

Operation Manual of Controller SR201

for Un-pressurized Integrated Solar Hot Water
Heater



Please read the manual carefully before operation!

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1. Safety information

We have carefully checked the text and pictures of this manual and provided the best of our knowledge and ideas, however inevitable errors maybe exist. Please note that we cannot guarantee that this manual is given in the integrity of image and text, incorrect, incomplete and erroneous information and the resulting damage we do not take responsibility.

1.1 Installation and commissioning

- When laying wires, please ensure that no damage occurs to any of the constructional fire safety measures presented in the building.
- The controller must not be installed in rooms where easily inflammable gas mixtures are presented or may occur.
- The permissible environmental conditions can't be exceeded at the site of installation.
- Before connecting the device, make sure that the power supply matches the specifications that controller requires.
- All devices connected to the controller must conform to the technical specifications of the controller.
- All operations on an open controller are only to be conducted cleared from the power supply. All safety regulations for working on the power supply are valid. Connecting and /or all operations that require opening the collector (e.g. changing the fuse) are only conducted by specialists.

1.2 Liability waiver


The manufacturer can't monitor the compliance with these instructions or the circumstances and methods used for installation, operation, utilization and maintenance of this controller. Improper installation can cause damages to material and person. This is the reason why we do not take over responsibility and liability for losses, damages or cost that might arise due to improper

installation, operation or wrong utilization and maintenance or that occurs in some connection with the above-mentioned. Moreover, we do not take over liability for patent


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infringements or infringements occurring with the use of this controller on the third parties' rights. The manufacturer reserves the right to put changes to product, technical data or installation and operation instructions without prior notice. As soon as it becomes evident that safe operation is no longer possible (e.g. visible damage). Please immediately take the device out of operation. Note: ensure that the device can't be accidentally placed into operation.

1.3 Signal description

 Safety indication: Safety instructions in the text are marked with a warning triangle. They indicate measures which can lead to injury of person or safety risks.

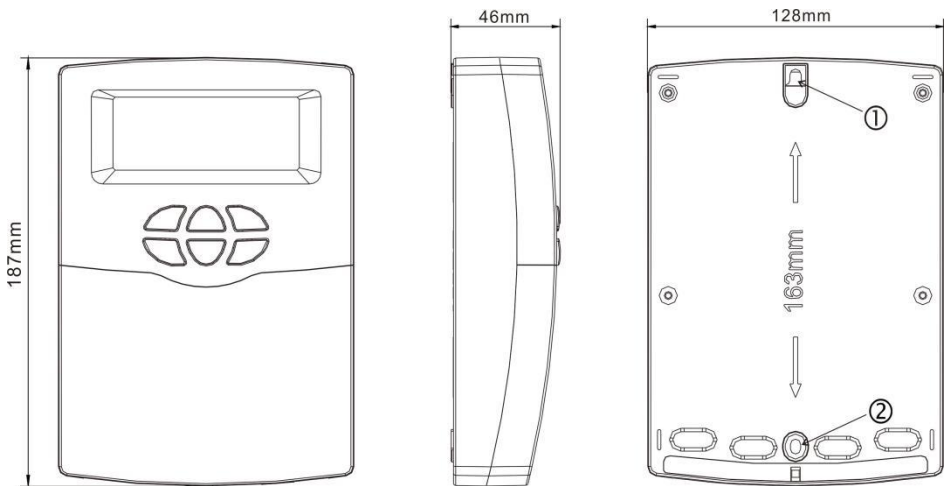
Operation steps: small triangle “▶” is used to indicate operation step.

Notes:  Contains important information about operation or functions.

2. Installation

2.1 Mounting controller

Dimension of controller:



Instruction SR201 for Un-pressurized Integrated Solar Hot Water Heater

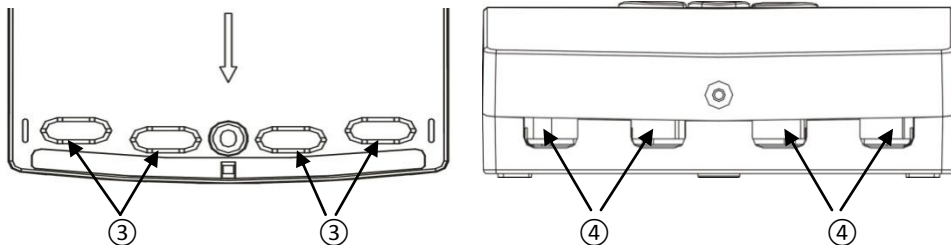
This controller can only be installed in the place having an adequate level of protection.

