

Demineralizers

**Still, water, models
WG221
WG221S**

First Edition

Thank you very much for buying Yamato Scientific AUTO STILL series WG221/221S model.

For proper use of this unit, please read the instruction manual and warranty thoroughly before operation. Keep both for any future references.

Warning: Read and apprehend the important warning signs in this instruction manual prior to use.

Yamato Scientific CO.,LTD

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Explanation of Graphic Indication

This instruction manual and our products apply various graphic indications for safety use. Ignoring these indicators or improper handling of the unit can cause such situations as indicated below. Please read and apprehend the following contents.



Warning Warning indicates possibility of serious injuries (1) or death.



Caution Caution indicates possibility of injuries (2) on person or damages on property (3).

(1) Serious injuries mean any injuries , electric shocks, bone fractures and poisoning causing after effects or requiring hospitalization or long outpatient treatment

(2) Injuries mean any injuries and electric shocks not requiring hospitalization or long outpatient treatment.

(3) Damages on property mean any damages on facilities, machinery, buildings, etc.

Meaning of graphic indications



It shows conducts to be surely done.



It shows warnings or cautions.



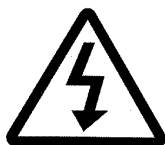
It shows prohibited conducts.

Table of Symbol Mark

Warning



General Warning



Warning of High Potential voltage



Warning of High Potential voltage



Warning of drive section



Warning of explosion

Caution



General Caution



Caution of electric shock



Caution of scald



Caution of low-water boiling



Caution of water leak



Water only



Caution of deadly poison

Prohibition



General Prohibition



Prohibition of fire



Prohibition of disassembling

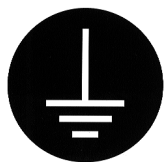


Prohibition of touch

Compulsion



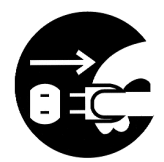
General Compulsion



Ground the unit



Install on level area



Pull electric power plug



Fixed time check or maintenance

Caution for Safety



Warning



Do not use this unit in flammable or explosive gas environments.

This unit is not explosive proof. Never use this unit in flammable or explosive environments to prevent fire or explosion.

See Page5 for dangerous element Table of Dangerous Element



Never fail to ground the unit.

Connect with the grounded outlet. If you do not have grounded outlet, use the adapter for grounding that is non-standard accessories, and then be sure to ground the lead.



Do not use this unit if malfunction occurs.

If smoke or any strange odor should disburse from the unit, switch off power to prevent fire or electric shock.



Do not bundle the power cable during use.

Overheat or fire can occur if the power code is bundled in use of the unit.



Do not damage the power code.

Forcibly bending, pulling or wrenching damages the power code, and can cause a fire or electric shock.



Do not disassemble or remodel this unit.

Disassembling this unit can cause a fire, electric shock or other crisis. Never disassemble or remodel this unit.



Do not touch hot area.

Pay attention not to get scalded. Some areas of the boiler are hot during or after operation. Make sure if the boiler is cool enough before you start maintenance of the heater or other devices.



Fasten the tap when you do not use the unit

When you do not use the unit (in the nighttime or holidays) , certainly fasten the tap to prevent the accident of water leak .

Caution for Safety



Caution



If it begins to thunder.

If it begins to thunder, switch the power off. Neglecting this can result in fire or electric shock.



Be careful for using the cleanser (Organosol).

The main ingredients of the cleanser (organosol) is sulfamic acid and the solution is about PH1. Wear protective gloves, mask and glasses to handle the cleanser. Wash immediately by pure water the cleanser splashing on body.

Table of Dangerous Element

Explosive	Explosive Substance	Nitroglycol, Nitroglycerin, Nitrocellulose, and other explosive nitric esters.
		Trinitrobenzene, Trinitrotoluene, Picric acid, and other explosive nitro compounds.
		Peracetic acid, Methyl ethyl ketone peroxide, Benzoyl peroxide, and other organic peroxides.
		Sodium azide, and other metallic azides
Flammable	Combustible Substance	Metallic lithium, Metallic potassium, Metallic sodium, Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid, Calcium carbide, Lime phosphate, Magnesium powder, Aluminum powder, and other combustible metal powders and sodium dithionite (hydrosulfite).
	Oxidant	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorates.
		Potassium perchlorate, Sodium perchlorate, Ammonia perchlorate, and other perchlorates.
		Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxides.
		Potassium nitrate, Sodium nitrate, Ammonia nitrate, and other nitrates.
		Sodium chlorite and other chlorites.
		Calcium hypochlorite and other hypochlorites.
	Ignitable Substance	Ethyl ether, Gasoline, Acetaldehyde, Propylene Oxide, Carbon disulfide, and other flammable substances with a flash point below minus 30°C.
		Normal hexane, Ethylene oxide, Acetone, Benzene, Methyl ethyl ketone, and other flammable substances with a flash point between minus 30°C and 0°C.
		Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substance with a flash point between 0°C and 30°C.
		Kerosene, Light oil, Turpentine oil, Isoamyl alcohol, Acetic acid, and other flammable substances with a flash point between 30°C and 65°C
	Combustible Gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other flammable gas at 15 degree and under 1 atmosphere.

Installation and Preparation for Use



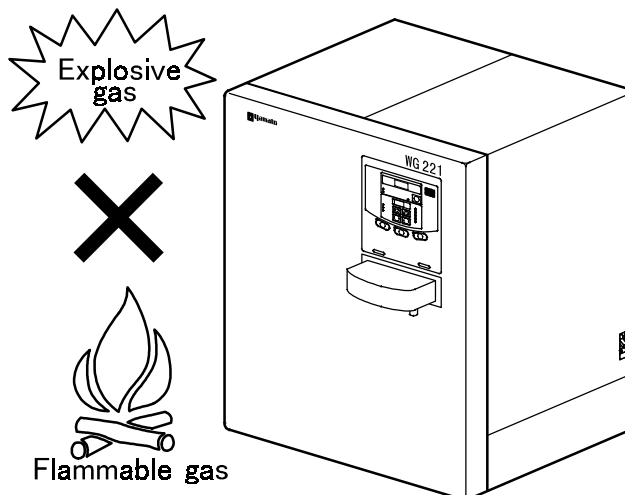
Warning



Do not use this unit in flammable or explosive gas environments.

This unit is not explosion proof. Never use this unit in flammable or explosive gas environments. Electric arc occurs when you switch the unit “ON” and “OFF”, and can cause a fire or explosion.

See Page 5 (Table of dangerous element) about flammable or explosive gas.

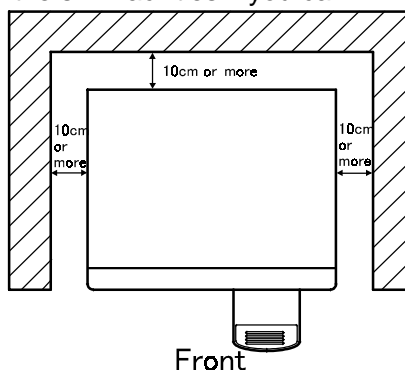


Select carefully the space to install the unit.

Do not install this unit in any of the following environments.

- In inflammable or corrosive gas environments
- In temperature beyond 35
- In severe change in temperature
- In very humid locations[
- Under direct sun
- In frequently vibrating areas

Provide ample space surrounding the unit as indicated below.
Install the unit in the place with the sink facilities if you can.



Installation and Preparation for Use



Warning

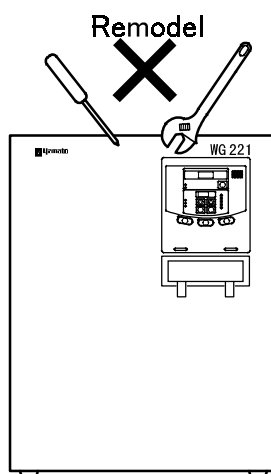


Do not remodel this unit.

Never disjoint this unit to avoid electric shock.

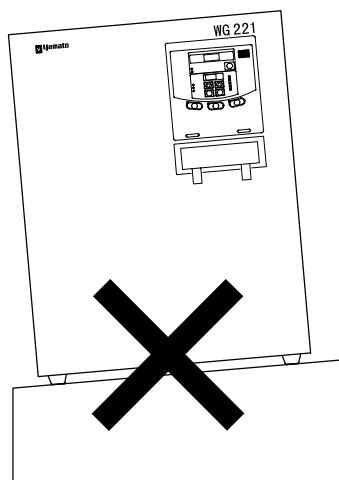
There are some high-pressure areas inside the unit. Ask your seller or Yamato Scientific's Technical Service Department for internal adjustment or repair.

You must follow this instruction manual for your daily check or maintenance. Never remodel the unit by yourself to prevent any troubles.



Install this unit on level areas.

If you do not, unexpected trouble can occur.





Warning



Ground the unit.

If you do not ground the unit, the earth leakage circuit breaker would not work in case of electric leakage. Be sure to connect the ground lead to prevent electric shock.

Ground the ground lead to the ground wire or terminal of the power source. Contact an electrician if you have no equipment for grounding.

Never connect with gas or water pipe.

Be sure to ground the lead wire when you use the adapter of non-standard accessories for grounding.



Use exclusively the outlet.

Use an outlet with adequate capacity (more than 15 A).

If you connect to those without enough capacity, you would not take enough distilled water or control properly the unit due to decrease of voltage from the power source. Connect the power cord to the sufficient power source.

Necessary capacity : AC100V single-phase 15A



Precaution for connecting the power cord.

Check certainly that the circuit breaker of power source is "off" and connect the power cord for this unit. Power plug of this unit is three core cable. So the plug has grounding line. If you do not have adaptable outlet (See Page2), Use the adapter for grounding that is non-standard accessories. If you use it, be sure to ground the lead wire.



Precaution for proper use of the power cord

Do not bundle the power cord during operation, or overheat or fire can occur.

Do not process, or bend, wrench or pull forcibly the cord. Such conduct can cause a fire or electric shock.

Do not damage the cord, by placing a desk or chair on it or placing it between objects. Such conducts can result in fire or electric shock.

Do not place the cord near any stoves or heaters, or the cable coating can melt causing a fire or electric shock.

If the power cord is damaged (core exposure or disconnection), turn immediately the circuit breaker and the power supply off, and request the seller to change the power cord. Neglecting this procedure can cause a fire or electric shock.

Connect the cord to an exclusive outlet.

Installation and Preparation for Use



Warning



Connect securely the water supply hose.

If you do not connect the joint securely, the water-supply hose or connector would come off, causing water leak or spouting.

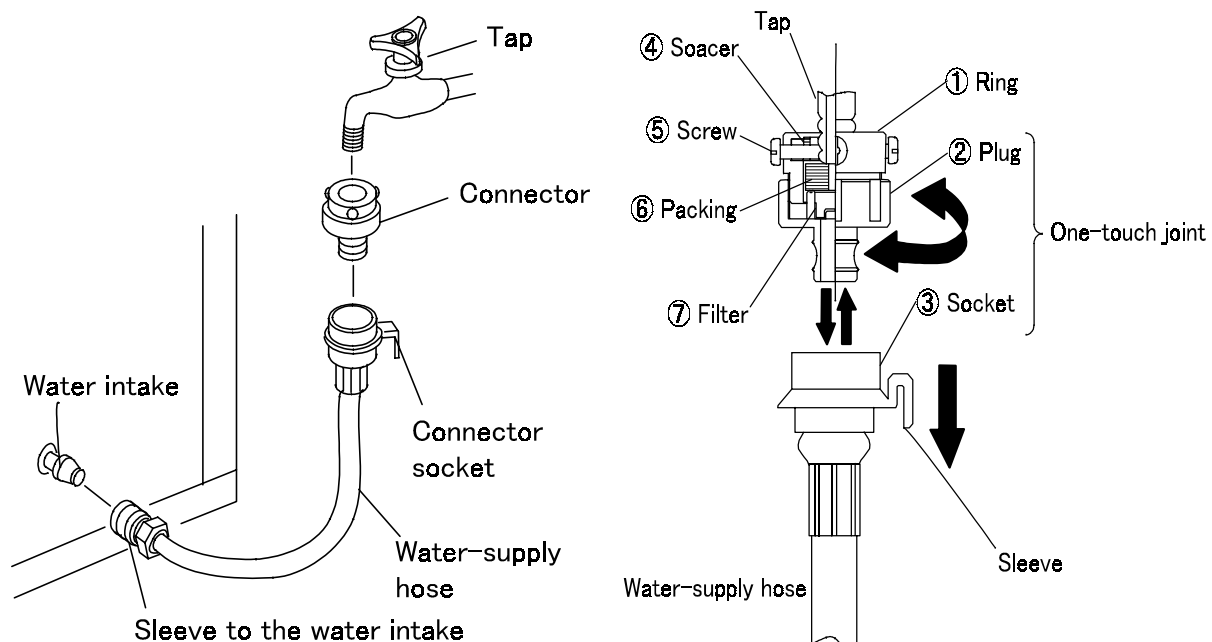
Use the connector and water-supply hose out of accessories for this unit. Install the unit on the level and stable place near a tap and drainage.



Connect securely the water-supply hose in the following procedure.

Connect to a tap.

- (1) Slide the joint sleeve of the socket to the direction the arrow shows. Then you can separate the connector and the hose.
- (2) Loosen the plug from the ring.
- (3) Fasten 4 screws in the same way while pushing the ring lightly and evenly so that the packing touches evenly the tap.
- (4) Turn right and fasten securely the plug. Then the packing seals the tap and connector.
- (5) Slide the sleeve to the direction the allow shows and insert the socket securely into the plug. Make sure the sleeve goes back to the original position when you loose your hold. Then you can finish the connection.



Installation and Preparation for Use

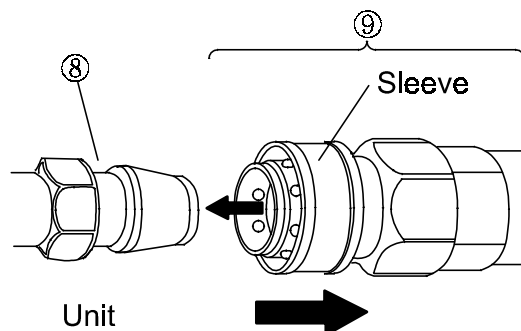


Warning



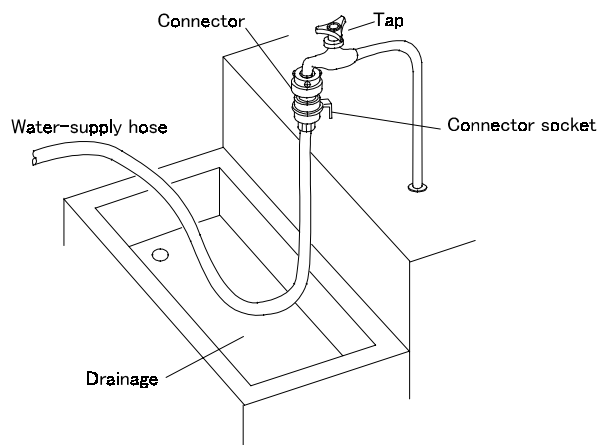
Connection to the unit

- (1) Remove the rubber cap from the plug .
- (2) Slide the sleeve to the direction the arrow shows, and insert securely the socket into the plug .
Make sure the sleeve returns to the original position when you loose your hold. Then, you can finish the connection.
The socket has a built-in valve which would not open for water run until the plug is connected.



Connect the water-supply hose to a tap with drainage system.

Connect the hose to a tap with drainage system. If you connect the water-supply hose to a tap without drainage system, damage on the hose could result in overflow of water.



