Service Manual

For

Water Purifier, Auto Still

WG203

- Second Edition -

Note:
Use and carry out the instruction manual together on the service of this unit.

Yamato Scientific Co. LTD.

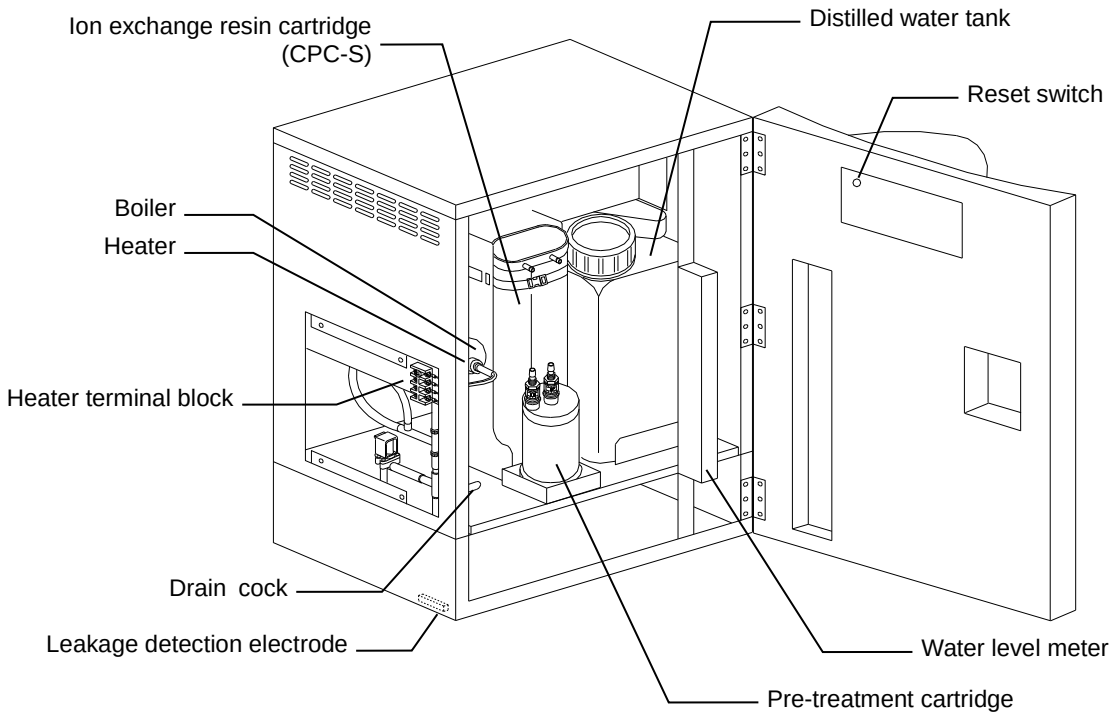
Contents

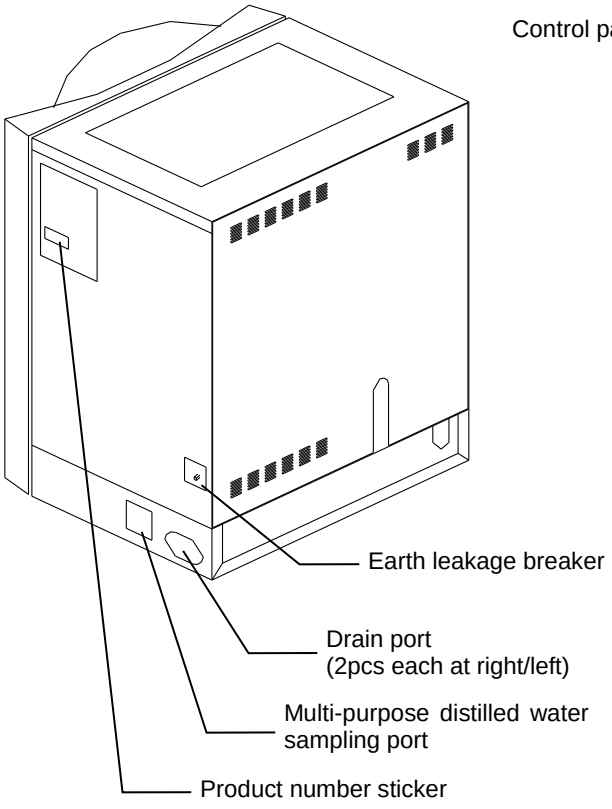
Specification

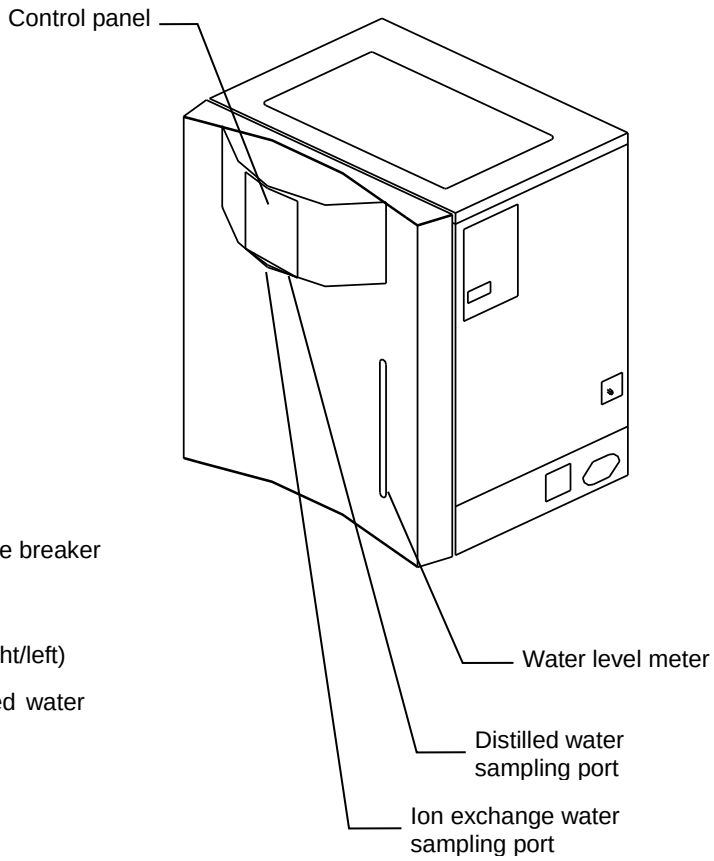
Model			WG203
Performance	Collecting method		Ion exchange ⇒ Distillation
	Sampled pure water		Distilled water/Ion exchange water
	Quantity of distilled water		Approx. 1.8ℓ/h
	Sampling flow rate		1ℓ/min. or more (ion exchanged water/distilled water)
Configuration	Distiller	Boiler	Super hard glass
		Condenser	Super hard glass
		Heater	Ceramic heater 1.4kw
	Distilled water storage tank		Made of polyethylene, 20ℓ
	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), 2ℓ × 2
