

Science and Technology Create Perfection

# Installation and Operating Manual

## **SR882 SOLAR STATION**

For Split Pressurized Hot Water System



**⚠ Read the instruction carefully please before operation!**

## Contents

### **Solar pump station installation and operation manual**

Contents .....	1
Solar pump station installation and operation manual .....	4
1. Solar pump station with integrated controller .....	4
1.1 Scope of delivery .....	4
1.2 About solar pump station .....	4
1.3 Safety instructions .....	4
1.4 Station dimensions .....	5
1.5 Specification of components .....	5
1.6 Technical Data .....	6
2. Mounting pump station .....	6
3. Commissioning of station .....	7
3.1 Flushing and filling the solar system .....	7
3.2 Flow check .....	8
3.3 Airstopp .....	8
3.4 Electrical connection .....	9
3.5 Flushing and filling unit (Spar part A06) .....	10
Manual of integrated controller of solar station .....	11
1. Safety information .....	11
1.1 Description of symbols .....	11
2. Overview .....	11
2.1 Introduction of controller .....	11
2.2 Technical data .....	12
2.3 Terminal connection .....	13
2.4 Menu Structure .....	14
2.5 Menu description .....	15
2.6 System description .....	17
3. Controller functions and parameters setup ( User grade) .....	18
3.1 Set time/week/day/month/year .....	18
3.2 tHET Timing heating .....	18
3.3 CIRC DHW pump control function .....	22
4. Controller functions and parameters setup (engineer grade) .....	26

4.1 Access main menu .....	26
4.2 DT Temperature difference function .....	26
4.3 TEMP Temperature .....	27
4.3.1 EMOF Switch-on temperature of collector emergency function .....	28
4.3.2 EMON Switch-off temperature of collector emergency function .....	29
4.3.3 CMX Maximum limited collector temperature (collector cooling function) .....	29
4.3.4 CMN low temperature protection of collector .....	30
4.3.5 CFR frost protection of collector .....	31
4.3.6 REC Tank re-cooling function .....	31
4.3.7 SMX1 Maximum temperature of tank 1 .....	32
4.4 PUMP Circuit pump speed adjust set .....	32
4.4.1 DTS Standard temperature difference for circulation pump 1 (speed adjusting) ...	33
4.4.2 RIS Gain for circulation pump 1 (speed adjusting) .....	34
4.5 OHQM Thermal energy measuring .....	34
4.5.1 FTYPE Flow counter type option.....	35
4.5.2 FMAX Flow rate.....	36
4.5.3 MEDT Type of heat transfer liquid.....	36
4.5.4 MED% Concentration of heat transfer liquid .....	37
4.6 INTV Pump interval function.....	37
4.6.1 ISTAR Turn-on time for pump interval running function .....	38
4.6.2 IEND Turn-off time for pump interval running function .....	38
4.6.3 ISTP Pump interval time .....	38
4.6.4 IRUN Pump running time.....	39
4.7 SFB Solid fuel boiler turn on/off .....	39
4.7.1 SFON Minimum turn-on temperature of tank.....	40
4.7.2 SFOF Maximum turn-off temperature of tank .....	40
4.7.3 MAX3 Maximum turn-off temperature of solid fuel boiler.....	40
4.7.4 MIN3 Minimum turn-on temperature of solid fuel boiler .....	41
4.8 FUN Auxiliary function .....	41
4.8.1 DVWG Anti legionnaires' function .....	41
4.8.2 COOL Tank cooling function.....	42
4.8.3 AHO Auto thermostat function.....	43
4.9 OSDC SD card data save function.....	44
4.9.1 OSDC card function switch-on and off .....	45

4.9.2 LOGI Data save intervals.....	45
4.10 UNIT Display unit °C and °F switches .....	46
4.11 HND Manual control.....	46
4.12 REST Recovery to factory set.....	47
4.13 PASS Password set.....	47
5. Operation button function.....	49
5.1 Holiday function .....	49
5.2 Manual heating .....	49
5.3 Temperature check.....	50
6. Protection function.....	51
6.1. Memory protection .....	51
6.2 Screen protection .....	51
6.3 pump idling protection.....	51
7. Trouble shooting .....	51
7.1 Trouble protection.....	51
7.2 Trouble checking.....	52
8. Quality Guarantee.....	54
9. Accessories.....	54

# Solar pump station installation and operation manual

## 1. Solar pump station with integrated controller

- Integrated solar controller
- Outstanding design
- Safety assembly with safety valve and manometer
- High-Quality casing for reduce heat loses
- Flow rate check

### 1.1 Scope of delivery

- 1\* solar pump station
- 1\* integrated solar controller
- 1\* flushing and filling unit (optional)
- 1\* collector sensor PT1000
- 2\* storage sensor NTC10K
- 1\* wall mounting bracket
- 1\* accessory bag (include 2 \* screw and dowel ; 2 \* strain relief)
- 1\* manual



### 1.2 About solar pump station

This solar pump station is a preinstalled and leak-tested group of fitting for transferring heat from collector to storage. It contains important fittings and safety devices for the operation of a solar thermal system:

- Ball valves on flow and return in combination with check valves to prevent gravity circulation.
- Airstopp for manual or automatic bleeding of the solar thermal system
- Flow rate check for displaying the flow rate
- Manometer for displaying the system pressure
- Safety valve to prevent inadmissible overpressure
- Flushing and filling unit (optional) for flushing, filling and emptying the solar thermal system.

### 1.3 Safety instructions

The installation and commissioning of the solar station as well as the connection of electrical components requires technical knowledge commensurate with a recognized vocational qualification as a fitter for plumbing, heating and air conditioning technology, or

a profession requiring a comparable level of knowledge. The following must be observed during installation and commissioning:

- The relevant regional and national regulations.
- The technical and safety instructions of these instructions.

### **Warning: risk of scalding**

There is danger of steam emission from safety valves. Therefore a discharge pipe must be connected to the safety assembly, please observe the enclosed instructions regarding the safety valve when doing this.

### **Attention: damage of solar pump station**

- The group of fittings must be installed with sufficient spacing to the collectors because temperatures in the vicinity of the collectors can be very high. An intermediate vessel may be necessary for installation in the attic.
- It is imperative that you make sure the PTFE sealing elements of the solar pump station do not come into contact with substances containing mineral oil. Mineral oil products cause lasting damage to the material, whereby its sealant properties are lost. If necessary, ask the manufacturer whether the solar fluid, fats or installation aids contain mineral oils. We don't assume liability nor provide warranty for damage to solar station resulting from sealants damaged in this way.

## **1.4 Station dimensions**

- Height ( with insulation): 410mm
- Width (with insulation): 350mm
- Depth (with insulation): 165mm
- Install height(centre): 1600mm
- Distance axis/wall: 55mm
- Pipe connections: 3/4" IT (inner thread)
- Connection for expansion vessel set: 3/4"ET, flat sealing
- Outlet safety valve: 1/2 IT



## **1.5 Specification of components**

1.5.1 Safety valve: 6bar

1.5.2 Manometer: 0-6bar

1.5.3 Non-return valve: opening pressure 200mm H<sub>2</sub>O height

1.5.4 Sensor on the collector flow pipe: NTC10K, B=3950

1.5.5 Circuit pump: Wilo 15-6

1.5.6 Digital flow counter (alternative mechanical flow counter)

1.5.7 Tank return connection (from tank): 3/4 IT

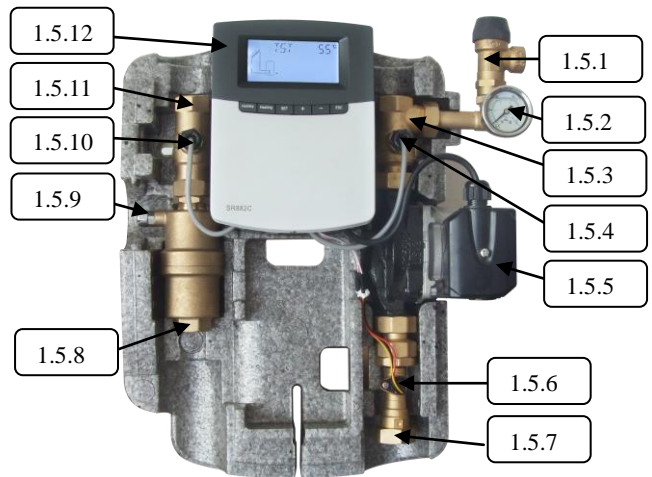
1.5.8 Tank flow connection (to tank): 3/4 IT

1.5.9 Airstopp for manual or automatic bleeding of the solar thermal system

1.5.10 Sensor on the collector return pipe: NTC10K, B=3950

1.5.11 Collector return pipe connection (from collector): 3/4 IT

1.5.12 Integrated solar controller

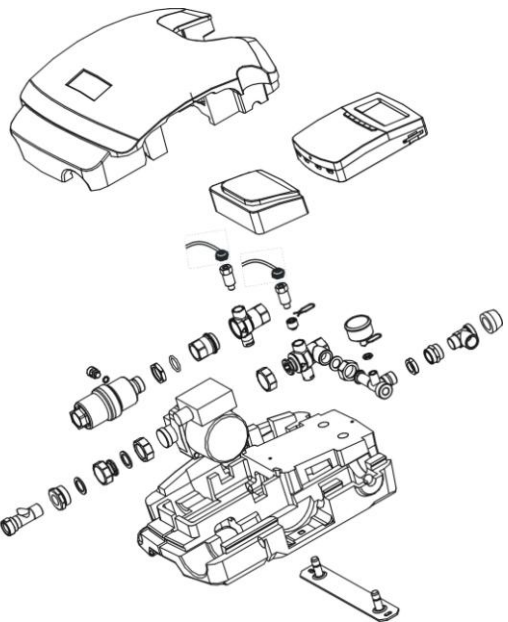


#### Material:

Fitting: brass

Seals: PTFE

Insulation: EPP,  $\lambda = 0.041 \text{ W / (m.K)}$



## 1.6 Technical Data

Max. permitted pressure: 6bar

Max. permitted operating temperature: 120°C

Digital flow rate: 0.1-20 L/Min

Mechanical flow rate: 2-8 L/Min

## 2. Mounting pump station

- Determine the mounting site of the station.
- Take the station out of packing; Remove the front half of the insulation.
- Hold the enclosed wall mounting bracket against the wall and mark the fastening holes, drill holes and insert dowels.
- Fasten the wall mounting bracket to the wall with the screws.
- Push the station against the wall mounting bracket, the station catches and is then attached to the wall.

- Connect the station to the solar thermal system.
- Check the inlet pressure of the expansion vessel and if necessary, adjust it to the local conditions,  $P_{inlet}(\text{bar}) = 1\text{bar} + \Delta Th(\text{m}) * 1/10$  ( $\Delta Th$ =height difference between collector and station) .
- Connect the electrical components of the solar station, mount the store and collector sensor and connect them to the controller, plug the controller into the socket.
- Tighten all union nuts and screw connections. And mount the front half of the insulation to the station.

### 3. Commissioning of station

#### Attention: Risk of scalding!

- In order to prevent the boiling of solar fluid in the collectors, the system should not be flushed or filled during periods of strong sunshine.