- ▶ Choosing a suitable site
- ▶ Drilling the upper fixing hole ①
- ▶ Screwing on the screw
- ▶ Taking away terminal cover
- ▶ Marking the position of bottom fixing hole ②
- ▶ Taking away the bottom plate
- ▶ Drilling the hole ②
- ▶ Re-hanging the bottom plate on screw ①
- ▶ Fixing bottom plate with screw ②

2.2 Power connection

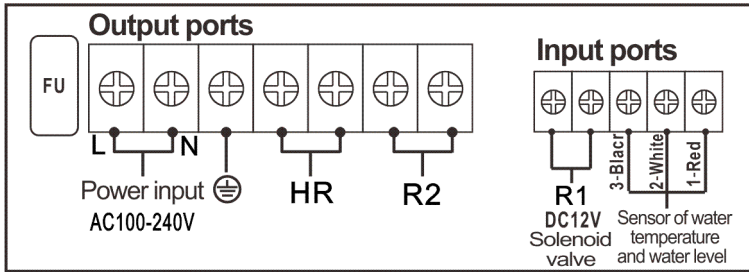
Depending on the type of installation, the cables may enter the device through the rear hole of the case ③ or the base side hole of the case ④

i Notes: the flexible wire must be fastened to the case using the strain-relief clamps provided.



2.3 Terminal port connection

⚠ Before opening the terminal, please be sure to switch-off the power and pay attention to the local electricity supply rules.



Power input L, N: 10A, for power connection, L: live wire, N: zero wire, protective ground wire, please connect it to ground reliably.

FU: the fuse of controller, AC250V/2A

● **Output ports**

HR: Electromagnetic relays, designed for on/off control of back-up heating device, Max. Current: 10A

R2: designed for electromagnetic relay use for the electric tracing belt (or Booster pump or hot water circulation pump) , maximum current is 2A.

R1:designed for the solenoid valve of water filling, output power is DC12V, wire connection is not positive and negative difference.

With Auxiliary electrical heating, the user must install the leakage protector himself.

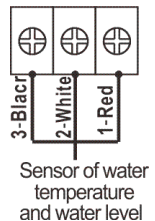
● **Input ports**

Sensor of water temperature and water level of the water tank(B03):

Port 1: connect red wire (+12V)

Port 2: connect white wire (COM)

Port 3: connect black wire (GND)

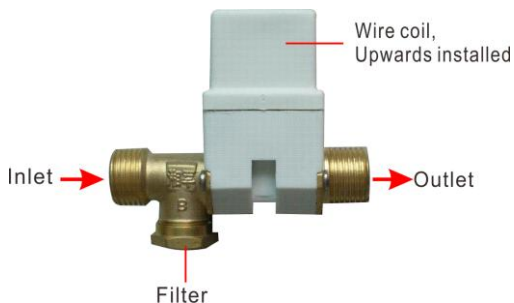


2.4 Installation of solenoid valve

- Flushing pipe and cleaning pipe before mounting the solenoid valve
- If water is provided by water tower, to avoid no water filling or water flow rate is too low at solenoid valve, please select the solenoid valve which pressure is matched to the hydraulic pressure got from water tower.

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- Check whether the required voltage labelled on the type plate of solenoid valve is same to the voltage of power output of controller, check whether the filter of solenoid valve is completed, whether the body of valve has no damage. And during installation please pay attention to the water flow and return of solenoid valve, side with filter is the water input, water flow direction and arrow signal on the body of solenoid valve should be aligned in same direction.
- Solenoid valve should be indoor installed at the place where is easy for maintenance or at the area where no more connected loss happened. To keep a long lifetime of solenoid valve, please pay attention to anti-frost, sun protection and prevent broken damage from freezing or aging of body of solenoid valve.
- It is prohibited to use a wrench worked on the coil wire and plastic parts, to ensure no damaged during installation and no torsion effect positioned on the solenoid valve, it is not allowed to install valve compulsively when tow connectors are not aligned.
- Two-core wire is used for connection with solenoid valve, if wire needs to be lengthened, please select cable of 1.0mm^2 .
- To easy clean the filter, water inlet pipe connected to the solenoid valve should be a kind of soft pipe or pipe is easily dismantled.