	Water quality gauge		5 stages lamp display 0 to ∞ × 10-4 S/m•25℃(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℃～35℃
	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			• Water quality failure arert • 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			• Water supply hose, drain hose, and connection assembly: 1 respectively • Operation manual: 1 • 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.

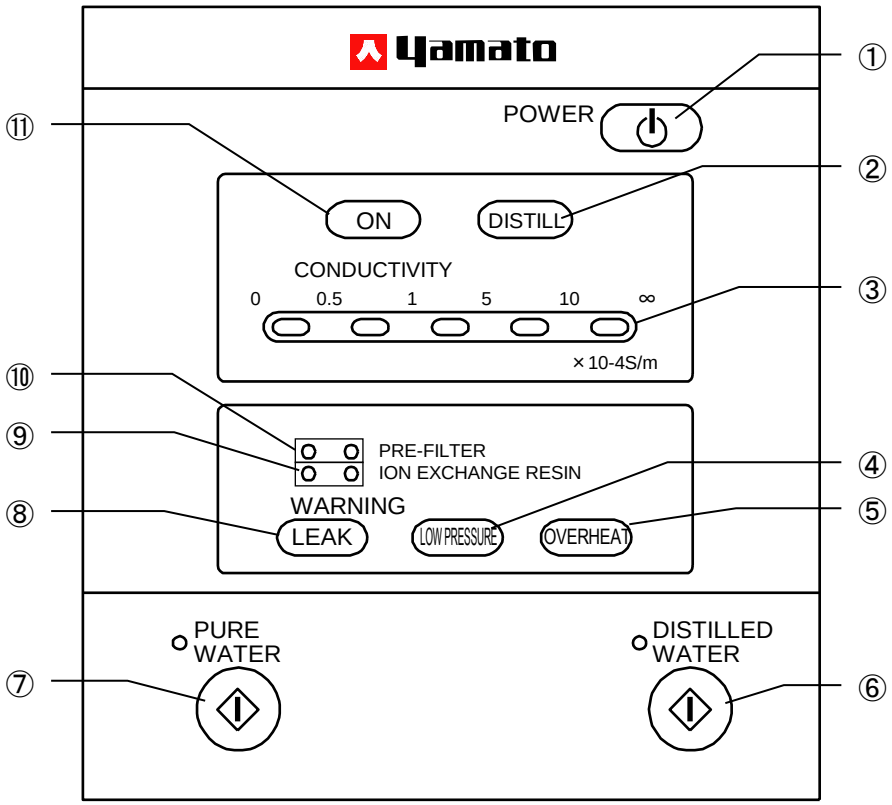
Main Unit


Ion exchange resin cartridge
(CPC-S)
Distilled water tank
Reset switch
Boiler
Heater
Heater terminal block
Drain cock
Leakage detection electrode
Water level meter
Pre-treatment cartridge


Earth leakage breaker
Drain port
(2pcs each at right/left)
Multi-purpose distilled water
sampling port
Product number sticker

