



## Heater-Controller Package manual

The electronic controller with backup electric heater element is built to fit solar water heater tanks. Controller can be used for other functions beside backup heat, such as circulator pump control. Various models of controller are available.

Voltage: Controller units can accept North American 120 V/60 Hz or European 220 VAC/50 Hz input.



**Figure 1: Standard electronic controller with heater, shipped as North American package.**

Thank you for purchasing controller II. Please read through this user manual before service.

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Controller II displays the temperature of the water tank and controls the electrical heating of pressurized solar water heater with heat pipes.

## Features

1. LCD screen: display water temperature, water level (volume), clock, time for starting electrical heating, time of starting heating for the second time and the other functioning mark.
2. Electrical auxiliary heating: set a desired hot water temperature, the electric heating will start when the solar circulating loop fails to provide hot water of the set temperature; the electric heating will stop automatically when the water temperature reaches the set temperature. Range of temp.: 30°C ~80°C.
3. Start Electrical auxiliary heating at set time: set a certain time for starting the electrical heating (3pm~5pm is recommended). The heating will only start at programmed time when the solar circulating loop fails to provide hot water of the programmed temperature.
4. Electrical auxiliary heating for the second time: to set two different time for starting the electrical heating, which helps to meet the customer's hot water requirement at any time.
5. Repeatable Heating: to ensure the water temperature. remains constant, which can be regarded as an electrical heater.
6. Battery: the battery can store the parameters for 12 h when power is off.
7. Anti-freezing:
  - start piping protection heater in cold weather, to avoid pipe damaging from freezing;
  - start Electric heater when water inside the tank is lower than 5 °C, and stop when water is up to 15°C.
8. Troubles display: easy to maintain.
9. Wide supply voltage: withstand high voltage fluctuations;
10. Safety: protection against short-circuit, over-current, current leakage.

## Technical Data

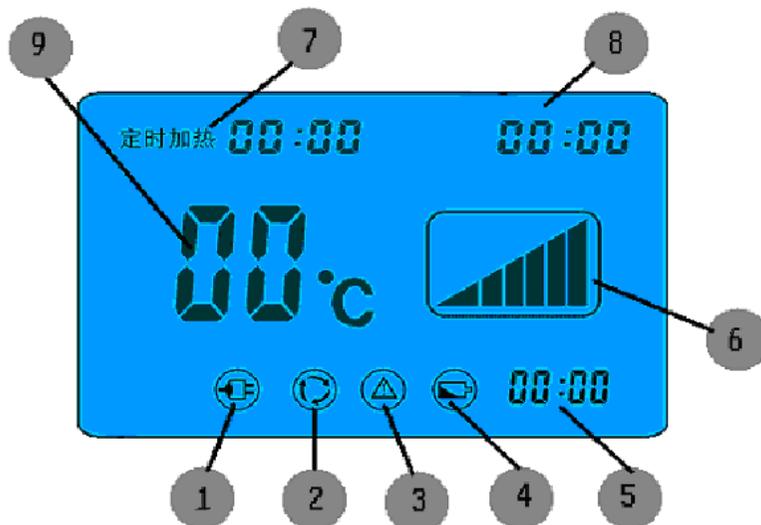
1. Power Supply: AC 220, 50Hz
2. Power: < 4W
3. Temp. sensor precision:  $\pm 2^{\circ}\text{C}$
4. Temp. sensor range: 0~99°C
5. Electric Heater: 1500/2000W
6. Piping protection heater: <500W
7. Leakage current: 30mA/0.1S
8. Dimensions: 200mm × 150mm × 45mm
9. Humidity: <85%

# Introduction

## 1 Controller



## 2. LCD Screen



- ①  shows the Piping protection heater is working.
- ②  shows the electric heater is on repeatable heating.
- ③  shows trouble occurs, and inform the user to shoot the trouble in time.
- ④  shows the battery is discharging, in case power is off.
- ⑤  shows clock time.
- ⑥  shows water level, water is always filled full inside tank and display in Six level.
- ⑦  shows TIME I (24h). This is to show the set time to start electric heater for the first time.
- ⑧  shows TIME II (24h). this is to show the time to start electric heater for the second time.
- ⑨  shows water temperature. When the numbers are flashing, it shows the electric heater is working.

### 3. Operation Instruction

#### 3.1 Parameters Setting

1. Press button “功能”, temperature signal  is flashing; change the parameter with the button of “up” and “down”. 5 seconds later the controller will execute the programme with the changed parameters;
2. press “功能” to adjust water temperature (50°C as default, temp. range 30~80°C), hour of the time(0~23), minutes(0~59), hour of heat time(0~23h) and minutes of heat time(0~59).
3. button “up”: press it and then the number will increase;
4. button “down”: press it and then the number will decrease;
5. buttons of “electric heater/电加热控制” and “time control/加热时间控制” will not react during programming, however the working programme will not be cancelled, for instance, clock can be adjusted when electric heater is working;
6. Controller will execute the programmed setting in 5 seconds after finishing adjusting.

