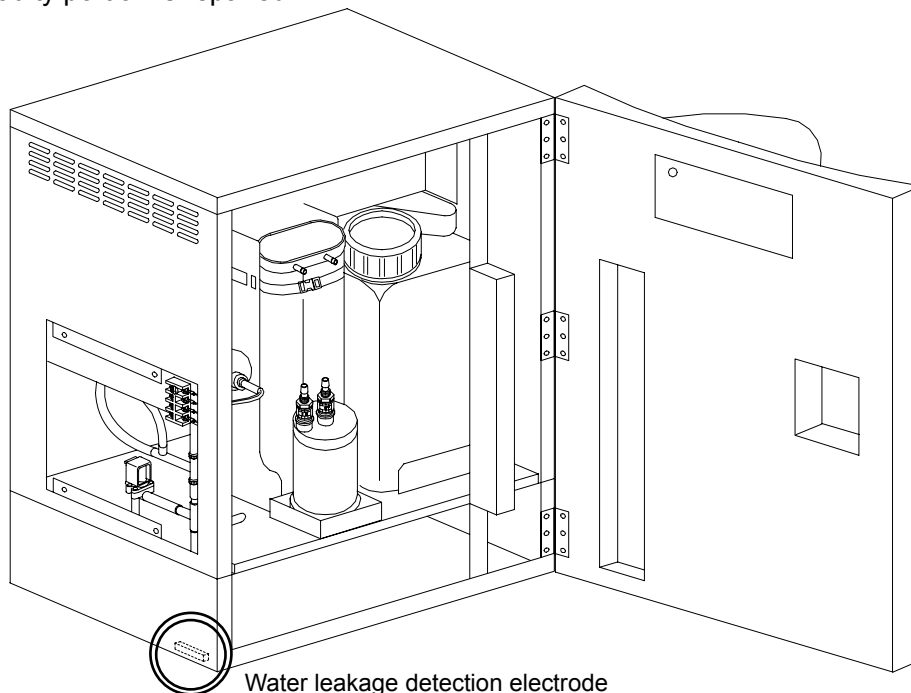
Failure indication and Its Contents

Safety device	Indication			Cause	Symptom	Countermeasure
	LEAK	LOW PRESSURE	OVER HEAT			
Low pressure error	Turns off	Blinks	Turns off	When raw water pressure is low, or the pressure of raw water is less than 0.5kgf/cm ²	All controls of the heater and solenoid valve are turned OFF.	Check the water pressure of raw water and the tap. When the raw water pressure is recovered, operation starts automatically (auto-recovery)
Controller error	Blinks	Blinks	Blinks	When the setting value which is memorized in the memory chip cannot be read properly, or when an abnormal value was displayed When an error at A/D circuit is detected		Turn the breaker OFF.

Remedy for Trouble

Remedy when water leakage detection ("LEAK" lights up)

1. Turn "OFF" the earth leakage breaker on the right side of body.
2. When restarting after the faulty portion is repaired, wipe off water accumulated at the bottom of system, dry up, remove the water leakage detection electrode, and dry up enough.
3. Be sure to reset the electrode to the original condition.
4. Close the door.
5. Turn on the earth leakage breaker and press the POWER key. Normal operation is started because faulty portion is repaired.



Remedy when water stopping detection ("LOW PRESSURE" lights up)

1. Check the pressure of the raw water and if the tap is open (if water level reaches the device).
2. If the pressure of the raw water resumes, the system is reset automatically.

Remedy when overheat detection ("OVERHEAT" lights up)

1. Check if the cooling water flows.
2. If the cooling water flows, the heater may be overheated or disconnected.
3. In such a case, contact the distributor or the customer support center.

Trouble Shooting

Condition	Check the following.
Water is not supplied.	<ul style="list-style-type: none"> • Defect of raw water supply solenoid valve. • Insufficient city water pressure or water failure. • Defect of pressure switch. • Clogging of pre-treatment cartridge.
Water supply does not stop.	<ul style="list-style-type: none"> • Defect of float switch. • Defect of raw water supply solenoid valve.
No water is supplied to boiler.	<ul style="list-style-type: none"> • Defect of boiler water supply solenoid valve. • Defect of float switch. • Clogging of pre-treatment cartridge. • Opened boiler water drain cock.
Heater does not turn on.	<ul style="list-style-type: none"> • Defect of float switch. • Break in heater.
Cooling water does not flow.	<ul style="list-style-type: none"> • Defect of cooling water solenoid valve.
The initial accumulated water is not drained.	<ul style="list-style-type: none"> • Initial boiled water is not drained.
Distilled water is not accumulated.	<ul style="list-style-type: none"> • Defect of initial boiled water drain solenoid valve. • Defect of piping.
Distilled water is not stored.	<ul style="list-style-type: none"> • Defect of float switch.
Water is not sampled.	<ul style="list-style-type: none"> • Defect of Ion exchanged water/Distilled water sampling solenoid valve. • Defect of distilled water sampling pipe. • Defect of piping.