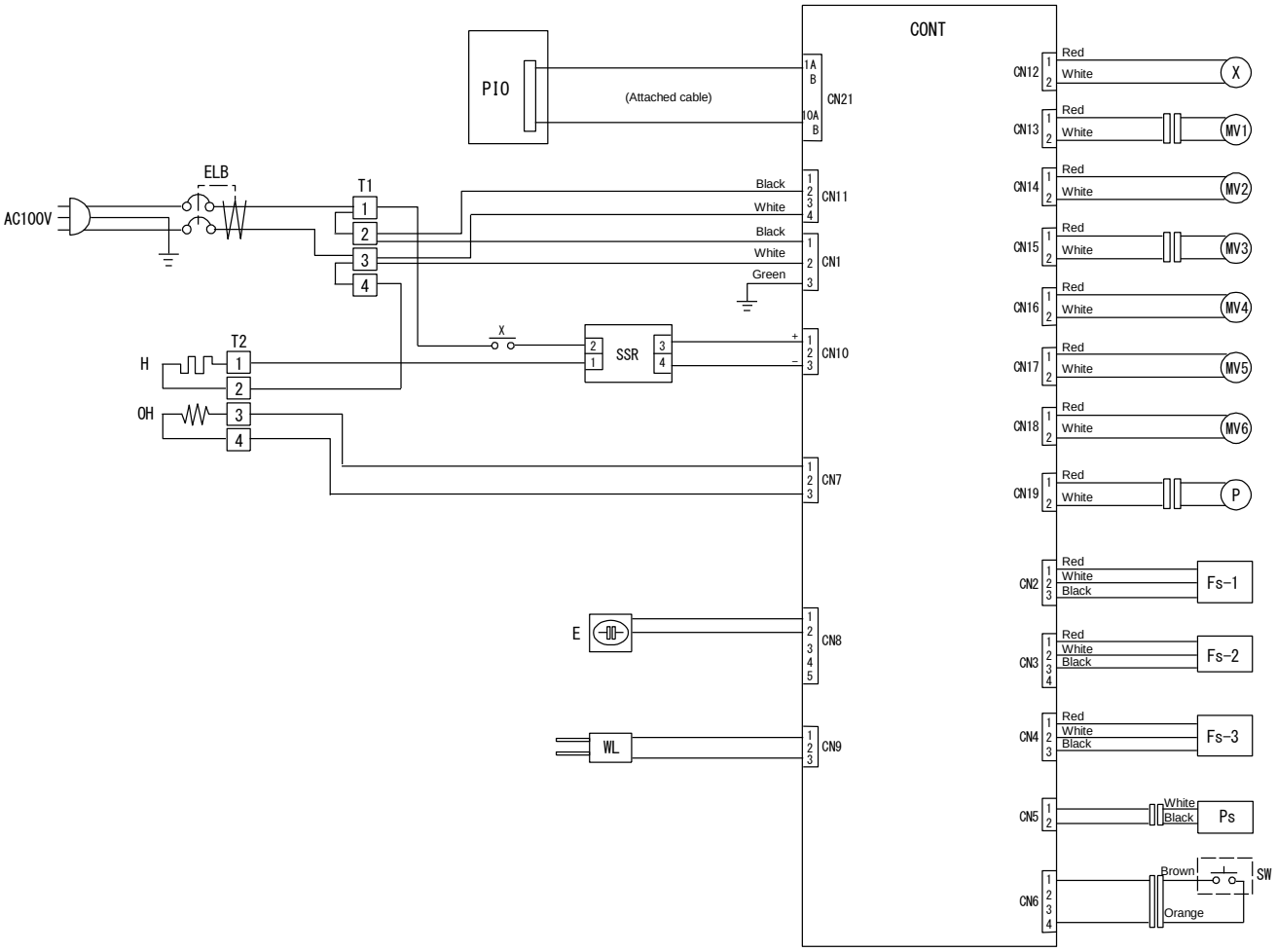

Control panel
Water level meter
Distilled water
sampling port
Ion exchange water
sampling port

Control Panel



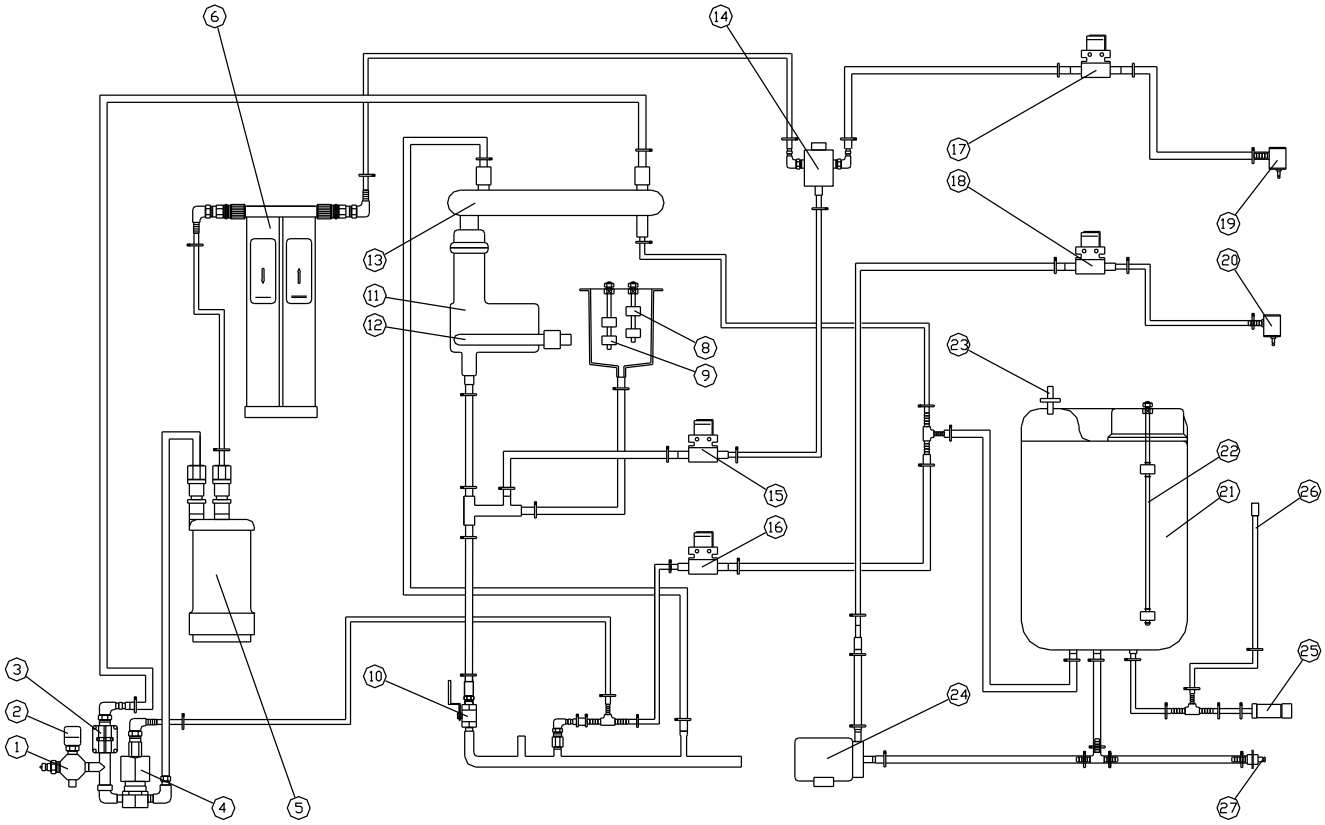
①	POWER key	Turns on/off the power of the controller.
②	DISTILL lamp	Lights up during distillation.
③	CONDUCTIVITY indicator	Lights up when the conductivity of pure water keeps between 0.0 to ∞μS/㎝.
④	LOW PRESSURE lamp	Blinks when low pressure error is detected.
⑤	OVERHEAT lamp	Blinks when overheat of 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.

