Operation Manual of Controller SR609C

For Pressurized Integrated Solar System

ℹ️ Read the instruction carefully please before operation!

Content

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 present or may occur.
- The permissible environmental conditions can't be exceeded at the site of installation.
- Before connecting the device, make sure that the energy 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 aforementioned. Moreover we do not take over liability for patent infringements or infringements – occurring in connection with the use of this controller on the third parties rights. The manufacturer preserves 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 immediate take the device out of operation. Note: ensure that the device can't be accidentally placed into operation.

1.3 Signal description

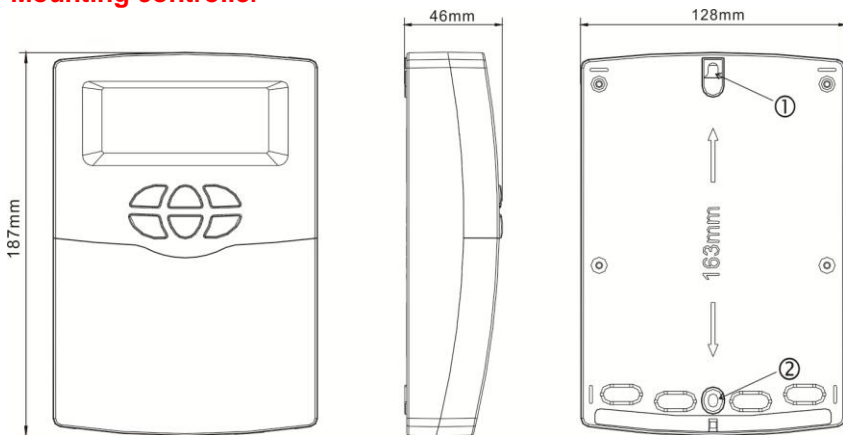**Safety indication:** Safety instructions in the text are marked with a warning triangle. They indicate measures which can lead to injury of person or safety risks.

Operation steps: small triangle "►"is used to indicate operation step.

Notes: Contains important information about operation or functions.

2. Installation

2.1 Mounting controller

Size of controller for electrical heater of 1500W
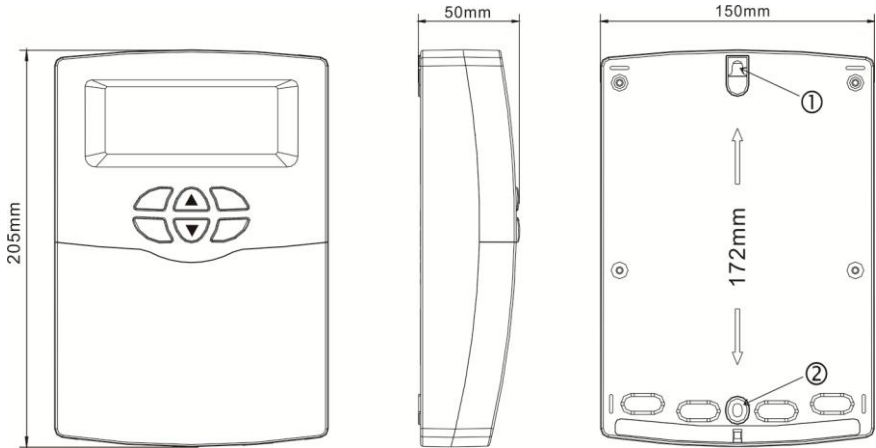
Size of controller for electrical heater of 3000W

Note: the controller can only be installed in an area having an adequate level of protection.

►Choosing a suitable site

►Drilling the up fixing hole ①

►Screwing on the screw

►Taking away the cover plate

►Hanging the bottom plate on the fixing hole ①

►Marking the position of 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 ③or the lower side hole of the case ④

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

③   ③   ④   ④
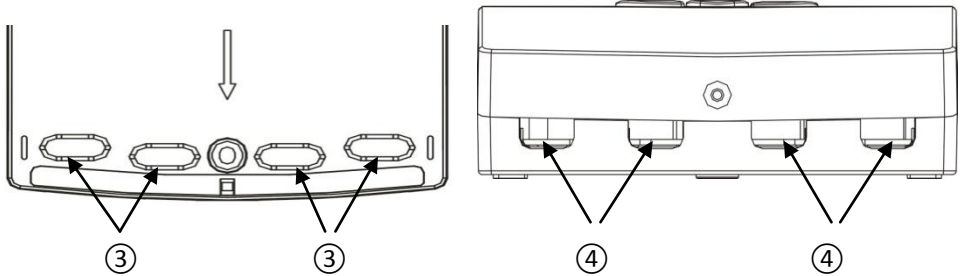
2.3 Terminal connection

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

- **Terminal layout of controller for electrical heater of 1500W**
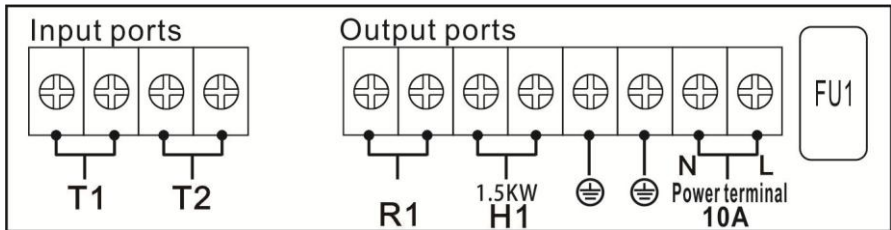
➢ **FU1**: the fuse of controller, AC250V/0.5A

➢ **Power terminal N, L**: 10A, for power connection, L: live wire, N: zero wire,
  ⏚ protective wire, please ensures to connect to ground.