In Case of Request for Repair

If the failure occurs, stop the operation, turn OFF the power switch, and unplug the power plug. Please contact the sales agency that this unit was purchased, or the Yamato Scientific's sales office.

< Check following items before contact >

- ◆ Model Name of Product
 - ◆ Production Number
 - ◆ Purchase Date
 - ◆ About Trouble (in detail as possible)
- } See the production plate attached to this unit.

Minimum Retention Period of Performance Parts for Repair

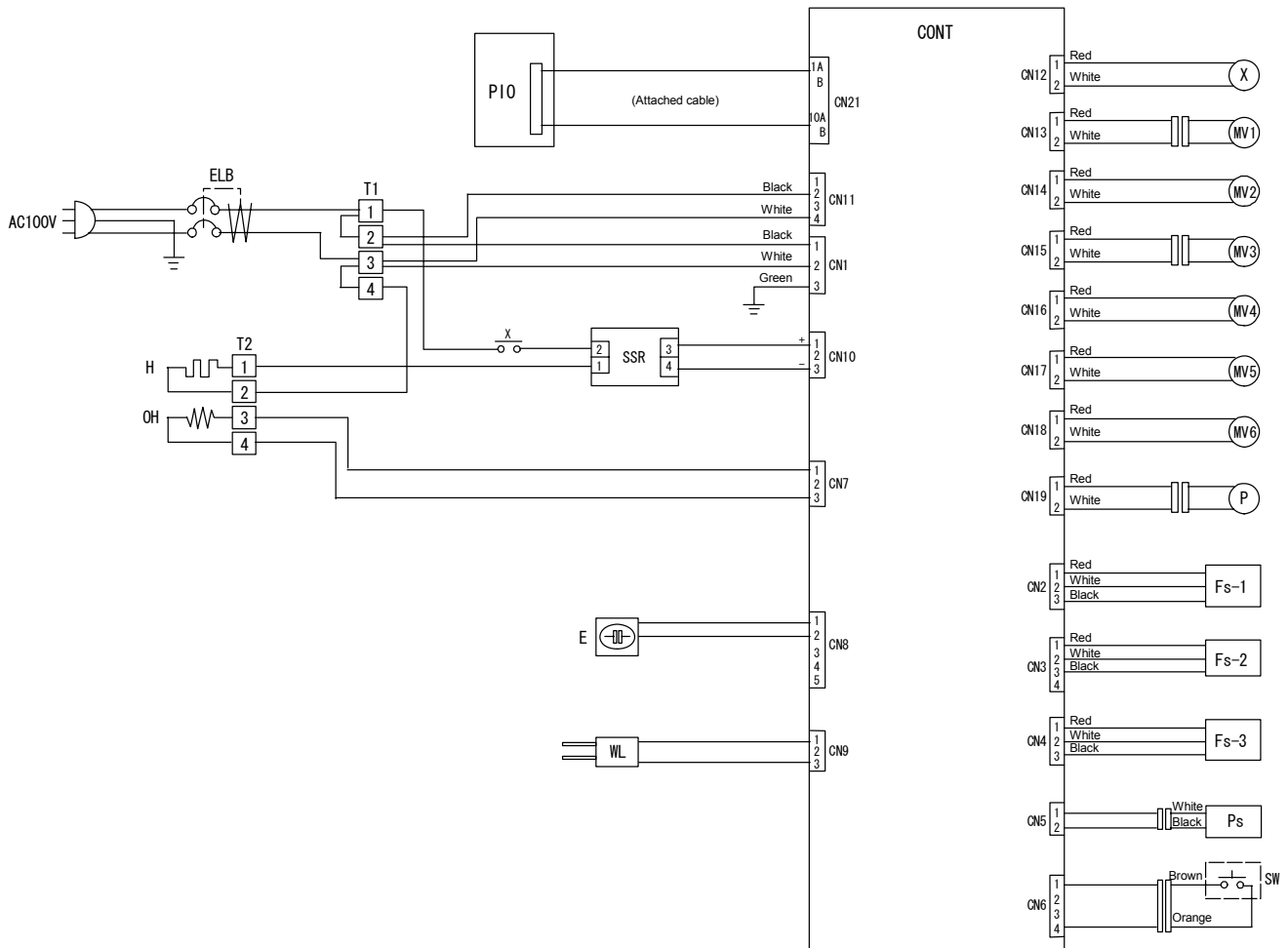
The minimum retention period of performance parts for repair of this unit is 7 years after discontinuance of this unit.

The "performance part for repair" is the part that is required to maintain this unit.