#### Attention: Risk of frost!

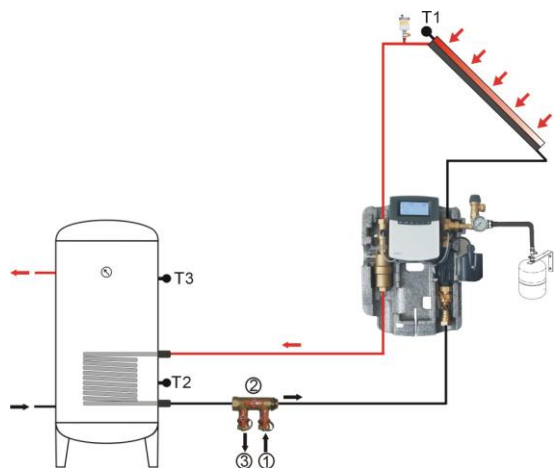
- Solar thermal system cannot be completely emptied after flushing. There is a danger of frost damage if water is used for flushing. Only use solar fluid to flush and fill the solar thermal system. Use water – propylene glycol mixture as solar fluid (Maximum 50% propylene glycol).

#### 3.1 Flushing and filling the solar system

Flushing and filling unit is the optional component, it can be installed horizontally at the lowest point of the solar circuit (see figure). A filter must be installed between the store and solar pump in order to prevent the flushed-out scale from store re-entering the solar circuit.

Flushing and filling steps:

- Disconnect the expansion vessel from the solar thermal system.
- Connect the pressure hose of a flushing and filling station to the fill ball valve (1) of flushing and filling unit.
- Connect the flushing hose of a flushing and filling station to the drain ball valve (3) of





flushing and filling unit.

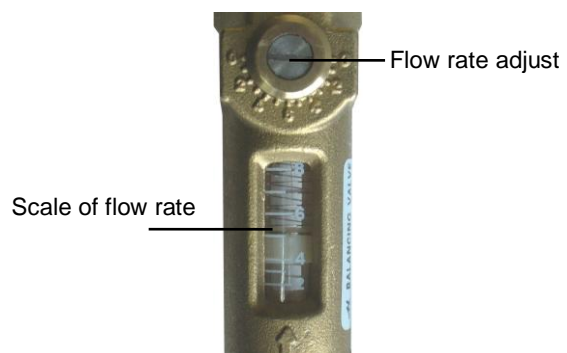
- Close the ball valve (2) in the centre of the flushing and filling unit.
- Open the filling ball valve (1) and drain ball valve (3).
- Flush the solar thermal system using the flushing and filling station for at least 15 minutes to remove all air from the system.
- During the flushing, bleed the solar thermal system several times at the airstopp until the discharged solar fluid is free of air bubbles.
- Close the drain ball valve (3) of flushing and filling unit, and continue to run the pump and increase the system pressure to approx. 5 bar, system pressure can be read from the manometer.
- Close the filling ball valve (1) of the flushing and filling unit, and then close the filling pump.
- Check the manometer to see whether the system pressure reduces and eliminate leaks where necessary.
- Reconnect the expansion vessel to the solar thermal system.

### 3.2 Flow check

The flow counter is used for measurement and display of flow rate 1-20 L/M, in order to guarantee the flawless function of the measuring device the system must be flushed and free from foreign substances.



**Digital flow rate counter**  
0.1 -20L/min



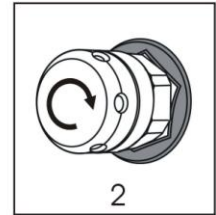
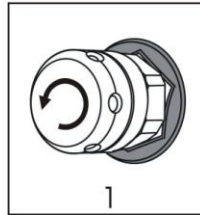
**Mechanical flow rate counter**  
2-8L/min

### 3.3 Airstopp

After pump station is filled and commissioning, airstopp will automatically release air for system, and it is possible to release air manually.

- Factory default status of Airstopp is releasing air automatically.

- In the case that airstopp is in automatic status, anti-clockwise turn the knob 180° to switch the status to manual air releasing. (See picture 1)
- In the case that airstopp is in manual status, clockwise turn the knob 180° to switch the status to automatic air releasing. (See picture 2)
- Airstopp is used for releasing the air from system. The air released from solar liquid will assemble at the top part of airstopp (see picture 3), and released from airstopp. In order to take the air from pipe to airstopp, minimum flow speed of 0.3m/s should be ensured.
- After air releasing, please check the system pressure, if need, please increase the system pressure to the desired operation pressure by filling and flush station.



**Warning:** high temperature scald!

During air releasing, temperature of released air and liquid maybe over 100°C.

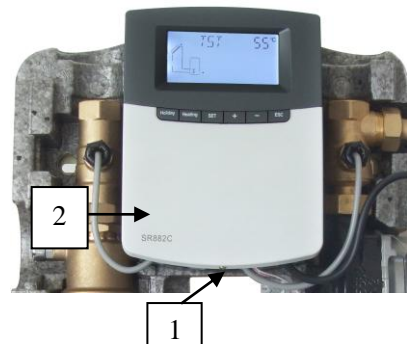
### 3.4 Electrical connection



**Warning:** disconnect the controller from power supply before opening the housing!

The controller is already integrated in the station and ready to plug in. Pump, pipe sensor and digital counter are already pre-connected with controller at factory. But for connecting other wires, it needs to open the controller, doing follows below steps:

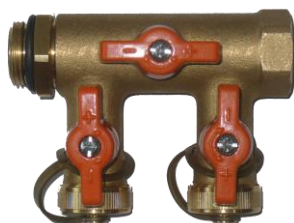
- Switch off the system, disconnect plug from the mains.
- Remove the front half of the insulation.
- Unscrew the cross-recessed screw 1 of the front cover of controller and remove it by pulling it downwards.
- Connect the wires to controller, and doing reverse steps to remount the front cover of controller and insulation.



For further information on electrical connection of the controller, please see manual of controller (2.3 Terminal layout and system description).

### 3.5 Flushing and filling unit (Spar part A06)

Flushing and filling unit is a optional accessory part of system, it is not included in the standard scope of delivery, please prepare separately



A06

# Manual of integrated controller of solar station

## 1. Safety information

We have carefully checked the text and figures 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, they are just some examples, and they apply only to our own system. Incorrect, incomplete and erroneous information and the resulting damage we do not take responsibility.

### 1.1 Description of symbols



#### Safety instruction:

The safety instruction in the manual is marked with a warning triangle. They indicate measures, which can lead to personal injury and safety risks.

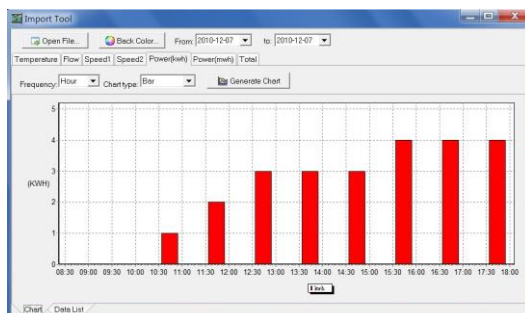
**Operation steps:** small triangle “►” is used to indicate operation step.

**Notes:** Contains important information about operation or function.

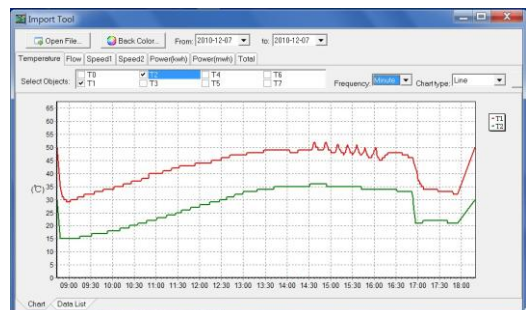
## 2. Overview

### 2.1 Introduction of controller

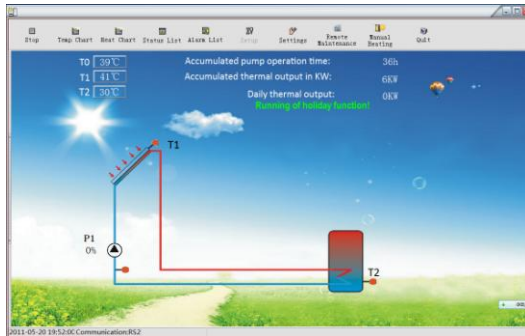
- LCD display
- 3 relay outputs
- 6 sensor inputs
- 1 PWM outputs for speed control of pump
- Data saved on SD card
- RS485 remote control
- Timing and temperature set point control function
- Energy saved on/off operation model



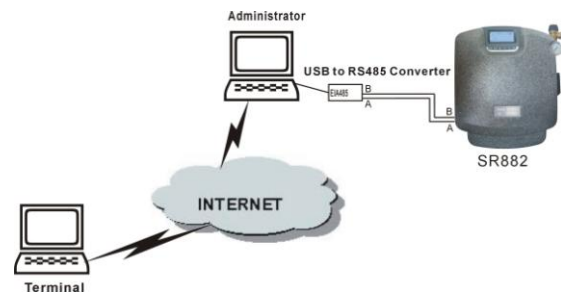
Picture 1



Picture 2



Picture 3



Picture 4

## 2.2 Technical data

- Material of cases: ABS
- Available ambient temperature: 0 ... 40 °C
- Dimensions: 188 x 138 x 43 mm
- Mounting: on wall or in the electrical cases
- Operation button: 6 operation buttons on panel
- Communication port: SD card groove.
- Power supply: 100 ... 240V ~, 50 ... 60 H z
- Power consumption : < 1W
- Accuracy of temperature measuring :  $\pm 2^{\circ}\text{C}$
- Range of collector temperature measuring: -10- 200°C
- Range of tank or pipe temperature measuring: 0-110°C
- Inputs: 1 x Pt1000 sensor ( $\leq 500^{\circ}\text{C}$ ) for collector (silicon cable  $\leq 280^{\circ}\text{C}$ ),  
5 x NTC10K, B3950 sensor ( $\leq 135^{\circ}\text{C}$ ) for tank, (PVC cable  $\leq 105^{\circ}\text{C}$ ),  
1 x RS485 remote control connection
- Outputs: 1 PWM outputs ( $\leq 200\text{W}$ )  
2 relays outputs ( each available power  $\leq 300\text{W}$  )
- Ambient temperature: -10-50 °C
- Water proof grade: IP40

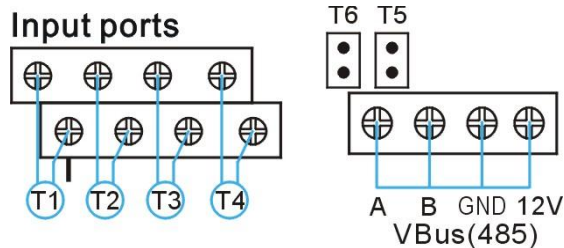
**Note:** SD card isn't included within the delivery scope of controller.

## 2.3 Terminal connection



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

### Input ports



Inputs T1: For PT1000 temperature sensor, used for measuring the temperature of collector.

Inputs T2 ~ T6: for NTC10K, B=3950 temperature sensor, used for measuring the temperature of storage or pipe.

VBus (485): for RS485 remote control connection.