➢ **Output ports**

  H1: Designed for electrical heater, electromagnetic relay, max. power is 1500W,

  R1: Designed for anti-freezing heating cables, Electromagnetic relay, max. power is 500W

ℹ️ Note:If power supply 100~130V/ AC   50/60Hz,Maximum power of H1:750W ;Maximum power output of R1:250W

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➢ **Input ports**

Input port T1：for NTC10K, B=3950, ≤135°C sensor (PVC cable ≤105°C)

designed for measuring the temperature of tank.

Input port T2: for NTC10K, B=3950, ≤135°C sensor (PVC cable

≤105°C),Optional.

● **Terminal layout of controller for electrical heater of 3000W**

➢ **Power terminal N, L**: 20A, for power connection, L: live wire, N: zero wire,

⏚ protective wire, please is sure to connect to ground.

➢ **Output ports**

H1: Designed for electrical heater, electromagnetic relay, max. power is

3000W,

R1: Designed for anti-freezing heating cables, Electromagnetic relay, max.
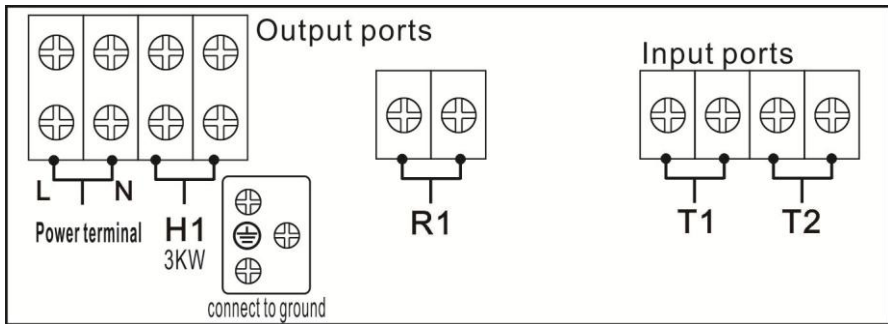
power is 500W

ℹ️ Note:If power supply 100~130V/ AC   50/60Hz,Maximum power

output of H1:1500W ;Maximum power output of R1:250W

➢ **Input ports**

Input port T1：for NTC10K, B=3950, ≤135°C sensor (PVC cable ≤105°C)

designed for measuring the temperature of tank.

Input port T2: for NTC10K, B=3950, ≤135°C sensor (PVC cable

≤105°C),Optional.

ⓘ **Note**: sensor T2 is not listed in the standard delivery package, self-purchase if need.

● **Advice regarding the installation of temperature sensors:**

► Only original factory equipped NTC10K,B=3950 temperature sensors are approved for using with tank, it is equipped with 20m PVC cable, and the cable is temperature resistant up to $105^{o}C$, connect the temperature sensors to the corresponding terminals with either polarity.

► All sensor cables carry low voltage, and to avoid inductive effects, must not be laid close to 230 volt or 400 volt cables (minimum separation of 100mm).

► Sensor cables may be extended to a maximum length of ca. 100 meter, when cable's length is up to 50m, and then $0.75mm^2$ cable should be used. When cable's length is up to 100m, and then $1.5mm^2$ cables should be used.

3. System diagram
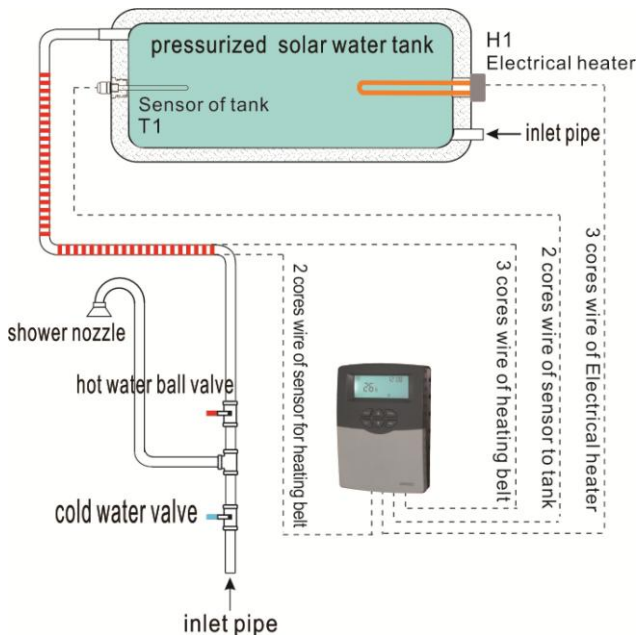
Note: this diagram is only for reference.

4. Functions operation

ℹ️ Before switching-on the power, please connect sensor to the input port of controller, connect electrical heater to the output port of controller.