Installation and Preparation for Use



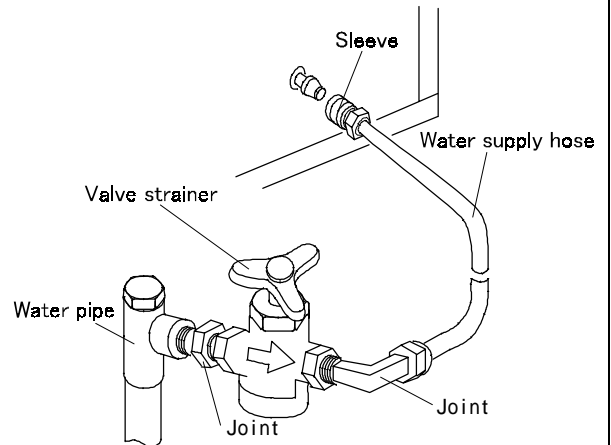
Caution



If drainage facility is away from the tap, use the Water Supply Unit, a non-standard accessory.

The "Water Supply Unit" includes all items from the sleeve to the joint. Refer to the instruction manual for the "Water Supply Unit" about connection to the faucet and for more information.

The "Water Supply Unit" has the structure to keep tight connection to the pipe compared to a normal hose set even when the water pressure changes.



Keep the following pressure of water service.

Keep water pressure within 0.5 to 5×100kPa (0.5 to 5kgf/cm²) even for use at night.

Keep the same water pressure even when you use the non-standard accessory "Water Supply Unit",

Installation and Preparation for Use



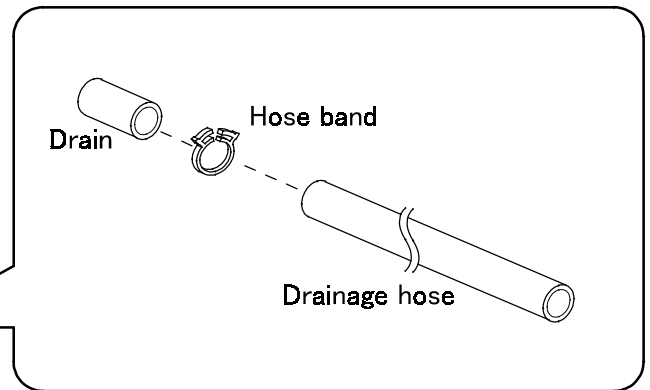
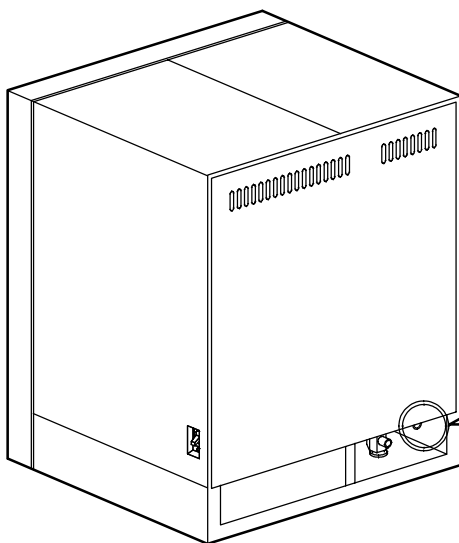
Warning



Connect securely the drainage hose.

Connect securely the drainage hose. If the hose comes off due to incomplete connection, water would leak inside the unit and might cause machine trouble.

- (1) Take the drainage hose and the hose band out of accessories for the unit.
- (2) Make sure the circuit breaker is off.
- (3) Take out the rubber stopper from the drain .
- (4) Pass the hose band over the hose. Then, insert the hose into the drain and fasten the hose band.

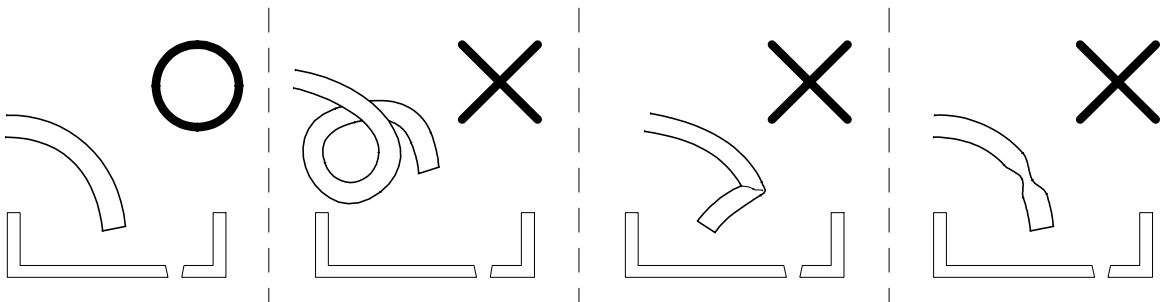


Be careful to arrange the drainage hose.

Do not bend the hose nor make any convex part.

Arrange the hose lower than the drain of the unit. And also avoid the connection which make water accumulate in the drainage hose or drain exit and become resistance for drain.

Lead the end of the drain hose to drainage capable of about 2 ℓ/min. of cooling water drained. Drainage with larger capacity is required when boiler water is drained.



Installation and Preparation for Use



Warning



Check the temperature of drained cooling water.

The drained water sometimes exceeds 60 °C especially in summer. Do not touch the water carelessly, or you can get scalded. Drain the water away from your work areas.

Drain hot water away from chloroethylene pipe, if used, in the drainage facility, or the drained water can deteriorate the pipe. You must connect the drain trap, a non-standard accessory for the unit, to the chloroethylene pipe in case the pipe temperature does not get lower than 60 °C.

Use the drain trap of the non-standard accessory even under 60 °C when you do not use the above-said pipe and joint.

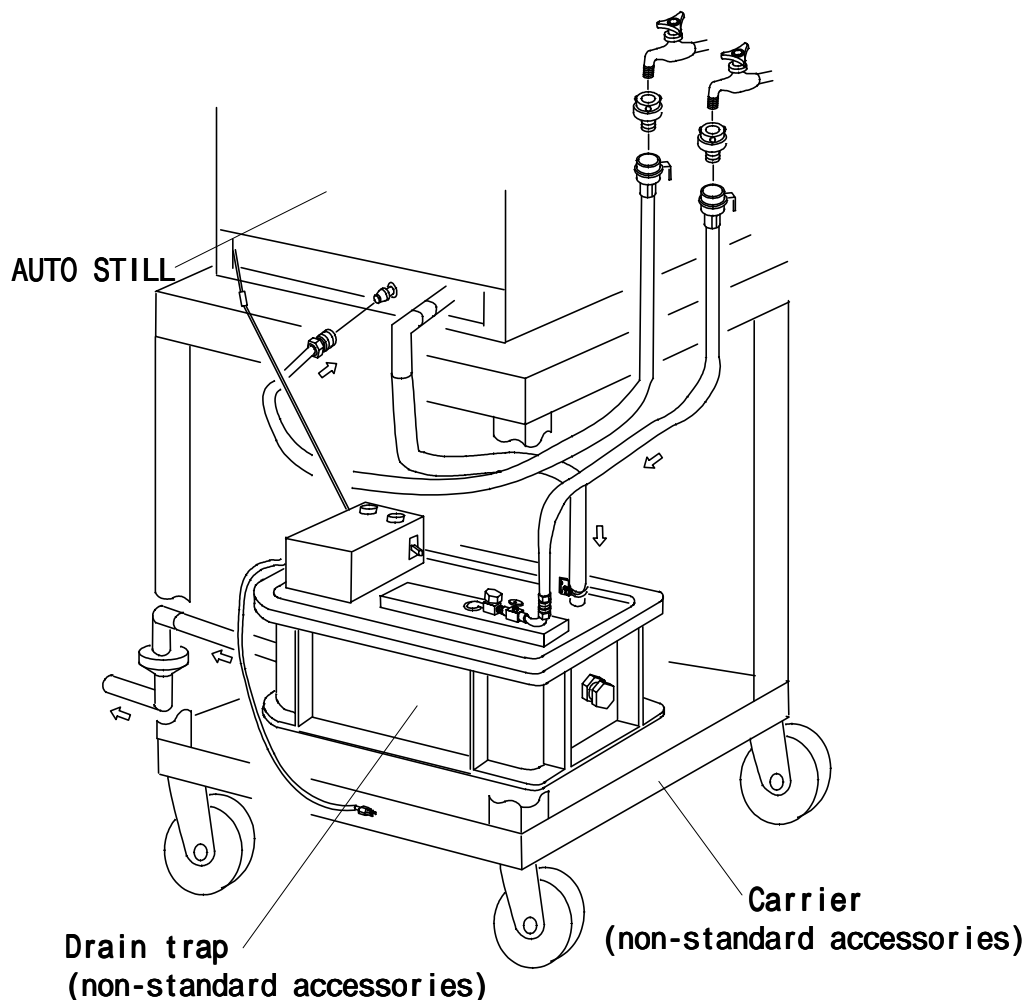


If the drain pipe of the drainage facility does not get lower than 60 °C.

Connect the drain trap, a non-standard accessory for the unit.

The trap keeps the drained water for a while to cool the water naturally. In addition, the trap mixes tap water and cooled drained water. Then mixed water is drained to drainage facility after mixed water is cooled down.

If you want to know about the details of the drain trap, ask your seller or Yamato Service Department.





Warning

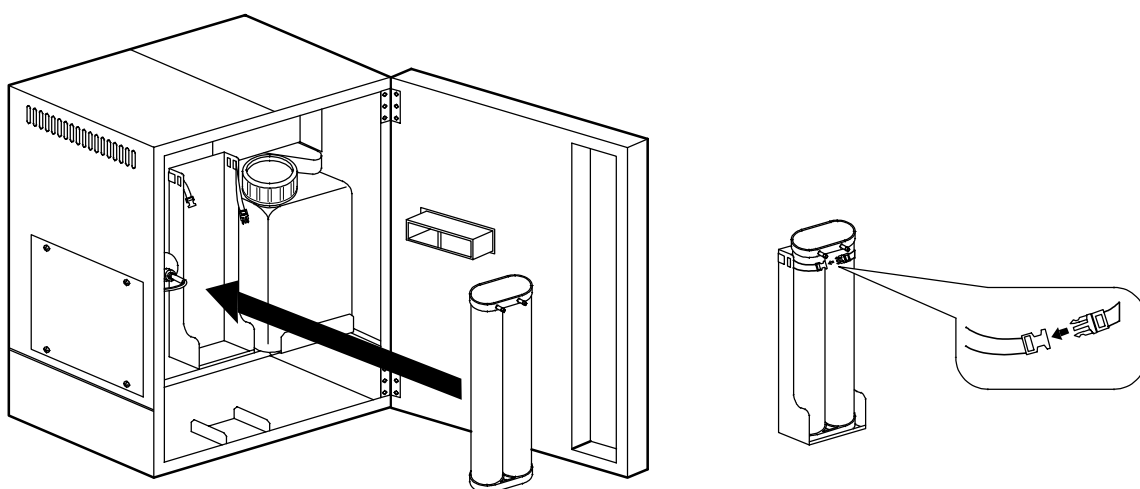


Connect securely the ion-exchange resin cartridge.

Connect securely the ion-exchange resin cartridge(CPC-N) as follows.

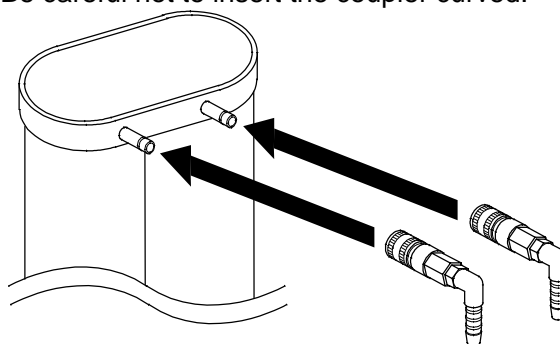
If you do not connect securely, the connected hose would come off, causing water leak.

- (1) Make sure the earth leakage circuit breaker or the unit is switched off, and the tap is being fastened.
- (2) Use the ion-exchange resin cartridge out of accessories for the unit.
- (3) Put the ion-exchange resin cartridge on the receive table.(See Fig.01)
- (4) Fix the ion-exchange resin cartridge with the band of the receive table.(See Fig.02)



- (5) Remove the rubber cap from the entrance and exit of the ion-exchange resin cartridge.
- (6) Insert the coupler which marked "IN" into the entrance(left side) of the ion-exchange resin cartridge as far as making sounds like "katchi".
- (7) Insert the coupler which marked "OUT" into the exit(right side) of the ion-exchange resin cartridge as far as making sounds like "katchi".

Sometimes the coupler is not easy to be inserted. If you insert the coupler hard, you may break the insertion. Be careful not to insert the coupler curved.



- (8) When you want to remove the coupler from the ion-exchange resin cartridge, it makes easy to remove the coupler that you pull the coupler forward with pushing the black part of the coupler deeply .



Warning



Connect securely the pre-treatment cartridge.

Connect securely the inside hose as follows.

If you do not connect securely, the connected hose would come off, causing water leak.

- (1) Make sure the earth leakage circuit breaker or the unit is switched off, and the tap is being fastened.
- (2) Use the pre-treatment cartridge out of accessories for the unit.
- (3) Take off the caps on the IN and OUT of the cartridge .
- (4) Open the unit front door. Then you can find one connecting hose with the IN coupler and other with the OUT. Connect the respective hoses to IN and OUT of the cartridge .
- (5) To connect each hose, slide the blue part of the coupler back to the hose side, and fit the end of the coupler to the respective end of the cartridge. Then release the blue part .(See Fig.03)
- (6) After you finish the connection, set the pre-treatment cartridge at the left side before the distilled water tank, as the picture shows. Be careful not to bend the hose.(See Fig.04)

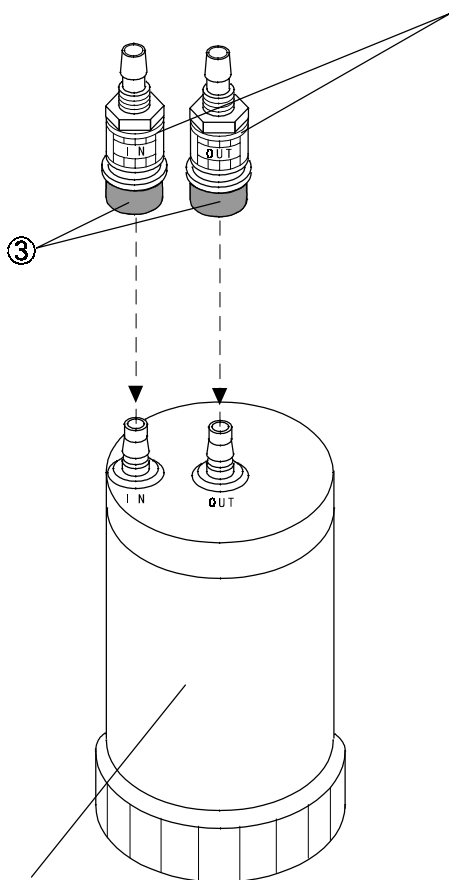


Fig.03

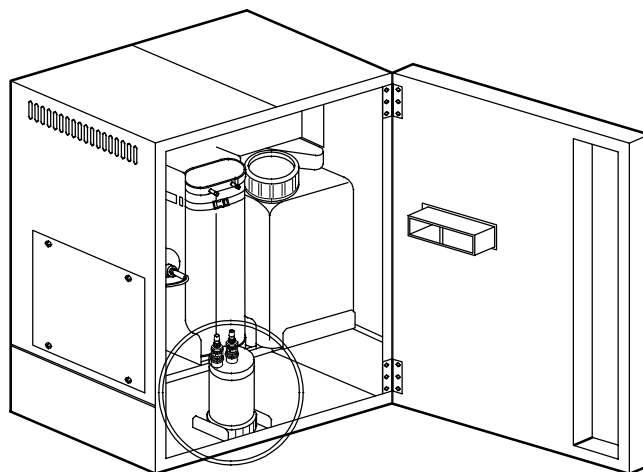


Fig.04



Warning



No use at occurrence of abnormality/troubleshooting

If smoke or any strange odor should disburse from this unit for any reasons, turn off immediately unit source breakers, extract the plug, and request the seller or Yamato Scientific to check the unit. Neglecting this procedure can result in fire or electric shock. Never try repairing the unit yourself. It is too dangerous.



