Operating Manual Number : LWD-3012E(7)
Revised : December, 2009
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Automatic Water Still

Model : LWD-3004 / LWD-3008 / LWD-3012

1.1. Tables of Contents

1.2. Getting Started

Thank you very much for purchasing Daihan Labtech product.

Your Water Still has been designed with function, reliability, and safety in mind. It is your responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert symbols through the manual.

This manual contains important operating and safety information. You must carefully read and understand the contents of this manual prior to the use of this equipment.

Warning

Warning alert you to a possibility of personal injury

Caution

Caution alert you to a possibility of damage to the equipment.

Note

Notes alert you to pertinent facts and conditions.

HOT

Hot Surface

Hot surface alert you possibility of burning injury by hot instrument surface

Explosive

Explosive alerts you to possibility of explosion by high pressure.

1.3. Product Overview

LabTech LWD Automatic Water storage tank produce ultra-pure, bacteria and pyrogen free distillate with a very low conductivity (Up to 3.5 MΩ at 20 ℃) produce distillate over to 4ℓ~ 12ℓ/minute. The distillate is in conformity with many regulations of many international pharmacopoeia.

Unique design and safety feature with hydraulic temperature controller and an electronic level switch provides automatic operation. By lack of water, the heating is automatically switched off to protect heater from over heating.

Your Automatic Water Stills are intensively tested before shipment. Some water droplets can be remain in the boiler or storage tank.

1.4. Product Specifications

Model	LWD-3004	LWD-3008	LWD-3012
Capacity	4.0ℓ/ hour	8.0ℓ/ hour	12.0ℓ/ hour
Dimensions(mm)	W740xD345xH513	W680xD360XH650	W700xD400xH650
Heater	3.0 kW	6.0 kW	9.0 kW
Cooling Water	Approx. 30ℓ~ 50ℓ	Approx. 60ℓ~ 80ℓ	Approx.80ℓ~ 100ℓ
Material Inner	Stainless Steel Boiling Chamber		
	Stainless Steel Storage Tank		
Outer	Powder Coated Steel		
Reservoir	8ℓ SUS Tank	14ℓ SUS Tank	19ℓ SUS Tank
Safety Device	Over Temp. Protector		
	Water Float Level Sensor		
	Water Supply Cut-Off		
Operation	Fully Automatic Operation		
Signal Lamp	Distill, Full, Water		
Electric Supply	220V, 50/60 Hz, 1Phase		

Optional Accessory

Model	Descriptions
LAB-1001	Prefiltration Cartridge (Hi-Clean Pre Filter)
LAB-1002	Prefiltration Cartridge (Hi-Clean Pre Filter + Carbon Filter)

Cartridge is attached on the side of the Automatic Water Still to remove particles in the feeding water to prevent scale formed in the boiling chamber

	
LAB-1001 Prefilter Cartridge removes larger than 5 ㎛ particles in the feeding water	LAB-1002 Prefilter Cartridge removes larger than 5 ㎛ particles and carbon filter removes organic components in the feeding water

1.5. Parts and Functions

① **ELECTRIC CIRCUIT BREAKER**

Automatically cut-off electrical supply if electrical leak in the circuit.

② **MAIN POWER SWITCH**

Main electrical supply power switch

③ **DISTILLED WATER DISPENSER (WITHDRAWAL)**

Distillate is withdrawn via the black plastic cap (1) on the front of the unit. The cap can be opened in continuous or in interval positions. A silicone or laboratory hose with an inner diameter of approx 15 cm can be fixed to the distillate withdrawal tap. The hose must be secured with a hose clip.

! WARNING !

The temperature of the distilled water in the storage tank may higher than 50 ℃

④ **DISTILL PILOT LAMP**

Signal lamp on during distillation operation

⑤ **FULL PILOT LAMP**

Signal Lamp on when the storage tank is full with distilled water. Once the tank is full Automatic Water Still stop operation.

⑥**OVER TEMPERATURE CUT OFF**

A low water cut off (thermostatic over-temperature cut off) protects the heating element against running dry causing over heating. In case of low water, the electric supply to the heater is switched off by the low water cut-off.

To restart the unit, check water supply to the boiling chamber and fill the water to immerse the heating element completely.