After power is switch on, the controller runs an initialization phase for 5 seconds, then controller runs a commissioning menu, it leads the user through the most important adjustment channels needed for operating the system.

4.1 Signals on display and function code

LCD display

Code	Description	Code/Signal Lighting	Code/Signal Blink
③	Intelligent heating function	Function is triggered	Function is working
④	Thermal disinfection function	Function is triggered	Countdown of disinfection function working （DDIS）
⑤	Timer function	Function is triggered	Function is working
⑥	Pipe heating function	Function is triggered	Function is working
⑶⑶	Timing heating function	Function is triggered	Function is working
🚰	Temperature controlled DHW within 3 time sections	Function is triggered	Function is working
🚰	Time controlled DHW within 3 time sections	Function is triggered	Function is working
AH	Automatic thermostat	Function is triggered	Function is working
⊘	Economic mode		
❄	Anti freezing protection	Function is triggered	Function is working
✋	Manual heating function		
⚠	Warning of sensor error		

4.2 Button Description
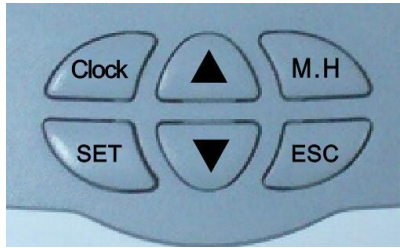
Layout of button

● Button description

"CLOCK" button: current time setting

"M.H" button: manual heating switch on/off

"SET" button: confirm the setting or activate the setting program

"ESC" button: exit or return to the previous menu

" ▲ " button: increase adjustable value or upwards menu

" ▼ " button: decrease adjustable value or downwards menu

● Main menu operation steps

► Press "SET" button for 3 seconds to access main menu

► Press "▲ ▼ " to adjust the menu

► Press "SET" to access submenu

● Submenu operation steps

► Press "SET" to access submenu

► Press "SET" again to the adjustable item, press "▲ ▼" to select "ON" to

open the option, or select "OFF" to close this option

► Press "SET" or "ESC" to confirm the adjust

► Press " ▲ "to access the next submenu
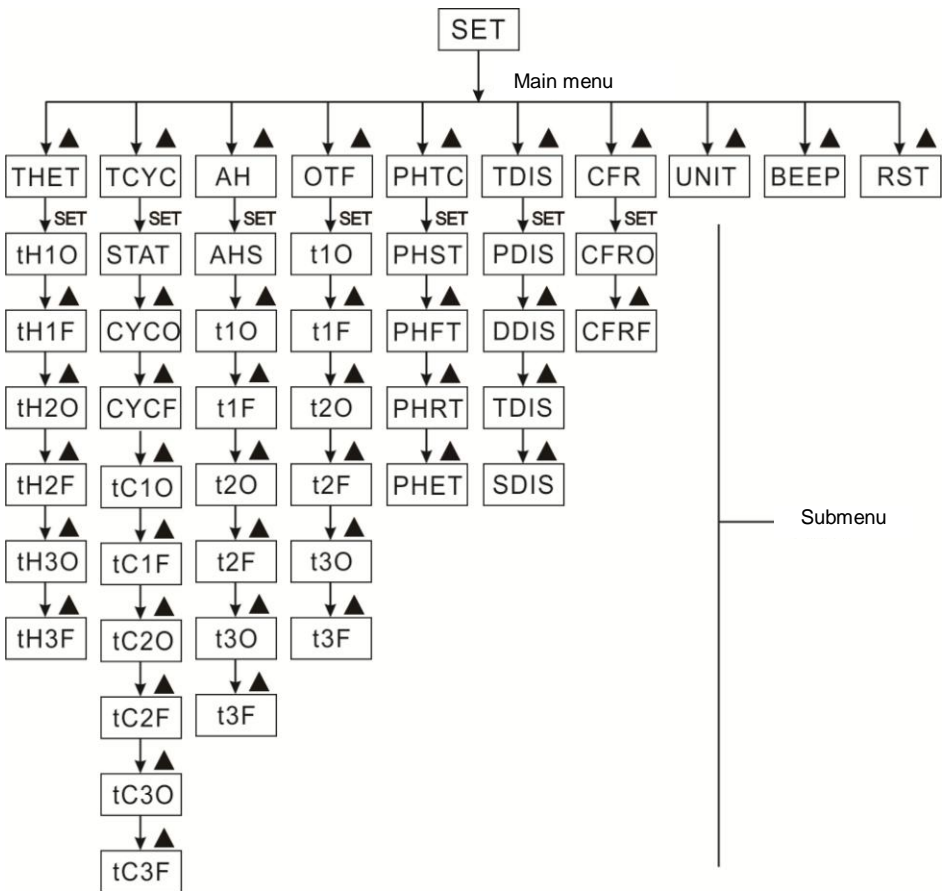
► Press "SET" to the adjustable value

► Press " ▼▲ " to adjust value

► Press "SET" or "ESC" to confirm the adjust

ℹ️ **Note**：after accessing the adjust channel, if no any button is pressed for 3 minutes, then display returns to the main interface.