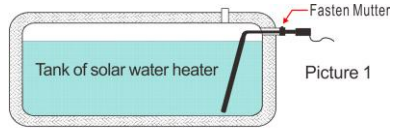
i Note: one-way check valve integrated into the solenoid valve, so no one-way valve needs to be installed.

2.5 Installation of sensor of temperature and water level

- Sensor of water temperature and water level is inserted into tank from the overflow connector.
- Fasten sensor with the mutter of sensor.
- 3-cores wire of sensor connected to the input port of controller

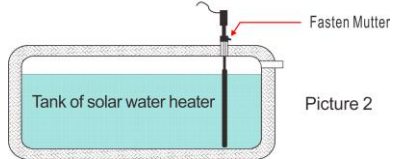
i Note:

1). Depending on the way of difference installation, we provide two different sensors, and the customer chooses one of them as needed. If the customer does not specify anything, we will follow the factory default configuration.



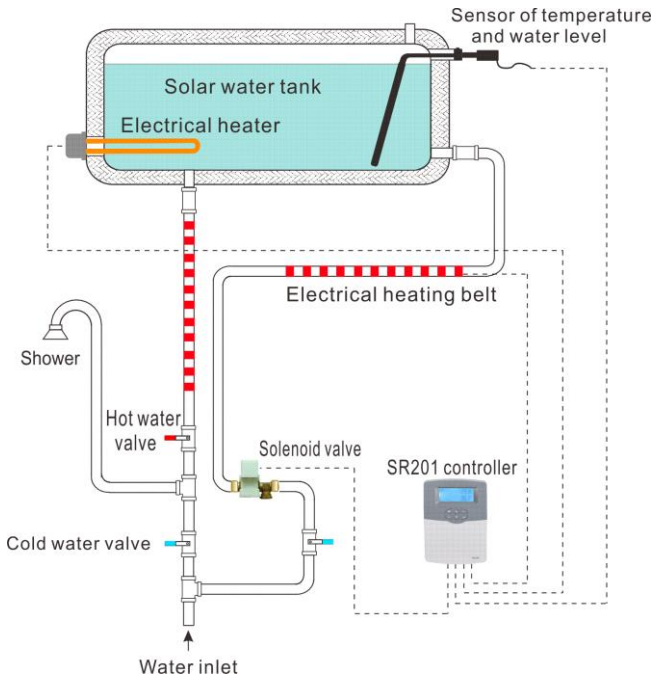
a) "Side mounted sensor"
(Factory default configuration) see the picture 1

b). "Top mounted sensor"
(Need to be specified in order) see the picture2



2). To avoid the measuring error or damage the sensor, sensor of temperature and water level must not touch or close to the e-heater tube

3. System diagram

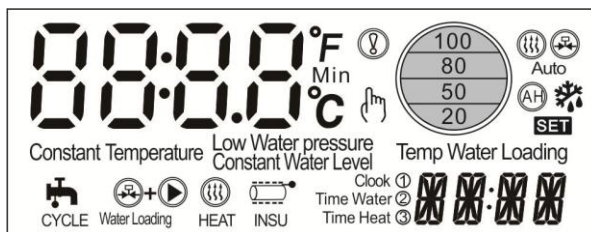


i Note: this diagram is only for reference.

4. Functions operation

Before switching-on the power, please connect sensor of temperature and water level, water filling solenoid valve to the input port of controller, connect electrical heater to the output port of controller. And then switching-on power, you can set the time and related parameters of the controller.

4.1 Signals on display and function code



LCD display screen

4.2 Button description



Buttons layout on the controller

➤ Button description

- “Water Loading” button: water filling manually
- “HEAT” button: heating manually
- “SET” button: access the menu or activate the set value
- “ESC” button: confirm the setting value and ESC or return to the previous menu
- “▲” button: increase adjustable value or upwards menu
- “▼” button: decrease adjustable value or downwards menu
- Hold press “Water Loading” button for 3s, switch on/off the booster pump.

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- Hold Press “INSU” for 3 seconds: switch on/off Pipe Insulation (Belt-cable heating).
- Hold Press “CYCLE” for 3 seconds: switch on/off manual hot water circulation function
- Hold Press “ESC” button for 3 seconds: Celsius degree and Fahrenheit exchange.



Note:

1. When controller works at normal status, by pressing “▲▼” button, it is possible to view controller running time (DAYS), sensor running time(SDAY), software version(SW) and sensor version(S SW).
2. if without any operate during 3s,the controller works back to normal work interface.