During normal operation, turn the control to maximum level to boiling water to produce maximum distilled water production.

The Cut Off Temperature is 120 ℃.

⑦ **TAP WATER SUPPLY INLET**

The tap water supplies water to the water still trough solenoid valve. Use Screw Lock Connector /w pressure tube (Acc. Part#) supplied with to connect between the inlet and tap water main.

⑧ **COOLING WATER OUTLET**

Connect 1/8” silicone hose supplied with or heat resistant hose to the cooling water outlet. It must not be longer than 1.5 meters. The hose has to be led to the drain on a lower level and must have slope on the complete length of the hose.

The cooling water must be allowed to flow off without back draughts.

! WARNING !

The temperature of the cooling water from the outlet may up to 70 ℃

⑨ BOILER DRAIN VALVE

Connect 1/8” silicone hose supplied with or heat resistant hose to boiler drain valve to drain the boiler in case of cleaning and/or maintenance works.

! WARNING !

The temperature of the boiling water in the boiling tank may up to 100 ℃

⑩ STEAM VENTILATION PIPE

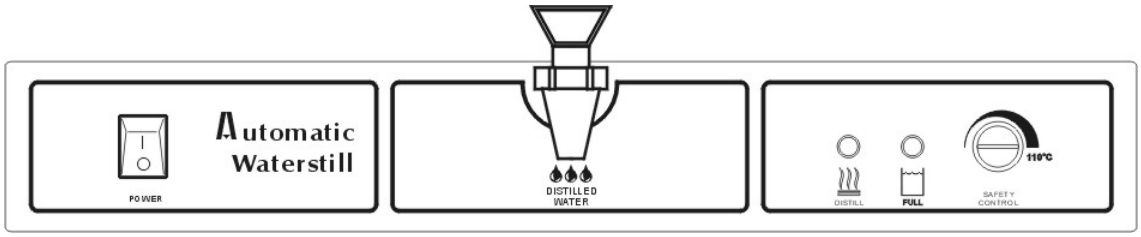
Excess Steam generated by water still vent to the ventilation pipe. Cover the pipe hole with dust guard shield to prevent contamination.

⑪ Supply water valve from outside

The function of valve supply into the filter from the outside water

Connect through a hose to water-line of outside.

Adjust a valve to a proper volume by after check water pressure



1.6. Installation

Before Installation

The information given in this manual must by all means be carefully ready and observed. Only then can a perfect functioning of the Water Still be guaranteed.

A free of charge guarantee repair cannot be granted for defects due to improper installation or handling.

1) The main voltage must correspond to the voltage given on the name-plate

2) Place Water Still on the flat and leveled surface

3) Place Water Still near by water supply and drain

Installing the Water Still

The Water Still is suitable for bench top use. Indoor use only. If the unit is to be placed on a bench top, place on solid, even and leveled surface only.

Tap water supply and drainage facility is absolutely required.

The unit is not suitable for use in explosion endangered surroundings.

Electrical Supply and Connection

Electrical Circuit Breaker and Main switch of the Water Still must be on OFF position.
Main voltage and voltage stated on the name plate at the right-hand side of the unit must be identified.

The electrical requirement of the LWD is **220 VAC 3.0 kW, 15 Amp(LWD-3004), 220 VAC 6.0 kW, 30 Amp(LWD-3008), Single Phase to 220 VAC 9.0 kW, 45 Amp(LWD-3012).**

Be sure to use power cord and consent having enough capacity which can stand up to 20 Amp to 50 Amp.

Be sure the electrical supply has ground.

The Water Still must only be installed and connected to a properly installed power connection according to the local electrical regulations.

It must be secured that the power can be cut all-pole (switch or socket)

■ Water Connection

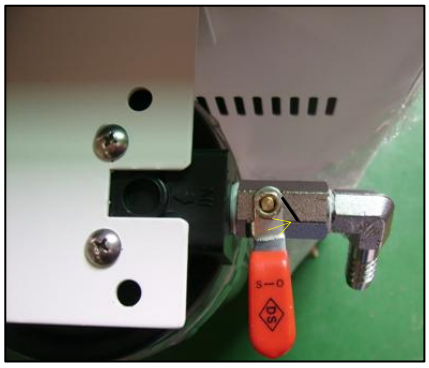
Accessories supplied with for water connection :

1. Screw Lock Connector /w Pressure Hose x 1 ea
2. Silicone Hose 1.5 m x 2

All water connection of the water still, except the distillate withdrawal tap on the front, are at the right-hand side of the unit.