4.3 Menu structure

➢ It is possible to given a detailed set through the submenu, please completely learn the submenu.

4.4 Menu description

Code (Main menu)	Code (Submenu)	Default value	Description
THET			Timing heating
TCYC		OFF	Set the temperature and time of circulation pump of DHW
	STAT	ON	Switch-on condition of DHW circulation pump
	CYCO	40℃/03MIN	Switch-on temperature and time of DHW circulation pump
	CYCF	45℃/15MIN	Switch-off temperature and time of DHW
AH		OFF	Automatic thermostat
	AHS	S2	Selection of sensor for thermostat function
OTF		OFF	Timer
PHTC		OFF	Pipe heating protection
	PHST	00:00	Start time of pipe heating
	PHFT	23:59	Stop time of pipe heating
	PHRT	10MIN	Set the running time of pipe heating
	PHET	30MIN	Set the interval time of pipe heating
TDIS		OFF	Thermal disinfection
	PDIS	07	Monitoring days
	DDIS	10MIN	Disinfection running time
	TDIS	70℃	Disinfection running temperature
	SDIS	18:00	Start time of disinfection
CFR		OFF	Tank anti-freezing protection
	CFRO	03℃	Switch-on temperature of anti-freezing protection
	CFRF	05℃	Switch-off temperature of anti-freezing protection
UNIT		℃	Temperature unit selection
BEEP		OFF	Warning of sensor error
RST			Reset to factory value

ℹ️ **Note**: R1 output port is designed for one of functions from TCYC, AH, OTF, PHTC, if one of these functions is selected to be activated, and then the others should be deactivated in the menu.

4.5 Setting time

►Press "Clock" button, time displays on the

screen, hour "00" blinks on the screen.

►Press "▲▼" button to set hour of clock

►Repress "Clock", minute "00"blinks

► Press "▲▼" button to set minute of clock.

► Press "Clock" to exit program, or waiting for 20 seconds, controller exits

automatically, the set parameter is saved automatically.

 Note: at the case that power is switched-off, time can be kept for

36hours.

4.6 THEH 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

(T1) of tank drops below the preset switching-on temperature of this function,

electrical heating (H1) starts to work, when T1 rises up to the preset turning

off temperature, electrical heating (H1) is stopped.

Within 24 hours, three time sections can be set with this controller.

Factory set:

The first time section: electrical heating function starts at 4:00 and ends at

5:00 am.   Within this time section, switch-on temperature is 40℃,

switch-off temperature is 50℃.

The second time section: from 10:00 to 10:00 am, it means there is no

electrical heating in this time.

The third time section: electrical heating function starts at 17:00 and ends at

22:00 pm.   Within this time section, the switch-on temperature is 50℃,

switch-off temperature is 55℃.

The switch-on temperature adjustable range: 0℃ ~ (OFF-2 ℃)
The switch-off temperature adjustable range: (ON+2 ℃) ~ 95℃

If you want to shut off one timing heating, then you can set the turning on
time and turning off time same value (for example, the second time section
no this function, then you can set turning on/off time is 10:00 ~ 10:00)

When time is outside of the preset time section, electrical heating doesn't
work automatically even when the tank temperature reaches the switch –on
temperature of heating.

Setup steps:
►Press "SET" button for 6 seconds, to access the
  main menu and select menu "THET".
►Press "SET" button again to access the program.
►Press "SET" button again, the first switch-on time
  and temperature parameters "th1O 04：00 "displays
  and blinks on the screen.
►Press "SET" button, hour "04" blinks on the screen.
►Press "▲▼" button, to set hour of the switch-on
time of heating
►Press "SET" button, minute "00" blinks on the screen.
►Press "▲▼" button, to set minute of the switch-on time of heating
►Press "SET" button, temperature "40" blinks on the screen.
►Press "▲▼" button, to set the switch-on temperature of heating.
►Press "SET" or "ESC" button to confirm.

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►Press "▲" button, to access the first switch-off time and temperature parameters, "th1F 05：00 "displays and blinks on the screen.

►Press "SET" button, hour "05" blinks on the screen.

►Press "▲▼" button, to set hour of the switch-off time of heating

►Press "SET" button, minute "00" blinks on the screen.

►Press "▲▼" button, to set minute of the switch-off time of heating

►Press "SET" button, temperature "45" blinks on the screen.

►Press "▲▼" button, to set the switch-on temperature of heating.

►Press "SET" or "ESC" button to confirm.

►Press "▲" button, to access the second switch-on time and temperature parameters, "th2O 04：00 "displays and blinks on the screen. Doing like above to set time and temperature for the second section and the third section.