If it begins thundering.

If it begins thundering, turn the circuit breaker off immediately.

Neglecting this procedure can result in circuit disorder, fire or electric shock due to thunderbolts.



When you dispose of the unit.

Dispose of the unit as large-sized discarded article.

Do not leave the unit in child playground etc.



Be careful to use the cleanser(Organosol).

Keep the cleanser in an airtight container, and avoid preservation in hot and humid areas.

The main ingredient of the cleanser "Organosol 10" is sulfamic acid (PH1 acid solution).

Wear protective gloves, mask and glasses to handle the cleanser.

Wash by pure water the cleanser splashing on body.

Neutralize cleanser after use with sodium hydroxide.

Check by a PH indicator if cleanser is neutralized irrigation channel or fields.

Do not use the vacant cleanser container as a drink bottle.

Do not drain the cleanser directly into an agricultural irrigation channel or fields. The cleanser can kill rice plants and other farm products.



When you do not use the unit in the nighttime or holidays

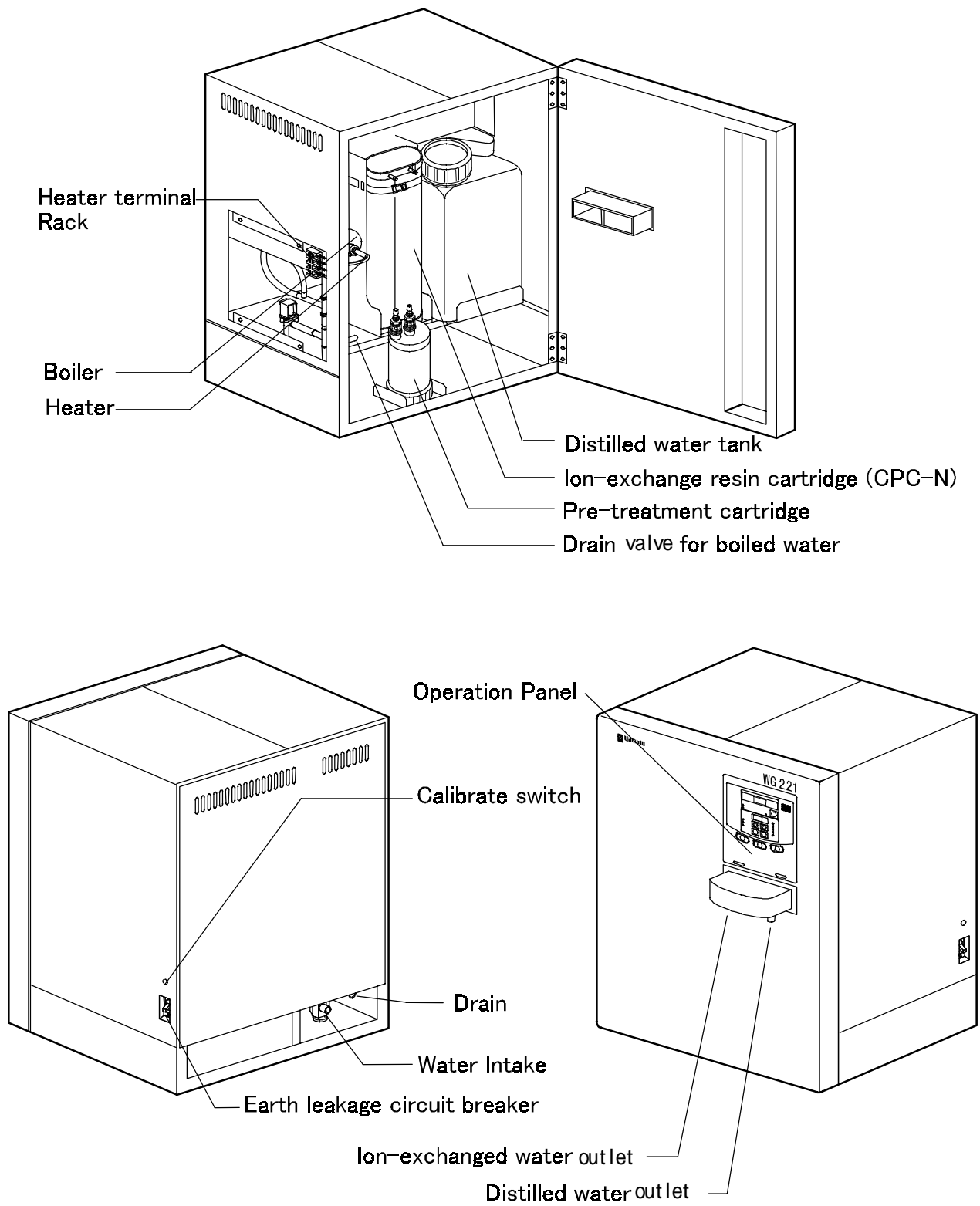
Turn the circuit breaker off.

Be sure to Fasten the tap.

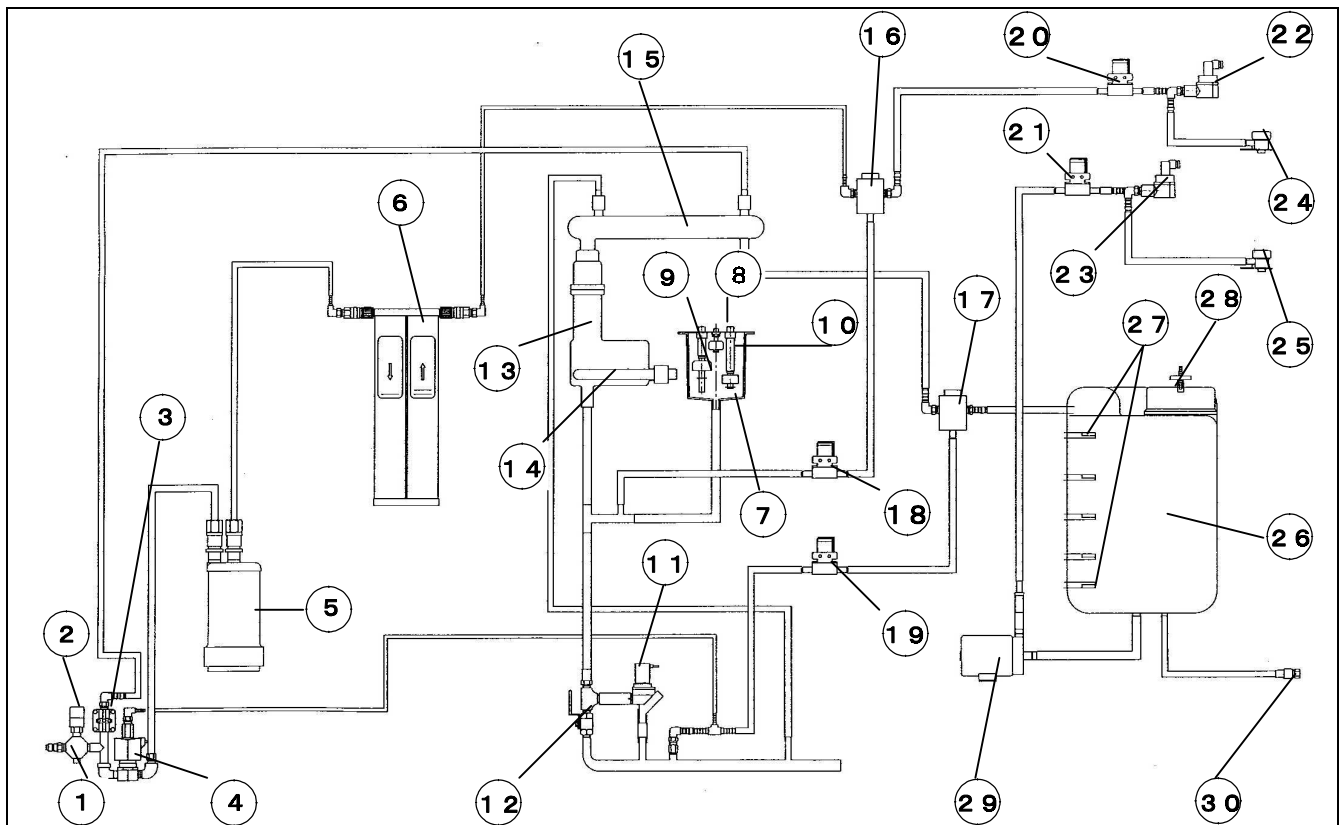
The change of water pressure may cause some accident like water leakage.

Body

This drawing identifies parts.



Piping Diagram

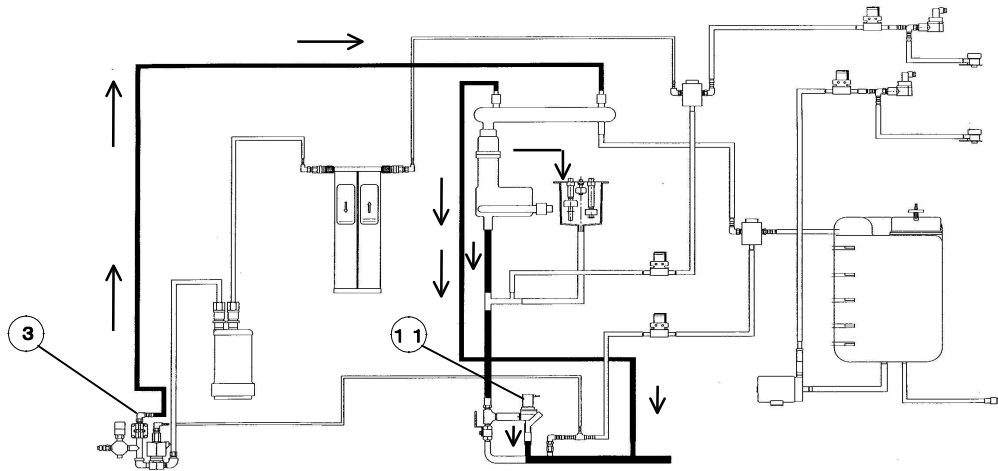


- | | | | |
|---|--|----|---|
| ① | Decompressor | ①⑥ | Electrode for ion-exchanged water |
| ② | Pressure switch | ①⑦ | Electrode for distilled water examiner |
| ③ | Solenoid valve for cooling water | ①⑧ | Solenoid valve for boiler water supply |
| ④ | Solenoid valve for raw water | ①⑨ | Solenoid valve to drain the initial distilled water |
| ⑤ | Pre-treatment cartridge | ②① | Solenoid valve to take ion-exchanged water |
| ⑥ | Ion-exchange resin cartridge | ②② | Solenoid valve to take distilled water |
| ⑦ | Float receptacle | ②③ | Ion-exchanged water flow sensor |
| ⑧ | Float switch to detect boiler overheating | ②④ | Distilled water flow sensor (WG221S only) |
| ⑨ | Float switch to control boiler water level | ②⑤ | Ion-exchanged water outlet |
| ⑩ | Float switch to control the heater | ②⑥ | Distilled water outlet |
| ⑪ | Solenoid valve to drain boiler water | ②⑦ | Distilled water tank |
| ⑫ | Valve to drain boiler water | ②⑧ | Float switch to check the water level |
| ⑬ | Boiler | ②⑨ | Air filter |
| ⑭ | Heater | ③① | Pump to take distilled water |
| ⑮ | Condenser | ③② | Drain for distilled water tank |

Operation System

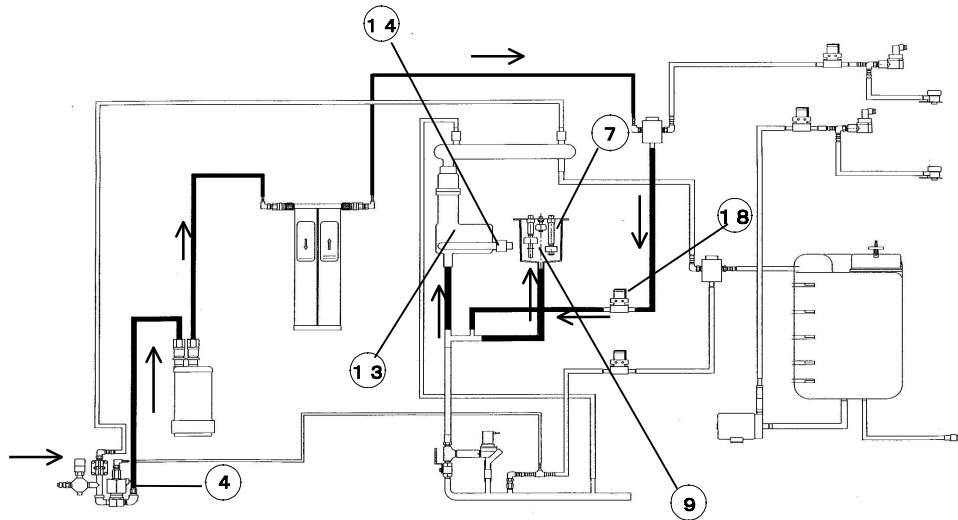
*This drawing identifies WG221S operation system by the process.
(There are some different parts used for WG221.)*

(1) Drain boiler water



Turn the circuit breaker on and push the power switch ,then after 15sec. (11) solenoid valve to drain boiler water opens for about 40sec. and at the same time (3) solenoid valve for cooling water opens for about 30sec.

(2)Supply and distillation of boiler water



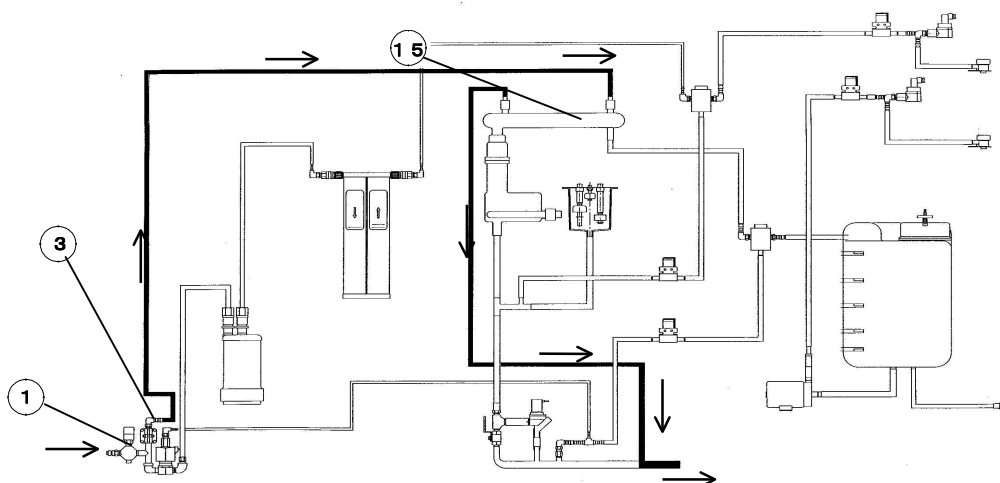
After finished boiler water drainage, (4) solenoid valve for raw water and (18) solenoid valve for boiler water opens at the same time ,and then water is supplied into boiler.

When (9) float switch (to control the boiler water level) in the (7) float receptacle finds water level sufficient, (14) heater becomes on to start distillation.