7. The clock time might not be precise after half year's service, please readjust clock time with the above instruction.

### 3.2 Function Introduction

#### 1. start the controller

after connecting with the power source, all parts on the LCD screen will flash for 5 seconds, and then it will only display the temp., and heat time and the clock time.

Press button “功能” to adjust the temp.(50°C as default temp. with the arrange of 20~80°C), hour of the time(0~23), minutes(0~59), hour of heat time(0~23h) and minutes of heat time(0~59).

If the heat time is displayed, the electrical heating has been started.

#### 2. Start electrical heating manually

press button “手动”, the heating will be started immediately, in the meantime, the Heating Indicator Light will be turned on, Signal “°C” will begin flashing with lighted screen. The heating will stop when the temp inside the tank is 1°C higher than the set temp.

press button “手动” again, the heating will be stopped.

When the temp. is higher than the set temp. or 80°C, the heating will not start.

#### 3. start and cancel the heating at set time

 shows the electric heating TIME I / 时间 I and

TIME II / 时间 II, the electrical heater will start only when the water temp. inside the tank is lower than the programmed temp.

To cancel the function of electrical heating at TIME I / 时间 I or TIME II / 时间 II, press the button of “TIME I / 时间 I” or “TIME II / 时间 II” when the respective heating time is displaying, then - :- - will be seen on that position. To resume the function of electrical heating at programmed time, press the button of “TIME I / 时间 I” or “TIME II / 时间 II” when - :- - is displaying, then the set time becomes effective again.

#### 4. Repeatable electrical heating

Press the button of “循环”, the signal  will be lighted, which shows that the repeatable heating has already been started, press this button once again, this function will be canceled.

When signal  is flashing, The heating will start when the temp. is 5°C(default) lower than set temp.; and stop when 1°C higher.

During repeatable heating, the electric heating indicator light will be turned on, Signal “°C” will begin flashing with lighted screen.

#### 5. start Piping protection heater

Press Button “循环” and “手动” at the mean time until one “beep” sound is heard, piping protection heater will be started and  will be lighted.

To cancel Piping Protection Heater, press Button “循环” and “手动” at the mean time again until one “beep” sound is heard.  will be turned off.

When Piping Protection Heater is working, it is heating the piping to avoid leakage from freezing.

#### 6. Key Combination

- “TIME I / 时间 I” + “TIME II / 时间 II” : turn on/off screen light
- “Up” + ”功能” + “Down”: Default settings

### 4. Battery

the battery will start when power is off, the signal of battery  will be lighted, the temperature will be displayed as 00, water level signal is not lighted. All parameters can be stored. The battery storage can be used as long as 12 h.

### 5. Troubles display

when troubles occur with the controller, the signal of troubles  will be lighted on LCD screen, and the position which showed the water temp. will display the trouble code instead.

E1 indicates that the short circuit of the temp. sensor;

E2 indicates that the open circuit of the temp. sensor.

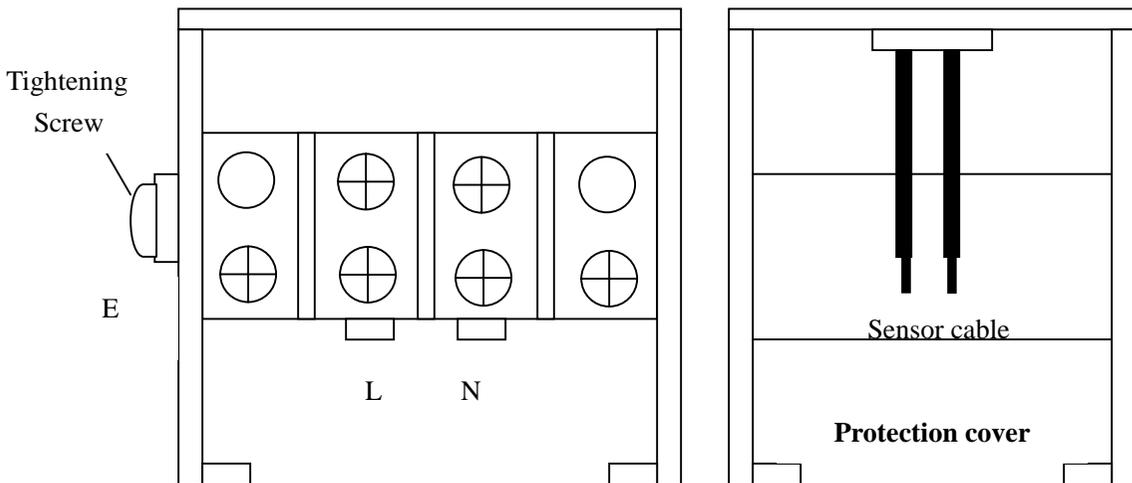
E4 indicates that error with data.