When heating signal displays on the screen, it indicates timing heating is activated.

4.7 TCYC Setting the running time/ temperature of DHW pump

Description:

This controller provides an output for running DHW circulation pump, which can be controlled by a temperature, at this case, an extra circuit pump (connect to the output R1) and an extra temperature sensor mounted on the hot water return pipe (connect to the input T2) should be installed in the system. When the temperature of DHW return is lower than the preset switch-on temperature, circuit pump is triggered, until temperature rises up to the switch-off temperature, pump is stopped.

- **DHW pump running at below 2 modes**:

➢ **Running controlled by time within the three time sections**

If sensor T2 is not connected to the controller, then time controlled mode is selected automatically, within a running time section, as default set, pump runs for 3 minutes and then ceases for 15 minutes, same process repeated within the running time section. Running time can be adjusted from 1-30Min; Stop time can be adjusted from 0-60Min.
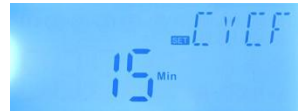
If the stop time (CYCF) is set to 0 minute，   then within the time section, DHW pump keeps running without any intervals.

Default time sections:

The first time section starts at 05.00 am, closes at 7:00am.

The second time section starts at 11.00 am, and closes at 13:00pm.

The third time section starts at 17.00 pm, and closes at 22:00pm.

➢ **Running controlled by temperature within the three time sections**

When sensor T2 is connected to the controller, then temperature controlled mode is selected automatically, within a running time section, as default set, pump R1 runs when T2 is below $40^{o}C$, and pump R1 stops when T2 reaches to $45^{o}C$

Startup condition for temperature controlled mode (STAT): when tank temperature T1 is $2^{o}C$ higher than the preset switch-off temperature, and then DHW circuit pump is triggered.

i **Note:**

STAT not available on the time controlled mode.

Default time sections:

The first time section starts at 05.00 a.m., closes at 7:00a.m.

The second time section starts at 11.00 a.m., closes at 13:00p.m..

The third time section starts at 17.00 p.m. closes at 22:00p.m.

If it is needed to close one time section, just set the start time and stop time at a same value (e.g. 10:00 starts, 10:00 closes)

i Note:

DHW pump temperature controlled mode is prior to time controlled mode.

When sensor T2 is connected to the controller, then time controlled mode is switched -off automatically, and switched to temperature controlled mode.

If sensor T2 should be installed, in order to avoid measuring error, please ensure a safety distance of 1.5m to tank.

The setting steps for time controlled mode and temperature controlled mode is same.

Setup steps (example with temperature controlled mode)

►Press "SET" button for 6 seconds, to access the main menu and select menu "TCYC".

►Press "SET" button again, "OFF" blinks on the screen.
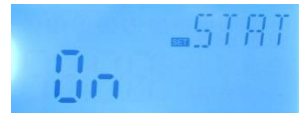
►Press "▲ ▼" button, to activate this function

►Press "SET" or "ESC" button to confirm.

►Press "▲" button, "STAT" displays (startup temperature of DHW pump)

►Press "SET" button again, "STAT" blinks on the screen.

►Press "▲ ▼" button, to activate this function

►Press "▲" button, "CYCO 40°C" displays (switch
–on temperature of DHW pump)

►Press "SET" button again, "40 ^{o}C" blinks on the screen.

►Press "▲▼" button, to adjust switch-on temperature, adjustable range 0 ^{o}C～ (OFF-2 ^{o}C)

►Press "SET" or "ESC" button to confirm.

►Press "▲" button, "CYCF 45°C" displays (switch –off temperature of DHW pump)

►Press "SET" button again, "45 ^{o}C" blinks on the screen.

►Press "▲▼" button, to adjust switch-off temperature, adjustable range (ON+2 ^{o}C) ～55 ^{o}C.

►Press "SET" or "ESC" button to confirm.

►Press "▲" button, to the first time section setting, "tC 1O 05:00"displays (switch –on time of the first time section of DHW pump)

►Press "SET" button again, hour "05" blinks on the screen.

►Press "▲▼" button, to adjust hour of the switch-on time

►Press "SET" button again, minute"00" blinks on the screen.

►Press "▲▼" button, to adjust minute of the switch-on time

►Press "SET" or "ESC" button to confirm.

►Press "▲" button, to the first time section setting, "tC 1F 07:00"displays (switch –off time of the first time section of DHW pump)

►Press "SET" button again, hour "07" blinks on the screen.

►Press "▲▼" button, to adjust hour of the switch-off time

►Press "SET" button again, minute"00" blinks on the screen.

►Press "▲▼" button, to adjust minute of the switch-off time

►Press "SET" or "ESC" button to confirm.

►Press "▲" button, to the second time section setting, "tC 2O 11:00"displays (switch –on time of the second time section of DHW pump), repeat above steps to set the second time section and the third time section.