Wiring Diagram



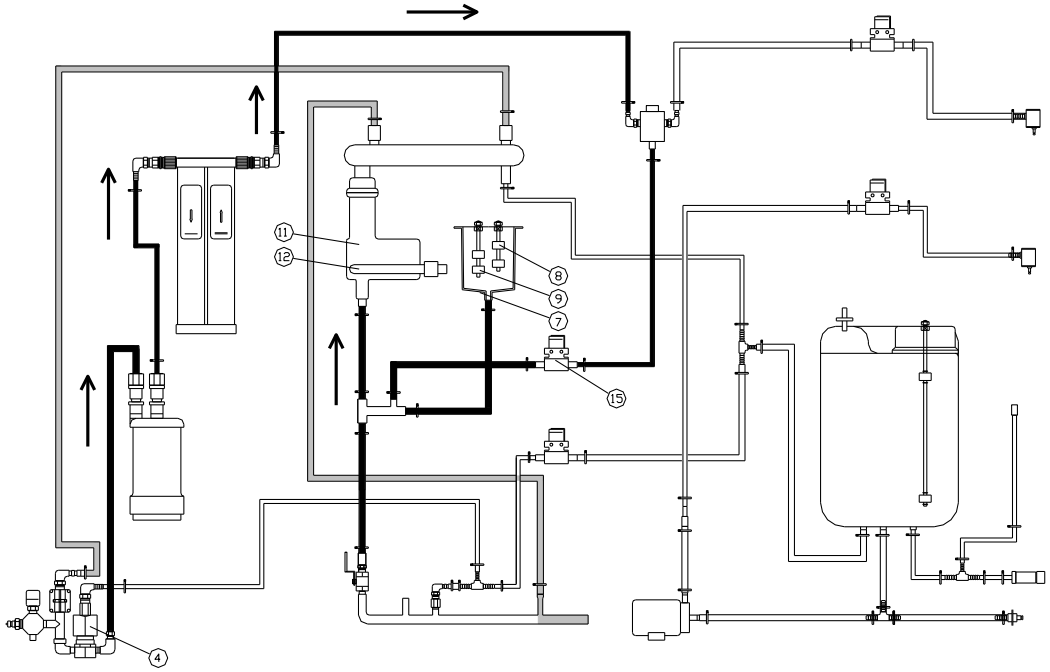
Symbol	Part name	Symbol	Part name
ELB	Earth leakage breaker	X	Main relay
T1, T2	Terminal block	MV1	Raw water solenoid valve
H	Heater	MV2	Boiler water supply solenoid valve
OH	Temperature sensor	MV3	Cooling water solenoid valve
E	Ion exchange water quality gauge	MV4	Initial accumulated water drain solenoid 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

Piping System View



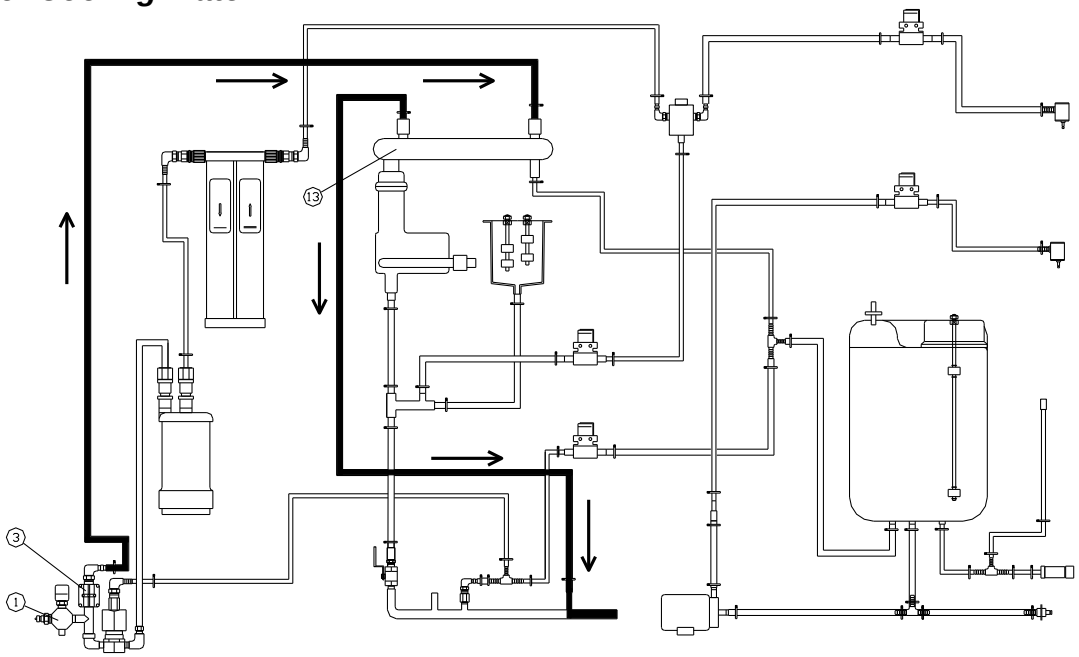
1	Pressure reduction valve	**15**	Boiler water supply solenoid valve
2	Pressure switch	**16**	Initial accumulated water drain solenoid valve
3	Cooling water solenoid valve	**17**	Ion exchange water sampling solenoid valve
4	Raw water supply solenoid valve	**18**	Distilled water sampling solenoid valve
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		

