Operation manual

SR961S/SR962S

Solar Pump Station

⚠️ **Please read this manual carefully before using!**

Contents

1. Safety information

1.1 Important 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 can not 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. Please be aware of it!

1.2 About this manual

This manual describes the installation, functions and operation of a solar station, which integrates a solar controller. When installing the remaining components e.g. the solar collectors, pump assemblies and the storage unit, please be sure to observe the appropriate installation instructions provided by each manufacturer. Installation, electrical connection, commissioning and maintenance of the device may only be performed by trained professional personnel. The professional personnel must be familiar with this manual and follow the instructions contained herein.

1.3 Liability waiver

The manufacturer cannot monitor the compliance with these instructions or the circumstances and methods used for installation, operation, utilization and maintenance of this pump station. 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 occur 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 pump station- on third parties rights. The manufacturer preserves the right to put changes to product, technical date 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 cannot be accidentally placed into operation.

1.4 Description of symbols

Safety symbol: 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. Overview of solar station
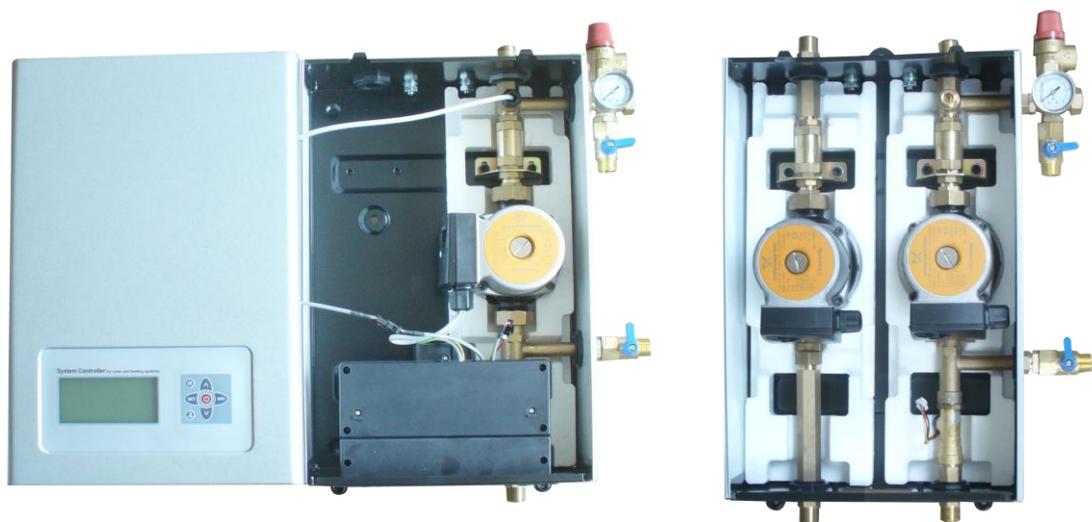
SR961S single line pump station   SR962P built-in DHW pump picture
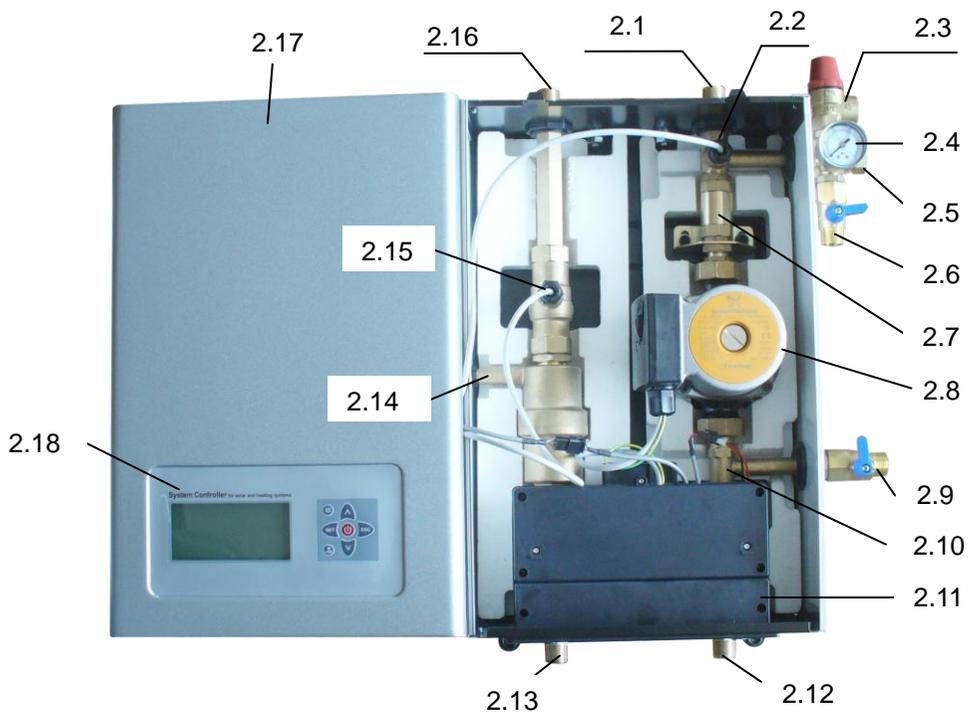
SR962S double line pump station