If it is needed to close one time section, just set the start time and stop time at a same value (e.g. 10:00 starts, 10:00 stops)

When DHW pump signal 🚰 displays and blinks, it indicates that temperature controlled DHW pump mode is activated,

When signal 🚰 displays and blinks, it indicates the time controlled DHW pump mode is activated,

4.8 AHO Automatically thermostat function

Automatically thermostat function is independent from solar system, it is used to release the extra heat to reduce the tank temperature or to trigger back-up heater to heat tank to the desired temperature. This function needs an electromagnetic valve or circulation pump R1, corresponding temperature is T2 or T1.

Note:

AHO<AHF: this thermostat function is used to control the back-up heater
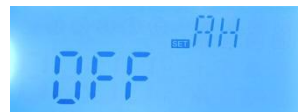
AHO>AHF: this thermostat function is used to release the extra heat from tank

Setup steps:

► Select main menu AH

► Press "SET" button, parameter "OFF" blinks on the screen

► Press " ▲ ▼ " to activate this function

►Press "SET" or "ESC" button to confirm the set.

►Press " ▲ " button, parameter "AHS S2" appears (sensor selected for this function, S1 presents T1, S2 presents T2)

► Press "SET" button, parameter "S2" blinks on the screen

► Press " ▲ ▼ " to select sensor

►Press "SET" or "ESC" button to confirm.

►Press " ▲ " button to access the setting program of timer of the thermostat function, "t1 O 00：00 "displays, it is ready for set the start time of the first time section.

► Press "SET" button, hour "00" blinks on the screen

► Press " ▲ ▼ " to set hour of the start time

► Press "SET" button, minute "00" blinks on the screen

► Press " ▲ ▼ " to set minute of the start time

► Press "SET" button, temperature "40°C" blinks on the screen, adjustable range is 0°C ~ 95°C

► Press " ▲ ▼ " to set the switch-on temperature of the thermostat function.

►Press "SET" or "ESC" button to confirm.

►Press " ▲ " button to access the setting program , "t1F   23：59 "displays, it is ready for set the close time of the first time section.

► Press "SET" button, hour "23" blinks on the screen

► Press " ▲ ▼ " to set hour of the close time

► Press "SET" button, minute "59" blinks on the screen
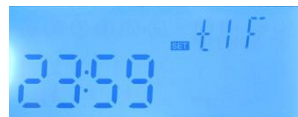
► Press " ▲ ▼ " to set minute of the close time

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► Press "SET" button, temperature "45°C" blinks on the screen，adjustable range is 0°C ~ 95°C

► Press " ▲ ▼ " to set the switch-off temperature of the thermostat function.

►Press "SET" or "ESC" button to confirm.

►Press " ▲ " button to access the setting program of second time section, repeat above steps to set second time section and the third time section.

When the signal of thermostat **"AH"** is blinks on the screen, it indicates that the thermostat function is activated.

4.9 OTF Three time sections set (Timer function)

Description:

Controller has timer function, within the set time section, output R1 is switched-on; outside the time section, and then output R1 is switched-off.

Setup steps:

►Select OTF DHW circulation main menu.

►Press "SET" button, "OFF" displays on the screen.

►Press" ▲ ▼ "button to activate the function

►Press "SET" or "ESC" to confirm

►Press" ▲ "button to access the setting program to set the timer, "t1O 00:00"displays on the screen, it is ready for setting the start time of the first time section.

►Press "SET" button, hour"00"blinks

►Press"▲ ▼"button to adjust hour of the start time

►Press "SET" button, minute"00"blinks,

►Press"▲ ▼ "button to adjust minute of the start time

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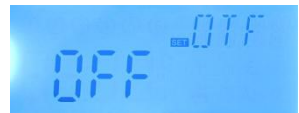
►Press "SET" or "ESC" to confirm

►Press" ▲ "button to set the close time of the first time section, "t1F   00：

00"displays on the screen.

►Press "SET" button, hour"00"blinks

►Press" ▲ ▼ "button to adjust hour of the close time

►Press "SET" button, minute"00"blinks,

►Press" ▲ ▼ "button to adjust minute of the close time

►Press "SET" or "ESC" to confirm

►Press" ▲"button to access the program of setting the second time section,

repeat above steps to set the second time section and third time section.

If it is needed to close one time section, just set the start time and stop time at a

same value (e.g. 10:00 starts, 10:00 closes)

When timer signal ⑤ blinks, it indicates that the timer function is activated.

4.10 PHTC Time controlled pipe heating protection

Description:

In winter, when outdoor temperature is low, controller will trigger the pipe

heating protection function to avoid pipe leakage due to freezing.

Example: at the preset time section, if running time of pipe heating is set with 10

minutes, the interval of pipe heating is set with 10 minutes, then the heating

function runs for 10 minutes, then it stops for 10 minutes, this heating process is

repeated within the time section, through this setting, it can avoid to give power

to heating wires for long time, save electricity and can avoid fire due to aging of

wire.

Setup steps:

►Select menu PHTC pipe heating function.