Be sure to all tubing and hoses connected to the Water Still is straight through the end not to interfere water flow and check all connected parts without any water leakage.

Matters that require attention



The valve on filter housing is recommended to use along with the line that we marked.

The marked LINE is to adjust a proper volume of water supply as a result of operation testing at factory.

(But if the distilled water is not appropriated, please adjust a valve to make proper water flow subject to tap water pressure at your place.)

1. Tap Water Supply Inlet

Connect Screw Lock Connector /w Pressure Hose to the Tap Water Supply Inlet.

Be sure to connect tightly prevent water leakage.

Connect the other end to the Tap Water Main.

2. Cooling Water Outlet

Connect 1/8” silicone hose supplied with or heat resistant hose to the cooling water outlet. It must not be longer than 1.5 meters. The hose has to be led to the drain on a lower level and must have slope on the complete length of the hose.

The cooling water must be allowed to flow off without back draughts.

3. Boiler Drain Outlet

Connect 1/8” silicone hose supplied with or heat resistant hose to boiler drain valve to drain the boiler in case of cleaning and/or maintenance works.

Turn drain valve to **Lock Position** before operation

1.7. Operation

■ Before Operation

1. Before operation, please turn off Electrical Circuit Breaker and Power Switch.
2. Turn the Over Temperature Cut Off (SAFETY CONTROL) to counter clockwise to set minimum position.

Be sure to set SAFETY CONTROL at minimum volume to prevent heating before sufficient water supply to the boiler.

■ Start Operation

After assembly of all power and water connections ;

1. Turn the Circuit Breaker on.
2. Turn the Main Power Switch on.
3. Gently open the stop valves of the Tap Water supply and control water flow rate about 15ℓ/min.

Close Tap Water supply valve when not in operation.

4. Tap water circulates as following process ;

Tap Water Valve → Tap Water Supply Inlet →
Solenoid Valve → Condenser Coil →
Boiler Level Controller → Boiler → Steam
→ Storage Tank→ Over Flow
→ Cooling Water Outlet

Wait for a few minutes so that the Water Still to be filled with water. To fill the circulation loop completely, The Water Still need about 20ℓ and it will takes about 5 minutes depending on the feeding water flow rate.

Once the tap water completely filled up the Water Still, water come from cooling water outlet tubing.

Leave the Water Still for a few minutes to wash out impurities in the boiler and water circulation loop.

The cooling water must be allowed to flow off without back draughts.

5. Turn the SAFETY CONTROL to maximum position.
6. The Distill Pilot Lamp will turn on.
7. The heater start boiling and generate steam.

Functional Descriptions

LWD Automatic Water Still operates fully automatically.

After switching the power on, the solenoid valve is opened and water supplies to the water still.

Water flows through the cooling coil, in the storage tank and a boiler level controller that controls the water level of the boiler.
Waters flow to the boiler to generate steam.
Once the water level of the boiler is sufficient to immerse the heating element, Water Level Switch turned on. Water that is not in use for evaporation over flows off through the Cooling Water Outlet.

Turning the SAFETY CONTROL to maximum position, Distill Pilot Lamp will glows and the heating element is switched on.

Heating element boils water in the boiling chamber generates steam.

Produced steam is led through two steam tubes connected to the storage chamber where cooling coil condenses steam and make droplets of distillate drip into the storage tank.

The level of the distilled water is controlled by Water Level Sensor in the storage Tank (right-hand tank).
When the tank is full, an electronic regulator and relay switches the water still off.
The solenoid valve cuts off the inflow of the cooling water, the heating element is switched off and FULL Pilot Lamp will glow.

The first production of distilled water may containing impurities and which may contaminated during transportation or installation. Fill the storage tank to FULL and discard distilled water at least twice before use.

Distilled water can be withdraw through blue and white plastic tap of Distilled Water Dispenser (DISTILLED WATER) outlet.
After withdrawal of the distilled water, the unit switch back automatically, and the storage tank will be filled again.
Carbon Dioxide is degassed though a Steam Vent Pipe on the top of the Water Still.

