

# SOLAR CONTROL SYSTEM User Manual

Solar control system is composed by design a touch screen design controller and a main board. By sensing the temperatures in different position and communicating with each other, the controller and main board can operate the pump station for heat exchange between solar collector and water tank, domestic water circulation and the auxiliary heating device. The intelligent control system makes it easier and more convenient to run the solar system automatically.

With microcomputer, the large LCD display helps you track the temperature in four positions, control the circulation via pump station and operate auxiliary heating.



## FUNCTIONS







- ☐ Monitor and display the temperature at solar panel-T1
- ☐ Monitor and display the temperature at bottom of water tank-T2
- ☐ Monitor and display the temperature at top of water tank-T3
- ☐ Monitor, display the temperature of domestic water
- ☐ Temperature calibrating
- ☐ Clock
- ☐ Periods programmable for auxiliary heating
- ☐ Green backlight
- ☐ Over-heating protection for water tank
- ☐ Intelligent control of water tank heating
- ☐ One step reset to default setting
- ☐ Combined with boiler by control 3-way motorized valve
- ☐ Automatically snow melting
- ☐ Problem diagnosing.

## SPECIFICATION

- ☐ Temperature measuring range: 5~95°C
- ☐ Temperature detecting error:  $\pm 1^{\circ}\text{C}$
- ☐ Sensor: NTC 3950 10K
- ☐ Voltage: AC220V  $\pm 10\%$  50/60Hz
- ☐ Power output: in conjunction with boiler, pump and valve:  
    <3A (Resistive load), <1A (Inductive load)  
    electric auxiliary heat: <18A (Resistive load)
- ☐ Self-Power consumption : < 2W
- ☐ Display: LCD
- ☐ Key: touch screen
- ☐ Dimension: 104x93x17.5mm (HxWxD)
- ☐ Hole pitch: 60 mm (Standard)
- ☐ Protection degree: IP 30
- ☐ Operation temperature:  $-5^{\circ}\text{C}\sim 45^{\circ}\text{C}$
- ☐ Operation humidity:  $\leq 90\%$

## OPERATING MANUAL

### Instruction for function keys

- ☞ Power On/Off: press “” to turn on the controller when it is off; Press “” for 2 seconds to shut down the controller.
- ☞ Temperature display: Press “temp” key, it will display T1, T2, T3 and T4 in order. Then press any key to exit temperature display or the system will exit temperature display after 13 seconds automatically without any movement.
- ☞ Clock setting: press “clock” key for 2 seconds to start clock setting. It shall display “” and “” icon below the temp display while the current time display will flash. Press “” or “” to adjust current time and switch between hour and minute by “clock” key. Press any key to save and exit the current time setting interface or the system will save and exit clock setting after 13 seconds without any movement.
- ☞ Clear: press “clear” key for 3 seconds to start screen clearing and it will display a 15-seconds counting down on LCD during clearing process. All the keys shall be disabled during clearing process by which keep the LCD clean.
- ☞ Reset: Press “reset” key for 5 seconds to ignite reset function and it will display a 3-seconds counting down on LCD

for screen clearing while reset all the settings to default values and close all the output of relay. Note: the reset function is disabled under snow melting function.

☞ Domestic circulation pump control: press “pump” key to select “on”, “auto” or “off” for circulation pump then press any key to save the setting, otherwise the system will save the setting and turn back to normal display after 13 seconds without any movement.

☞ Auxiliary heating: press “heating” key to select between four selections which are “on”, “auto”, “snow melting” and “off”. Then press any key to save the setting or the setting will be saved automatically after 13 seconds.



a. without boiler: press the “heating” key for the first time to select “on”; press the “heating” key for the second time to select “auto”; press the “heating” key for the third time, the auxiliary heating shall be shut down (the auxiliary heating won't be displayed on LCD by now). Press “heating” key for 3 seconds to start “snow melting” function and then press “heating” key again the “snow melting” function will be stopped.

b. with boiler: the auxiliary heating includes only 3 selections which are “on”, “snow melting” and “off”. press the “heating” key for the first time to select “on”; press the “heating” key for the second time to select “off” to shut down auxiliary heating (the auxiliary heating won't be displayed on LCD by now).

## PARAMETER SETTING

☞ Press “set” key for 4 seconds to enter parameter setting interface and press “set” key again for setting the next parameter.

### The first parameter: timer and auxiliary heating set

When setting the auxiliary heating, it will display “” on the screen if auxiliary heating is on; while “” will be disappeared on the screen if auxiliary heating is off.