2.1～2.18 Kits Parameter

2.1	Collector flow pipe connections, male thread G1/2(to collector)
2.2	Sensor on the tank output pipe, NTC10K,B=3950
2.3	Safety valve, release pressure 6 bar
2.4	Pressure gauge, measuring range: 0~10bar system pressure
2.5	Expansion connection, male thread G1/2
2.6	Filling valve connection, male thread G1/2
2.7	One – way stop valve
2.8	Circuilation pump (solar liquid)
2.9	Draining valve connection, male thread G1/2
2.10	Electrical flow meter
2.11	Connection terminal box of built-in controller
2.12	Tank output pipe connection (from tank), male thread G1/2
2.13	Tank input pipe connection(to tank), male thread G1/2 (not on SR961S single pipe pump station)
2.14	Manual and automatic combined air separator (not on SR961S single pipe pump station)
2.15	Sensor on the collector return pipe (high temperature) NTC10K, B=3950 (not on SR961S single pipe pump station)
2.16	Collector return pipe connection, male thread G1/2 (from collector) (not on SR961S single pipe pump station)
2.17	Front cover of pump station
2.18	Display and control panel of built-in controller

2.19 Specification of pump station

Components	Parameters	Remark
Size of pump station		
Hight (not include the pipe connection)	420mm	
Width (not include the pipe connection)	280mm	
Thickness (not include the pipe connection)	155mm	

Safety components		
Pressure of safety valve	6bar	
Display range of pressure gauge	0～10bar	
Connection of expansion vessel	G1/2,male thread	
Maximum permission pressure	10 bar	
Maximum permission temperature	115°C	
Pump parameter		
Pump type	Wilo RS15/6	Grundfos 15-65
Maximum flow rate	2.5(t/h)	2.5(t/h)
Maximum water head	5.5m	5.5m
Maximum operation pressure	10bar	10bar
Suitable fliud temperature range	-10～110°C	-10～110°C
Stop units		
Ball valve size	G1/2	
One – way stop valve		
Withstand pressure	0～16bar	
Maximum permission temperature	-20～110°C	
Flow meter		
Measuring range	0.1～20L/min	
Manual/automatic air separator		Not on SR961S
Filling/draining connection unit		
Connection size	G1/2	
Insualtion		
Insulation material	EPS	
Built-in solar controller	see controller manual part	
Sensor on collector return pipe	NTC10K, B=3950	Not on SR961S
Sensor on collector flow pipe	NTC10K, B=3950	

2.20 High Efficiency Pump(Optional parts)

Note:Our pump station not only available for normal pump but also suitable for high efficiency pump,we list the below pump type which as optional parts for our pump station.