4.3 Menu description

Main functions menu (for users)			
Code (Main menu)	Code (Submenu)	Default value	Description
Clock			Clock
Time Water			Timing water filling
	Time Water①	03:00 / 50%	Time and water level of the 1st time water filling
	Time Water②	09:00 /100%	Time and water level of the 2nd time water filling
	Time Water③	16:00 / 100%	Time and water level of the 3rd time water filling
Time Heat			Timing heating
	Time Heat①	04:00 / 50°C	Time and temperature of the1st time water heating
	Time Heat②	10:00 / 0°C	Time and water level of the 2nd time water heating
	Time Heat③	17:00 / 60°C	Time and water level of the 3rd time water heating

5. Main functions setup

5.1 Time setting

- ▶ Press “SET” button, time displays on the screen,
- ▶ Press “SET” button again, hour “00” blinks on the screen.
- ▶ Press “▲▼” button to set hour of clock
- ▶ Repress “SET”, minute “00” blinks
- ▶ Press “▲▼” button to set minute of clock.
- ▶ Press “SET” or “ESC” to confirm setting, the set parameters are saved automatically.



i Note: at the case that power is switched-off, time can be remembered for 36 hours.

5.2 Timing filling and heating with three time-sections

Timing water filling description:

Within 24 hours, three time-sections of water filling can be set. When time of filling water comes, water is automatically filled into tank to the set water level. When water is being used (water level drops), the water filling is delayed for 30 minutes to start.

Timing heating description:




Electrical heater can be integrated into solar system used as back-up heating of system, and it can be triggered automatically at preset time by preset temperature. Within a preset time-section, when the temperature of tank drops below the preset switch-on temperature of this function, electrical heater starts to work, when temperature rises to the preset switch-off temperature, electrical heater is stopped. When water level is lower than 50% during a heating time-section, to avoid a dry heating, water is filled to the level of 50% firstly, then the electrical heater is triggered to heat to the desired temperature.

Timing filling and heating factory default reference as below:

- The first time: at 3:00 a.m. to fill water to the water level of 50%, at 4:00 a.m. to trigger electrical heater to heat water to the temperature of 50oC, to provide hot water for users just after getting up.
- The second time: at 9:00 a.m. to fill water to the water level of 100%, and electrical heater doesn't work, to use solar irradiation to heat water.
- The third time: at 16:00 p.m. to fill water to the water level of 100%, and at 17:00 p.m. to trigger electrical heater to heat water up to the temperature of 60oC for night

using.

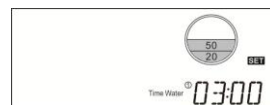
i Note:

1. Above parameters can be set base on the user's habit.
2. When water is using by user (water level drops),then water filling is delayed for 30 minutes to start.
3. Activate and deactivate the function of heating with three time-sections as below:
 - Hold "HEAT" button for 3 seconds to deactivate "timing heating" function. Heating icon was disappeared and show  Auto
 - Hold "HEAT" button for 3 seconds to activate "timing filling" function. Heating icon display and show   Auto

Code (Main menu)	Code (Submenu)	Default value	Adjustable arange	Description
Time Water				Timing water filling
	Time Water①	03:00 / 50%	00:00- 23:59 20-100%	Time and water level of the 1st time water filling
	Time Water②	09:00 / 100%	00:00- 23:59 20-100%	Time and water level of the 2nd time water filling
	Time Water③	16:00 / 100%	00:00- 23:59 20-100%	Time and water level of the 3rd time water filling
Time Heat				Timing heating
	Time Heat ①	04:00 / 50°C	00:00- 23:59 0-95°C	Time and temperature of the1st time water heating
	Time Heat ②	10:00 / 0°C	00:00- 23:59 0-95°C	Time and water level of the 2nd time water heating
	Time Heat ③	17:00 / 60°C	00:00- 23:59 0-95°C	Time and water level of the 3rd time water heating

Setup steps:

- ▶ Press "SET" button, time displays on the screen.
- ▶ Press "▲" button, time of the 1st timing water filling (Time Water ①) 03:00, water level 50% displays.
- ▶ Press "SET" button, hour "03" blinks on the screen.
- ▶ Press "▲▼" button, to set hour
- ▶ Press "SET" button, minute "00" blinks on the screen.



- ▶ Press “▲▼” button, to set minute
- ▶ Press “SET” button, water level “50%” blinks on the screen.
- ▶ Press “▲▼” button, to set water level
- ▶ Press “SET” or “ESC” button to confirm the setting.
- ▶ Press “▲” button, time of the 2nd timing water filling (Time Water ②) displays.