1.8. Servicing and Maintenance

■ De-scaling

Depending on the quality of tap water, the water still should be cleaned regularly to prevent scale formation.

The scale formed in the boiling chamber may reduce purity of the distilled water. Scale formed on the surface of heating element may cause damage to the heating element.

a. Turn the power off and close water supply.
b. Turn the SAFETY CONTROL to minimum position.
c. Prepare cleaning solution. 10% formic acid, 10% acetic acid and 80% distilled water. Commercial de-scaling agent can also be used.

Do not use any solution containing hydrochloric acid.

d. Remove Outer Lid.
e. Remove Inner Lid of the boiling chamber (Left-Hand chamber)
f. Unscrew to remove Water Deflector
g. Fill the solution into the boiler to fill up to the topmost scale formations
h. Turn the Main Power Switch on.
i. Open the Tap Water Stop valve.
j. Turn the SAFETY CONTROL to about 70 ℃ to moderate heat up.
k. Leave the Water Still approximately 30 minutes.
l. After 30 minutes open the Boiler Drain Valve to wash out solvent and scale mixture.
m. Fill and drain boiling chamber several times to completely remove solvent and scale mixture.
n. Restart Water Still
o. After de-scaling, the first few liters of distilled water should be discarded as it might contain traces of evaporated de-scaling agent.

! Caution !

Before opening and cleaning the Water Still, be sure to cut off power.

Please make sure that no fluids comes into contact with cable connections or the electrical parts of the inside of the unit

■ Cleaning Surface

The Powder-Coated surface of the Water Still can be cleaned with mild detergents, if necessary.

Servicing, repairs or modification must be carried out according to the commonly recognized Technical Rules and Regulations by competent electricians only.

Only original spare parts must be used. Always demand a detailed confirmation of the carried out tasks by the person in charge.

Replacing Heating Element

1) Drain out all waters inside of the water still.
2) Remove all covers and lids from the water still.
3) Remove compartment panel in the boiling chamber
4) Lay down water still
5) Remove bottom panel
6) Unscrew heater wire from the heating element
7) Unscrew heating element from the boiling chamber
8) Remove old heater and replace with new one.
9) Fix heating element with screw nut and connect heater wire.
10) Check water leakage before assemble.
11) Close bottom panel and assemble all parts.

Replacing Relay

1) Drain out all waters inside of the water still.
2) Remove all covers and lids from the water still.
3) Remove compartment panel in the boiling chamber
4) Lay down water still
5) Remove bottom panel
6) Remove defective relay and replace with new one.

Servicing, repairs or modification must be carried out according to the commonly recognized Technical Rules and Regulations by competent electricians only.

Only original spare parts must be used. Always demand a detailed confirmation of the carried out tasks by the person in charge.