Model No.:	Sample picture	Main Technical data	
Grundfos SOLAR PM2 15-85 130		Pump type	SOLAR PM2 15-85 130
		Max. fluid temperature	TF95
		Operating pressure PN	PN6
		Voltage/frequency	230VAC 50HZ
		Protection Class	IPX4D
		Power consumption	3W(min)-55W(max)
WILO STRATOS TEC ST15/7 PWM		Pump type	STRATOS TEC ST15/7 PWM
		Max. fluid temperature	TF95
		Operating pressure PN	PN6
		Voltage/frequency	230VAC 50HZ
		Protection Class	IP44
		Power consumption	3W(min)-70W(max)
WILO Yonos PARA RS15/6 RKC M		Pump type	STRATOS TEC ST15/7 PWM
		Max. fluid temperature	TF95
		Operating pressure PN	PN6
		Voltage/frequency	1-230VAC 50HZ
		Protection Class	IPX4D
		Power consumption	3W(min)-45W(max)

3. Mounting the solar station

► Drill the upper fixing hole

► Fasten the screw, hang the station

► Mark the bottom fixing hole

► Drill the bottom hole

► Fasten the bottom screw
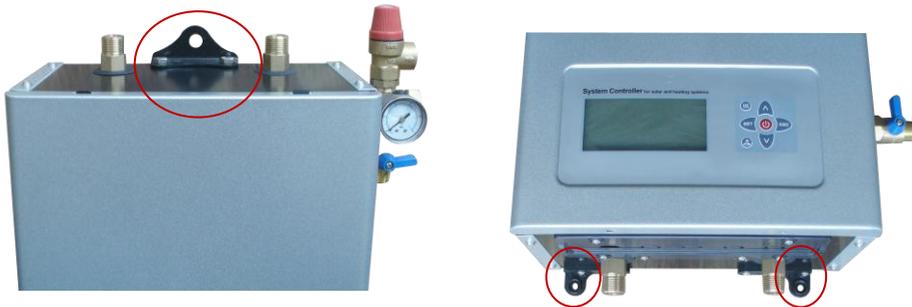
4. Attention Items for solar station installation
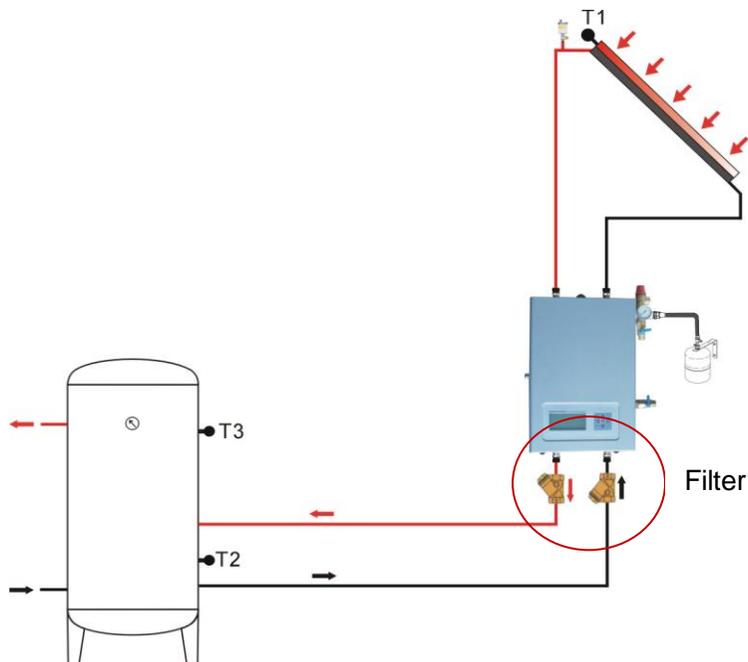
Note: In order to avoid jaming the degital flow meter and in result to displays no flow on solar station, the filter must be installed on the return and flow pipeline of solar station.

- All devices connected to the controller must conform to the technical specifications of the controller,assembly,installation and maintenance work may only be performed by properly qualified and authorized personnel with a generally recongnized qualification.

- The solar station must be installed indoors, prior to installation, remove sealing caps from solar station.

- According to the manual of expansion vessel to install and adjust it, the pipeline for connecting pump station and expansion vessel should be not insulated.

- Safety valve: Risk of scalding from hot steam with discharge from the safety valve due to heating and excess pressure in the hydraulic pipes. Using a copper pipe to drain the discharged liquid from the safety valve to the barrel and disposed it in an eco-friendly way, according to valid technical regulations and local codes, do not allow solar fluid to leak into the environment.