Following water supply, when (9) float switch controls water supply into the boiler by opening and closing (4) solenoid valve for raw water and (18) solenoid valve for boiler water.

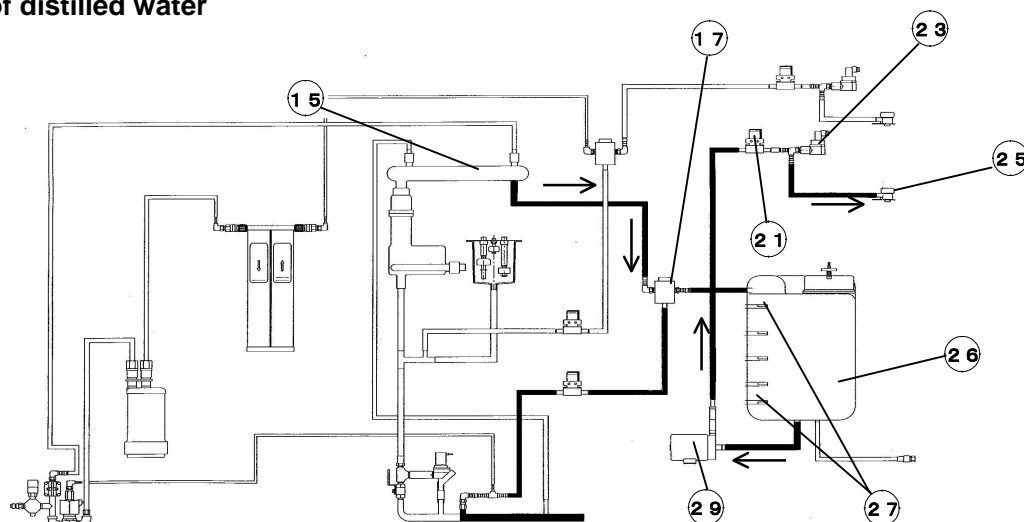
Operation System

(3)Flow of cooling water



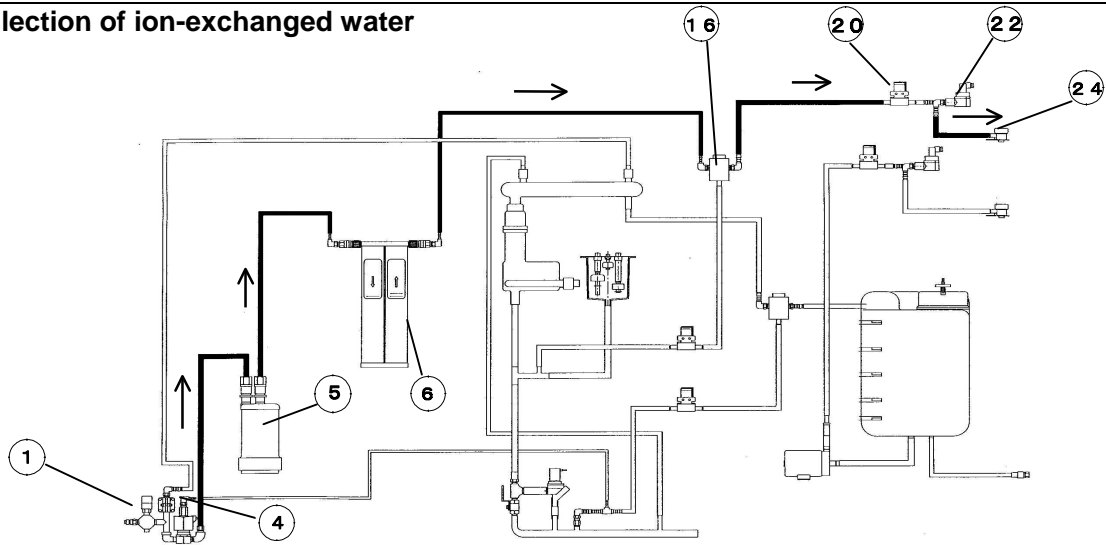
In distillation of boiler water ,cooling water flows and drains from the (1) decompressor, (3) cooling water solenoid valve to (15) condenser. When distilled water tank is full of water or taking ion-exchanged water , distillation stops and water flow and drain stops automatically.

(4)Collection of distilled water



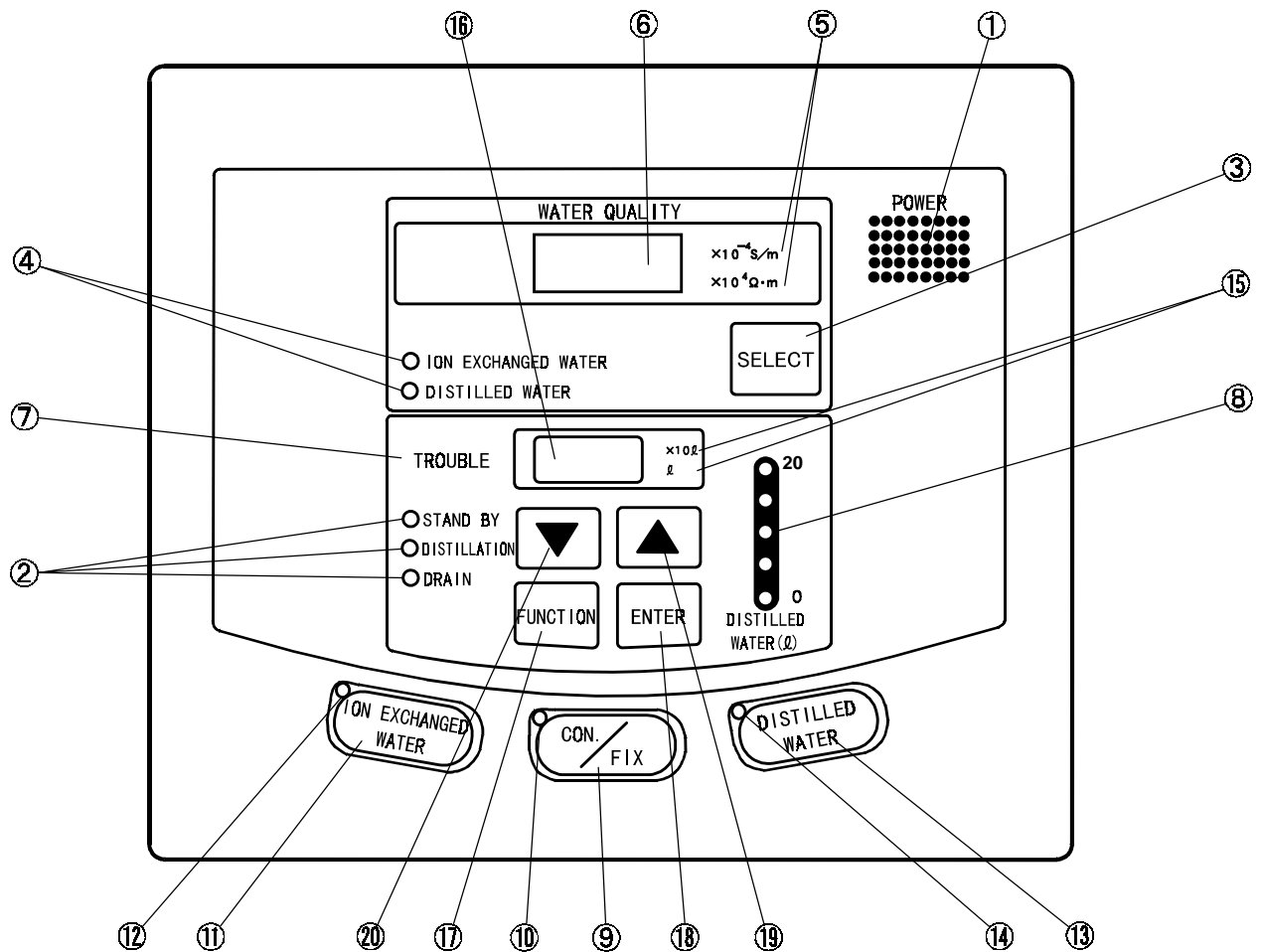
For about 10min. from the beginning of distillation of boiler water , distilled water condensed in (15) condenser is stored into (26) distilled water tank through (17) electrode for distilled water, after initial water is drained by (19) solenoid valve (to drain the initial distilled water) opened. The unit judges water full and stops distillation when the highest (27) float switch inside the tank is activated. Distilled water stored is taken out by (29) pump(to take distilled water) through (21) solenoid valve to take distilled water, (23) distilled water flow sensor (WG221S only)and (25) distilled water outlet.

(5)Collection of ion-exchanged water



Ion-exchanged water is taken out by through (1) decompressor, (4) solenoid valve for raw water , (5) pre-treatment cartridge , (6) Ion-exchange resin cartridge(CPC-N), (16) electrode for ion-exchanged water , (20) solenoid valve to take ion-exchanged water , (22) Ion-exchanged water flow sensor and (24) Ion-exchanged water outlet .

Operation Panel



Power switch

Operation indication lamp

Select switch

Lamp to identify the measured electrode

Unit of water quality measurement

Indicator (1)

Trouble indication lamp

Distilled water level indicator

Switch to change methods to take pure water

Display lamp to identify the method to collect water

Switch to take ion-exchanged water

Lamp to indicate collection of ion-exchanged water

Switch to take distilled water

Lamp to indicate collection of distilled water

Unit of amount to collect

Indicator (2)

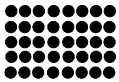


Function key

Enter key

Up key

Down key

Operation Panel

<p>POWER</p> 	<p>Power Switch...</p> <p>This is the switch for power supply. The STAND-BY lamp is lit when the power cable is connected and the earth leakage circuit breaker is on. When you push the switch in this situation, power becomes "ON". If you push the switch again, then power becomes "OFF".</p>
<p>○ STAND BY ○ DISTILLATION ○ DRAIN</p>	<p>Operation Display Lamp...</p> <p>Stand-By: (1) The yellow lamp is lit when the power source is "ON". But the power switch is "OFF". (2) The yellow lamp blinks in case of suspension of water supply or decrease of raw water pressure. In addition, the indicator (1) shows .</p> <p>DISTILLATION: The green light is lit during distillation.</p> <p>DRAINAGE: The green light is lit during automatic drainage of boiler water.</p>
	<p>Select Switch...</p> <p>This switch is to select either electrode for water quality check. Each one push automatically and alternatively select either sensor for ion-exchanged water or the other for distilled water. Then the indicator (1) shows either electrical conductivity or resistivity of the selected electrode.</p>
<p>○ ION EXCHANGED WATER ○ DISTILLED WATER</p>	<p>Lamps to identify the electrode to measure...</p> <p>Either lamp is lit to show the electrode selected by the SELECT switch.</p> <p>ION EXCHANGED WATER: Water quality at the exit of the ion-exchange resin cartridge</p> <p>DISTILLED WATER: Quality of distilled water at the exit of the condenser</p>
<p>$\times 10^{-4} \text{ S/m}$ $\times 10^4 \text{ } \Omega \cdot \text{m}$</p>	<p>Unit to display water quality...</p> <p>Either unit of the value the indicator (1) shows is identified.</p> <p>$\times 10^{-4} \text{ S/m}$: represents the electrical conductivity ($=\mu\text{S/cm}$)</p> <p>$\times 10^4 \text{ } \Omega \cdot \text{m}$: represents the resistivity ($=\text{M } \cdot \text{cm}$)</p> <p>(The resistivity is shown by the integral number within 1 to 18.</p>

Operation Panel

WATER QUALITY



Indicator (1) ...

The displayed (selected) water quality is the converted value at 25 °C. Another water quality not indicated (selected) is always being checked. If either water deteriorates its quality to the specific value, the indicator repeatedly indicates the sensor No. The indicator also gives the respective error codes in case of stop of raw-water supply, decrease of water pressure or any other trouble in the device.

<The standard values to determine deterioration of water quality>

Ion-exchanged water: $\times 10^{-4}$ S/m or more

Distilled water: $\times 10^{-4}$ S/m or more

<Example of indication of water deterioration>

In case you select the ion-exchanged water by SELECT key: When quality of ion-exchanged water is 0.10×10^{-4} S/m while distilled water is 10×10^{-4} S/m or more. (deterioration of water)



Electric conductivity of the selected electrode C3 (ion-exchanged water)

Electric conductivity of the electrode C1 (deteriorated distilled water)

<Stop of raw-water supply or decrease of water pressure>

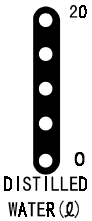
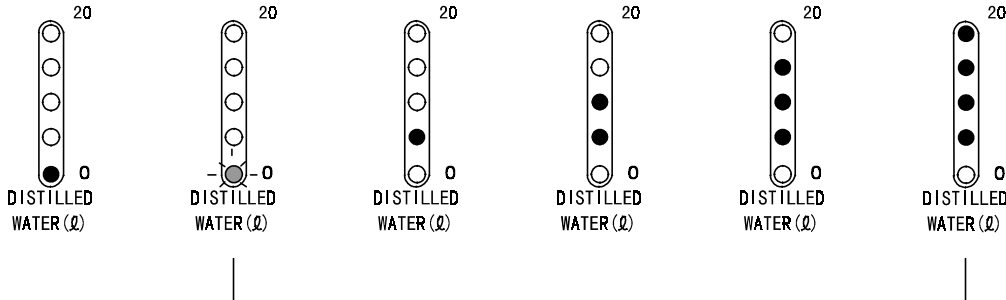
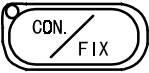
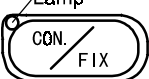





'CUE' comes up and the STAND-BY, an operation display lamp, blinks.










<In trouble>

The display identifies the trouble.

Refer to the Trouble Shooting Guide (P.27) for more information.

TROUBLE	<p>Trouble Indication lamp...</p> <p>The lamp blinks when detects abnormality in operation or trouble of the unit. The indicator (1) identifies such a situation.</p>
	<p>Distilled Water Level indicator...</p> <p>The indication lamps show 5 levels of the distilled water in the tank. When the water storage is less than 2ℓ, the lowest yellow lamp is lit. In this case, you can not take distilled water for preventing the empty pump operation. When the lowest lamp start blinking, you can take distilled water again.</p> <div style="text-align: center;"> <p><No water> <Full water></p>  <p>Operational range of the pump to take water</p> </div>
	<p>Switch to change methods to collect pure water...</p> <p>This is the switch to select taking water repeatedly or by the fixed volume. To select taking the fixed amount, push once. If you push again, you can take water repeatedly.</p>
<p>Lamp</p> 	<p>Lamp to identify the water-collection method...</p> <p>This lamp is lit only while you select the repeated collection. On the other hand, the lamp goes out when you select collection of the fixed volume.</p>
	<p>Switch to collect ion-exchanged water...</p> <ol style="list-style-type: none"> In case of repeated collection <ul style="list-style-type: none"> Switch ON (one push) to collect ion-exchanged water. Switch OFF (one more push) to stop collection. In case of collecting the fixed volume <ul style="list-style-type: none"> Switch ON (one push) to start collection of ion-exchanged water. The unit stops automatically its operation when the collection reaches the set amount. If you push the switch during collection, the unit would stop operation even before the collection reaches the set amount.
	<p>Lamp to indicate collection of ion-exchanged water...</p> <p>The green lamp is lit during collection of ion-exchanged water.</p>
	<p>Switch to take distilled water...</p> <ol style="list-style-type: none"> In case of repeated collection <ul style="list-style-type: none"> Switch ON (one push) to collect distilled water. Switch OFF (one more push) to stop collection. In case of collecting the fixed volume <ul style="list-style-type: none"> Switch ON (one push) to start collection of distilled water. The unit stops its operation automatically when the collection reaches the set amount. If you push the switch during collection, the operation would stop even before the collection reaches the set amount. <p>WG221 can change to collection mode of the fixed volume by using switch (to change methods to take pure water). But in collection of the fixed volume mode, switch to take distilled water does not work.</p>

Operation panel

	Lamp to indicate collection of distilled water... The green lamp is lit during collection of distilled water.
×10ℓ ℓ	Unit of volume to collect... When the indicator (2) shows the volume to take, the unit of (ℓ) is displayed. In other case the indicator shows the total flow, the unit of ×10ℓ is displayed.
	Indicator (2)... The indicator shows the following. 1) In case of repeated collection The indicator shows  . 2) In case of collecting the fixed amount It shows the set volume. The initially set value is 0.1ℓ. The display set value is decreasing as water is being collected. At the completion of collection, the set value comes up again. 3) Identification of function The indicator also identifies the function selected. a)  : Indication of the total flow b)  : Mode to change the unit for water quality check 4) Display of total flow The total water flow shows the aggregate volume of distilled water collected.
	Function key... Push the select functions. The indicator (2) identifies the selected function.
	Enter key... A push on the key completes your selection of function. In other word, you need to push this key to escape from the function-selecting mode.
	Up key... Push the key to set the following 1) At collection of the set volume Set the volume to collect. Each one push increases the set value in the indicator (2). The set value goes up successively when you keep pushing the key. 2) At the selection of a function You can select the following functions by pushing this key. a) ON or OFF to display the total flow of ion-exchanged water. b) Change of units to indicate water quality.
	Down key... Push this key to set the following 1) At collection of the set volume Set the volume to collect. Each one push decreases the set value in the indicator (2). The set value goes down successively when you keep pushing the key. 2) At the selection of a function You can select the following functions by pushing this key. a) ON or OFF to display the total flow of ion-exchanged water. b) Change of the unit to indicate water quality.