►Press "SET" button， "OFF" blinks on the screen

►Press" ▲ ▼ "button to activate this function

►Press "SET" or "ESC" to confirm

►Press " ▲ " to access the setting program, "PHST 00:00"Displays on the screen, it is ready to set the start time of the first time section.

►Press "SET" button, hour"00"blinks

►Press " ▲ ▼ "button, adjust the hour of the start time

►Press "SET" button, minute"00"blinks

►Press" ▲ ▼ "button to adjust the minute of the start time

►Press "SET" or "ESC" to confirm

►Press " ▲ "button, "PHFT 23:59"displays on the screen, it is ready to set the close time of the first time section.

►Press "SET" button, hour "23" blinks

►Press " ▲ ▼ "button, adjust the hour of the close time

►Press "SET" button, minute"59"blinks

►Press" ▲ ▼ "button to adjust the minute of the close time

►Press "SET" or "ESC" to confirm

►Press " ▲ "button to set the running time of pipe heating function, "PHRT 10MIN"displays on the screen.

►Press "SET" button, "10MIN" blinks

►Press " ▲ ▼ "button, to adjust the running time of pipe heating, (minute) adjustable range is 1~ 60MIN.

►Press "SET" or "ESC" to confirm

►Press " ▲ "button to set the interval time, "PHET 30MIN"displays on the screen

►Press "SET" button, "30MIN"blinks

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►Press "▲ ▼" button to adjust the interval (minute), adjustable range is 0~90MIN.

►Press "SET" or "ESC" to confirm

When the timer signal ⑥ blinks on the screen, it indicates that the timer function is activated.。

ℹ️ **Note**: if the interval time PHET is set with 0 minute, then within the time section, pipe heating will run without stop.

4.11 TDIS Thermal disinfection

Description:

In order to avoid occurring bacteria in water tank, controller will trigger the back-up heater to heating tank to the required temperature to kill the bacteria. Therefore, tank temperature is monitoring by controller at the monitoring period (PDIS), if the temperature is not reached to the desired temperature during this monitoring period, then controller will trigger the electrical heater at the preset start time (SDIS), and controller ensures to heat tank temperature during the heating period (DDIS) is always higher than the desired disinfection temperature (TDIS). When thermal disinfection function is working, countdown time starts, and signal ④ blinks on the screen, countdown time finished, thermal disinfection heating is stopped. This function stops.

Setup steps:

►Select TDIS thermal disinfection main menu

►Press "SET" button, "OFF" blinks

►Press" ▲ ▼ "button, to activate this function

►Press "SET" or "ESC" to confirm

►Press" ▲ "button, to set the days of a thermal disinfection period, "PDIS 07"displays on the screen.

►Press "SET" button, "07"blinks

►Press" ▲ ▼ "button, to set the days of a thermal disinfection period, adjustable range is 1-30 days.

►Press "SET" or "ESC" to confirm

►Press" ▲ "button，to set the disinfection heating time "DDIS 10" displays.

►Press "SET" button, "10"blinks on the screen.

►Press" ▲ ▼ "button, to set the heating time, adjustable time is 1-120 minutes

►Press "SET" or "ESC" to confirm

►Press" ▲ "button to set the heating temperature, "TDIS 70"displays on the screen.

►Press "SET" button, "70℃"blinks

►Press " ▲ ▼ "button，set the heating temperature, the adjustable range is 0-90℃

►Press "SET" or "ESC" to confirm

►Press" ▲ "button to set the start time of thermal disinfection function, "SDIS 18：00"displays on the screen.

►Press "SET" button, "18"blinks

►Press" ▲ ▼ "button to set the start time of thermal disinfection function

►Press "SET" or "ESC" to confirm

When thermal disinfection signal ④ blinks on the screen, it indicates that the disinfection function is activated.

4.12 CFR Tank anti-freezing protection

Description：

In winter, when outdoor temperature is very low, in order to avoid freezing of collector tube/ tank, when controller measures the tank temperature T1 drops to only 3°C (factory set), controller will trigger the electrical heater to heat tank until

its temperature rises up to 5°C, and then tank anti-freezing function is deactivated automatically.

Setup steps:

►Select main menu CFR tank anti-freezing protection function

►Press "SET" button, "OFF" blinks

►Press "▲ ▼ "button to activate the function

►Press "SET" or "ESC" to confirm

►Press" ▲ "button, "CFRO 03"displays (switch-on temperature of tank anti-freezing protection)

►Press "SET" button, "03"blinks

►Press"▲ ▼ "button to adjust the switch on

temperature for this function, adjustable range is

0-8℃）

►Press "SET" or "ESC" to confirm

►Press" ▲ "button, "CFRF 05"displays (Switch-off temperature of tank anti-freezing protection)

►Press "SET" button, "05"blinks

►Press" ▲ ▼ "button, to adjust the switch-off temperature, adjustable range is 2-10 ^{o}C.