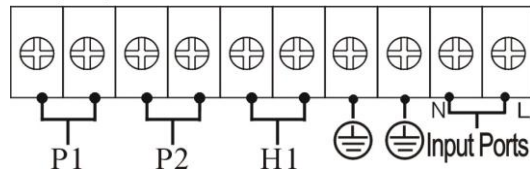
#### ● Advice regarding the installation of temperature sensors:

- 1) Only original factory enclosed Pt1000 temperature sensors are approved for use with the collector, it is equipped with 1.5meter silicon cable and suitable for all weather conditions, the temperature sensor and cable are temperature resistant up to 280<sup>o</sup> C, not necessary to distinguish the positive and negative polarity of the sensor connection.
- 2) Only original factory enclosed NTC10K,B=3950 temperature sensors are approved for use with tank and pipe, it is equipped with 1.5meter PVC cable, and they are temperature resistant up to 105<sup>o</sup> C, not necessary to distinguish the positive and negative polarity of the sensor connection.
- 3) 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)
- 4) If external inductive effects are existed, e.g. from heavy current cables, overhead train cables, transformer substations, radio and television devices, amateur radio stations, microwave devices etc, then the cables to the sensors must be adequately shielded.
- 5) 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<sup>2</sup> cable should be used. When cable's length is

up to 100m, and then 1.5mm<sup>2</sup> cable should be used.


## ● Output ports

Output ports



## Power terminal : L, N, GND

Input ports L, N is power connection terminal, please connect correctly.

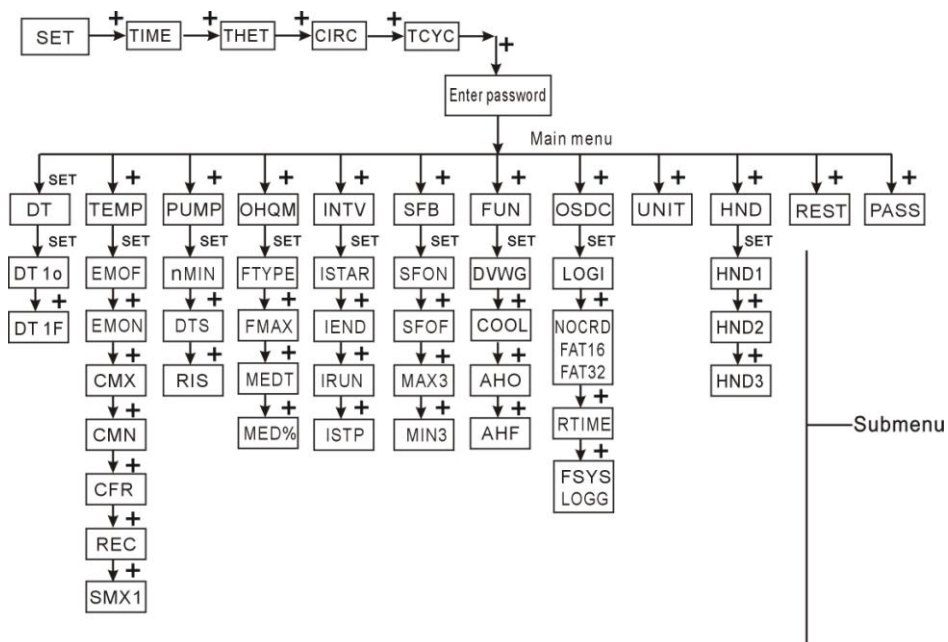
 is Ground line terminal.

**Output P1:** For solar circuit pump, also suitable for RMP control, semiconductor relay, max. switching current 1A.

**Output P2:** Electromagnetic relay, its max. switching current 3.5A.

**Output H1:** For back-up electrical heater, electromagnetic relay, max. switching current 10A,

## 2.4 Menu Structure



## Submenu:

Through submenu, user can set the parameter as desired value, please check it carefully.

## 2.5 Menu description

Code (Main menu)	Code (Submenu)	Code (Submenu)	Menu Description
DT			Temperature difference
TEMP			Set Temperature
	EMOF		The maximum switch-off temperature of collector
	EMON		The maximum switch-on temperature of collector
	CMX		Maximum temperature of collector (Collector cooling function)
	CMN		Low temperature protection of collector
	CFR		Frost protection of collector
	REC		Tank re-cooling function
	SMX1		Maximum temperature of tank
PUMP			Set parameters for pump speed adjust
	nMIN		Speed controlling of circulation pump (RPM pump controlling)
	DTS		Standard temperature difference (for circulation pump speed adjust)
	RIS		Increase scale (circulation pump speed adjusting parameter set)
OHQM			Thermal energy measuring
	FTYPE		Select type of flow counter
	FMAX		Flow rate
	MEDT		Type of heat transfer liquid
	MED%		Concentration of heat transfer liquid
INTV			Pump interval function
	ISTAR		Switch-on time for pump interval function
	IEND		Switch-off time for pump interval function
	IRUN		Pump running time
	ISTP		Pump interval time
SFB			Switch on/off of solid fuel boiler
	SFON		Minimum switch-on temperature of tank
	SFOF		Maximum switch-off temperature of tank



	MAX3		Maximum switch-off temperature of solid fuel boiler
	MIN3		Minimum switch-on temperature of solid fuel boiler
FUN			Auxiliary functions
	DVWG		Anti legionnaires' function
	COOL		High temperature cooling function
	AHO		Switch-on temperature for thermostat
	AHF		Switch-on temperature for thermostat
OSDC			SD card function
	LOGI		Data saving interval time (in minute)
	NOCRD FAT16 FAT32		No card in groove EMS memory < 2G EMS memory > 2G
	RTIME		Rest days for data saving ( in day)
	FSYS LOGG		System file error <b>Log</b> possible
UNIT			Celsius and Fahrenheit temperature switch
HDN			Manual controlling
REST			Recovery to factory set
PASS			Password set

## 2.6 System description

### Note:

T3 is alternative sensor, when no sensor (T3) is installed on the top part of tank, controller will use the signal of sensor T2 automatically to control the auxiliary heating or the circulation pump.

### 1 collector array – 1 storage tank – 1 pump and auxiliary heating

#### Description:

The solar circuit pump (P1) is switched on as soon as the switch-on temperature difference ( $\Delta T_{on}$ ) between the collector array (T1) and the storage tank (T2) is reached. If the temperature difference between the collector array (T1) and storage tank (T2) drops below the switch-off temperature difference ( $\Delta T_{off}$ ), or the temperature of storage tank (T3) reaches the preset maximum storage temperature, then the solar circuit pump (P1) is switched off.

#### Back-up heating by auxiliary boiler (detailed see paragraph 3.2):

Within the preset schedule of back-up heating, if the temperature T3 is below the preset switch-on temperature, then the back-up heating (H1) is triggered, when T3 is heated to the preset switch-off temperature, back-up heating H1 is ceased.

T1: Sensor on collector array

T2: Sensor on the bottom part of tank.

T3: Sensor on the top part of tank

(optional sensor)

T4: Sensor on hot water pipe, on solid fuel boiler or for thermostat (alternative)

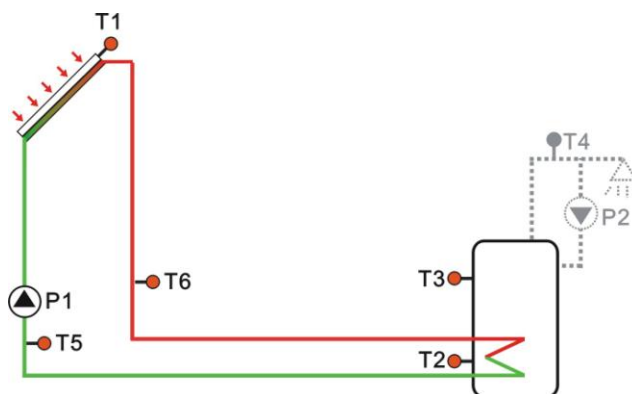
T5: Sensor on tank return pipe (for measuring thermal energy)

T6: Sensor on tank flow pipe

P1: Solar circuit pump

P2: Hot water circuit pump, solid fuel boiler circuit pump, output for thermostat or output for high temperature cooling (Note: this output can only be used as one of the above mentioned four functions, depending on which function is activated)

H1: Output for back-up electrical heater



### 3. Controller functions and parameters setup ( User grade)

#### 3.1 Set time/week/day/month/year

► Press “SET” button, “TIME” displays on the screen.

► Press “SET” button, hour area “00” blinks on the screen.

► Press “+、-” button, to adjust hour

► Press “SET” button, minute area “00” blinks on the screen.

► Press “+、-” button, to adjust minute

► Press “SET” button, week area “MO” blinks on the screen.

► Press “+、-” button, to adjust week

► Press “SET” button, “day/month/year” area “year” blinks on the screen.

► Press “+、-” button, to adjust year

► Press “SET” button, “day/month/year” area “month” blinks on the screen.

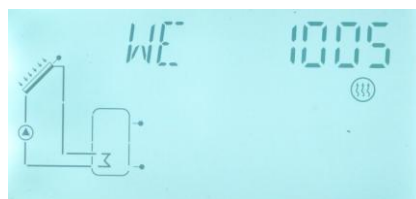
► Press “+、-” button, to adjust month

► Press “SET” button, “day/month/year” area “day” blinks on the screen.

► Press “+、-” button, to adjust day

► Press “ESC” button, to exit program or wait for 20 second to exit automatically.

CODE	WEEK
MO	Monday
TU	Tuesday
WE	Wednesday
TH	Thursday
FR	Friday
SA	Saturday
SU	Sunday



#### 3.2 tHET Timing heating

##### Description:

Electrical heater, gas boiler or oil boiler can be integrated into solar system used as back-up of system, and they can be triggered automatically at preset schedule by preset temperature. Within a preset schedule, when the temperature (T3) of top part of tank drops below the preset switching-on temperature of this function, back-up heating starts to work, when T3 rises up to the preset turning off temperature, back-up heating is stopped. Within 24 hours, three time sections can be set with this controller.

##### Factory set:

**The first schedule:** back-up heating function starts at 4:00 and ends at 5:00 am. Within this time section, switch-on temperature is 40°C; switch-off temperature is 45°C.

**The second schedule:** from 10:00 to 10:00 am, it means there is no back-up heating in this time.

**The third schedule:** back-up heating function starts at 17:00 and ends at 22:00 pm. Within this time section, the switch-on temperature is 50°C; switch-off temperature is 55°C.

The switch-on temperature adjustable range: 10 °C ~ (OFF-2 °C)

The switch-off temperature adjustable range: (ON+2 °C) ~ 80 °C

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

When time is outside of the preset schedule, back-up heating doesn't work automatically even when the tank temperature reaches the switch –on temperature of heating.

**Note:**

- When there is no sensor installed in the top part of tank (no T3 sensor), controller will take the signal of T2 (sensor in bottom of tank) automatically to control this function.
- The time in this controlled is 24 hours mode, when you set schedule, the switch-off time of heating should be larger than the switch-on time. For example: if you set the switch-on time of heating is at 17:00, but switch-off time of heating is 6:00, then this setting doesn't take effect, that means within this time section, heating function doesn't work. The correct set is like flowing: it should be divided into two time sections, one time section is from 17:00 to 23:59, the other time section is from 00:00 to 06:00.

**Setup steps:** under standby status.

► Press “SET” button, then press “+” button, “tHET” menu displays on the screen.

► Repress “SET” button, to access “tHET” program,

► Repress “SET” button, to access parameter setting window of tHET program, “tH 1o 04:00” displays on screen, “04” of hour time blinks on screen, the switch-on time and temperature for the first schedule of heating function can be



► Press “+”“-” button to adjust hour of time

► Repress “SET” button again, “00” of minute time blinks on screen

- ▶ Press “+”“-” button to adjust minute of time
- ▶ Repress “SET” button, temperature “40℃” blinks on screen



- ▶ Press “+”“-” button, to set the switch-on temperature of heating

- ▶ Then, Press “ESC” to exit this set

- ▶ Press “+” button, “tH 1F 05:00” displays on screen, the switch-off time and temperature for the first schedule of heating function can be set.