1. Boiler Water Supply and Distilling Operation



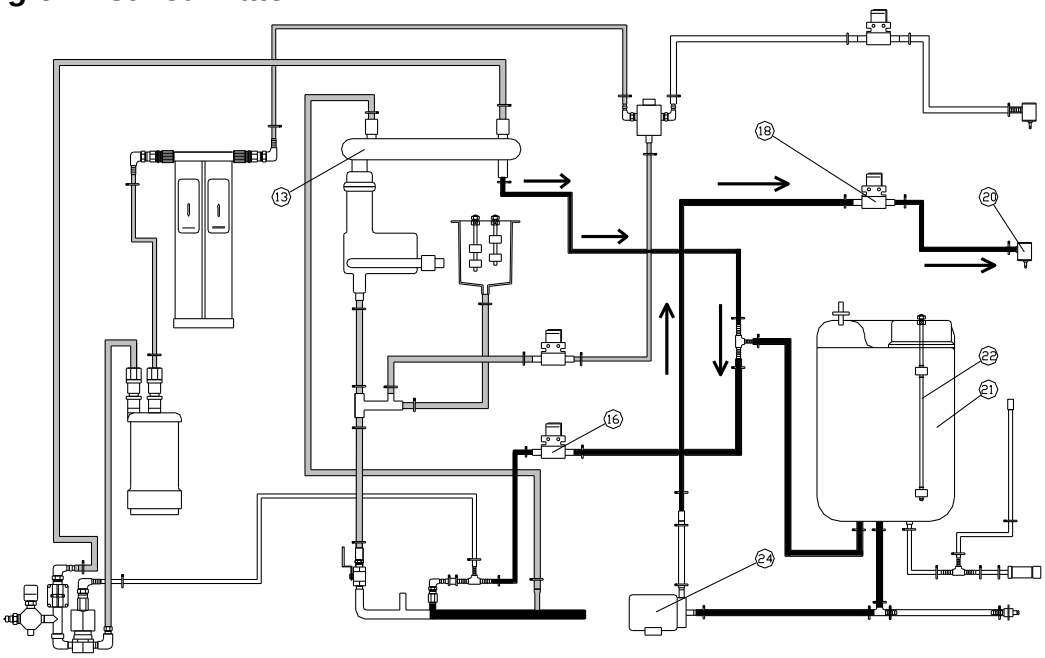
Turn ON the earth leakage breaker, and press the power switch. Then, the raw water supply solenoid valve (4) and the boiler water supply solenoid valve (15) open at the same time to supply water to the boiler (11). When the float switch 1 (8) in the float cylinder (7) detects water level, the heater (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



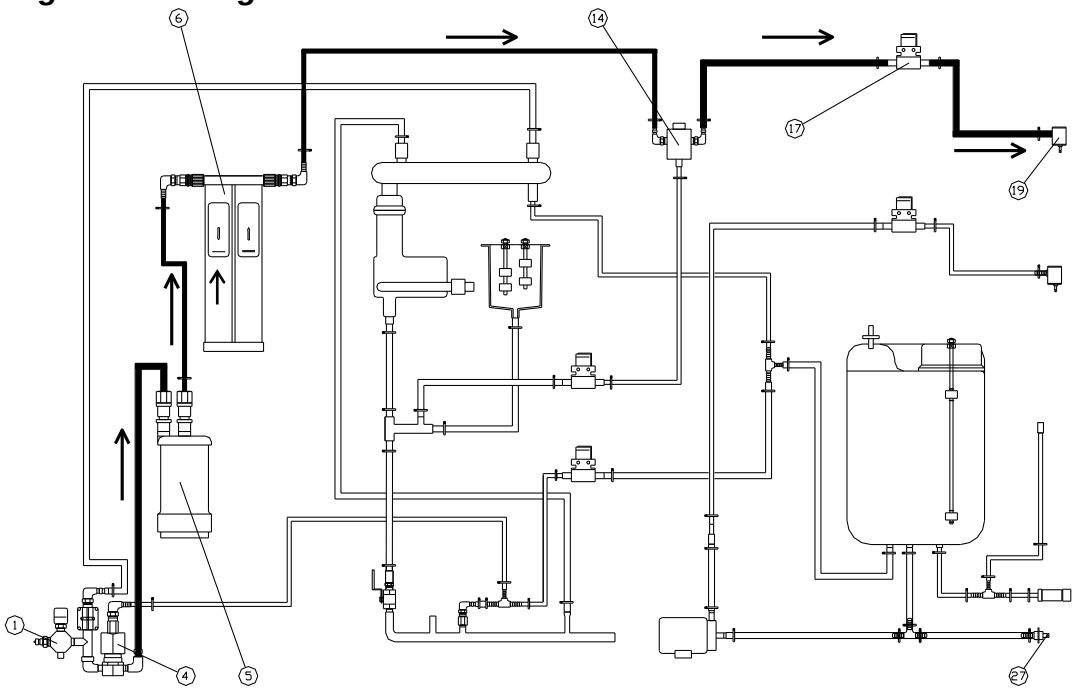
During distillation, water is supplied and discharged in the order: (1) pressure-reducing valve, (3) cooling water solenoid valve and condenser (13). When the distilled water tank is full, or when ion exchanged water is sampled, distillation is stopped, and the cooling water is also stopped automatically.