►Press "SET" or "ESC" to confirm

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

4.13 UNIT Celsius degree and Fahrenheit unit switch

Setup steps:

►Select this function menu UNIT,

►Press "SET" button, "TEMP ℃" displays on the

screen

► Press "SET" button again, "°C" blinks

►Press '▲ ▼ "to switch the temperature unit

►Press "SET" or "ESC" to confirm
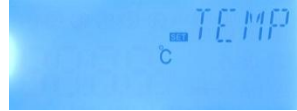
4.14 BEEP Beeper error warning

When temperature sensor has error, this function will send warning to manager.

When beeper sounds, press "ESC" to exit the warning function.

Setup step:

►Select BEEP warning function menu

►Press "SET" button, "BEEP OFF" displays

►Press "SET" button，"OFF" blinks

►Press" ▲ ▼ "button to activate the function

►Press "SET" or "ESC" to confirm

4.15 RST Reset function

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

Setup steps：

►Select RST main menu

►Press "SET" button, "YES" blinks

►Press "SET" button for 3 seconds, then beeper

sounds "di…." 3 times, and then "YES" lighting, it

indicates the controller program is recovered to the

factory set.

►Press "SET" or "ESC" to confirm

4.16 M.H manual heating

Description:

You can trigger back-up electrical heater by this controller to adjust the tank temperature. When controller measures the temperature T1 is below the desired temperature, it will trigger the electrical heater until the tank temperature (T1) rises up to the desired temperature.

Activate/deactivate the function

►Press "M.H" button for 3 seconds, temperature "60 ^{o}C" blinks on the screen.

►Press " ▲ ▼ " button to adjust the desired temperature, adjustable range 10°C～80 ^{o}C, factory set is 60 ^{o}C

►Press "M.H" or press "ESC" button or waiting for 20 seconds to start the manual heating function, and displays manual heating signal ⑪ ⒣

►Press "M.H" again, to switch-off manual heating function.

i **Note:** manual heating can heat tank only for one time, when manual heating function is activated, tank is heated until its temperature reaches to the desired value, and then manual heating is deactivated automatically.

4.17 Intelligent heating mode

At the case that solar energy is not enough, in order to ensure a enough hot water for customer, controller will automatically measure the tank temperature at the preset time, if the default temperature is not reached, controller trigger the electrical heater to heat tank until the temperature rises up to the default value.

Factory set(Not change):

first heating time is 13:00 and desired temperature is 30°C

second heating time is 14:00 and desired temperature is 35°C,

third heating time is 15:00, desired temperature is 40°C,

forth heating time is 16:00, desired temperature is 45°C,

fifth heating time is 17:00, desired temperature is 50°C,

Setup steps:

►Press "▲"button for 3 seconds, ③ displays on
the screen, Intelligent heating mode is activate.

►Press" ▲"button for 3 seconds again, ③ signal
closed, Intelligent heating mode deactivated.

When intelligent heating signal ③ blinks on the screen, it indicates this function
is working.

4.18 Economic mode

Description:

At the case of economic mode, timing heating function is deactivated
automatically; heating can only be triggered by manual heating function.

Activate/deactivate this function:

►Press" ▼"button for 3 seconds, ✏ signal blinks,
eco mode activated.

►Press" ▼"button for 3 seconds again, ✏ signal
closed, eco mode deactivated.

ℹ️ **Note**: if the timing heating function is needed to be used, then the eco
mode should be deactivated.

4.19 View the measuring value

When controller works normal, by pressing " ▲ ▼ " button, it is possible to view
the T1, T2 temperature value, running time and software version.

Note:

1. T2 value can be viewed only when the corresponding function is activated.

2. At the view status, if no any button is pressed within 20 seconds, display turns to the main interface.

5. Protection function

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

5.2 Screen protection
When no any press on button for 5 minutes, screen protection is activated automatically, and then LCD lighting lamp is switched-off.   Through press any button to light LCD lamp again.

5.3 Trouble protection
When temperature sensor's (T1) wiring is interrupted, not connected or short circuit, controller switches off the corresponding signal output, and simultaneously " - - -" error code displays on the screen.

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

7. Technical specification

- Power supply：AC230V ±10%,50Hz

- Power consumption：< 3W

- Accuracy of temperature measuring： ± 2°C

- Range of tank temperature measuring： 0 ~100 ^{o}C

- Suitable power of electrical heater: ≤ 1.5KW or ≤ 3KW (optional)

- Inputs:T1: NTC10K, B3950 sensor (≤ 135°C) for tank, (PVC cable ≤105°C),

    T2: temperature sensor, optional

- Outputs：H1 for electrical heater, R1: Relay.

- Ambient temperature ： -10°C ~ 50°C.

- Water proof grade：IP40.

$\boxed{i}$ Note:

If power supply:AC110V±10%,60Hz:

Suitable power of electrical heater: ≤ 0.75KW or ≤ 1.5KW (optional)

Suitable power of R1: ≤ 0.25KW

8. Delivery list

- Controller   1 piece

- Power cable 10A (for controller of 3000W, plug not provided) 1 piece

- Customer manual   1 piece

- NTC10K sensor（size: φ6*50mm,cable length20 m）   1 piece

- Accessories   1 bag