Model		WG203	
Performance	Collecting method		Ion exchange ⇒ Distillation
	Sampled pure water		Distilled water/Ion exchange water
	Quantity of distilled water		Approx. 1.8λ/h
	Sampling flow rate		1λ/min. or more (ion exchanged water/distilled water)
Configuration	Distiller	Boiler	Super hard glass
		Condenser	Super hard glass
		Heater	Ceramic heater 1.4kw
	Distilled water storage tank		Made of polyethylene, 20λ
	Raw water side filter		Pre-treatment cartridge (PWF-1), Activated carbon + Hollow yarn film 0.1 μm
	Ion exchange resin cartridge		One-touch connection cartridge type (CPC-S), 2λ × 2
	Water quality gauge		5 stages lamp display 0 to ∞ × 10 ⁻⁴ S/m•25°C (Display of electric conductivity)
	Water sending pump		Magnet pump
	Multi-purpose distilled water sampling port		One port on the right side of the unit
Standard	Raw water pressure range		0.5 × 100 kPa to 5 × 100 kPa (0.5 to 5 kgf/cm ²)
	Ambient temp.		5°C ~ 35°C
	Power supply (50/60 Hz)		100V AC 15A
	External dimension (*) (Width X Depth X Height)		600 × 560 × 780 mm
	Weight		Approx. 48 kg
Attached mechanism			<ul style="list-style-type: none"> • Water quality failure alert • Detection of cooling water failure • Prevention of baking heater with no load • Detection of heater disconnection • Prevention of heater overheat • Detection of water leakage • Detection of water outage • Earth leakage breaker • Initial boiled water drain • Detection of water level gauge failure (boiler and tank) • Recovery after power failure • Detection of water quality gauge failure
Accessories			<ul style="list-style-type: none"> • Water supply hose, drain hose, and connection assembly: 1 respectively • Operation manual: This manual • Hose clamp: 1 • Scale washing agent (1kg): 1 • Pre-treatment cartridge: 1 • Ion exchange resin cartridge: 1

* : The projection is not included for external dimensions.

Wiring Diagram



Symbol	Part name	Symbol	Part name
ELB	Earth leakage breaker	X	Main relay
T1, T2	Terminal block	MV1	Raw water solenoid valve
H	Heater	MV2	Boiler water supply solenoid valve
OH	Temperature sensor	MV3	Cooling water solenoid valve
E	Ion exchange water quality gauge	MV4	Initial accumulated water drain solenoid valve
WL	Water leakage detector	MV5	Distilled water sampling solenoid valve
FS1	Control float switch	MV6	Ion exchange water sampling solenoid valve
FS2	Control float switch	P	Distilled water sampling pump
FS3	Water level float switch	SSR	Solid state relay
PS	Pressure switch	PIO	Display board
SW	Reset switch	CONT	PLANAR board

List of Dangerous Substances



Never use explosive substances, flammable substances and substances that include explosive or flammable ingredients in this unit.

EXPLOSIVE

EXPLOSIVE:	Ethylene glycol dinitrate (nitro glycol), Glycerin trinitrate (nitroglycerine), Cellulose nitrate (nitrocellulose), and other explosive nitrate esters
	Trinitrobenzene, Trinitrotoluene, Trinitrophenol (picric acid), and other explosive nitro compounds
	Acetyl hidroperoxide (peracetic acid), Methyl ethyl ketone peroxide, Benzyl peroxide, and other organic peroxides

FLAMMABLE

IGNITING:	Lithium (metal), Potassium (metal), Sodium (metal), Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid compounds, Calcium carbide, Lime phosphate, Magnesium (powder), Aluminum (powder), Powder of metals other than magnesium and aluminum, Sodium hydrosulfite
OXIDIZING:	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorate
	Potassium perchlorate, Sodium perchlorate, Ammonium perchlorate, and other perchlorate
	Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxide
	Potassium nitrate, Sodium nitrate, Ammonium nitrate, and other nitrate
	Sodium chlorite and other chlorites
	Calcium hypochlorite and other hypochlorites
INFLAMMABLE LIQUID:	Ethyl ether, Gasoline, Acetaldehyde, Propylene chloride, Carbon disulfide, and other flammable substances having a flash point of lower than -30°C
	Normal hexane, ethylene oxide, acetone, benzene, methyl ethyl ketone, and other flammable substances having a flash point of -30°C or higher but lower than 0°C
	Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substances having a flash point of 0°C or higher but lower than 30°C
	Kerosene, Light oil (gas oil), Oil of turpentine, Isopentyl alcohol (isoamyl alcohol), Acetic acid, and other flammable substances having a flash point of 30°C or higher but lower than 65°C
FLAMMABLE GAS:	Hydrogen, Acetylene, Ethylene, Methane, Propane, Butane, and other flammable substances which assume a gaseous state at 15°C and 1 atm

(Source: Appendix Table 1 of Article 6 of the Industrial Safety and Health Order in Japan)

Responsibility

Please follow the instructions in this document when using this unit. Yamato Scientific has no responsibility for the accidents or breakdown of device if it is used with a failure to comply. Never conduct what this document forbids. Unexpected accidents or breakdown may result in.

Note

- ◆ The contents of this document may be changed in future without notice.
- ◆ Any books with missing pages or disorderly binding may be replaced.

Instruction Manual for

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Model WG203

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