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).

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.
Overheat of heater	Turns off	Turns off	Blinks	When the temperature at the heater excesses the error judgment value, or when breakage or shortage occurs on the temperature sensor		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.

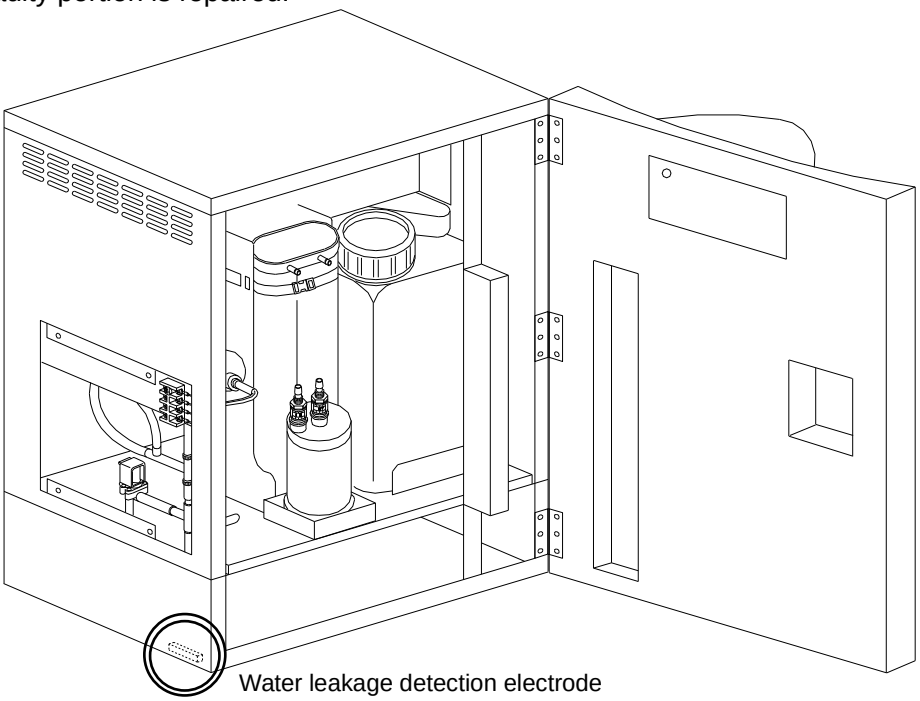
Failure indication and Its Contents

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.
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 10.

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.



Water leakage detection electrode

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.

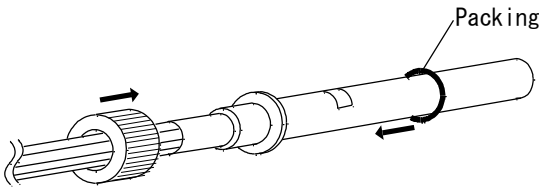
Remedy when overheat detection ("OVERHEAT" lights up)

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.

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 12 "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.

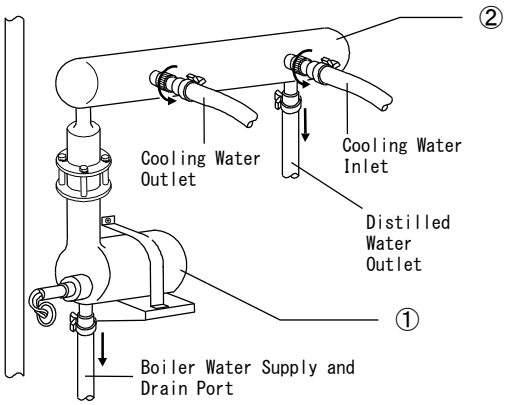


9. Install on the boiler so that "YK-W-3" mark of the heater is faced up.
10. Feed the heater lead wire through the grommet, check the heater lead wire attaching position, and secure to the terminal block.
11. Mount the left side plate.
12. Close the boiler water drain cock.
13. Close the front door, 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.

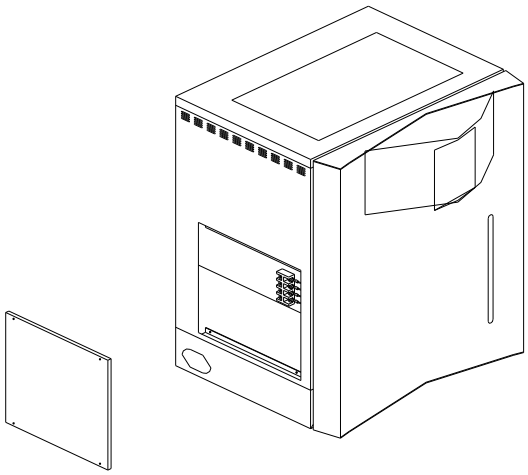
Washing of Distiller

Dismounting of Distiller

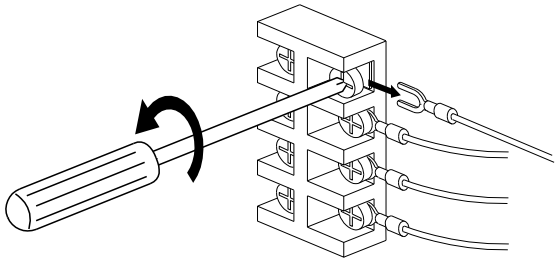
1. Turn "OFF" the earth leakage breaker of the unit.
2. Close the tap.
3. Check that the boiler is not hot (longer than 30 minutes after the breaker is turned "OFF"), then open the front door of the unit, and open the boiler water drain cock.
4. Disconnect the hose connected to the boiler ① and condenser 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.