Identification of "TROUBLE" / Identification of causes

This unit has self-diagnosis function. If any operational abnormalities or machine troubles should occur, the alarm lamp in operation panel blinks. If this occurs, immediately disconnect the breaker and turn the tap off.

See page 36 "Display and Details of Error Code", if you need to know about the details of identification of "TROUBLE".

E.31

The TROUBLE lamp also blinks.

Water leakage

E.32

The TROUBLE lamp also blinks.

Heater overheating

E.34

The TROUBLE lamp also blinks.

Defect of the float switch for the distilled water tank.

E.35

The TROUBLE lamp also blinks.

Abnormal boiler water level

E.36

The TROUBLE lamp also blinks.

Defect of the float switch to control the boiler water level.

E.15

The TROUBLE lamp also blinks.

Defect in the electric circuit

Preparation and Check before Use

**Warning**

1. Check water supply.

- Check if the water-supply hose is securely connected.
- Then, open the tap.
- Make sure if no water leaks from the joint of the hose.

2. Check drain.

- Check if the drain hose is securely connected.
- Make sure if the hose is not bent or if there are no convex parts.
- If the hose is bent, not only the unit does not run correctly, but also it may cause the accident of water leak. Sometimes check if the drain is done correctly.

3. Check the power source.

- Make sure that the power cable is connected to an appropriate outlet.

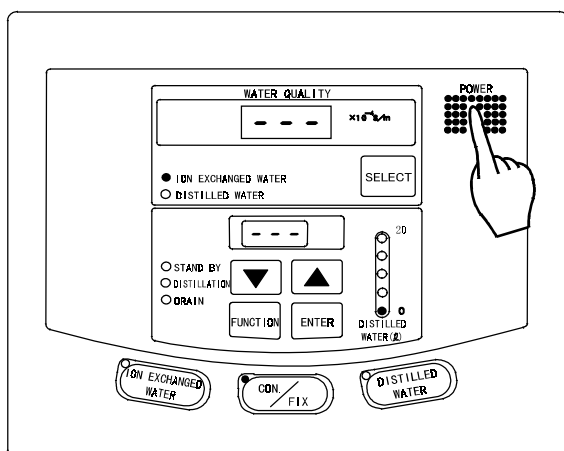
4. Just after run

- After turning on electricity initially or drain from distilled water tank, It takes much time to start collecting of distilled water because of the air in pump or pipe.
- Just after exchanging pre-treatment cartridge or Ion-exchange resin cartridge , It also takes much time to start collecting of distilled water. And when you change the some of cartridge, drain about 5 liters to remove the initial impurities.

Run Menu

Run menu as follows when you are ready for operation.

1. Power-on



- 1 Switch ON the earth leakage circuit breaker.
- 2 Push the POWER switch.

Operation panel display in about 15 seconds after you push the power switch until the distillation starts.

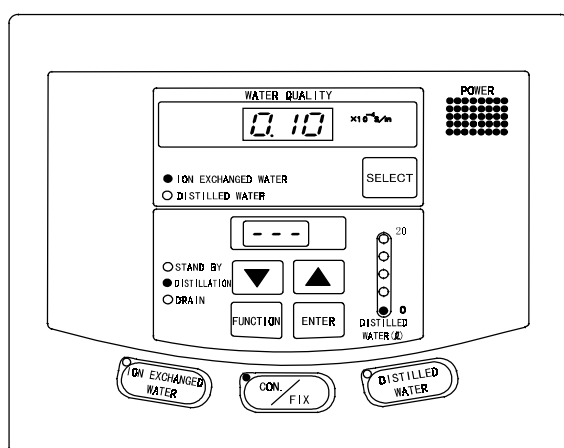
The indicator (1) blinks .

The STAND-BY, an operational indication lamp, goes out.

(However, the indication (1) does not show if you push the power key some time after switching on the earth leakage circuit breaker.)

2. Drain boiler water after you push the power switch.

Display of operation panel...

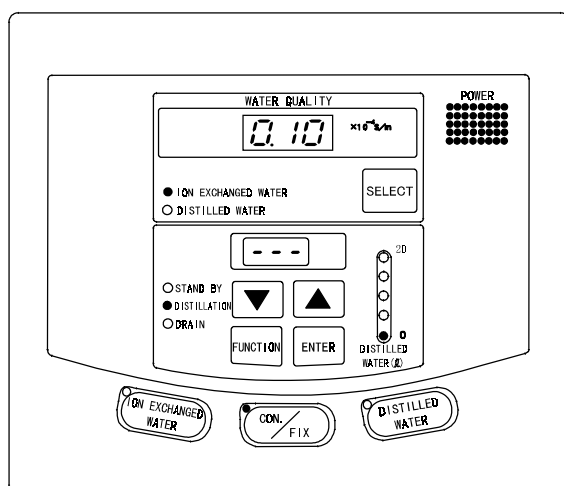


Operation indication lamp lit with the green light during drainage of boiler water.(about 30 sec.)

(However, drainage of boiler does not work only if you push the power key after switching on the earth leakage circuit breaker.)

3. 15 minutes after you push the power switch.

Display of operation panel...



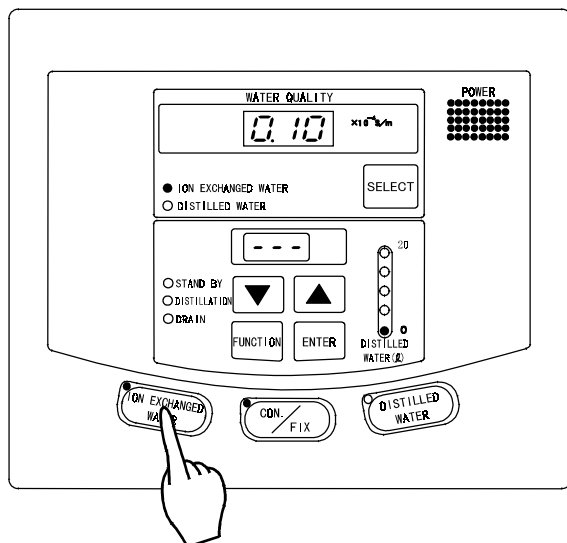
The indicator (1) shows electric conductivity of ion-exchanged water. (Ex.)

The ION EXCHANGED WATER lamp is lit to identify the electrode being measured.

Among distilled water level indicators, the yellow lamp is lit to show no water storage.

Water is supplied to the specific level. At the completion of initial water supply, distillation starts. Then, the green DISTILLATION lamp is lit among operation indication lamps.

Repeated collection of ion-exchanged water



Push once the ION EXCHANGED WATER switch while the CON. lamp, identifying the water collection method, is lit.

Among the operation panel indicators;

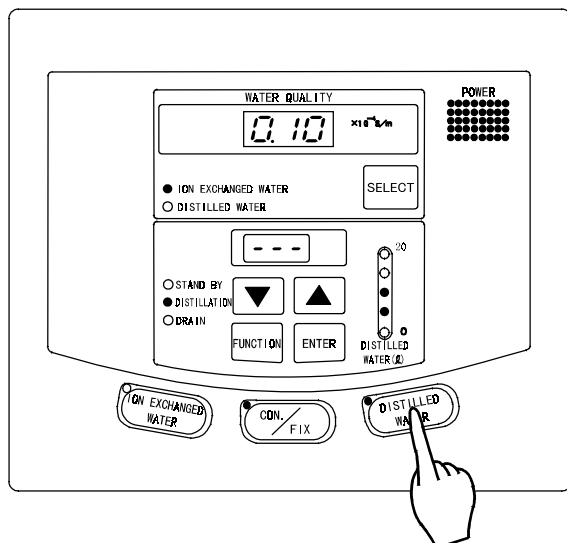
The lamp indicating collection of ion-exchanged water blinks

If you push again the ION EXCHANGED WATER switch;

Among the operation panel indicators;

The lamp indicating collection of ion-exchanged water goes out.

Repeated collection of distilled water



Push once the DISTILLED WATER switch while the STAND BY lamp, identifying the method of water collection, is lit but the yellow "no water" lamp, among indicators to show the volume of distilled water, is not lit.

Among the operation panel indicators;

The lamp, indicating collection of distilled water, is lit.

If you push again the DISTILLED WATER switch;

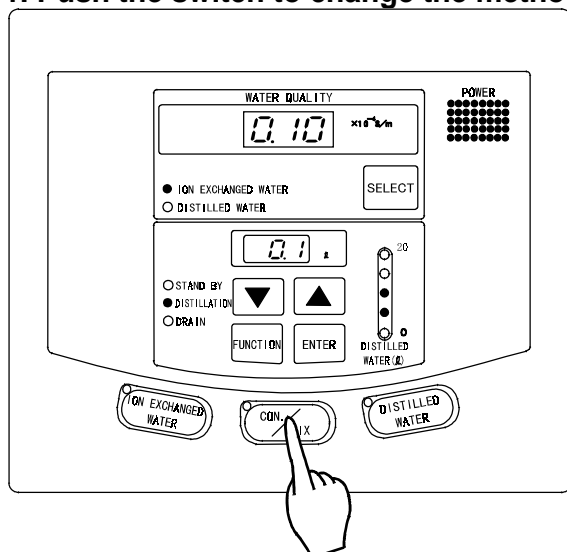
Among the operation panel indicators;

The lamp indicating collection of distilled water goes out.

(If, among indicators to show the volume of distilled water stored, the yellow "no water" lamp gets lit during collection of water, the unit automatically stops taking water and the lamp showing collection of distilled water goes out.)

Collection of The Fixed Volume of Ion Exchanged Water

1. Push the switch to change the method to collect water. Then the CON. lamp goes out.

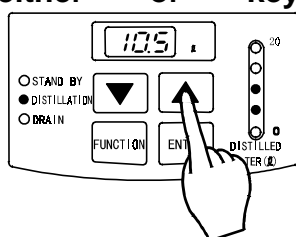


Among the operation panel indicators;

The CON. lamp, a collection method indicator, goes out.

The indicator (2) shows the initial value of **0.1**. (ℓ), a unit of collection, blinks.

2. Push either or key to set the volume to take.

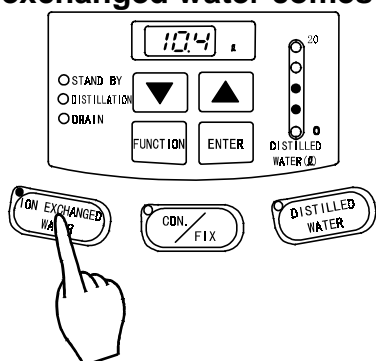


Among the operation panel indicators;

The indicator (2) changes the value according to your key touch.

(You can set up to 99.9ℓ.)

3. Push the ION EXCHANGED WATER switch. Ion exchanged water comes out from the outlet

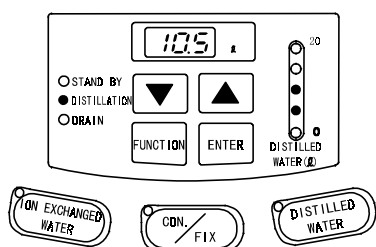


Among the operation panel displays;

The lamp indicating collection of ion exchange water is lit.

The indicator (2) starts decreasing the displayed value.

4. When the indicator (2) decreases the displayed value to **0.1** and the remaining water flow of 0.1ℓ is completed;



Among the operation panel indicators;

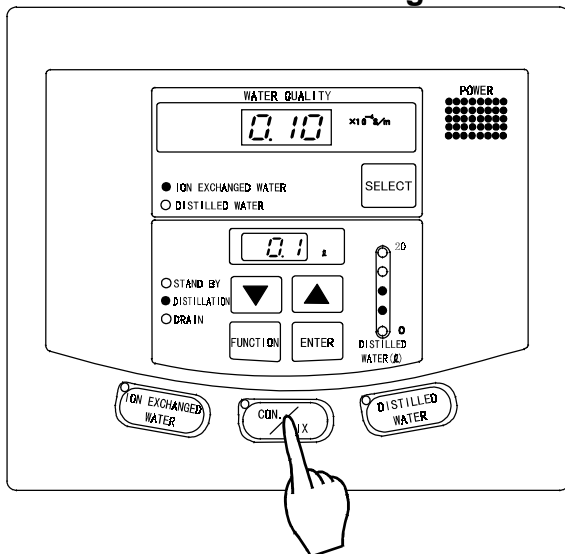
The lamp indicating the collection of ion exchanged water goes out.

The indicator (2) returns to the set value.

(The actual amount of collected water may increase or decrease between maximum $\pm 10\%$)

Collection of The Fixed Volume of Distilled Water(WG221S)

1. Push the switch to change the collection method and put out the CON. lamp.



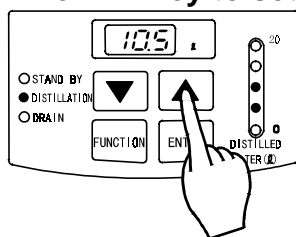
Among the operation panel indicators;

The CON. lamp, the collection method indicator, goes out.

The indicator (2) shows the initial value of **0.1**.

At the same time, (ℓ), a unit of water collection, is lit.

2. Push or key to set the volume to take.



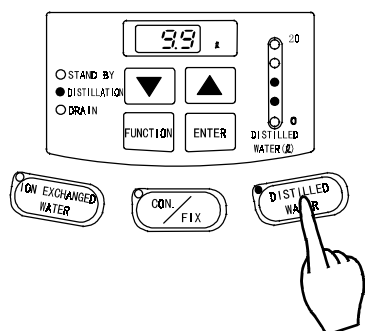
Among the operation panel indicators;

The indicator (2) changes the value according to each your key operation.

(You can set up to 99.9ℓ.)

3. Push the DISTILLED WATER switch.

Distilled water comes out from the outlet.