- The Maximum distance between solar station and water tank is 300mm; keep top edges of solar station and top edge of storage tank.

- Be careful of scald from hot fluid. Maxiumu temperature of collectors during filling/leak check or installation/maintenance should be below 70oC, allow collectors to cool down if necessary.

- Please ensure hydraulic connections are pressure-tight, connetions pipe should be insulated, and unused connections must be sealed tightly with a suitable end plug.

- Air-seperator: if the system is pressue-tight (no leakage), connect the power supply to the solar controller, using the manual mode of controller to circuit system for 15 minutes, then switch-off power supply, solar fluid is heated gradually, air dissolveed in fluid is released out, through air –seperator to release air. If necessary, repeats this process until no more air is vented out. If the system pressure drops due to over air release, then it is necessary to refilling fliud to the required pressure.

- After filling the system, please check safety valve accoring to its manual.

- All safety regulations for working on the power supply are valid, All installtion and maintenance work should be performed when power is switched-off.

5. Connection terminal of built-in controller

5.1 Open the connection terminal box

►Loosen the 4 fixing screws (picture A) which are on the back of connection box.

Note: 2 screws inside circle are for fixing the box, not need to loosen it.

A
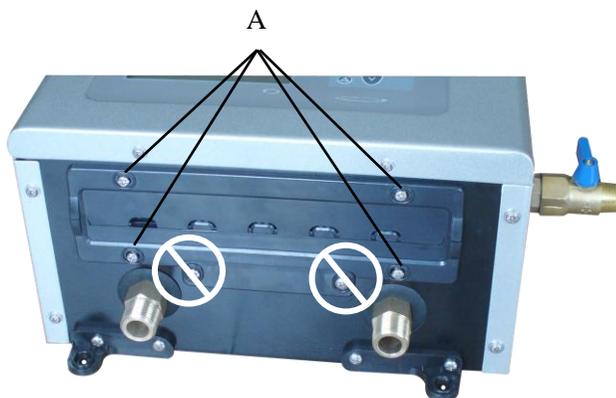
►Pull out the connection box downwards parallelly.

►Loosen the protection screw (picture B), open the cover of terminal upwards

B
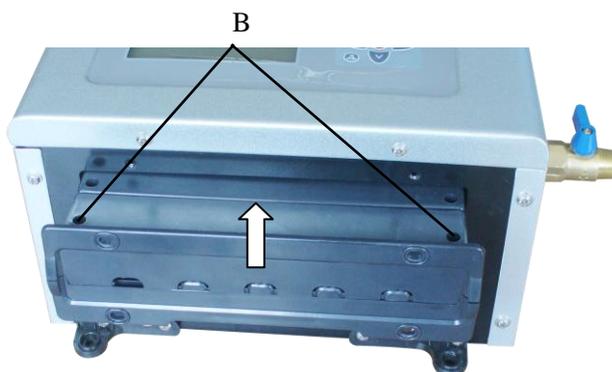
► Using proper tools (like knife) to take out the plastic (picture C) piece, wires can pentrate connection termial through prepared holes.

C
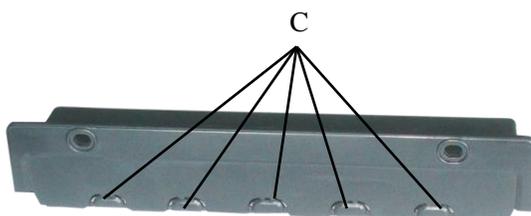
Note: Please use delivered clamps to fix wires correctly. (Picture D)
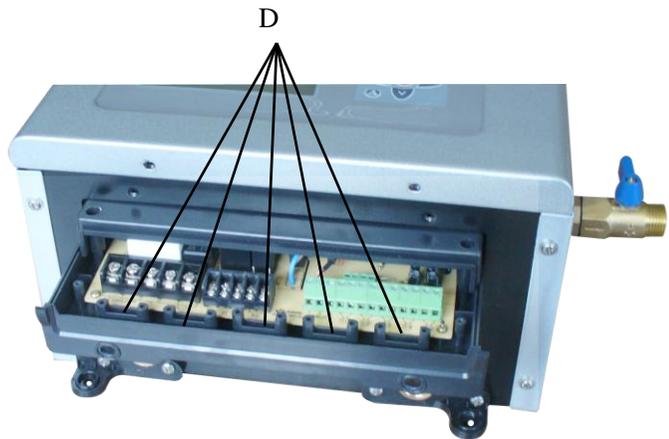
5.2 Terminal connection