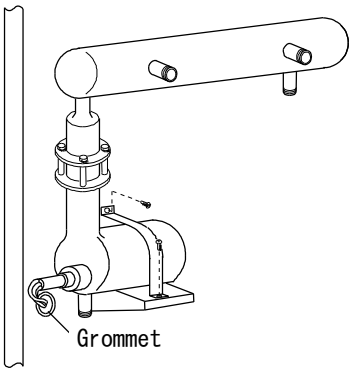
6. Loosen 4 screws on the right of terminal block located at the right top of the body frame with left side plate dismounted by use of Phillips screwdriver, and disconnect the heater lead terminal.



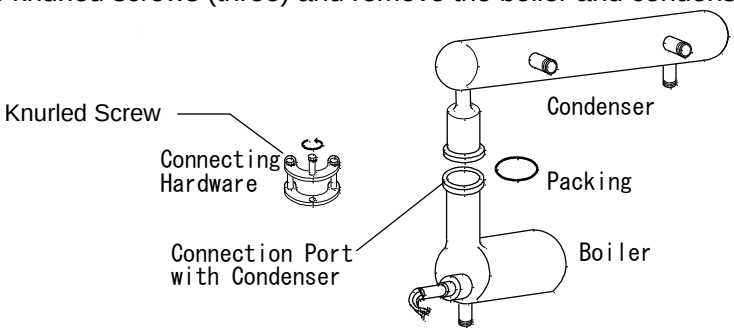
Washing of Distiller

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

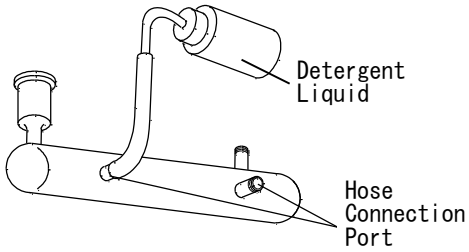
1. Adjust detergent liquid.
   1) Prepare approx. 2 liters of hot water at 50 to 60°C.
   2) Add attached scale detergent (Orgazor) approx. 200g to hot water prepared in 1) and agitate well.
2. Seal the hose connection port at the bottom of boiler (boiler supply and drain port) by use of rubber stopper, 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 13 "Washing of boiler" for formulating detergent liquid.)



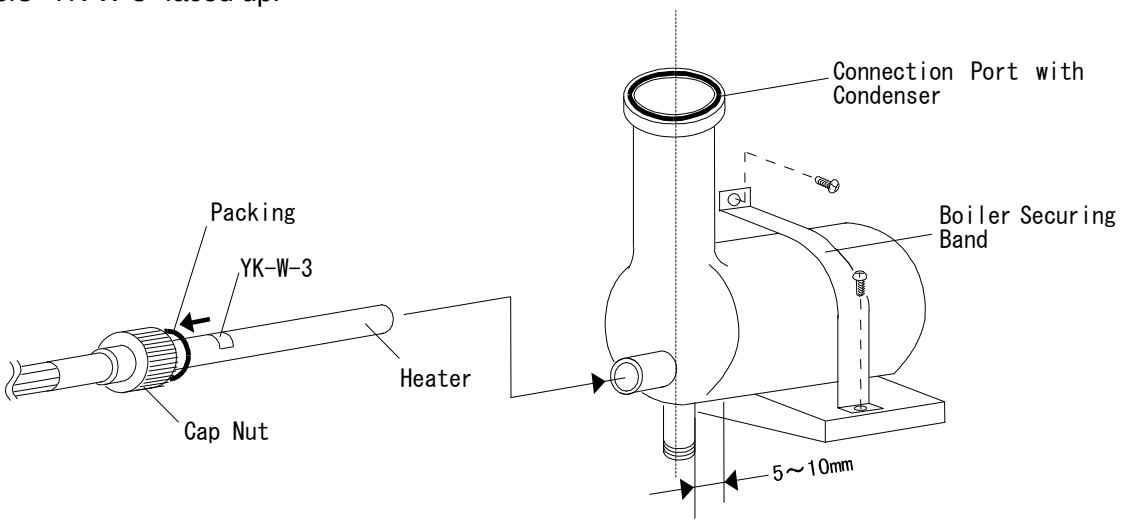
2. If detergent liquid should flow out of hose connection port, seal with rubber stopper. Most fur can be removed in 4 - 5 hours approximately.
3. Drain detergent liquid, and then wash enough with city water.

Handling of Detergent Liquid

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.

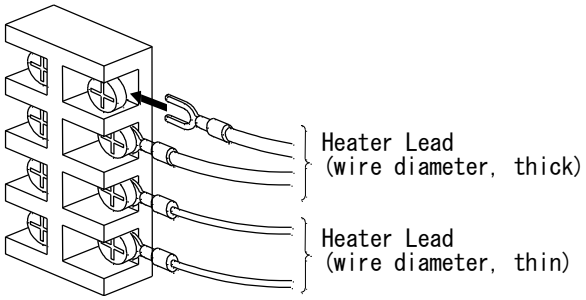
Installation of boiler

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

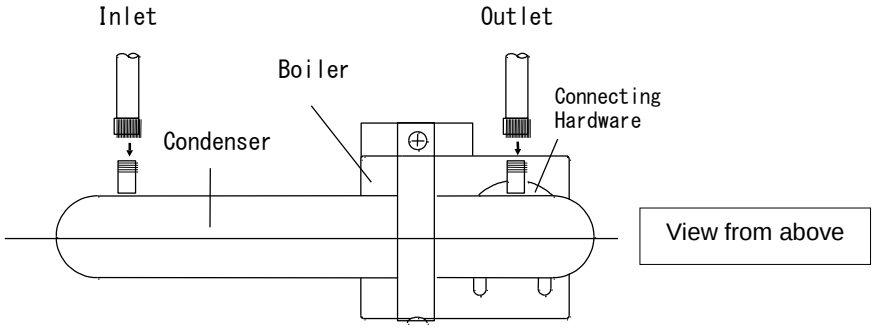
2. Attach 4 heater lead terminals to the terminal block.