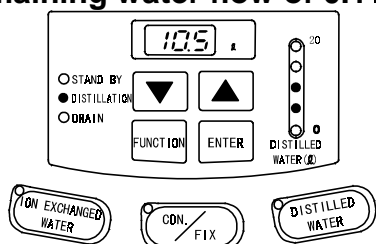
Among the operation panel indicators;

The lamp indicating collection of distilled water is lit.

The indicator (2) starts decreasing the displayed value.

(If the yellow “no water” lamp, one of indicators to show the level of distilled water stored, is lit during water collection, the unit automatically stops collection and the lamp indicating collection of distilled water goes out. In addition, the indicator (2) returns to the set value.)

4. When the indicator (2) decreases the displayed value down to **0.1** and the remaining water flow of 0.1ℓ is completed;



Among the operation panel indicators;

The lamp indicating collection of distilled water goes out.

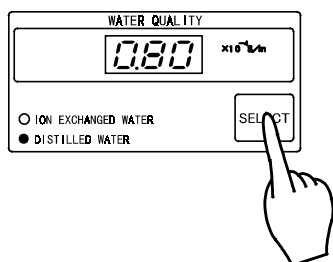
The indicator (2) returns to the set value.

(The actual amount of collected water may increase or decrease between maximum $\pm 10\%$)

Indication of Water Quality

Selection of either electrode for ion-exchanged or distilled water

Each one push on SELECT switch selects alternatively the electrode of either water quality examiner to be measured.



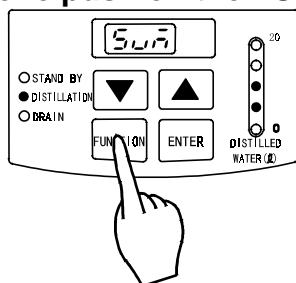
Among the operation panel indicators;

Either ION EXCHANGED WATER and DISTILLED WATER is lit alternatively by each push to identify one electrode measured.

(The electric conductivity is shown by the unit of " $\times 10^{-4} \text{ S/m}$ " when the power switch is "ON".)

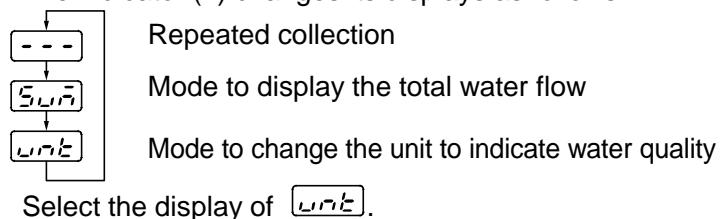
Change of the unit to indicate water quality.

1. Each one push on the FUNCTION key changes displays of indicator (2).

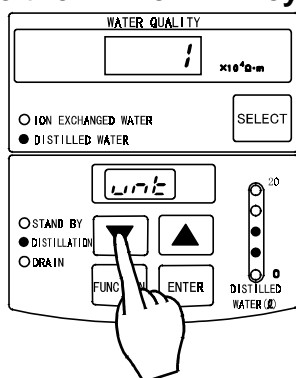


Operation panel display

The indicator (2) changes its displays as follows.



2. Push either or key once.

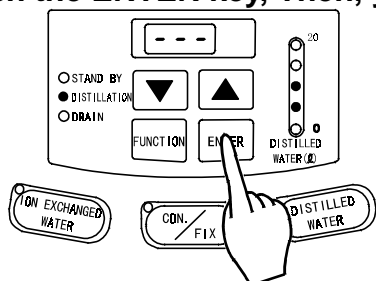


Among the operation panel indicators;

The unit for water quality indication changes. Then the unit of resistivity " $\times 10^4 \Omega \cdot \text{m}$ " is shown.

The indicator (1) also indicates the resistivity. The integral number shows from 1 to 18 within the range of 1.0 to 18.2 ($\times 10^4 \Omega \cdot \text{m}$).

3. Push the ENTER key, Then, you can fix the unit and get out from the function mode.



Among the operation panel indicators;

The indicator (2) shows ---.

(The unit to indicate water quality returns to the electric conductivity when you switch the POWER key OFF and ON again.)

Indication of Water Quality

Measurement of Electric conductivity

The water quality examiner in the operation panel shows the electric conductivity at the exit of ion-exchange resin cartridge and of distilled water condenser. Use the indication as the standard for exchanging ion-exchange resin cartridge. When you read the indication, be sure that the part of electrode is in the full of water; that is in the flowing of ion-exchanged water. Besides that the part of electrode is not in the water, the indication is not correct for the influence of bubbles in the following case.

1. At the beginning of running or during the unit stopped
2. Just after exchanging pre-treatment cartridge or ion-exchange resin cartridge
3. Just after the beginning of distillation of water

Electric conductivity

Electric conductivity shows how much electricity can pass. As water contains more electrolyte or impurity, more electricity can pass through and the value of conductivity gets larger. On the contrary, the value gets smaller as water contains less electrolyte.

That means water is more pure as the conductivity is smaller.

However, the value of conductivity shows containment of electrolyte only but does not indicate any containment of non-electrolyte such as organic, colloid, dissolved gas and microorganism. Therefore, conductivity is just one of indicators to show water purity.

Resistivity is to indicate the same property as the electric conductivity shows. Resistivity is reciprocal to electric conductivity. The larger resistivity indicates higher purity.

To calculate the resistivity from the electric conductivity;

$R = \text{Resistivity} = \frac{1}{\rho = \text{Electric conductivity}}$

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

Pure water theoretically has the following value.

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

(The resistivity is displayed by the integral number within 18 to $1 \times 10^4 \cdot m$. Note there is no decimal number indication.)

$= 0.055 \times 10^{-4} S/m$ (0.055 \cdot /cm) 25

Quality of ion-exchanged/distilled water

Ion-exchanged water and distilled water have the following properties respectively. Select either water according to your requirement.

It is ideal to use distilled water just after you collect. If you do not use the water soon, drain the distilled water tank. When you keep distilled water in the tank for a while, drain the tank and store new distilled water in the tank to use.

(1) Ion-exchanged water

Since almost all electrolyte are removed from ion-exchanged water, you can get water with the lowest electric conductivity. But it is impossible to remove non-electrolytic impurity. Purity is a little low with a new resin or at the re-start of flow after operation stops.

(2) Distilled water

The mode can remove averagely electrolyte and non-electrolyte except ammonia and other substances with low boiling point.

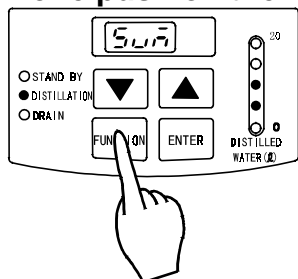
However, water absorbs carbonic acid gas from air and creates carbonic gas during its production process (in condensation and storage).

Accordingly, water quality is worse than ion-exchanged water and becomes weak acid (pH5 to 6) with its electric conductivity about 1 to $2 \times 10^{-4} S/m$ 25 (1 to 2.5 \cdot /cm).

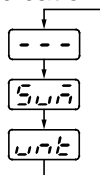
Display of Total Flow/Resetting

Check the total flow to know the time to exchange ion-exchange resin or pre-treatment cartridge.

1. Each one push on the FUNCTION key changes display of indicator (2).



Among operation panel indicators, the indicator (2) changes indications as follows.



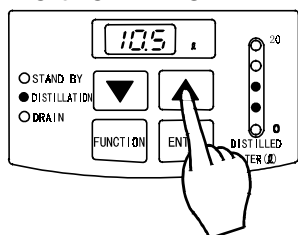
Repeated collection

Mode to display the total flow

Mode to change the unit for indicating water quality

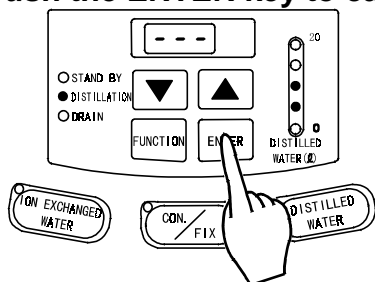
Select and display **5.00**.

2. Push either **FUNCTION** or **ENTER** key once.



The indicator (2) in the operation panel shows the total flow.

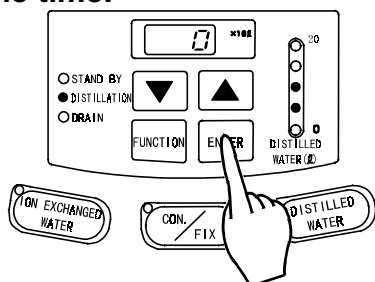
3. Push the ENTER key to cancel the function.



The indicator (2) in the operation panel shows **---**.

Resetting the total flow.

Select the total flow in the indicator (2). Then, push the **CON. / FIX** and **ENTER** key at the same time.



The indicator (2) shows **0**.

Safety Devices and Error Codes



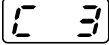
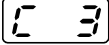



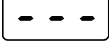

Displays and Details of Error Code

Safety device	Indicators	Indication	Cause	Effect on operation	Measure
Detecting leakage	Indicator(1)	E.31 is lit	Water leakage	Heaters, solenoid valves and any other controllers become off.	Turn the breaker off and check piping parts. (See P38 for troubleshooting)
Heater overheat protection		E.32 is lit	Heater overheat	Heaters, solenoid valves and any other controllers become off.	Contact the seller or Yamato Scientific's Technical Service Department.
Detecting trouble of float switch		E.34 is lit	Trouble of the float switch for distilled water tank	Heaters, solenoid valves and any other controllers become off.	Contact the seller or Yamato Scientific's Technical Service Department.
Detecting abnormal water level		E.35 is lit	Abnormal water level in the float receptacle	Heaters, solenoid valves and any other controllers become off.	Check if the boiler water drain valve is open. If this abnormality is indicated with the valve closed, contact the seller or Yamato Scientific's Technical Service Department.
Detecting float switch trouble		E.36 is lit	Trouble of the float switch for float receptacle	Heaters, solenoid valves and any other controllers become off.	Contact the seller or Yamato Scientific's Technical Service Department.
Detecting trouble of the electric circuit		E.15 is lit	Trouble in the electric circuit	Heaters, solenoid valves and any other controllers become off.	Contact the seller or Yamato Scientific's Technical Service Department.

"TROUBLE" blinks to alarm abnormal situation while the indicator (1) shows a certain error code.

Safety Devices and Error Codes

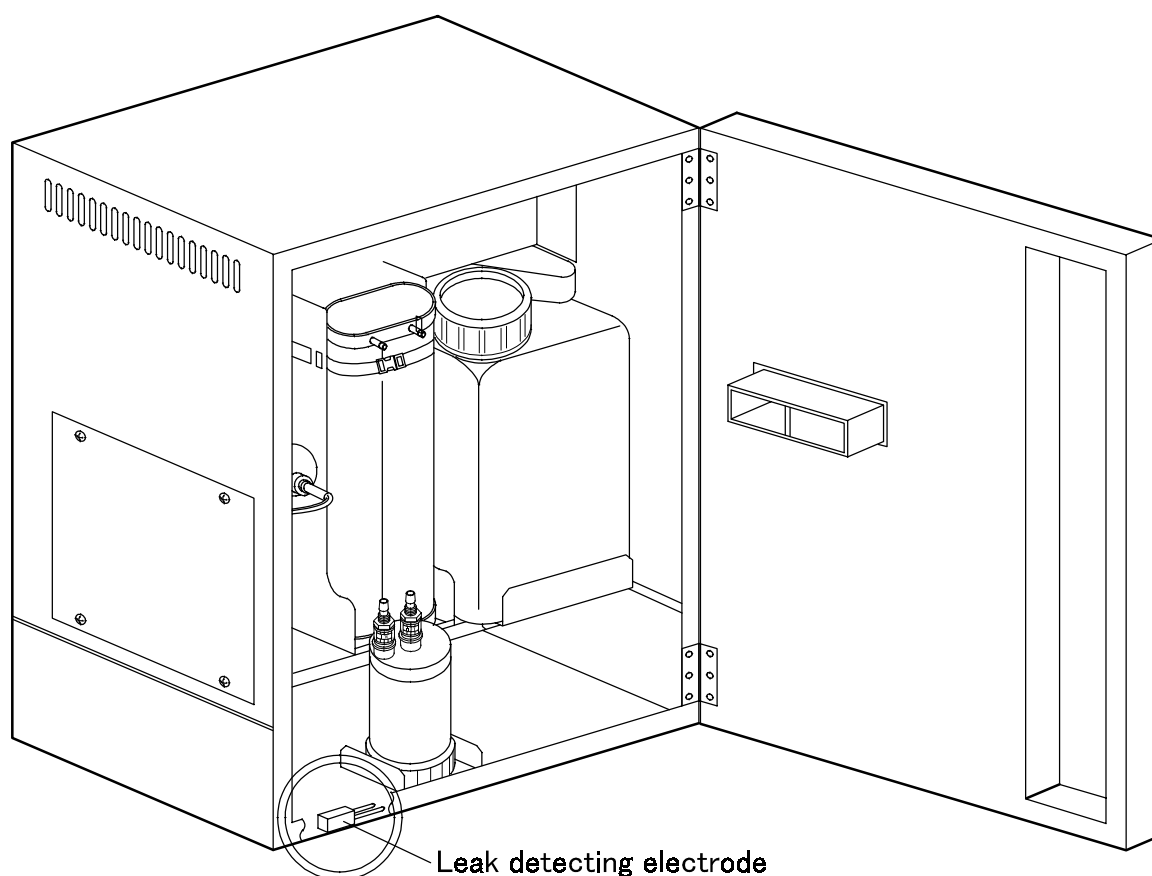
Trouble Displays other than Error Codes/Details

Safety devise	Indicator	indication	Cause	Effect on operation	Troubleshooting
Detecting abnormal water quality	Indicator (1)		Ion-exchanged water deteriorates lower than the standard. See page24 about the standard.	The indicator repeatedly alarms  . However, operation continues as usual.	It is not machine trouble. Change the old ion-exchange resin into new one.
			Distilled water deteriorates lower than the standard. (When the value reaches 10×10^{-4} S/m or more.)	The indicator repeatedly alarms  . However, operation continues as usual.	Contact the seller or Yamato Scientific's Technical Service Department.
			Water quality is too low to measure.	The usual operation continues. However, the sign is continuously shown when you select the electrode.	Indications of  and  are shown at the same time. Follow the respective instructions.
Detecting sensor trouble			Disconnection of the measured electrode without water.	The usual operation continues. However the sign is continuously shown when you select the electrode.	This situation sometimes occurs in operation of this device. However, if this indication would not disappear for a long time when water flows, request service.
		 STAND BY lamp is lit	Interruption/pressure decrease of original water flow. When pressure of water service gets lower than 50kPa (0.5kgf/cm ²)	Distillation and collection of ion-exchanged water stops temporarily.	Make sure if the water pressure is normal and the tap is open. Distillation starts again when the original water pressure is re-gained.
	Lamp to identify the electrode measured.	Blinking	Disconnection of the thermistor for temperature compensation of the measured electrode.	The temperature without compensation is shown when you select the electrode.	It is better to request earlier service.

Troubleshooting


Troubleshooting when *E.3 1* is lit to indicate water leak.

- (1) Turn the earth leakage circuit breaker in the right side of the unit OFF.
- (2) After the defect is repaired, to re-start the operation, wipe the water at the bottom areas of the device and dry it, and also remove the leak detecting electrode and dry it .
- (3) Set the electrode in the original position.
- (4) Close the door.
- (5) Turn the breaker ON, and push the POWER switch. Normal operation starts as the defect is repaired.



Check and maintenance

Time for periodical check and maintenance (Check periodically the unit to use in stable condition.)