- ▶ Press “SET” button, “05” of hour time blinks on screen.



- ▶ Press “+”“-” button to adjust hour of time
- ▶ Repress “SET” button, “00” of minute time blinks on screen

- ▶ Press “+”“-” button to set minute of time

- ▶ Repress “SET” button, temperature “45℃” blinks on screen

- ▶ Press “+”“-” button, to set switch-off temperature of heating

- ▶ Press “ESC” to exit this set program, parameters are saved automatically

- 
- ▶ Press “+” button, “tH 2o 10:00” displays on screen, the switch-on time and temperature for the second schedule of heating function can be set.

- ▶ Press “SET” button, “10” of hour time blinks on screen.



- ▶ Press “+”“-” button to adjust hour of time
- ▶ Repress “SET” button, “00” of minute time blinks on screen

- ▶ Press “+”“-” button to set minute of time

- ▶ Repress “SET” button, temperature “50℃” blinks on screen

- ▶ Press “+”“-” button, to set switch-on temperature of heating

- ▶ Then, Press “ESC” to exit this set

- ▶ Press “+” button, “tH 2F 10:00” displays on screen, the switch-on time and temperature for the second schedule of heating function can be set.



- ▶ Press “SET” button, “10” of hour time blinks on screen.

- ▶ Press “+”“-” button to adjust hour of time

- ▶Repress “SET” button, “00” of minute time blinks on screen
  - ▶Press “+”“-” button to set minute of time
  - ▶Repress “SET” button, temperature “55°C” blinks on screen
  - ▶Press “+”“-” button, to set switch-off temperature of heating
  - ▶Press “ESC” to exit this set program, parameters are saved automatically
- 

▶Press “+” button, “tH 3o 17:00” displays on screen, the switch-on time and temperature for the third schedule of heating function can be set.

▶Press “SET” button, “17” of hour time blinks on screen.

▶Press “+”“-” button to adjust hour of time

▶Repress “SET” button, “00” of minute time blinks on screen

▶Press “+”“-” button to set minute of time

▶Repress “SET” button, temperature “50°C” blinks on screen

▶Press “+”“-” button, to set switch-on temperature of heating

▶Then, Press “ESC” to exit this set

▶Press “+” button, “tH 3F 22:00” displays on screen, the switch-on time and temperature for the second schedule of heating function can be set.

▶Press “SET” button, “22” of hour time blinks on screen.

▶Press “+”“-” button to adjust hour of time

▶Repress “SET” button, “00” of minute time blinks on screen

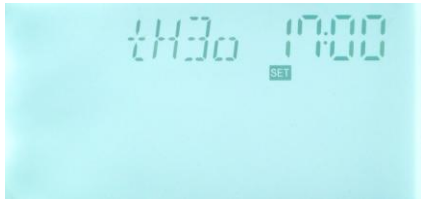
▶Press “+”“-” button to set minute of time


▶Repress “SET” button, temperature “55°C” blinks on screen

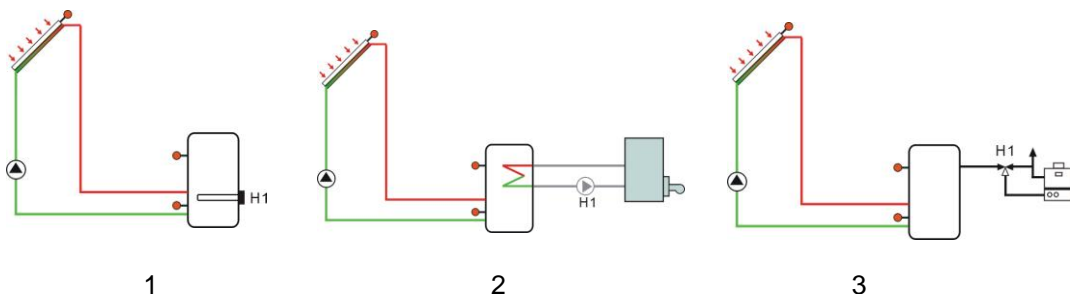
▶Press “+”“-” button, to set switch-off temperature of heating

▶Press “ESC” to exit this set program, parameters are saved automatically

---



**Note:** when no gas or oil boiler is connected to solar system, electrical heater can be installed as back-up device, when electrical heater is in operation status, signal  blinks on screen, and LED light is on.

**Application Example:**

If customer use electrical heater as back-up, please according to the power of electrical heater to equip corresponding safety devices like contactor and breaker with this controller, we strongly recommend equipping with SR802 device with this controller, (SR802 detailed technical data see paragraph spare parts)

**3.3 CIRC DHW pump control function**

Select CIRC submenu, "CIRF OFF" appears on the screen, the default set is: OFF.

- ▶ Press "SET" button, parameter "OFF" blinks on the screen.
- ▶ Repress "SET" button to activate this function, "CIRC ON" appears on the screen.
- ▶ Press "ESC" to exit this submenu, or wait for 20 seconds to exit automatically, the parameter values are saved automatically.



- ▶ Press "+" button, "tCYC" appears on the screen.
- ▶ Press "SET" button to access "tCYC" menu.
- ▶ Press "SET" button, access tCYC three schedules function, "tC 1o 05:00" appears, now can set the first turn-on time.
- ▶ Press "SET" button again, "05" of hour time blinks on screen.
- ▶ Press "+" "-" button to adjust hour of time.
- ▶ Repress "SET" button, "00" of minute time blinks on screen.
- ▶ Press "+" "-" button to adjust minute of time.
- ▶ Repress "SET" button, "03 Min" of pump running time



blinks on screen.

- ▶ Press “+” “-” button to adjust pump running time
- ▶ Press “ESC” to exit this set
- ▶ Press “+” button, “tC 1F 07:00” appears, now can set the first turn-off time.
- ▶ Press “SET” button again, “07” of hour time blinks on screen.
- ▶ Press “+” “-” button to adjust hour of time.
- ▶ Repress “SET” button, “00” of minute time blinks on screen.
- ▶ Press “+” “-” button to adjust minute of time.
- ▶ Repress “SET” button, “15 Min” of pump stop time blinks on screen.
- ▶ Press “+” “-” button to adjust pump stop time
- ▶ Press “ESC” to exit this set program, parameters are saved automatically



- 
- ▶ Press “+” button, “tC 2o 11:00” appears, now can set the second turn-on time.
  - ▶ Press “SET” button again, “11” of hour time blinks on screen.
  - ▶ Press “+” “-” button to adjust hour of time.
  - ▶ Repress “SET” button, “00” of minute time blinks on screen.
  - ▶ Press “+” “-” button to adjust minute of time.
  - ▶ Repress “SET” button, “03 Min” of pump running time blinks on screen.
  - ▶ Press “+” “-” button to adjust pump running time
  - ▶ Press “ESC” to exit this set
  - ▶ Press “+” button, “tC 2F 13:00” appears, now can set the second turn-off time.
  - ▶ Press “SET” button again, “13” of hour time blinks on screen.
  - ▶ Press “+” “-” button to adjust hour of time.
  - ▶ Repress “SET” button, “00” of minute time blinks on screen.





- ▶ Press “+” “-” button to adjust minute of time.
- ▶ Repress “SET” button, “15 Min” of pump stop time blinks on screen.
- ▶ Press “+” “-” button to adjust pump stop time
- ▶ Press “ESC” to exit this set program, parameters are saved automatically

-----

▶ Press “+” button, “tC 3o 17:00” appears, now can set the third turn-on time.

▶ Press “SET” button again, “17” of hour time blinks on screen.

▶ Press “+” “-” button to adjust hour of time.

▶ Repress “SET” button, “00” of minute time blinks on screen.

▶ Press “+” “-” button to adjust minute of time.

▶ Repress “SET” button, “03 Min” of pump running time blinks on screen.

▶ Press “+” “-” button to adjust pump running time

▶ Press “ESC” to exit this set

▶ Press “+” button, “tC 3F 22:00” appears, now can set the third turn-off time.

▶ Press “SET” button again, “22” of hour time blinks on screen.

▶ Press “+” “-” button to adjust hour of time.

▶ Repress “SET” button, “00” of minute time blinks on screen.

▶ Press “+” “-” button to adjust minute of time.

▶ Repress “SET” button, “15 Min” of pump stop time blinks on screen.

▶ Press “+” “-” button to adjust pump stop time

▶ Press “ESC” to exit this set program, parameters are saved automatically



### Description of temperature controlled DHW pump:

Solar system can provide temperature-controlled hot water circulation function; this function needs an extra hot water circulation pump (connect output port P2) and a sensor, which is installed on the return pipe of hot water (connect input port T4). When the temperature signal of sensor T4 is less than the preset turning on temperature of DHW pump, the hot water circulation pump (P2) triggers and works till the temperature exceeds the turning off temperature.

**Factory set:** the switch-on temperature of temperature controlled DHW pump function is 40°C, the Switch-off temperature is 45°C,

**Condition for triggering hot water circulation pump:** only when tank temperature T3 is 2°C higher than the required hot water temperature, hot water circulation pump just can be triggered.

**Description of time controlled DHW pump:**

DHW pump can also be controlled at the pre-set time sections, this function needs an extra DHW pump (connect output port P2), this pump will be triggered timing, and within a running time section, default operation is pump runs for 3 minutes, then stops for 15 minutes, the process repeats within the time section.

**Default time sections:**

The first time section: pump works at 05:00 and stops at 07:00.

The second time section: pump works at 11:00 and stops at 13:00.

The third time section: pump works at 17:00 and stops at 22:00.

If user wants to switch-off any time section, then just set the start time and close time with a same time. i.e. starts at 05:00 and close also at 05:00.

**Note:**

- Temperature controlled DHW function is prior to time controlled DHW function.
- When T4 is installed on the return pipe of hot water, controller will automatically turn-off the time controlled function, inverse to use temperature controlled DHW function.
- In order to avoid large measuring error, the sensor T4 on hot water return pipe should be installed 1.5m far away from tank at least.

## 4. Controller functions and parameters setup (engineer grade)

### 4.1 Access main menu

Under standby status, doing like following to access main menu

► Press “SET” button and then press “+” three times, “PWD 0000” displays on screen, then press “SET” button again, the left first digital blinks, ask for entering password, factory default password is “0000”

► Press “+”“-” button to enter first digital of password.

► Press “SET” button again, the second digital blinks

► Press “+”“-” button, to enter second digital of password

► Press “SET” button again, the third digital blinks

► Press “+”“-” button to enter the third digital of password

► Press “SET” button again, the fourth digital blinks

► Press “+”“-” button, to enter the fourth digital of password

► Press “SET” button again to access main menu

► Press “+”“-” button, to select the desired main menu for parameter setting

► Press “ESC” button to exit main menu



**Note:** factory set password is “0000”, if don’t set new password, then continuously press “SET” button four times to access main menu.

### 4.2 DT Temperature difference function

#### Description:

Solar circuit pump P1 is triggered by the temperature difference function, so long as the temperature difference between collector and tank reaches the switch-on DT, solar circuit pump is triggered.