**When troubles occur, Buzzer will start working and the controller will shut down all operations. Please shut down power and start using after shooting the troubles.**

# Installation Instruction

## 1. outdoor mounting instructions

- a. the controller shall be mounted by professional electricians.
- b. the max. power of the heater is 2 kW, and the controller shall connect with the socket outlet (3p, 10A, 220V).
- c. check the parts are in conformity with the packing list.
- d. unscrew the two bolts at the bottom of the electric heater, take off the protection cover and connect wire as Fig. 1 shows.
- e. unscrew the flange at the bottom of the water tank, check whether the “O” ring is flat inside the flange collar, and insert the electrical heater into the flange, tighten the 6 hexagon flange bolts to ensure good sealing.



**Fig. 1 Wire Connection Instruction diagram of Electric Heater**

## 2. Cable connection

- a. Unscrew the two nuts, lift the front cover and the mounting rails shall be disclosed, as the Fig.2 shows.
  - b. Connect the wires with mounting rails with matched color.  
**Note: three thicker wires in yellow/green, brown and blue are connected with power source, please ensure they are connected tightly.**
  - c. fix the cable in its holders and tighten the screw.
  - d. close the cover in the way of opening it and fix it tight.
- Fig. 2 can be served as reference to connect the wires.

### **3. Mounting the controller**

Drill two holes on the wall which shall be away from the water, the four holes shall be 8mm diameter, 35 mm deep. And fix the plastic fitting piece in the wall, and then mount the controller on the plastic fitting piece. Adjust the controller parameters after installation completely.

### **4. Plumbing Instruction**

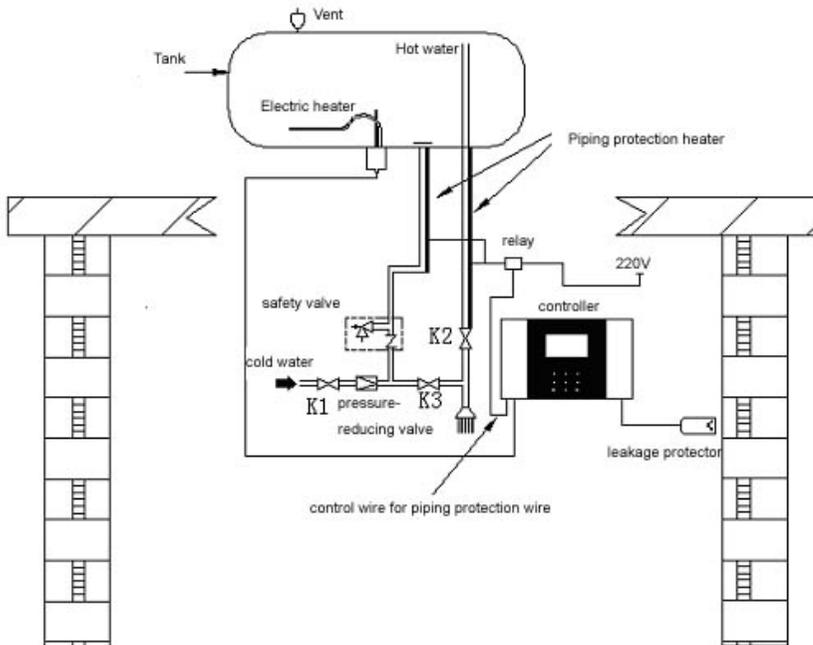
Fig. 3 can be served as a plumbing instruction.

## **Warning**

1. the controller shall be installed by professional electricians. During the duration of installation and mounting, mount the electrical heater and sensors first, and then insert the evacuated tubes.
2. the maximum power is 2 kW, the socket outlet shall be 3p 10A, 250V and earthed. The cable shall use ones with three 1mm<sup>2</sup> wires and three 1.5 mm<sup>2</sup> wires.
3. Do not start the electrical heating when hot water is used.
4. the controller shall be checked on current leakage protector often and frequently. To check the leakage protector, press once White Button, it is known that the protector is in effect if it reacts. Then press once the rectangle button to connect with power source, the controller will resume working.

sensor	Red	⊕ ⊕	
sensor	Grey	⊕ ⊕	
vacant	Black	⊕ ⊕	
vacant	Blue	⊕ ⊕	
vacant	Black	⊕ ⊕	
Piping heater +	Green	⊕ ⊕	← Mounting rails
Piping heater -	Black	⊕ ⊕	
Negative	Blue	⊕ ⊕	
Live	Brown	⊕ ⊕	
Earth	Yellow/Green	⊕ ⊕	

**Fig. 2 Wire connection instruction diagram**



**Fig. 3 plumbing with controller**