Repeat above steps to set the time and water level of the second and the third of timing water filling (“Time Water ②” and “Time Water ③”).

- ▶ Press “▲” button, timing heating “Time Heat ①” displays.
- ▶ Press “SET” button, hour “04” blinks on the screen.
- ▶ Press “▲▼” button, to set hour
- ▶ Press “SET” button, minute “00” blinks on the screen.
- ▶ Press “▲▼” button, to set minute
- ▶ Press “SET” button, temperature “50°C” blinks on the screen.
- ▶ Press “▲▼” button, to set temperature (adjustable range: 0-90°C)
- ▶ Press “SET” or “ESC” button to confirm the setting.



Repeat above steps to set the time and temperature of the second and the third of timing heating (“Time Heat ②”and “Time Heat ③”).

5.3Pipe insulation (belt-cable heating) function

Function Description:

After switch on the belt-cable heating (default: R2 heating for 10mins, which can't be set), stop for 30 minutes (stop time adjustment range: 0-90 minutes). This process will automatically run repeatedly, which can avoid long-term power on belt-cable, save electric energy, and effectively prevent malignant accidents such as aging and fire of the belt-cable caused by long-term power on.

Switch on/off the function:

- ▶ Hold press the "INSU" button for 3 seconds, to activate the function, and the pipeline freeze protection stop time is "30" minutes.
- ▶ Press“▲/▼”button, adjust the running time, adjustable time: 0-90Mins, default is 30mins.
- ▶ Hold press "INSU" button for 3s to deactivate the function immediately.

5.4 Booster pump function


Function description:

In some areas with low pressure water supply, a booster water pump (R2) is necessary. When the conditions are met, the booster pump R2 and the solenoid valve R1 are ON or OFF at the same time.

- ▶ Hold press“Water Loading” button for 3s, switch on the booster pump.
- ▶ Hold press“Water Loading” button for 3s, switch off the booster pump.

5.5 Hot water circulation.

Function Description: The hot water circulating pump can operate by manually.

- ▶ Hold Press “CYCLE” for 3 seconds: switch on the function, and cycle time “03” display on screen.
- ▶ Press“▲/▼”button, adjust the running time, adjustable time: 1-60Mins,default is 3mins.
- ▶ Press “ESC” button or wait for 6s to activate the function and " Hot water circulation" icon blink on the screen  .
- ▶ Hold press“CYCLE”button for 3s to deactivate the function immediately.

Note:

1. No matter one of the three (Booster pump or Belt-cable heating or Hot water circulation) needs to occupy the output R2, So one of the functions is on, the other two functions are automatically off.
2. For example, the booster pump function is currently on. Now, you need turn on the belt-cable heating function. Please hold press“INSU” button for 3seconds,it’s mean that you activate the belt-cable heating and the booster pump function are automatically off.

5.6 Delay time of water filling when tank is lack-of water

Function description:

When the water level drops from high to low, when the water level is lower than 20%, it will automatically fill to 50% water level after a delay of 30 minutes.

5.7 Celsius degree and Fahrenheit unit switch

► Hold press "ESC" button for 3s, switch on Fahrenheit degree.

5.8 BEEP Beeper error warning

When temperature and water level sensor has error, this function will send warning to manager (detailed see section 7.8 error code). When beeper make sound, press any button to escape the warning function.

5.9 Compulsive water filling function

Description:

If sensor of temperature and water level is out of working, "E0" displays on the screen, then you can trigger water filling function compulsively.

► Hold Press "Water Loading" button for 3 seconds to trigger compulsive water filling function, (countdown 8 minutes), countdown time and water level of 0%, 20%, 50%, 80% and 100% displays on the screen alternatively.

► Press "Water Loading" button again to stop the compulsive water filling function

5.10 Factory reset manually function

Through this function, it is possible to recover all parameters to the factory set.

Setup steps:

Under power-off status

► Hold "SET" button, then switch-on power, screen displays "MRST", beeper sounds "di..." 3 times, and then release "SET" button, it indicates the controller program is recovered to the factory set.

6. Manual functions

6.1 Manual water filling

Description:

When water in the solar tank is not full, user needs to fill water immediately, then press "Water Loading" button to start water filling.

Activate and deactivate this function:

- ▶ Press “Water Loading” button, then water level of water filling signal blinks on the screen
- ▶ Continuously press “Water Loading” button, water level of tank can be set (50%-100%)
- ▶ Press “ESC” button or wait for 6 seconds to confirm the setting, and water is filling now.