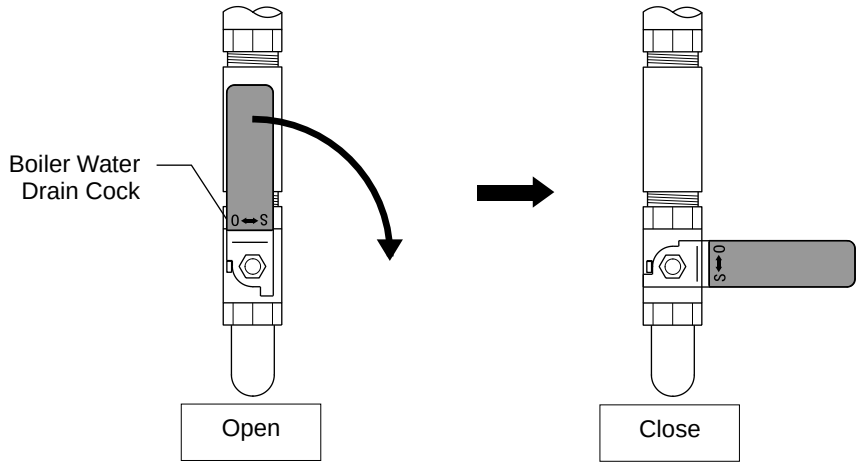
3. Install the left side plate on the body.
4. Insert the hose to the boiler water supply and drain port, and secure with the hose band.

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.

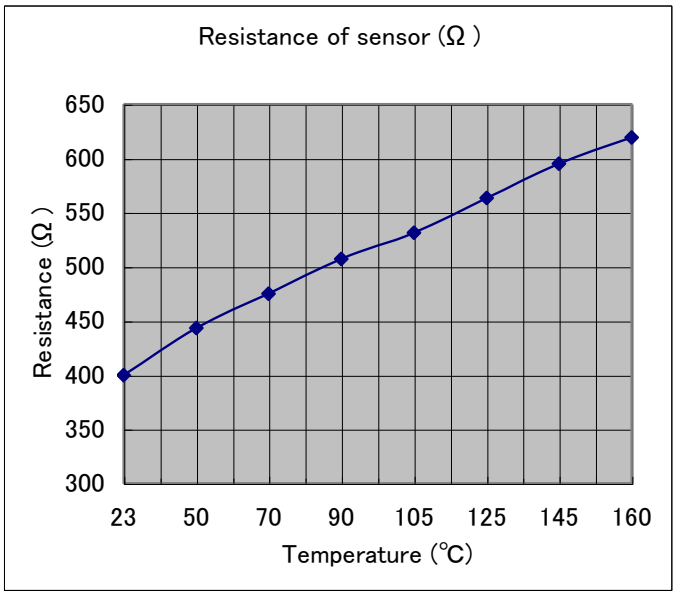


Ceramic Heater

Model: YK-W-3

Specification:

Resistance of heater unit: 4.84Ω ±10%(at23℃)
At stabilized boiling condition: Approx. 1400W
Resistance of sensor unit: 400Ω ±10%(at23℃)



Note)

- The current of approximately 20A passes for a very short period just after the current is supplied when the heater is cold. The current, however, soon decreases.
- When the heater is removed for replacement, make sure that the boiler has been drained and the heater has been sufficiently cooled down.
- Do not touch the heating unit even after removed.

Replacement Parts Table

Symbol	Part Name	Code No.	Specification	Manufacturer
ELB	Earth leakage breaker	LT00029776	NV-L22GR 20A	Mitsubishi
T1, T2	Terminal block	A0050115	TB-20C 4P	SAKAZUME
H, OH	Heater (temperature sensor)	2420016003	YK-W-3	Yamato Scientific
E	Ion exchange water quality gauge	1011890001	For WG25/220	Yamato Scientific
WL	Water leakage detector	WG55005328	lead wire 2,7m	Yamato Scientific
Fs-1	Control float switch	LT00014441	WA050514-2	Yamato Scientific
Fs-2	Control float switch	LT00014440	WA050514-1	Yamato Scientific
Fs-3	Water level float switch	LT00014439	YF4-1888	Yamato Scientific
Ps	Pressure switch	2040040001	ST-B-BR1-N2	Sanyo Keiki
SW	Reset switch	2010010014	A2A-4W	OMRON
X	Main relay	2050000056	G7L-1A-TUB 100V	OMRON
MV1	Raw water solenoid valve	LT00014451	AG3X-A300-100V	CKD
MV2	Boiler water supply solenoid valve	LT00014450	J241-811	CKD
MV3	Cooling water solenoid valve	LT00014453	AB2X-1242	CKD
MV4	Initial accumulated water drain solenoid valve	LT00014450	J241-811	CKD
MV5	Distilled water sampling solenoid valve	LT00014450	J241-811	CKD
MV6	Ion exchange water sampling solenoid valve	LT00014450	J241-811	CKD
P	Distilled water sampling pump	2150080001	MD-10A	IWAKI
SSR	Solid state relay	2160000035	TRS5225	Toho Denshi
PIO	Display board	LT00013590	WG203	Yamato Scientific
CONT	PLANAR board	LT00013589	WG203	Yamato Scientific

Service Manual for

Water Purifier, Auto Still
WG203

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