Service Parts

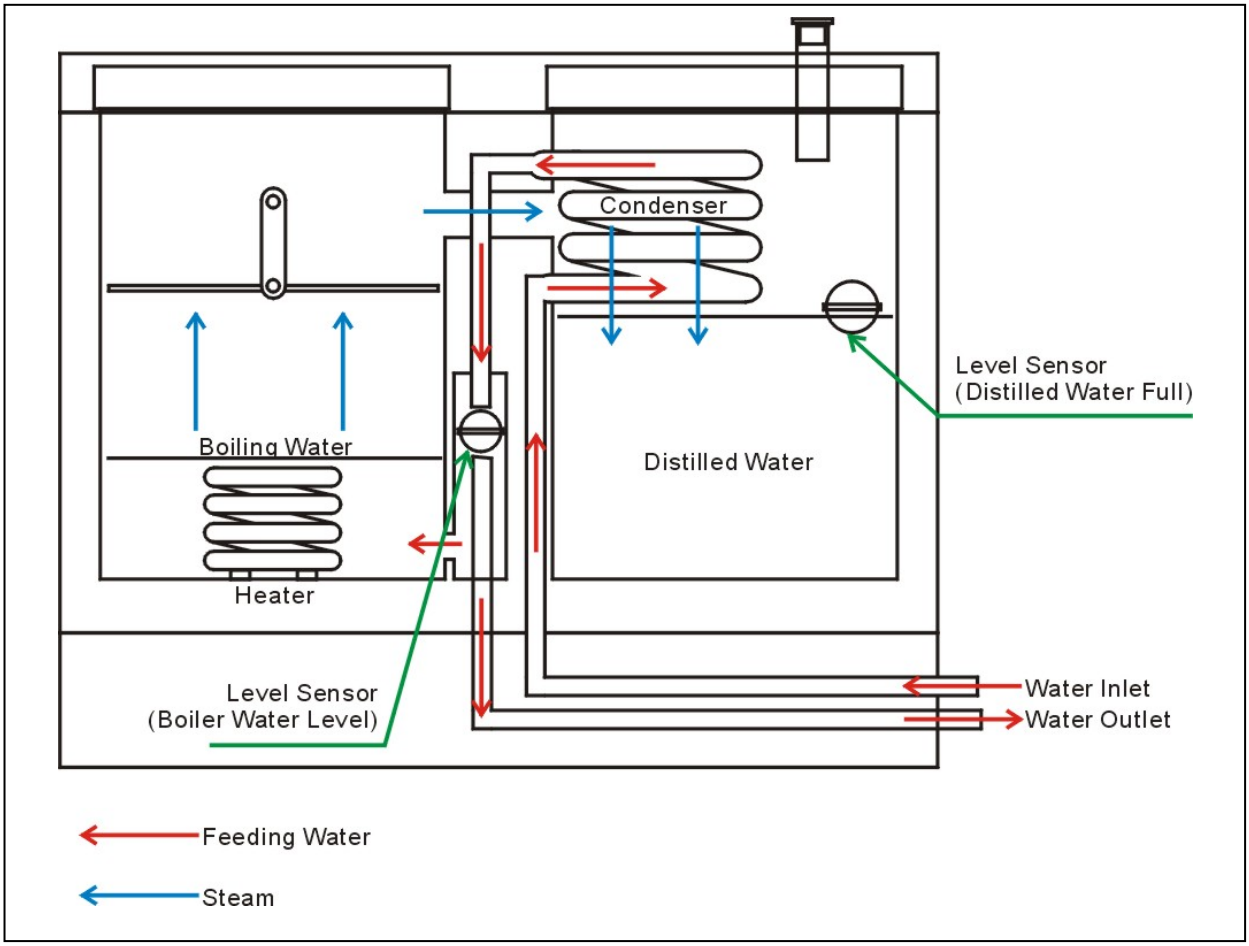
Hardware Components

Part#	Part	Model / Spec.	U/Price	Q'ty
LWD-H001	WATER DISPENSER COCK			1
LWD-H002	FILTER HOUSING	10 INCH		1