- Terminal ports layout
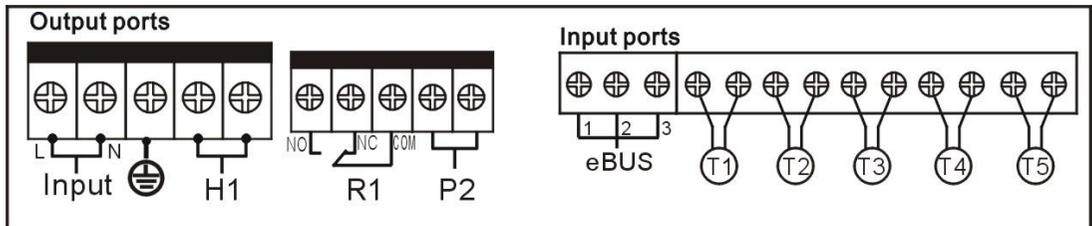
- Power connection

Input Ports: Input ports L, N is power connection terminal, please connect correctly (L:phase line N:Neut line) is Ground line terminal.

- Input ports

Input T1: PT1000 temperature sensor, for measuring the collector temperature

Input T2~T5: NTC10K，B=3950 temperature sensor, for measuring tank and pipeline temperature

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

① Only original factory equipped Pt1000 temperature sensors are approved for using with the collector, it is equipped with 1.5m silicon cable and suitable for all weather conditions, the cable is temperature resistant up to 280°C, not necessary to distinguish the positive and negative polarity of the sensor connection.

② Only original factory equipped NTC10K,B=3950 temperature sensors are approved for using with tank and pipe, it is equipped with 1.5meters PVC cable, and the cable is temperature resistant up to 105°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 meters, 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.

- Output ports

Output R1: electromagnetic relay, max. switching current 3.5A, (for electrical heat trace)

Output P2: electromagnetic relay, max. switching current 3.5A, (for DHW circulation pump)

Output H1: electromagnetic relay, max. switching current 10A, (for back-up heat source)

eBUS interface:For remote display panel(optional connection)

By using SR805 remote display screen can preset all parameter as display panel of built-in controller of pump station.The remote display panel was connected to eBUS by wires.

Port 1: connected with red wire (+12V)

Port 2: connected with white wire (COM)

Port 3: connected with black wire (GND)
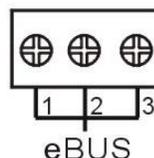
Operational application: connect remote display by cabel wires

Cable wired remote display
(Model No.: SR805)

3 cores cable wire

T1

T3

T2
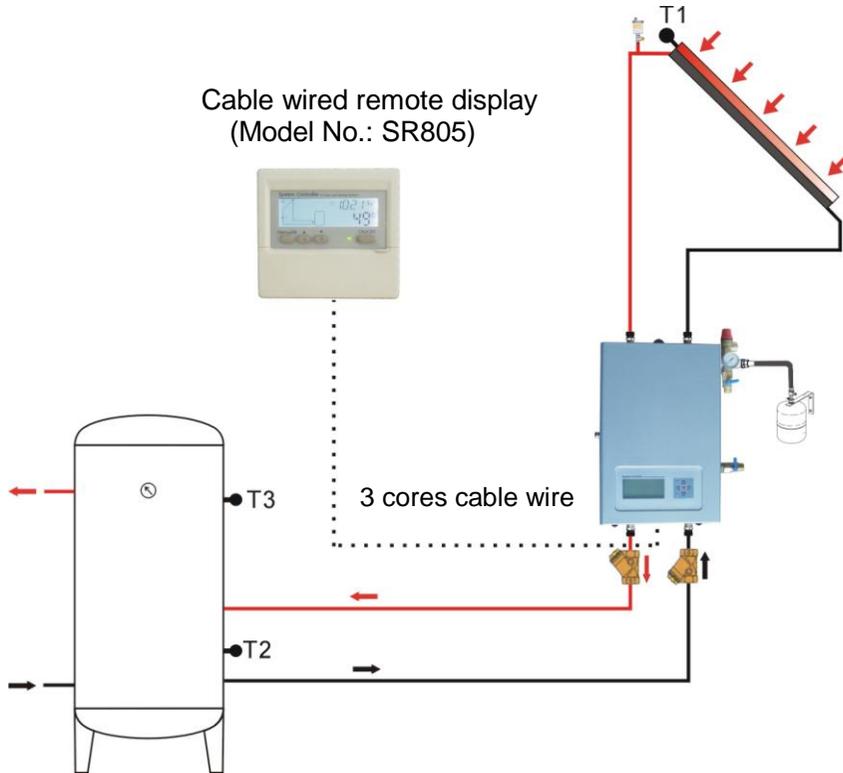
Operational application: wireless connect remote display (optional connection)