The first period: on—03:00, off—06:00

The second period: on—16:00, off—17:00

The third period: on—18:00, off—22:00

Above are default value which can be adjusted according to your needs.

### The second parameter: domestic hot water circulation

When setting the domestic circulation, it will display “” on the screen if domestic water circulation pump is on; while “” will be disappeared on the screen if domestic water circulation pump is off.



The first period: on—06:00, off—08:00

The second period: on—11:00, off—13:00

The third period: on—18:00, off—20:00

Above are default value which can be adjusted according to your needs.

### The third parameter: boiler on/off

Press “” or “” to adjust parameter. The boiler will be on when you select “1” and the boiler will be off when you select “0”

### The fourth parameter: auxiliary heating function during low consumption hours

Default setting on—03:00, off—05:00

Press “” to exit parameter setting or it will exit setting interface after 60 seconds without any movement.



☞ Press “temp” key for 4 seconds to enter calibration function and the press “temp” once again to calibrate the next parameter.

The first parameter: T1 calibration

The second parameter: T2 calibration

The third parameter: T3 calibration

The fourth parameter: T4 calibration

The parameter—T<sub>x</sub> will be displayed on screen, the default setting value is 10 which means calibration value is 0 and no setting for calibration; when the actual temp is higher than the temp displayed by controller, press “” or “” key to adjust

setting value to be >10 and value difference from 10 shall be calibration value; when the actual temp is lower than the temp displayed by controller, press “▲” or “▼” key to adjust setting value to be <10 and value difference from 10 shall be calibration value.

Press “⏻” to exit parameter setting or it will exit setting interface after 60 seconds without any movement.

## CONTROL INSTRUCTION

### ● Overheat protection for water tank—temperature T3

The threshold for overheat protection is 80°C

When  $T3 \geq 80^\circ\text{C}$ , the circulation will be stopped and auxiliary heating can not be started.

When  $T3 \leq 70^\circ\text{C}$ , the overheat protection will be disabled

### ● Solar circulation pump control: when T3 is not under overheat protection

If  $T1-T2 \geq 10^\circ\text{C}$ , the circulation pump will work as normal. If  $T1-T2 < 5^\circ\text{C}$ , the pump will be stopped.

If the operation duration is more than 30 min continuously, for protecting the pump, it will be stopped for 3 min and start again later.

### ● Domestic circulation pump control

Under “on” function, the domestic circulation pump will be started and then it will be run into “Auto” function after 6min.

Under “Auto” function, if  $T4 < 30^\circ\text{C}$  while  $T3 \geq 40^\circ\text{C}$ . The circulation pump will run for 5 minutes and break off for 20 minutes, while the previous settings for domestic circulation pump will be invalid until T3 and T4 transcend above range.

Under “off” function, the pump will be shut down.

### ● Auxiliary heating control

#### a. Without boiler

“On”: the auxiliary heating will be operated when the temp of the top of the water tank  $T3 < 60^\circ\text{C}$ ; When  $T3 = 65^\circ\text{C}$ , the auxiliary heating will be stopped automatically. When people want to turn on the auxiliary heating manually again, if  $T3 \leq 55^\circ\text{C}$ , press “auxiliary heating” key to turn on; If  $T3 \geq 55^\circ\text{C}$ , the auxiliary heating can not be operated.

“Auto”: when the actual temp of T3 is equal to or lower than  $45^\circ\text{C}$ , the auxiliary heating will be operated automatically according to 3-periods program and be stopped heating when  $T3 \geq 55^\circ\text{C}$  in the first and second time period, as well be stopped when  $T3 \geq 65^\circ\text{C}$  in the third time period.

“Snow melting”: the auxiliary heat will be ignite and Solar circulation pump will be started too while LCD displays “snow melting icon”. When  $T1 \geq 20^\circ\text{C}$ , the pump will run another 20 minute then stop automatically. When  $T3 \geq 55^\circ\text{C}$ , the auxiliary heating will shut off. The auxiliary heating operate will turn back to the model before “snow melting”.

#### b. With boiler: the auxiliary heating includes “on” and “snow melting” functions

“On”: the auxiliary heating will be operated when the temp of the top of the water tank  $T3 < 55^\circ\text{C}$ ; When  $T3 = 65^\circ\text{C}$ , the auxiliary heating will be stopped automatically. When people want to turn on the auxiliary heating manually again, if  $T3 \leq 55^\circ\text{C}$ , press “auxiliary heating” key to turn on; otherwise, the auxiliary heating can not be operated.