6.3 Manual heating

Description:

It is possible to trigger back-up heater manually to heat the water to the desired temperature. When controller detects that the water temperature is lower than the preset switch-on temperature of manual heating function, controller will trigger heater to work until the water temperature rises to the desired temperature.

Activate and deactivate the function:


- ▶ Press “HEAT” button, temperature “60°C” displays on the screen.



- ▶ Press “▲▼” button to adjust the desired temperature, adjustable range: 0°C -80°C, factory set is 60°C.

- ▶ Press “HEAT” or “ESC” button or wait for 6 seconds to confirm the setting, heater starts to work, and manual heating signal   blinks on the screen.

- ▶ Press “HEAT” again to cease the manual heating function.

 Note: manual heating can only heat tank once, when manual heating function is triggered, water is heated to the desired temperature and then heating is stopped, this function is deactivated automatically.

7. Protection function

7.1 Tank high temperature protection function

Description:

To prevent tank from damaging caused by high temperature, when tank temperature rises to the switch-on protection temperature, default is 70°C, water filling will be triggered, it will stop until tank temperature drops to 68°C (default set is 2°C hysteretic)

or water level is to 100%. When water is using (water level is dropping), then water filling is delayed for 30 minutes to start. (this tank protection function is time limited, it can only be triggered from 8:00-17:00).

7.2 High temperature protection of collector tube


Description:

When water level is lower than 20% and water temperature is higher than 95°C, to avoid the collector tube exploded due to the thermal stress, water filling function will be stopped compulsively ("Water Loading" button is unable), and "E4" displays on the screen. When water temperature drops below 80°C, this protection function is deactivated, and water filling function is recovered.

7.3 Tank anti-freezing protection

Description:

In winter, when outdoor temperature is very low, to avoid freezing of collector tube/ tank, when controller measures the tank temperature drops to only 3°C (factory set, not adjustable), controller will trigger the electrical heater to heat tank until its temperature rises to 7°C, and then tank anti-freezing function is deactivated automatically.

When anti-freezing signal  blinks, it indicates anti-freezing function is running.

7.4 low water pressure protection

Function description:

In the process of water supply, because of low water pressure, water cut-off, vacuum pipe rupture or water leakage, the controller will automatically enter the low water pressure mode.

The icon of "low water pressure" shows on screen. After 60 minutes, controller will exit the low water pressure protection and refill the water. During water filling process, the water level drop down "0",the icon of "low water pressure" is flash, and the controller automatically turns off the water filling function.

under state of low water pressure protection, press the "water loading" button to restore the water supply function immediately.



Note:

When the "low water pressure" icon flashes:

1. Check whether the vacuum pipe is broken or leaking
2. Check whether the water pressure of tap water is normal
3. After the problem is eliminated, press the "water loading" button to start the water supply.

7.5 Overflow protection

When the water temperature and level sensor fails, causing the water tank overflow, the controller will automatically stop the water supply.

7.6 Memory protection

In case power failure occurs, controller keeps the parameter settings unchanged.

7.7 Screen protection

When no any press on button for 5 minutes, screen protection is activated automatically, and

LED backlight is dimmed by light. Through press any button to light LCD lamp again.

7.8 Trouble protection

Error code	Display status	Error description
E0	Temperature zone displays "E0"	Communication fault between controller and sensor of temperature and water level
E4	E4 and clock signal displays alternatively in every 4 seconds.	Collector tube high temperature protection
----	Temperature zone displays "----"	Temperature fault of sensor of temperature and water level

-88.8°C	Temperature zone displays "-88.8 oC "	
E7	E7 and clock signal displays alternatively in every 4 seconds.	Water level fault of sensor of temperature and water level

8. Quality Guarantee

The warrantee expires within 12 months after the date of purchasing the controller.

9. Technical specification

Power supply: 100-240V/AC,50-60Hz

Power consumption: < 2W

Accuracy of temperature measuring: ±1°C

Range of tank temperature measuring: 0 ~100 °C

Inputs: temperature and water level sensor

Outputs: 3electromagnetic relays

Ambient temperature : -10°C ~ 50°C.

Water proof grade: IP40.

10. Delivery list

- Controller-----1piece
- User manual-----1piece
- Sensor of water temperature and water level (with cable of 20m) -----1piece
- Solenoid valve -----1piece
- Accessories-----1bag
- 10A power cable-----1piece