Item to check and maintain	Period	Note
Exchange of pre-treatment cartridge	Each 6 or 12 months	Durability: About 5000 ℓ in case of using water service in Tokyo (with quality of 200×10^{-4} S/m) You need earlier exchange of the cartridge when you use raw water with worse quality.
Exchange of ion-exchange resin cartridge	When the indicator (1) shows 	Durability: About 650 ℓ of raw water with quality of 200×10^{-4} S/m
Cleaning the still	3 months	You need earlier cleaning when you use raw water with worse quality.
Cleaning the water supply hose filter	6 months	
Hose exchange	2 years	Check the joint once a month.
Distilled water tank	3 months	

Exchange of Pre-Treatment Cartridge

Refer to Page 15 “Connect securely the pre-treatment cartridge” in the “Safety Precaution”.
Dispose of the old pre-treatment cartridge as nonflammable.
If you use the unit without changing the pre-treatment cartridge, the span of life of the ion-exchange resin cartridge is made short.

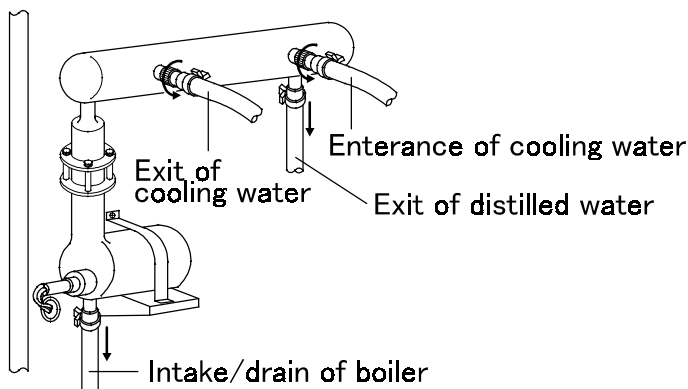
Exchange of Ion Exchange Resin Cartridge

Because the keeping of the cartridge for long time makes the water quality and durability worse, prepare the spare cartridge for the time to exchange. The standard of keeping in about four months.
Refer to Page 14 “Connect securely ion-exchange resin cartridge” in the “Safety Precaution”.
Dispose of the exchanged cartridge as nonflammable.
If you use the unit without changing the cartridge, stone attaches increasingly to the inside of the boiler and heaters, which can decrease collection of distilled water and damage heaters.

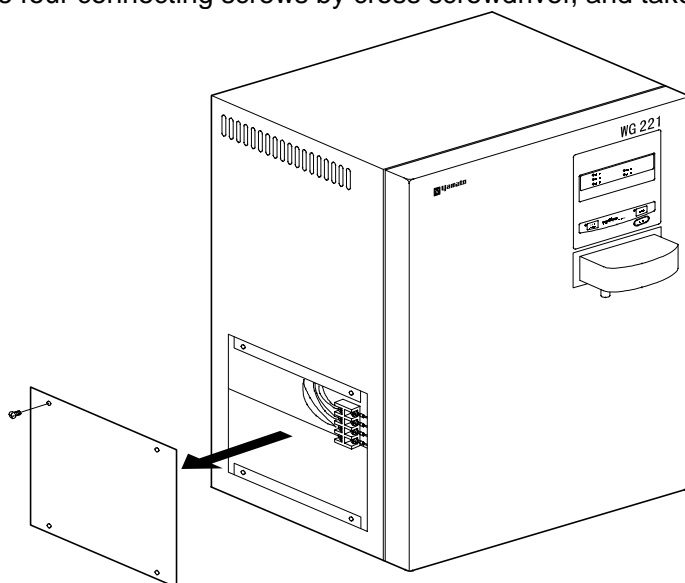
Cleaning Still

Removal the still

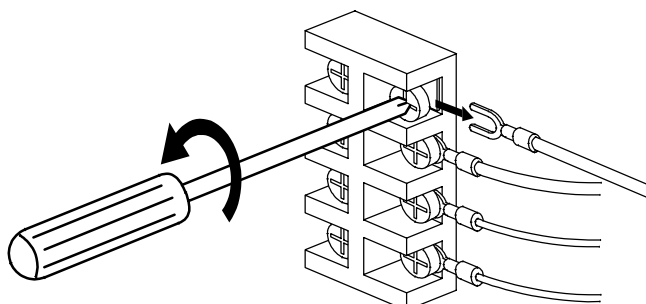
1. Turn "OFF" the circuit breaker.
2. Close the faucet.
3. Make sure if the boiler cools down enough (about more than 30 min. later). Open the front door of this unit and the valve to drain boiler water.
4. Remove both hose connected to the boiler and condenser respectively. Twist the hose-band by using tools, move the part of notches and you can remove the exit of distilled water and outlet/drain of boiler. When you remove them, be careful not to damage the glasses with giving excessive power. Remove the nut of entrance and exit of cooling water by rotating counterclockwise. Be sure not to lose the inside packing.



5. Take off the four connecting screws by cross screwdriver, and take off the left side board.



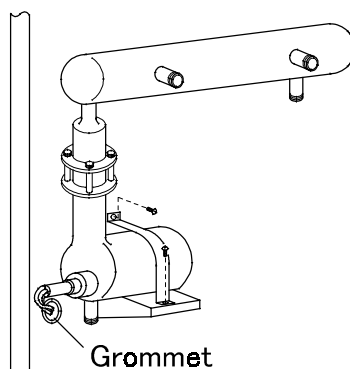
6. By cross screwdriver, loosen the four connecting screws in right side of terminal rack that is in the upper right of framework made by removing the left side board. Pull the heater terminal.



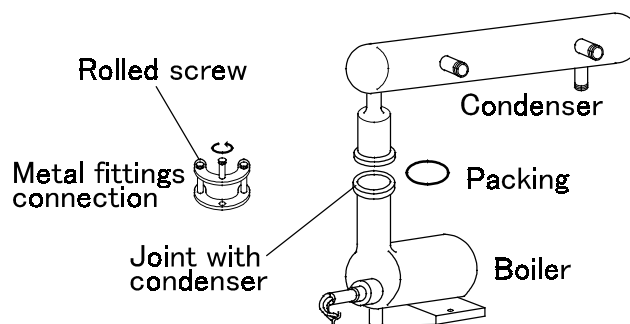
Cleaning Still

Removal the still

- 7.(1) Pull the heater terminal from the grommet.
But do not bend or pull leads from heaters beyond the necessity.
- (2) Remove the two screws of band for boiler fixed by cross screwdriver, and take off the boiler condenser.



- (3) Loosen the three rolled screw of metal fittings connection, and remove the boiler condenser.



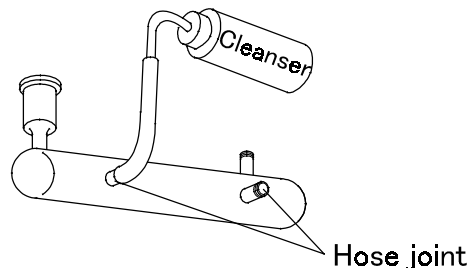
Cleaning the boiler

1. Preparing scale detergent
 - (1) Prepare hot water with temperature between 50 and 60 about 2 liters.
 - (2) Mix well "Organosol 10" about 200g, an accessory for this unit, and hot water prepared (1).
 2. Stop the hose joint in the lower part of the boiler (outlet/drain of boiler) by rubber stopper etc.
 3. Set the boiler at the stable place not to pour scale detergent from the boiler.
 4. Pour the scale detergent from joint into the condenser with the heater connected.
 5. Almost all scales are removed in about 4 to 5 hours. Drain the scale detergent from the boiler. If a lot of scales in the boiler are not removed, add new scale detergent to repeat cleaning.
 - (1) If you finished removing the scales, take off the heaters from the boiler and wash them thoroughly by the tap water. Wash them in the big beaker with full of water not to be wet of leads and drain.
Do not wash them by the tap water directly.
 - (2) If solid scales is not removed by the scale detergent, do the following treatment.
Boiler : Wipe off by brush etc.
Heater: Wipe off by soft material like chip or plastic etc.
- The scales in the heater must be wiped equally and the solid scales must not be left partly. Extremely the part only become a large heat resistance, therefore the heater may be broken.

Cleaning Still

Cleaning the condenser

1. Pour the scale detergent into the cooling pipe of the condenser.
(See page41 about the preparing scale detergent)



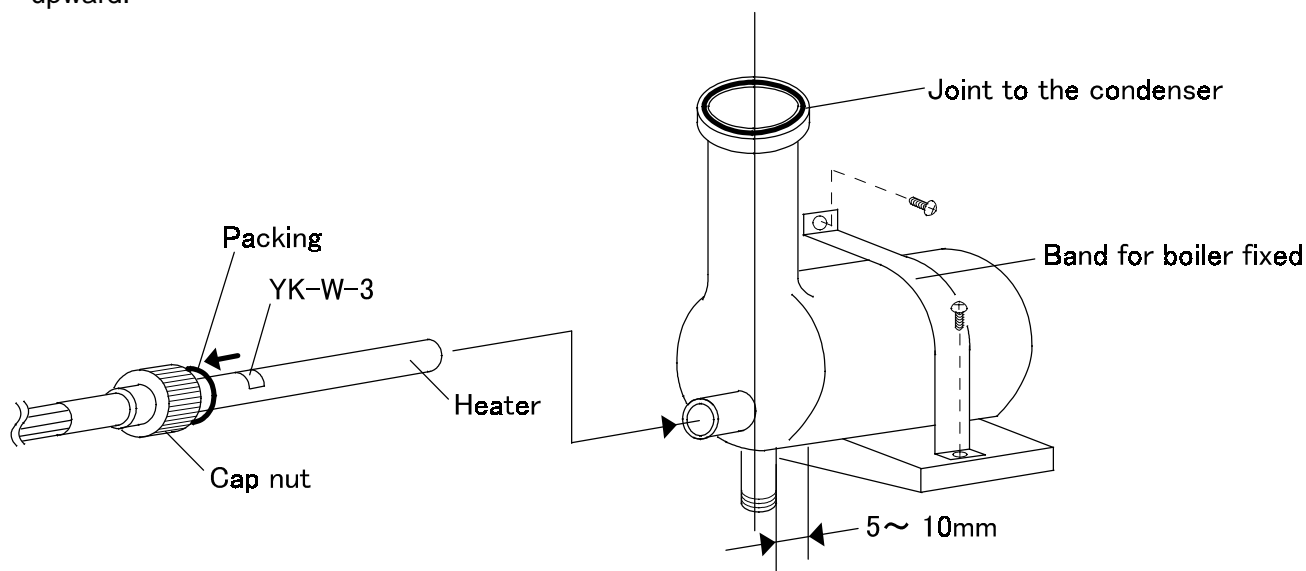
2. If the cleanser comes out from the hose joint, stop the hose joint by silicone stopper etc. Almost all fur is removed in about 4 or 5 hours.
3. After the scale detergent drained, wash the inside of condenser by tap water thoroughly.

About the treatment of the cleanser (See page16 “Caution for Use”)

1. Wash the boiler and the heater a little early. The more the amount of the scales adhesion is, the more difficult you remove it. And it may cause that the amount of taking distilled water decreases and the heater is broken.
2. After washing, drain the cleanser from them and neutralize cleanser by the neutralizer. Check by a PH indicator if cleanser is neutralized irrigation channel or fields. (the main ingredient of the scales cleanser : sulfamic acid , PH of the solution : about PH1 acid)
3. Keep the cleanser in an airtight container, avoid preservation in hot and humid areas, and keep in cool and dark areas.
4. Wear protective gloves, mask and glasses to handle the cleanser.
5. Wash by pure water the cleanser splashing on body.
6. Do not use the vacant cleanser container as a drink bottle.
7. Do not drain the cleanser directly into an agricultural irrigation channel or fields. The cleanser can kill rice plants and other farm products.

Installation of the boiler

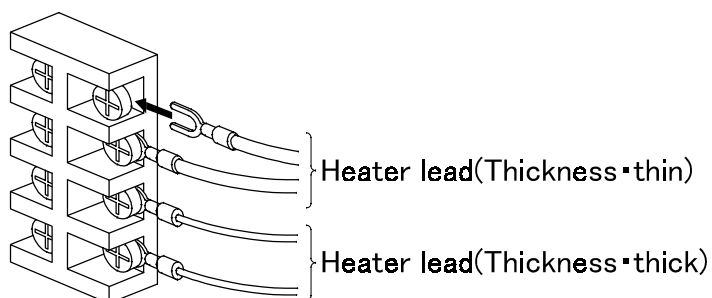
1. Set the joint (to the condenser) level by the band for boiler fixed.
After you check that there is packing in the cap nut, insert it into the boiler with the characters “YK-W-3” upward.



Cleaning Still

Installation of the boiler

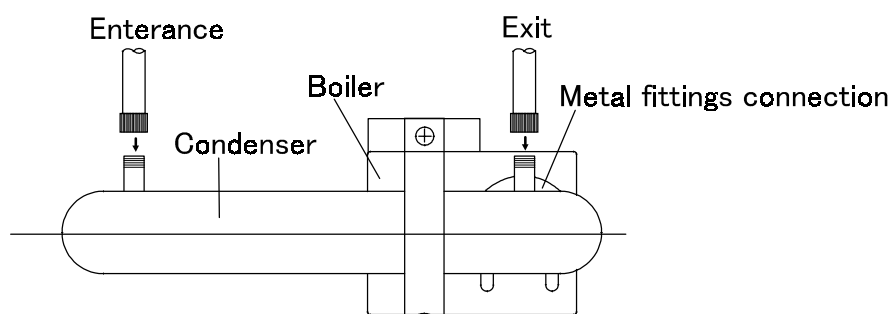
2. Connect the four heater terminals with the terminal rack.



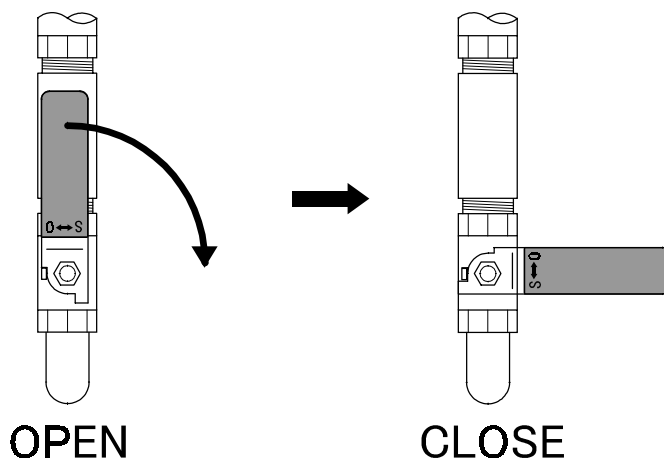
3. Install the left side board on the unit.
4. Insert the tube into supply and drain for boiler and fix it by hose band.

Installation of the Condenser

1. Insert the packing into the joint with boiler and condenser, and fix boiler and condenser in the same direction by metal fittings connection.



2. Connect the each hose to entrance of cooling water, exit of cooling water, and exit of distilled water.
3. Close the valve to drain boiler water.

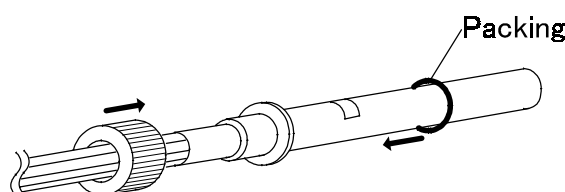


Exchange Heaters

If the heater snapped or was broken, exchange the heater as follows.(Refer to P.40 ~ 43 for exchanging)

1. Turn "OFF" the circuit breaker.
2. Close the faucet.
3. About more than 30 min. later after turned "OFF" the circuit breaker, open the front door of this unit and the valve to drain boiler water.
4. Open the left side board, loosen the four connecting screws in right side of terminal rack, and pull the heater terminal.
5. Pull the heater terminal from the grommet.
6. Remove the cap nut of the heater, and pull the heater.
7. Remove the packing and the cap nut from the broken heater.
8. Install the packing and the cap nut to the new heater.