For example: the switch-on DT is 8°C, switch-off DT is 4°C, if the temperature in the bottom part of tank is 20°C, then just when collector temperature rises up to 28°C, pump is triggered, and when collector temperature drops to 24°C, pump is ceased.

**Note:** the switch-on/off DT of 8 °C and 4 °C are standard system setting according to many years’ experience, only in special application cases it needs to be changed, (e.g. far distance heat transferring), normally it is recommended using default set. Switch-on and switch-off DT are alternating set. To avoid mistake the minimum difference between two temperature differences ( $\Delta T_{on} - \Delta T_{off}$ ) is set as 2°C.

### Setup the switch-on temperature difference:

Under standby status, access main menu DT,

►Press “SET” button, to access settings program of DT, “DT 1o 08°C” displays on the screen, “08°C” blinks, the switch-on temperature difference can be set.



►Press “+”“-” button, to adjust the value of switch-on DT, adjustable range (OFF+2°C)~20°C, factory setting is 8°C

►Press “ESC” button to confirm the DT 1o set point.

►Press “+” button, “DT 1F 04°C” displays on the screen



►Press “SET” button, “04°C” blinks, the switch-off temperature difference can be set.

►Press “+”“-” button to adjust the value of switch-off DT, adjustable range 0°C~(ON-2°C), factory set is 4°C.

►Press “ESC” to exit menu, or wait for 20 seconds to exit automatically, the setup parameters are saved automatically.

### 4.3 TEMP Temperature

For every system, the factory set parameters are in the best condition that is fully integrated into the entire solar system. But these parameters can also be set individually to cater the special requirements, please carefully observe the operation data of system components after setting.

**Note:** parameters that can be set depend on the system design, not all the parameters can be adjusted in a solar system.

Following submenus and parameters can be set under TEMP main menu.

Sub menu	Function description	Adjustable range	Factory set	Function exit temperature	Paragraph
<b>EMOF</b>	Switch-on temperature of collector emergency function	(ON+3°C) ~200°C	130°C		See 4.3.1
<b>EMON</b>	Switch-off temperature of collector emergency function	80°C ~ (OF-3°C)	120°C		See 4.3.2
<b>CMX</b>	Maximum limited collector temperature (collector cooling function)	70°C~190°C	110°C	107°C	See 4.3.3
<b>CMN</b>	Low temperature protection of collector	0°C~90°C	--		See 4.3.4
<b>CFR</b>	Frost protection temperature of collector	-10°C~10°C	--		See 4.3.5
<b>REC</b>	Tank re-cooling function		OFF		See 4.3.6
<b>SMX1</b>	Maximum temperature of tank1	2°C~95°C	60°C	58°C	See 4.3.7

### 4.3.1 EMOF Switch-on temperature of collector emergency function

#### Function description:

When collector temperature rises up to the preset switch-on temperature of collector (EMOF), collector emergency function is activated, solar circulation pump is stopped in order to avoid the damage of system other components caused by high temperature. The adjustable range of this EMOF temperature is (ON+3°C) ~200°C, factory set is 130°C. When the temperature of collector rises up to EMOF temperature, solar circuit pump is locked, but when collector temperature drops to the switch-off temperature of collector emergency function (EMON) (factory set is 120°C), solar circuit pump is unlocked, and collector emergency function is deactivated.

Select EMOF submenu, "EMOF 130°C" displays

►Press "SET" button, 130°C blinks.

►Press "+" "-" button, adjust the EMOF temperature, adjustable range: (ON+3°C) ~200°C ,factory set is 130°C



►Press "SET" button, activate and deactivate this function, if the function is deactivated, then "EMOF ----"displays on the screen.

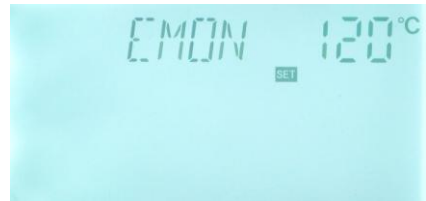
►Press "ESC" button to exit menu or wait for 20 seconds to exit automatically, set parameters are saved automatically.

### 4.3.2 EMON Switch-off temperature of collector emergency function

Select EMON submenu, "EMON 120°C" displays

►Press "SET" button, 120°C blinks.

►Press "+" "-" button, adjust the EMON temperature, adjustable range: 80 °C ~ (OF-3) °C , factory set is 120°C.



►Press "SET" button, activate and deactivate this function, if the function is deactivated, then "EMON ----" displays on the screen.

►Press "ESC" button to exit menu or wait for 20 seconds to exit automatically, set parameters are saved automatically.



When these two signals of EM blink on the screen, it indicates this function is activated, and at this moment temperature of tank reaches to its maximum limited temperature



When only this signal of EM blinks on the screen, it indicates this function is also activated, but temperature of tank doesn't reach to its maximum limited temperature



### 4.3.3 CMX Maximum limited collector temperature (collector cooling function)

#### Function description:

The collector cooling function delays the vaporization of the heat transfer fluid. Shortly before reaching the maximum temperature of the collector, the solar pump starts working to cool down the heat transfer fluid by the heat losses occurring in pipelines and storage cylinder.

When tank temperature rises to its preset maximal temperature, solar circuit pump is ceased compulsively even the temperature difference is satisfied. If the sunshine is very good, as a result collector temperature will rise continuously, when collector temperature rises up to its maximal temperature, solar pump will be triggered again even at the case that tank temperature is already to its maximal temperature. And solar pump works until the temperature of collector is decreased by this reversed circulation or when tank temperature rises its emergency temperature (95°C).



When  displays, and  blinks on the screen, it indicates that tank emergency temperature reaches, tank temperature is  $\geq 95^{\circ}\text{C}$

### Setup steps:

To access main menu TEMP, then select submenu CMX “CMX 110°C” displays on the screen.

►Press “SET” button, parameter “110°C” blinks.

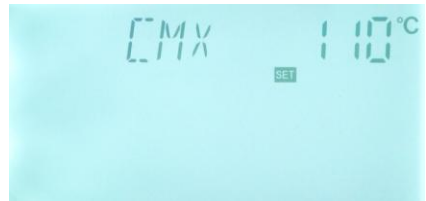
►Press “+”“-” button, to adjust the collector protection temperature, adjustable range (70°C~190°C) , factory set is 110°C

►Repress “SET” button, activate and deactivate this function, if deactivate the function, “CMX - -” displays on screen.

►Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



CMX signal displays on screen, it indicates that this function is activated.



### 4.3.4 CMN low temperature protection of collector

#### Description:

When the temperature of collector is below preset CMN temperatures, solar circuit pump is locked, even when the temperature difference between collector and tank exceeds the switch-on temperature difference, solar pump doesn't work yet. When temperature of collector is 3°C higher that the preset CMN temperature, solar circuit pump is unlocked for operating, controller exits this program.

### Setup steps:

To access main menu TEMP, then select submenu CMN, “CMN-----” displays on screen, default set is off.

►Press “SET” button, default off signal “- - -” blinks on screen.

►Repress “SET” button, to activate and deactivate this function

►Press “+”“-” button, to adjust the low protection temperature of collector CMN, adjustable range (00°C~90°C), after activate the function, factory set is 10°C

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



CMN signal displays on screen, it indicates that this function is in activated.

### 4.3.5 CFR frost protection of collector

#### Description:

In winter when the temperature of collector is below the preset frost protection temperature (factory set is 4 °C), Solar circuit pump is triggered to circuit solar liquid reversed. Besides when tank temperature (T2) drops to 6 °C, electrical heater is triggered automatically and it is in operation until T2 is heated up to 21 °C or it is stopped when program of CFR is exited. When collector temperature rises up to 7 °C, solar circuit pump is ceased, program of CFR exits automatically.

This function is used in systems, which use water as heat transfer liquid, to avoid the freezing of solar heat transfer fluid.

#### Setup steps:

To access main menu TEMP, then select submenu CFR, "CFR ----" displays on screen, default set is off.

▶ Press "SET" button, default off "- - -" blinks.

▶ Repress "SET" button, to activate or deactivate this function

▶ Press "+" "-" button, to adjust the temperature of frost protection function, adjustable range is (-10 °C ~ 10 °C) , after function activated, default set is 4 °C

▶ Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



CFR signal displays on screen, it indicates that this function is activated.

**Note:** this function is only available in special solar system which using no-anti-freezing liquid; this kind of system is only suitable in area where the ambient temperature is near to 0 °C for only a few days. If safety requirement is very high, then anti-freezing is necessary, we suggest using suitable anti-freezing liquid to avoid frost problem.

### 4.3.6 REC Tank re-cooling function

#### Description:

If tank temperature is over tank's maximum temperature, and at the same time, collector temperature is 5 °C lower than tank temperature, then solar pump can be triggered, through this reversed circulation, tank temperature is decreased by heat loss occurs in collector, solar pump keeps in working until tank temperature drops below its maximum temperature.



**Setup steps:**

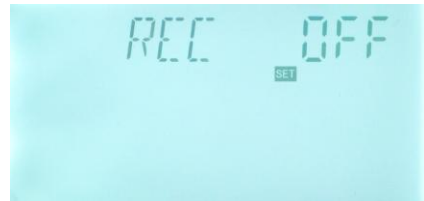
To access main menu TEMP, then select submenu REC, "REC OFF" displays on screen, default set is off.

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

► Repress "SET" button to activate or deactivate this function, after function activated; factory set is "REC ON"

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

☀ REC signal displays on screen, it indicates that this function is in activated.



#### 4.3.7 SMX1 Maximum temperature of tank 1

**Description:**

When the DT between collector T1 and Tank 2 caters the switch-on DT of circulation, solar pump is triggered, but in order to avoid the high temperature inside tank, controller will check whether the temperature (T3) of top part of tank is higher than the maximum temperature of tank, when T3 is higher than preset SMX temperature, solar pump is ceased even at the case that DT caters condition. When tank temperature drops and is 2°C below the SMX, solar pump restarts when DT caters condition.

**Setup steps:**

To access main menu TEMP, then select submenu SMX, "SMX 60°C" displays on screen.

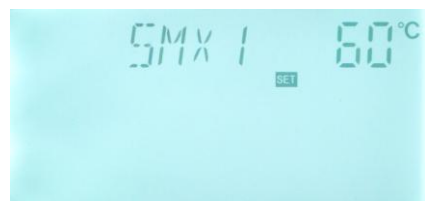
► Press "SET" button, parameter "60°C" blinks

► Press "+" "-" button to adjust the value of maximum temperature of tank, adjustable range is (2°C ~ 95°C), default set is 60°C

► Repress "SET" button to activate and deactivate this function, if function deactivated, "SMX1 - - -" displays on the screen.

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

☀ SMX signal displays on screen, it indicates that this function is in activated.



#### 4.4 PUMP Circuit pump speed adjust set

**Description:**

P1 output can be configured to function either as RPM controlled output or simple switch

output.

When nMIN is set as 30-90%, P1 output used as RPM output.

When nMIN is set as 100%, it means P1 output used as switch output.



**Normal switch output:** circuit pump speed control (RPM) is deactivated, pump is operated with a fixed speed, and flow rate is not changed.

**RPM control output:** (speed control function is activated), the control system attempts to maintain a constant temperature difference between collector and tank. The pump performance is continuously adjusted, based on the temperature difference flow rate of pump is increased or reduced.

#### Setup steps:

To access main menu PUMP, "PUMP" displays on the screen, press "SET" to access the menu, then "nMIN 100" displays on screen.