“Snow melting”: the auxiliary heat will be ignite and Solar circulation pump will be started too while LCD displays “snow melting icon”. When  $T1 \geq 20^\circ\text{C}$ , the pump will run another 20 minute then stop automatically. When  $T3 \geq 55^\circ\text{C}$ , the auxiliary heating will shut off. The auxiliary heating operate will turn back to the model before “snow melting”.

### ● Control of 3-way valve with boiler

If  $T3 \leq 45^\circ\text{C}$ , the water inside 3-way valve will be let to boiler for extra heating to satisfy domestic hot water use.

If  $T3 \geq 55^\circ\text{C}$ , the valve will lead the water by pass boiler and supply to domestic use directly.

## SYSTEM ALARM

T1’s failure: “E1” and “✖1” will display when you check on T1, and the Solar circulation pump will be shut off until the failure of T1 is rectified.

T2’s failure: “E2” and “✖1” will display when you check on T2, and the Solar circulation pump will be shut off

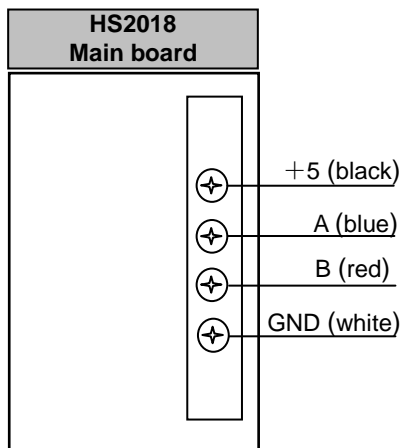
until the failure of T2 is rectified.

T3's failure: "E3" and "✖1" will display when you check on T2, and the Solar circulation pump, auxiliary heating, domestic circulation pump, 3-way valve and boiler will be shut down—the circulation pump will be under "off" model, the "auxiliary heating" key and "pump" key will be invalid, until the failure of T3 is rectified.

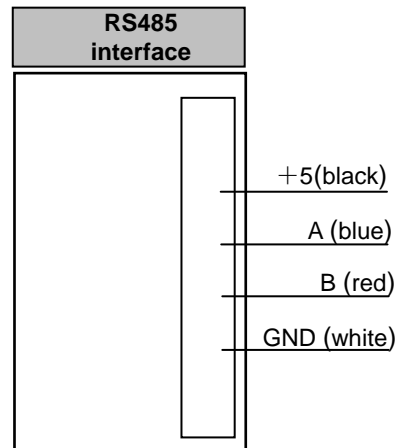
T4's failure: "E4" and "✖1" will display when you check on T4, and the domestic circulation pump will be shut off until the failure of T4 is rectified.

When the communication between controller and main board got problem, the LCD will display "EC" and "✖0", and the Solar circulation pump, auxiliary heating, domestic circulation pump, 3-way valve and boiler will be shut down—the "auxiliary heating" key and "pump" key will be invalid.