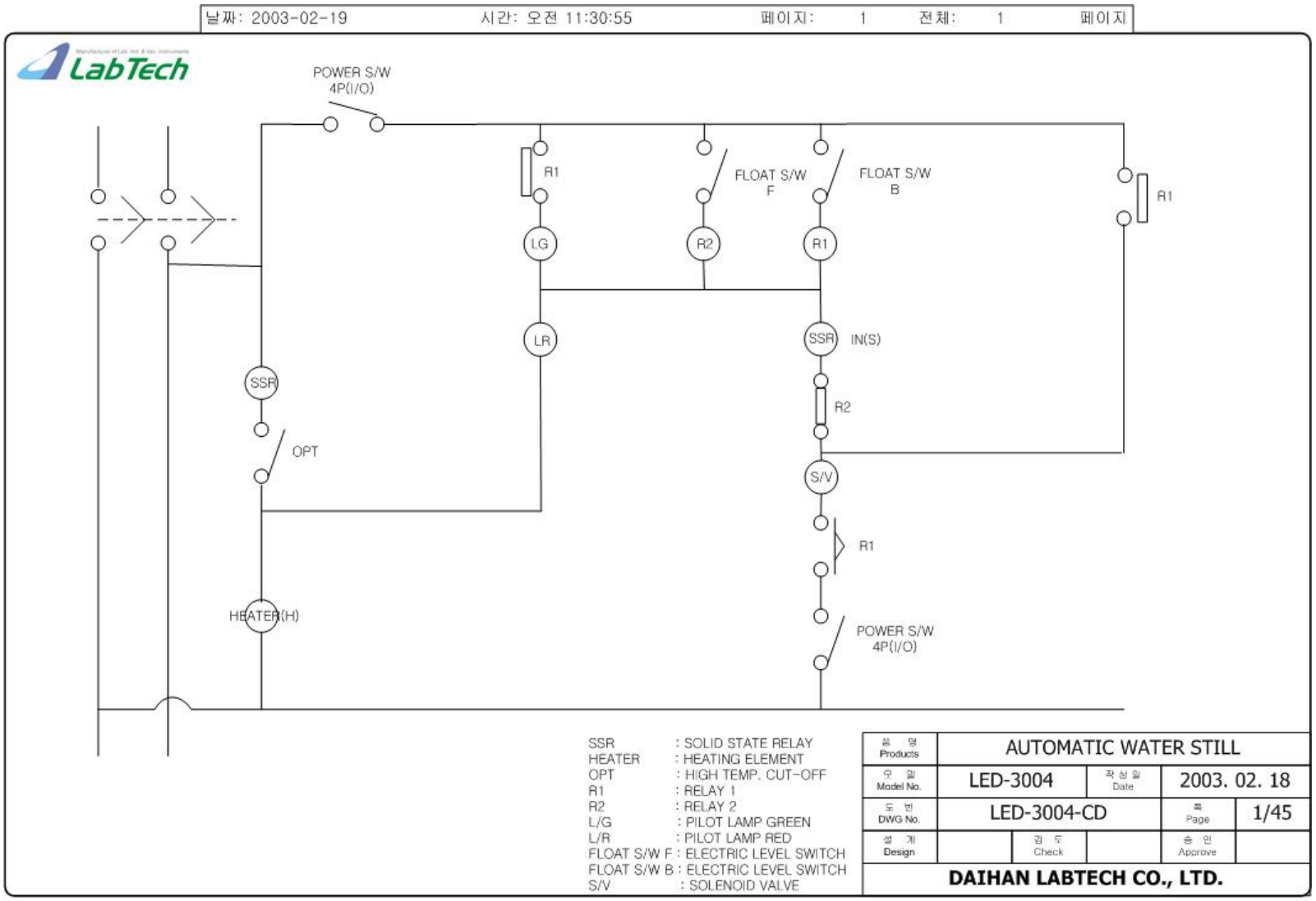
Electric Components

Part#	Part	Model / Spec.	Price	Q'ty
LWD-E001	OPT SAFETY CONTROLLER	TS 120 SR		1
LWD-E002	CIRCUIT BREAKER	20A		1
LWD-E003	POWER CORD	15A 2.0 SQx3C 2m		1
LWD-E004	HEATER	3Kw		1
LWD-E005	POWER S/W	E104(EOCS)250V 10A(GREEN)		1
LWD-E006	RELAY	KH-103-H2C		2
LWD-E007	RELAY SOCKET			2
LWD-E008	SOLID STATE RELAY	HSR-2A302Z(HY)		1
LWD-E009	FLOAT S/W SUS	STRAIGHT		1
LWD-E010	FLOAT S/W PL	STRAIGHT PLASTIC		1
LWD-E011	PILOT LAMP RED	TN-10H		2
LWD-E012	PILOT LAMP GREEN	TN-10H		2
LWD-E013	SOLENOID VALVE			1

1.9. Water Flow Diagram



1.10. Circuit Diagram



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1.11. Warning

HOT

1. Make sure the electric supply is AC 220V , 50/60Hz, Single Phase

2. Place Water Still on the flat surface

3. Do not touch top of the instrument. During operation, surface of the top of the water still and steam ventilation from the hole is very hot.

4. Lime deposit should be removed from the evaporator once or twice a month depending on the degree of hardness of the tap water. Take of the upper part of the water still and remove the silicone packing. A mixture of 10% formic acid, 10% acetic acid and 80% distilled water is recommended for cleaning the apparatus. Fill the solvent into the evaporator to just above the highest lime deposit and heat to approx. 70^{o}C. The evaporator is clean after approx. 15 to 20 minutes. pour out the lime and solvent mixture thoroughly rise with water.