► Press "SET" button, parameter "100" blinks on the screen.

► Press "+" "-" button, to adjust pump speed.

adjustable range: (30~100%) , factory set is 100%.

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.4.1 DTS Standard temperature difference for circulation pump 1 (speed adjusting)

##### Description:

The preset default minimum pump speed in this controller is 30%. When the switch-on temperature difference ( $\Delta T_{ON}$ ) reaches, solar pump is triggered, and then within 10 seconds, pump speed increases to its minimum speed (30%). Thereafter, controller checks temperature continuously, when a standard temperature difference (DTS) reaches, the speed of pump increases one grade (10%), temperature difference RIS increases every 1°C, speed of pump increases 10% until it reaches to its maximum speed 100%. Through setting the temperature difference increase rate (RIS) can achieve the controlling of pump speed. If temperature difference drops to the switch-off temperature difference ( $\Delta T_{OFF}$ ), circuit pump is ceased.

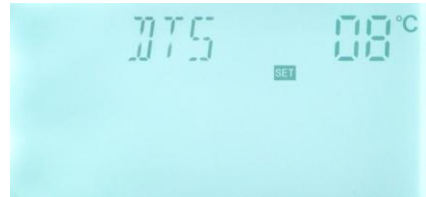
**Setup steps:**

To access PUMP, then select submenu DTS, “DTS 08 °C” displays on screen.

▶ Press “SET” button, parameter “08°C” blinks on the screen

▶ Press “+” “-” button, to adjust the standard DTS, adjustable range (2 °C~30 °C) , factory set is 08°C

▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



**4.4.2 RIS Gain for circulation pump 1 (speed adjusting)**

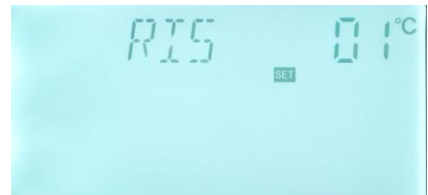
**Setup steps:**

To access menu PUMP, then select submenu RIS, “RIS 01 °C” displays on screen.

▶ Press “SET” button, parameter “01°C” blinks on the screen

▶ Press “+” “-” button, to adjust standard RIS, adjustable range (1 °C~20 °C) , factory set is 1°C

▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



**4.5 OHQM Thermal energy measuring**

**Description:**

Controller has function for measuring the thermal energy; it can measure the energy which is transferred from collector to tank. For the sake of measuring, the temperature on flow and return pipe should be checked, and an extra flow meter should be installed on the circulation pipe, it is used for measuring the flow rate.

The thermal energy transferred by solar system is calculated with measured parameters flow rate and temperature T5 (installed on the return pipe). Thermal energy got in the current day displays in DkWh, accumulative thermal energy displays in kWh or MWh. The amount of 2 values is the total energy output.

Factory set of OHQM is off.

**Setup steps:**

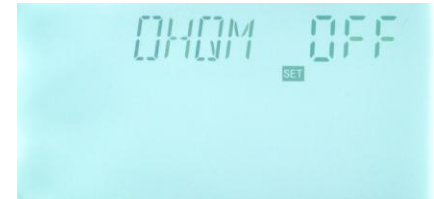
To select menu OHQM, “OHQM” displays on the screen,

► Press “SET” button, parameter “OHQM OFF” blinks on the screen

► Repress “SET” button, “OFF” blinks.

► Repress “SET” button, to activate this function, then “OHQM ON” appears on the screen

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



Thermal energy got in current day, accumulative thermal energy and operation time of pump can be reset, doing like following.

**Operation steps:** under standby status,

► Press “+” “-” button, select the thermal energy of current day, “DKWH XX” “SET” displays on the screen.

► Press “SET” button for 3 seconds, buzzer makes 3 times “du-----”, the daily thermal energy is cleared, and daily thermal energy is reset to “00”.

► Press “+” “-” button, select to check accumulative thermal energy, “KWH XX” or “MWH XX” “SET” displays on the screen.

► Press “SET” button for 3 seconds, buzzer makes 3 times “du-----”, the sum thermal energy is cleared, and accumulative thermal energy is reset to “00”.

► Press “+” “-” button, select the operation time of pump, “hP XX” “SET” displays on the screen.

► Press “SET” button for 3 seconds, buzzer makes 3 times “du-----”, the operation time of pump is cleared, and it is reset to “00”.

**Note:** Only when the thermal energy measuring function is activated, operation time of circulation pump function just can be triggered.

#### 4.5.1 FTYPE Flow counter type option

FTYPE: flow counter type, adjustable range: (01,02)

Type of flow counter: 01: Mechanical flow counter

02: Digital flow counter

Under main menu QHQM, select “FTYPE” submenu, “FTYPE 01” displays on the screen

- ▶ Press “SET” button, “01” blinks
- ▶ Press “+” “-” button, to adjust flow counter type, adjustable range (01、02)
- ▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

#### 4.5.2 FMAX Flow rate

FAMX: Flow rate L/min. adjustable range: (0.1~20) L/min, increase rate 0.1L per button press, factory set is 2.0L/min

##### Setup steps:

To select submenu FMAX, “FMAX 2.0” displays on the screen.

- ▶ Press “SET” button, parameter “2.0” blinks on the screen

- ▶ Press “+” “-” button to adjust parameter of flow rate. adjustable range (0.1~20)

- ▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



**Note:** when select digital flow-counter, and then there is no this function.

#### 4.5.3 MEDT Type of heat transfer liquid

MEDT: type of heat transfer liquid, adjustable range (00~03), factory set : 01

Type of heat transfer liquid:

- 00: Water
- 01: Propylene glycol
- 02: Glycol
- 03: Tyfocor LS/G-LS



##### Setup steps:

To select submenu MEDT, “MEDT 01” displays on screen.

- ▶ Press “SET” button, parameter “01” blinks on the screen
- ▶ Press “+” “-” button, to select type of heat transfer liquid, adjustable range (00~03)
- ▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically,

parameters are saved automatically.

#### 4.5.4 MED% Concentration of heat transfer liquid

MED% Concentration of heat transfer liquid (volume percentage %), depending on the type of heat transfer liquid, adjustable range (20 ~70), factory set 40%

##### Setup steps:

To select submenu MED%, “MED% 40” displays on screen.

▶ Press “SET” button, parameter “40” blinks on the screen

▶ Press “+” “-” button to adjust concentration, adjustable range (20~70)

▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



**Note:** when MEDT is set as 00 or 03, then its MED% concentration doesn't appear.

#### 4.6 INTV Pump interval function

##### Description:

This function is useful when collector sensor isn't installed on collector (sensor installed on the outlet pipe of collector). In order to measure the actual temperature of collector, when circuit pump is in standby status, every 30 minutes (this parameter is set at ISTP menu), solar pump is triggered to run for 15 seconds (this is set at the IRUN menu), so that the hot water inside the collector can flow into the pipe, where sensor is mounted, as the result, the actual temperature of collector is measured. It is unnecessary to activate this function in all time, you can use it within a preset time section, default set time is 07:00 ~18:00; this time can be set at ISTAR and IEND submenu.

##### Setup steps:

To select submenu INTV, “INTV” displays on the screen.

▶ Press “SET” button to access menu, “INTV OFF” displays.

▶ Repress “SET” button, parameter “OFF” blinks, factory set is “OFF”



► Press “SET” button to activate this function, then “INTV ON” displays on the screen.

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.1 ISTAR Turn-on time for pump interval running function

##### Setup steps:

To select submenu ISTAR, “ISTAR 07:00” displays on the screen.

► Press “ SET” button, parameter “07:00” blinks,

► Press “+” “-” button, to adjust turn-on time.

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.2 IEND Turn-off time for pump interval running function

##### Setup steps:

To select submenu IEND, “IEND 18:00” displays on the screen.

► Press “ SET” button, parameter “18:00” blinks,

► Press “+” “-” button, to adjust turn-off time.

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.3 ISTD Pump interval time

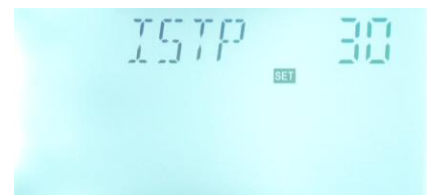
##### Setup steps:

To select submenu ISTD, “ISTD 30” displays on the screen.

► Press “SET” button, parameter “30” blinks; factory set is “30 minutes”

► Press “+” “-” button, to adjust time, adjustable range 2~ 60 minutes.

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.4 IRUN Pump running time

##### Setup steps:

To select submenu IRUN, "IRUN 15" displays on the screen.



► Press "SET" button, parameter "15" displays and blinks, factory set is "15 seconds"

► Press "+" "-" button, to adjust time, adjustable range 5~ 120 seconds.

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

#### 4.7 SFB Solid fuel boiler turn on/off

**Description:** Under SFB boiler is standby. If the tank temperature T3 drops below the preset turn-on temperature of solid fuel boiler ( SFON), and temperature of solid fuel boiler (T4) is between its minimum "MIN3" and its maximum " MAX3" ( MIN3< T4<MAX3), then solid fuel boiler (P2) is triggered; when tank temperature T3 rises up to the preset turn-off temperature of solid fuel boiler (SFOF),or when temperature of the solid fuel boiler(T4) exceeds its MIN3 and MAX3 ( that is T4>MAX3, or T4<MIN3) , then solid fuel boiler is stopped.

**Note:** the preset MIN3 should be at least 1°C higher than the preset SFOF, for example: set SFON is 50°C, SFOF is 55°C, then MIN3 should be at least 1°C higher than SFON, namely it is 56°C. Then when the tank temperature is below 50°C, solid fuel boiler is triggered, when the tank temperature rises over 55°C, solid fuel boiler is stopped.

##### Setup steps:

To select submenu SFB, "SFB" displays on the screen.



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

► Repress "SET" button, parameter "OFF" blinks, factory set is "OFF"

► Press "SET" button again to activate this function, then "SFB ON" displays on the screen.



► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.7.1 SFON Minimum turn-on temperature of tank

##### Setup steps:

To select submenu SFON, "SFON 50 °C" displays on the screen.

► Press "SET" button, parameter "50 °C" blinks on the screen.

► Press "+" "-" button, to adjust the turn-on

temperature, adjustable range: (10 °C~OF-2 °C) , factory set is : 50 °C

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.7.2 SFOF Maximum turn-off temperature of tank

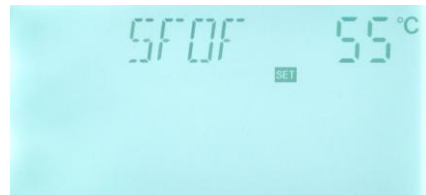
##### Setup steps:

To select submenu SFOF, "SFOF 55°C" displays on the screen.

► Press "SET" button, parameter "55 °C" blinks on the screen.

► Press "+" "-" button, to adjust the turn-off temperature, adjustable range: (ON+2 °C~80 °C) ,factory set is : 55 °C

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.7.3 MAX3 Maximum turn-off temperature of solid fuel boiler

##### Setup steps:

To select submenu MAX3, "MAX3 60°C" displays on the screen.

► Press "SET" button, parameter "60 °C" blinks on the screen.

► Press "+" "-" button, to adjust the turn-off

temperature, adjustable range: (MIIN3+2 °C~95

°C) ,factory set is : 60 °C

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.7.4 MIN3 Minimum turn-on temperature of solid fuel boiler

##### Setup steps:

To select submenu MIN3, "MIN3 30°C" displays on the screen.