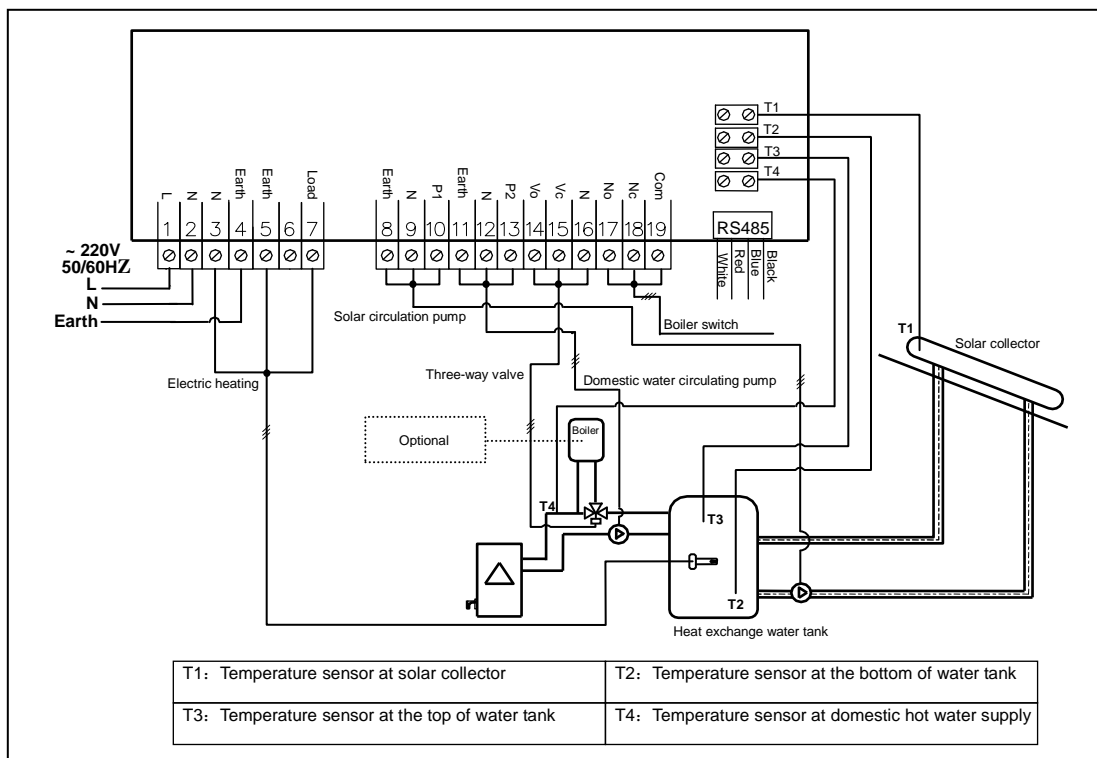
## WIRING



Pic.1 HS2018 Main board wiring diagram

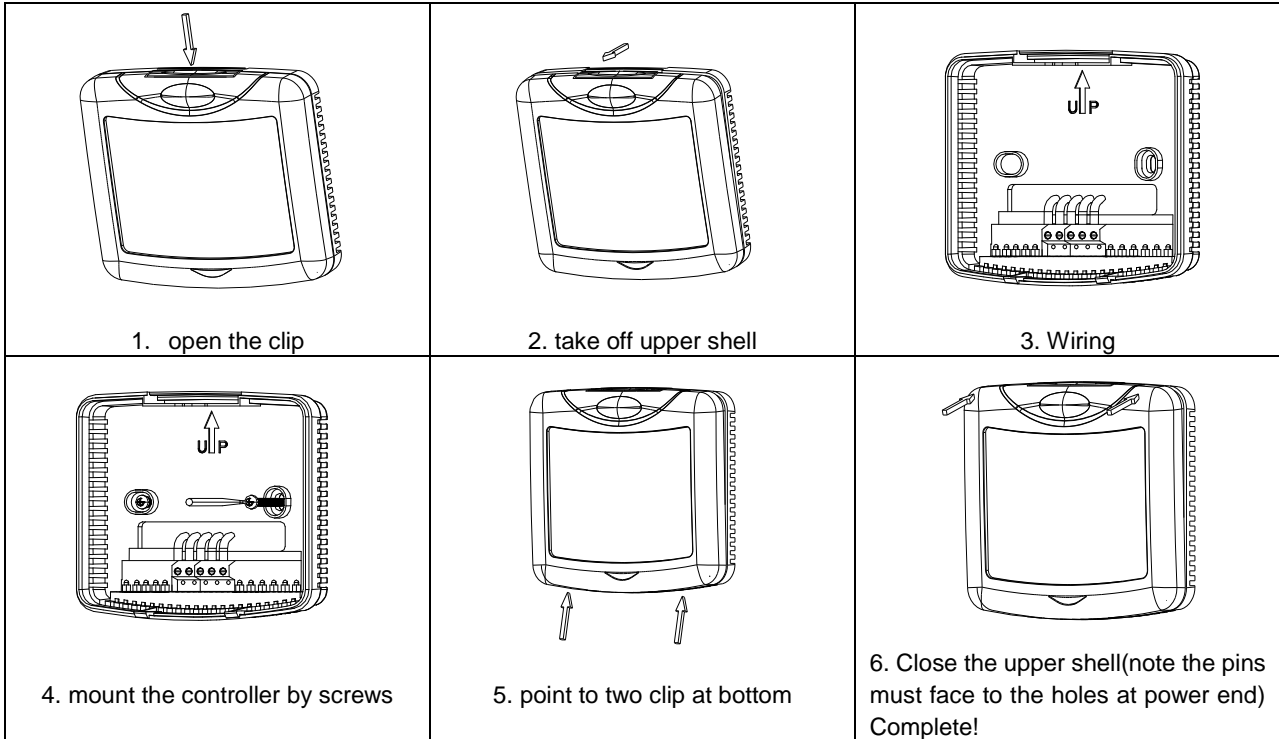


Pic.2 HS2018 RS485 wiring diagram



Pic.3 HS2018 controller wire diagram

## INSTALLATION GUIDE



**Note: please follow the wiring diagram strictly and prevent controller from water, mud, otherwise the controller will be damaged.**