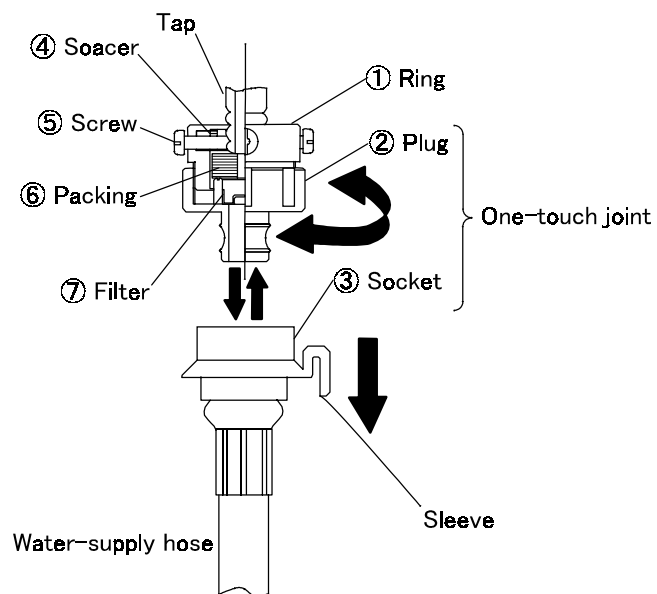
At this time, do not touch it with empty hands not to apply the finger marks.



9. Insert it into the boiler with the heater mark "YK-W-3" upward.
10. Insert the heater terminal into the grommet, and fix it in the terminal rack with checking the position of installing heater lead.
11. Install the left side board on the unit.
12. Close the valve to drain boiler water.
13. Open the faucet after closing the front door.
14. Turn "ON" the circuit breaker.
15. Check that the STAND-BY lamp lit.
16. Push the calibrate switch in the upper part of the circuit breaker.
(The calibrate switch is a switch to memorize in the inside controller the standard temperature which the sensor inside the each heaters shows at normal running. It senses malfunction when the temperature become 20 high more than the standard temperature for some reasons at the normal running.)
17. At the calibrate running for 5 min. long, the indicator (1) of the operation panels blinks **CAL**.
18. After 5 min. calibrate running, the running become normal automatically.

Clean Water Supply Hose Filter

- (1) Close the faucet and remove the water supply hose after turning off the unit breaker.
- (2) Remove plug from ring with turning.
- (3) Clean filter in the plug by tap water.
- (4) Push the filter by flat end of a pencil etc. from the hole at the side of sleeve in case of terrible stoppage.
- (5) Brush the filter.
- (6) Assemble the filter in the reverse procedure.



Exchange Hoses

Use the specified hose for exchange.

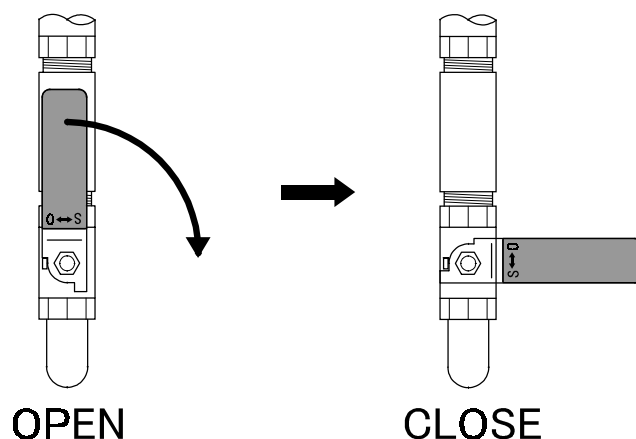
When you do not use the unit for a long time



If you do not use the unit for a long time, turn off the unit breaker for safety and close the faucet. Water in the boiler and the distilled water tank deteriorates its quality by the growth of unwanted bacteria and algae. Drain as follow.

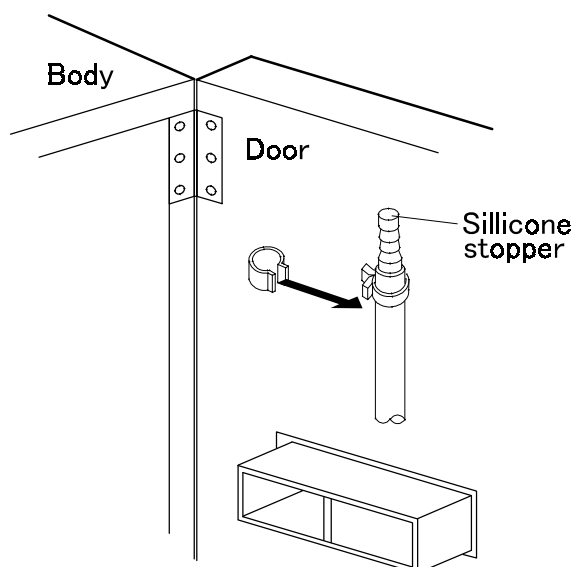
Draining boiler water

- (1) Before draining the boiler water, turn off the unit breaker , check if faucet is closed , and wait for 30 minutes or longer.
- (2) Open the valve to drain the boiler water.
- (3) Make sure if all water is drained from the boiler and float receptacle.
- (4) Close the boiler water draining valve. If the drain valve remains open in the next use of the unit, water would not flow into the boiler or start distillation.



Draining distilled water

- (1) Make sure if the unit breaker is turned off. Open the front door.
- (2) Pull out the hose to drain distilled water set at the upper left on the back of front door.
- (3) Remove the silicone stopper to drain the distilled water from the tank. Check in advance the remaining water level in the tank, and prepare receptacle for drainage.
- (4) Be careful not to set the drain hose higher than the bottom level of the distilled water tank, or more tank water remains in the tank.
- (5) Install the silicone stopper at the point tightly, and insert stopper securely in the original folder after completing drainage.



After-sales Service and Warranty

When you request repair

If any troubles should occur, note the error code, stop the operation immediately. Turn the power switch off, pull the power cord out and contact the seller or Yamato Scientific's Technical Service Department.

(Necessary information)

Model number
Serial number
Date of purchase
See the warranty or nameplate on the unit
Detailed information on difficulties
The service man requests you to show the warranty on his visit.

Warranty (attachment)

The seller or Yamato Scientific's gives you the warranty. Keep your warranty card for future references. Check the name of distributor, date of purchase and any other contents of warranty.

The term of warranty is one year limited commencing the date of purchase. Repair is made without charge according to the contents of warranty.

As for repair after expiration of the warranty period, consult the seller or our Technical Service Department. As long as the function of the unit can be maintained by repair, we will repair the unit upon your request.

Minimum period to keep repair parts in stock

Minimum period to keep repair parts is 7 years limited after we stop the production of this model of units. The repair parts mean any necessary parts to maintain the performance of the unit.

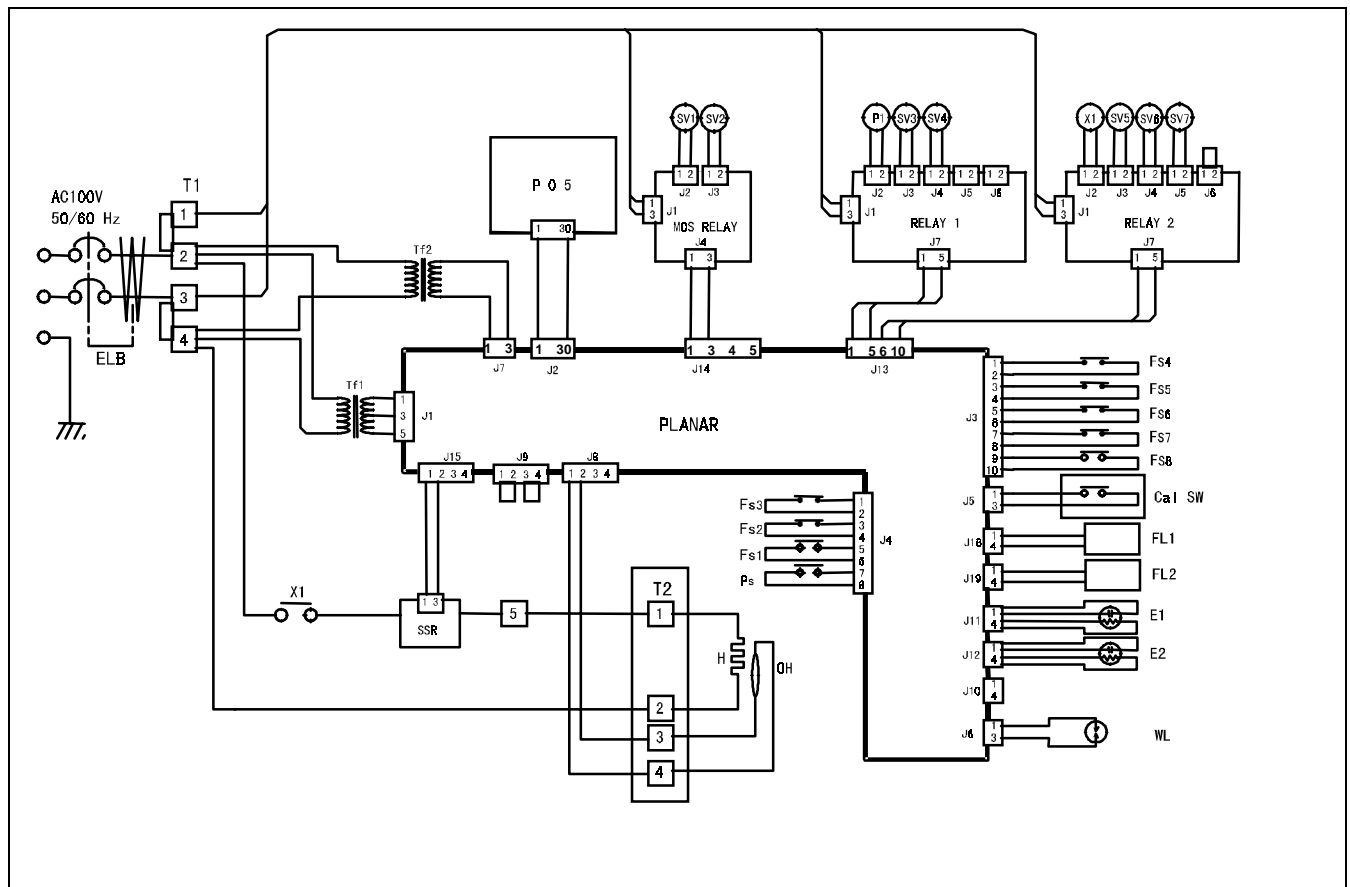
When you encounter the following

Fault indication	Check points
STAND BY switch is not lit when the breaker is turned on.	Is the power supply cable is securely connected with the outlet? Is there any power failure?
No water is supplied.	Defect of solenoid valve to supply raw water. Low pressure or interruption of water service. Defect of pressure switch. Stoppage in the pre-treatment cartridge.
Water supply can not be stopped.	Defect of float switch. Defect of solenoid valve to supply raw water.
No water is supplied into the boiler.	Defect of solenoid valve to supply boiler water Defect of float switch. Defect of solenoid valve to drain boiler water.
Heater can not be turned on.	Defect of float switch. Heater disconnection.
No cooling water flows.	Defect of solenoid valve for cooling water.
Distilled water is not drained.	Defect of solenoid valve to drain initial distilled water.
Boiler water is not drained.	Defect of solenoid valve to drain boiler water.
Distilled water is not stored.	Defect of solenoid valve to drain initial distilled water. Defect in piping.
Distillation would not stop.	Defect of float switch.
No water is collected.	Defect of solenoid valve to collect ion-exchanged or distilled water. Defect of pump to take distilled water. Defect in piping.

Specifications

Type		WG221	WG221S
Collection method		ion exchange	Distillation
Pure water to collect		Distilled / Ion exchanged water	
Volume of distilled water to produce		About 1.8ℓ/h	
Water flow to collect		1 ℓ/min. or more (Distilled / Ion exchanged water)	
Still	Boiler	Super hard glass	
	Condenser	Super hard glass	
	heater	Ceramic heater 1.9kw	
Distilled water tank		Made of polyethylene 20ℓ	
Raw water filter		Pre-treatment cartridge (ACF0827) Activated carbon and hollow fiber membrane (0.1 μ m)	
Ion-exchange resin cartridge		Cartridge type of one-touch connect (CPC-N) Mix bed Resin 3ℓ	
Water quality examiner		Digital display (selection of either electric conductivity or resistivity) 0.05 ~ 300 × 10 ⁻⁴ S/m·25 (in case of electric conductivity) 18 ~ 0.1 × 10 ⁴ ·m·25 (The resistivity is shown by the integral number from 1 to 18.)	
Water supply pump		Magnet pump	
Indication of tank water levels		5 levels by LED display	
Water volume to take		0.1 ~ 99.9ℓ	
Range of raw water pressure		0.5 ~ 5 × 100 kPa (0.5 ~ 5 kgf / cm ²)	
Power requirement (50 / 60 Hz)		AC100V About 15A	
External dimensions *1 (W × D × H)		About 570 × 455(590:including outlet) × 730 (mm)	
Weight		About 43 (kg)	
Supplemental functions		Water abnormality alarm Automatic boiler drainage Automatic adjustment of cooling water level Prevention of low-water boiling Overheat prevention Water leak detector No water supply detector Earth leakage circuit breaker Initial distilled water drainage Abnormality detection of the float switch for the distilled water tank System to set the volume of distilled water to take (WG221S only) System to set the volume of ion-exchanged water to take	
Accessories		Water supply hose , Drain hose , Joint hose Instruction manual Warranty Hose clamp Scale detergent (1kg) Pre-treatment cartridge Ion-exchange resin cartridge	1 (for each) this book 1 1 1 1 1
Non-standard accessories		Type Water outlet unit ----- (OWH10) Drain trap ----- (OWI10) Pressure pump (OWJ10) ----- (OWJ10) WQ500/501 joint unit ----- (OWQ10) Carrier ----- (AS200) WL100 joint unit ----- (OWL20) Joint unit of membrane filter ----- (OWM30) Membrane filter ----- (OWN10)	Part No. 253686 253211 253220 253695 253175 253668 253667 253670

*1...The exterior dimensions exclude projected areas.



Symbol	Name of Parts	Symbol	Name of Parts	Symbol	Part of Name
Cal_SW	Calibrate SW	SV1	Solenoid valve to supply boiler water	T1	Terminal
E1	Electrode for ion-exchanged water	SV2	Solenoid valve to supply raw water	T2	Terminal
E2	Electrode for distilled water	SV3	Solenoid valve to drain initial distilled water	Tf1	Transformer
E2	2 Electrode for distilled water	SV4	Solenoid valve to drain boiler water	Tf2	Transformer
ELB	Earth leakage circuit breaker	SV5	Solenoid valve to take ion-exchanged water	WL	Water leak detector
FL1	Flow sensor (ion-exchanged water)	SV6	Solenoid valve for cooling water	X1	Relay
FL2	Flow sensor(distilled water)WG221S only	SV7	Solenoid valve to take distilled water	PS	Pressure switch
FS1	Float switch to control heater	OH	Overheat detector		
FS2	Float switch to control boiler water level	P1	Pump to take water		
FS3	Float switch for boiler overheat	PIO-5	Operation board		
FS4	Float switch to check water level	PLANAR	Planar board		
FS5	Float switch to check water level	RELAY1	Relay board		
FS6	Float switch to check water level	RELAY2	Relay board		
FS7	Float switch to check water level	SSR	SSR board		
FS8	Float switch to check water level				
H1	Heater				
MOS RELAY	MOS relay board				