► Press "SET" button, parameter "30 °C" blinks on the screen.

► Press "+" "-" button, to adjust the turn-off temperature, adjustable range: (10 °C ~ MAX3-2 °C) ,factory set is : 30 °C

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

#### 4.8 FUN Auxiliary function

The auxiliary functions of this controller can be set under "FUN" menu; it is possible to activate several auxiliary functions at the same time.

##### Note:

Sometimes, your selected function needs an extra signal input to connect temperature sensor or an extra output to connect pump or electromagnetic valve. When all inputs and outputs have been occupied, function you selected may not be available for activating. In such case, you can't see the submenu options.

Following submenu can be accessed through menu "FUN"

Submenu under FUN	Description	Paragraph
DVWG	Anti legionnaires' function	4.8.1
COOL	Tank cooling function	4.8.2
AHO	Auto thermostat function	4.8.3

##### 4.8.1 DVWG Anti legionnaires' function

##### Description:

In order to avoid occurring bacteria in water tank when the temperature of tank is lower for a long time, controller will check the temperature of tank every 7 days in a period automatically, if the temperature of tank is never over 70°C during this period, then at the factory default time of 01:00 on Sunday every period auxiliary heating system is triggered automatically to heat water until it rises up to 70°C ( this is factory default set, impossible to reset ) , bacteria is killed by high temperature, thereafter function is deactivated.

### Setup steps:

To select submenu DVWG, "DVWG ----" displays on screen. Default set is "----".



▶ Press "SET" button, parameter "----" blinks on the screen.

▶ Repress "SET" button, function is triggered. And then "70°C" blinks on the screen.

▶ Press "+" "-" button to adjust this temperature, adjustable range is: (5~95°C)。



▶ Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

## 4.8.2 COOL Tank cooling function

### Description:

Tank high temperature cooling function is independent of solar system's operation, this function is used to maintain the tank with a constant temperature, so extra energy in tank will be transferred to other devices, to achieve this function, it is necessary to add a electromagnetic valve or a circuit pump P2, its temperature is monitored by T3.

### For example:

The set point of tank high temperature cooling function is 70°C, then when tank temperature (T2) rises up to 71°C, tank cooling function is activated, electromagnetic valve or circuit pump and DT circuit pump (P1) are triggered at the same time; when tank temperature ( T2) drops to 67°C, electromagnetic valve or circuit pump and DT circuit pump (P1) are ceased at the same time.

### Setup steps:

To select submenu COOL, "COOL ---" displays on screen.



▶ Press "SET" button, "----"blinks on the screen, default set is "---."

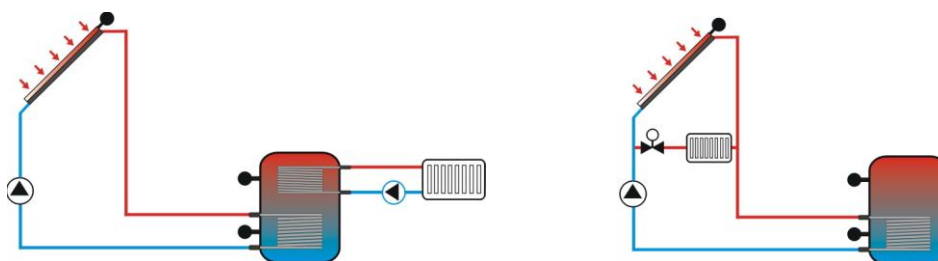
▶ Repress "SET" button, to activate cooling function, and "COOL 95°C" displays on the screen, ("95°C" blinks)

► Press “+” “-” button to adjust function switched-on temperature, adjustable range is 5 °C ~ 120 °C。

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



This signal blinks on the screen; it indicates tank cooling function is activated.



Application example for reference

### 4.8.3 AHO Auto thermostat function

#### Description:

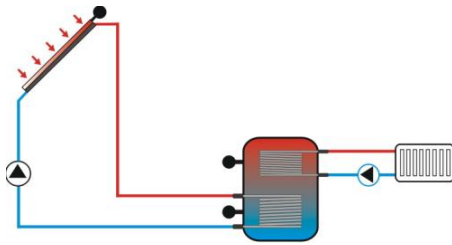
Thermostat function keeps the tank temperature is always same, it is independent of the solar system's operation; when tank temperature is below the switch-on temperature (ATO) of this function, the function controls to trigger back-up heating device. When tank is overheated, this function will transfer heat energy from tank to other place, and ensure tank temperature is constant. For this function it is necessary to install an extra electromagnetic valve or a circuit pump P2, corresponding temperature is T4.

#### Note:

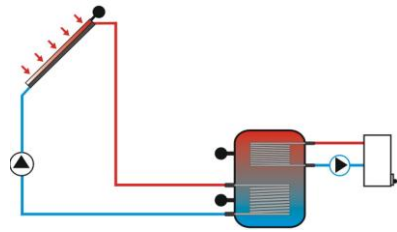
When  $AHO < AHF$ : This function is used to control back-up heating.

When  $AHO > AHF$ : This function is used to transfer energy from tank to other place, control tank temperature is constant.

2 application examples:



Release energy from tank



Heat tank to constant temperature

### Setup steps:

To select menu AHO, "AHO ----" displays on the screen.

► Press "SET" button, parameter "----"blinks. Factory set "----".

► Repress "SET" button, to activate this function, and parameter "50°C"blinks on the screen.

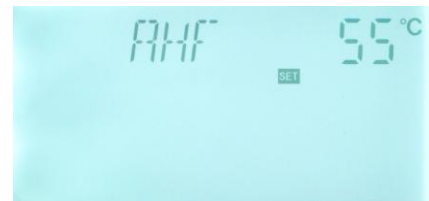
► Press "+" "-" button to adjust switch-on temperature of thermostat function, adjustable range (2~95 °C)


► Press "ESC" button to exit menu.

► Press "+" button, "AHF 55°C" displays, parameter "55 °C" blinks, and factory set "55 °C"

► Press "+" "-" button to adjust switch-off temperature of thermostat function, adjustable range (2~95 °C)

► Press "SET" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



 Signal blinks on the screen, it indicates AHO function is activated.

**Note: when one of functions AHO, COOL, CIRC, SFB is activated, then the rest 3 functions will be automatically deactivated.**

## 4.9 OSDC SD card data save function

### Description:

Put the SD card in the groove, data is logged immediately. Then under menu of the OSDC card, "OSDC ON" displays automatically, it means data is logging, the interval of data log can be set. If card is full, then data logging is stopped, and CFULL displays on the screen.

#### 4.9.1 OSDC card function switch-on and off

##### Setup steps:

To select menu OSDC, “OSDC” displays on the screen.

► Press “SET” button, “OSDC OFF” appears, in this case, data isn’t saved.

► Repress “SET” button, “OFF” blinks on the screen, factory default set: “OFF”.

► Repress “SET” button again to activate this function, and “OSDC ON” displays on the screen, start to save data now.

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.9.2 LOGI Data save intervals

##### Description:

By this function, SD card can save data in every 60 seconds (factory default time 60 seconds).

##### Setup steps:



To select menu LOGI, “LOGI 60” displays on the screen.

► Press “SET” button to access program, “LOGI 60” appears and “60” blinks.

► Press “+” “-” button to adjust data save interval, adjustable range: 01~1200 seconds.

► Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



**Note:** if SD card is used,  card signal will appears on the screen, if SD card is full, then data log is stopped, and  card signal blinks.

Short message Code	Description
FSYS	File system error
NOCRD	NO card
FAT16	Capacity of card is less than 2G
FAT32	Capacity of card is larger than 2G
RTIME	Left log time (in days)
LOGI	Data save interval( in minutes)
LOGG	LOG is possible
WRITR	Written protection of SD card

#### 4.10 UNIT Display unit °C and °F switches

##### Setup steps:

To select menu UNIT, “UNIT” displays on the screen.

▶ Press “SET” button to access program, “UNIT °C” appears and “°C” blinks.

▶ Press “+” “-” button to switch unit between °C and °F, factory set is °C.

▶ Press “ESC” button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.11 HND Manual control

When using this controller first time or when debugging this controller, output of this controller (P1, P2, H1) can be triggered manually with “On, OFF” control.

##### Setup steps:

To access main menu HND,

▶ Press “SET” button, “HND1 off” displays on the screen, P1 output manually set

▶ Repress “SET” button, “HND1 on” displays on the screen, P1 output is switched-on

▶ Repress “SET” again, “HND1 off” displays, P1



output is switched-off

▶ Press “ESC” to exit P1 set program

-----

▶ Press “SET” button, “HND2 off” displays on the screen, P2 output manually set

▶ Repress “SET” button, “HND2 on” displays on the screen, P2 output is switched-on

▶ Repress “SET” again, “HND2 off” displays, P2 output is switched-off

▶ Press “ESC” to exit P2 set program



-----

▶ Press “SET” button, “HND3 off” displays on the screen, H1 output manually set

▶ Repress “SET” button, “HND3 on” displays on the screen, H1 output is switched-on

▶ Repress “SET” again, “HND3 off” displays, H1 output is switched-off

▶ Press “ESC” to exit H1 set program



-----

**Note:** when manual mode is activated,  signal displays on the screen, after 15 minutes all outputs are switched-off, controller exits manual mode automatically.

#### 4.12 REST Recovery to factory set

##### Setup steps:

To access main menu REST,

▶ Press “SET” button, “YES” displays on the screen.

▶ Hold down “SET” button, buzzer makes “du-----” 3

times, then release “SET” button and wait for display recovery to initial interface, that means controller recovers to factory set, new parameters can be reset now.

▶ Press “ESC” button to exit set program or wait for 20 seconds to exit automatically.



#### 4.13 PASS Password set

##### Setup steps:

To access main menu PASS,



► Press “SET” button, “PWDC 0000” appears, the left digital blinks, ask for entering current password, factory set is “0000”

► Press “+” “-” button to enter the first digital

► Repress “SET” button, the second digital blinks

► Press “+” “-” button to enter the second digital

► Repress “SET” button, the third digital blinks

► Press “+” “-” button to enter the third digital

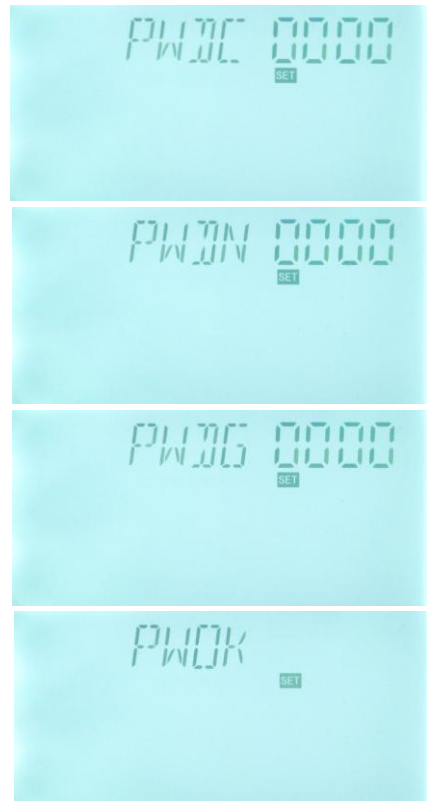
► Repress “SET” button, the fourth digital blinks

► Press “+” “-” button to enter the fourth digital

► Press “SET” button, “PWDN 0000” displays on the screen, ask for entering a new password, doing like above to enter the new password

► Press “SET” button, “PWDG 0000” displays on the screen, ask for reentering the new password, doing like above to reenter the new password, “PWOK” displays on the screen to indicate reentering password successfully.

► Press “ESC” button to exit set program or wait for 20 seconds to exit automatically.



### Warning

If the password is forgot, it is not possible to recover, but you can recover the password to factory set, then you can reedit a password like above descript steps, doing like following to recover to factory set.

► Switch-off the power of controller firstly,

► Press “SET” and hold it down, then reconnect the power supply.

► Buzzer makes “du-----” 3 times, then release “SET” button. Controller recovers to factory set( factory set possword is 0000), a new password can be reset now.

## 5. Operation button function

### 5.1 Holiday function

#### Description:


This function activates at night, solar liquid will flow from storage tank to collector to cool the tank, and therefore to prevent high thermal loads problem of the solar system due to completely heated storage tank. The function is activated at night between 10 pm and 6 am, when the collector temperature drops 8K below the storage tank temperature (T2), solar circuit pump starts to work; when the temperature of collector is 2°C below the tank temperature, and solar circuit pump is ceased.

#### Activate this function if:

- You intend to be absent for an extended period (holiday)
- No hot water is required for an extended period.

**Note:** The function is deactivated when the temperature in lower section of storage tank falls down to 35°C.

#### Activate/ deactivate this function:

► Press “Holiday” button for a long time until the signal of holiday function  displays on the screen, and then holiday function is activated.

► Repress “Holiday” button, signal  disappears, holiday function is deactivated.

#### Note:

**This function is only activated when you are not at home for long time, when you come back; please make sure to deactivate it.**

### 5.2 Manual heating

#### Description:

Electrical heater, gas or oil boiler can be as back-up devices in a solar system, this controller can achieve constant temperature controlling, when controller gets temperature signal of top part tank (T3) is 3°C below the preset temperature, back-up heating will be triggered. When temperature of top part tank (T3) reaches to the preset temperature, heating is ceased.



Conditions for triggering manual heating function: the setting temperature should be 3°C

higher than tank temperature.

#### Activate/deactivate the function:

► Press “Heating” button, temperature “60℃” blinks on the screen.

► Press “+”“-” button to adjust switch-on temperature, adjustable range 10℃~80℃, factory set is 60℃.

After 20 seconds, this function is activated, signal  displays on the screen, and  heating signal blinks also. LED heating indication light is on.


► Press “Heating” button again, to switch-off manual heating function.

**Note:** manual heating can only heat tank one time, after manual heating is triggered, when temperature of tank rises up to the preset temperature, manual heating ceases, and manual heating function will be deactivated automatically, if customer wants to heat again, you need redo according to above steps.

### 5.3 Temperature check

Under standby status,

► Press “+”“-” button can check the value of temperature sensors T1~ T6, flow rate, pump speed ( n %), accumulative operation time of circuit pump (hp), daily thermal energy (DKWH), accumulative thermal energy (KWH) or (MWH), Time and Date.

When checking temperature, T1 – T6 will display one by one, corresponding sensor signal  blinks. Press “ESC” button, TST tank temperature can be displayed.

#### Note:

1. Value of accumulative operation time of circuit pump (hp), daily thermal energy (DKWH) and accumulative thermal energy (KWH) or (MWH) can only be checked after triggering the QHQM thermal energy measuring function.
2. Flow rate ( L/M ) can be displayed when digital flow counter is used in solar system. If mechanical flow counter is used, then flow rate can't display.

## 6. Protection function

### 6.1. Memory protection

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

### 6.2 Screen protection

When no any press on button for 3 minutes, screen protection is activated automatically, and then LCD lighting lamp is switched-off. Through press any button to light LCD lamp again.

### 6.3 pump idling protection



Pump station monitors that no flow is in the circuit pipe within 3 minutes, then system pump is ceased, "P1" blinks on the screen, through this function, pump is prevented from damaging caused by pump idling.

: reasons for no flow :









- leakage problem in the system circuit pipe.
- block occuring on the blade of digital flow counter
- Switch-off the power supplier of controller to exit circuit pump protection function, recovery P1 to standby status.

## 7. Trouble shooting

### 7.1 Trouble protection





a. When there is a break or short circuit between the connection of temperature sensors, controller switches off the corresponding functions and no more output signals are given, at the same time error signals   are showed on the display. If controller does not work correctly, please check following points.

► Press "+" "-" button to check error code, "  "signal blinks on the LCD screen

Error message on LCD screen	Meaning	Cause of error	Error rectification
  T1 ---	T1 sensor problem	Sensor wiring open or short	Check resistance value, replace
  T2 ---	T2 sensor problem	Sensor wiring open or short	Check resistance value, replace
  T4 ---	T4 sensor problem	Sensor wiring open or short	Check resistance value, replace
	SFB function is activated	T4sensor not connected on controller	connectT4or close SFB function
	Thermostat function is activated	T4sensor not connected on controller	Connect T4 or close AHO function
  T5 ---	T5 sensor problem	Sensor wiring open or short	Check resistance value, replace
	Thermal energy measuring function is activated	T5sensor not connected on controller	Connect T5 or close QHQM function

## 7.2 Trouble checking

The controller is quality product, conceived for years of continuous trouble-free operation. If a problem occurs, the cause of the problem very often lies not in the controller but in the peripheral components. The following description of some well-known problems should help the installer and operator to isolate the problem, so that the system can be place back into operation as quickly as possible and to avoid unnecessary costs. Of course, not all possible problems can be listed here. However, most of the normal problems encountered with the controller can be found in the list below, only return the controller to seller when you are absolutely sure that none of the problems listed below is responsible for the fault.

Symptoms	Secondary symptoms	Possible cause	Procedure
Controller does not display any functions at all	Display shows nothing, no display illumination	Controller power supply is interrupted or program is out of work	Check the controller power cable Or change fuse
The solar pump doesn't operate, despite the fact that switch-on conditions are satisfied	The pump symbol on the display blinks	Pump power supply is interrupted	Check the pump power cable
Pump doesn't operate	The pump symbol on the display doesn't blink.  Lighted Or  blinks	The maximum storage tank temperature (SMX1) is reached The maximum collector temperature (EM) is reached.	No fault
	  Tn --- Error message displays on the screen	Fault (short circuit or open circuit) in a temperature sensor	On the controller, check the current values of all connected temperature sensors, replace all defective sensors and /or cabling.
The solar pumps operated, despite the fact that the switch-on conditions are not satisfied.	The pump symbol on the display blinks.	Holiday function or Frost protection function or tank re-cooling function is activated.	No problem, it is normal. If necessary to deactivate the corresponding functions.
Any function can't activate	In submenu not select the function	All inputs and outputs are used; inputs or outputs can only have one function every time.	No fault



**Warning!** Remove the device from the mains supply before opening the case

A potentially defective sensor can be checked using an ohmmeter. To do this, the sensor must be disconnected, its resistance measured, and the value compared with the figures in the table below, small deviation ( $\pm 1\%$ ) is acceptable,

**PT1000 resistance value**

℃	0	10	20	30	40	50	60	70	80	90	100	110	120
Ω	1000	1039	1077	1116	1155	1194	1232	1270	1309	1347	1385	1422	1460

**NTC 10K B=3950 resistance value**

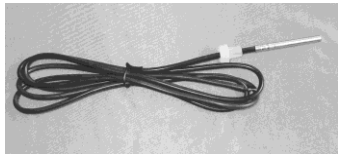
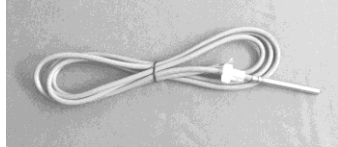
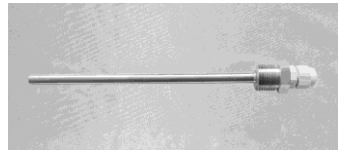

℃	0	10	20	30	40	50	60	70	80	90	100	110	120
Ω	33620	20174	12535	8037	5301	3588	2486	1759	1270	933	697	529	407


**8. Quality Guarantee**

Manufacturer provides following quality responsibilities to end-users: within the period of quality responsibilities, manufacturer will exclude the failure caused by production and material selection. A correct installation will not lead to failure. When a user takes incorrect handling way, incorrect installation, improper or crud handling, wrong connection of sensor in system and incorrect operation, the quality responsibility is invalid for them.

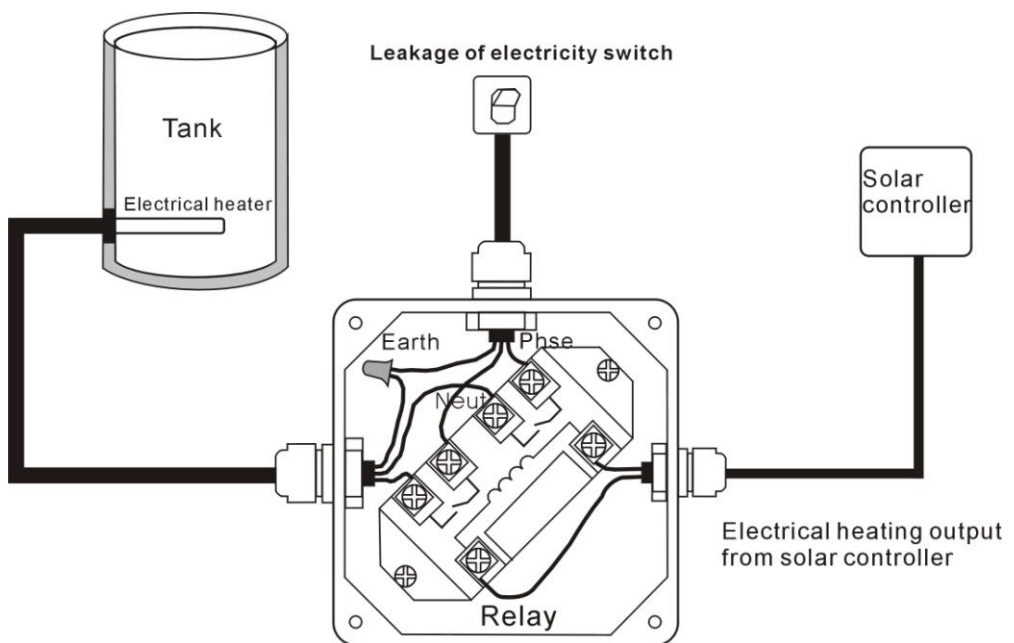
The warrantee expires within 24 months after the date of purchasing the controller.

**9. Accessories**

<b>A01: sensor for collector</b>	PT1000, Φ6*50mm	
<b>A02: sensor for tank and pipe</b>	NTC10K, B=3950, Φ6*50	
<b>A05: stainless steel thermowell</b>	Parameter: 1/2' OT, Φ8*200	
<b>USB to RS485 Converter</b>		

<p><b>SR802: unit for high pow</b></p>	<p>Dimension: 100mmx100mmx65 mm              Power supply: AC180V ~ 264V, 50/60Hz              Suitable power: <math>\leq 4000W</math>              Available ambient temperature: -10 ~ 50°C              Waterproof grade: IP43</p>	
--	---	--

**SR802 connection diagram:**



**Note:** switch-off power, and perform by profession installer