T1

Wireless remote display
(Model No.:SR805W)

T3

Wireless receiver transmitter

T2
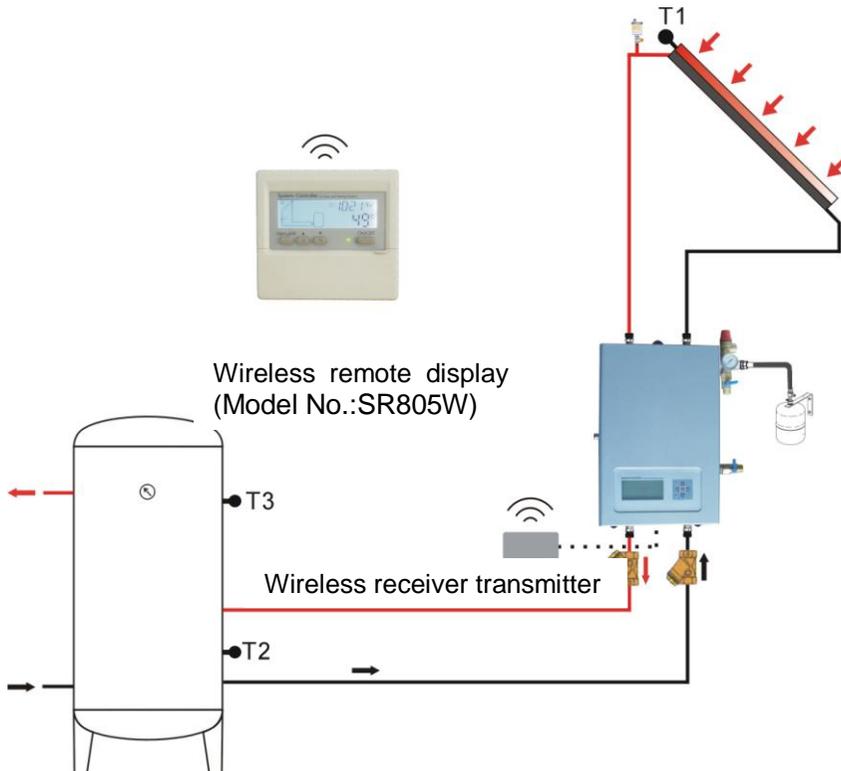
6. Operation manual of built-in controller

6.1 Operation button

 Set button   Exit/confirm   upwards   downwards

 ON/OFF button   manual heating   Holiday button

Note:

- Connect the sensors, pumps or switching valves to the controller before you connect the power.
- After power is switched on, you can set time, password, select system and relevant parameters.

6.2 Signal description

Signal on the display screen shows the current status. its meaning explained in following table.

Signal status	Display	Flashing display
⟨≀≀≀⟩		Back-up electrical heater is in active
⊓	Select digital flow meter	
☀ ⚠		Collector safety temperature function is in active
☀ ⚠	☀	⚠ Tank urgent stop funtion is in active
❄	Collector low temperature protection function is in active	
❄		Collector frost protection function is in active
☀		Tank recooling function is in active Collector cooling function is in active
☀	Tank high temperature protection function is in active	
▦	Tank thermostate function is triggered	Tank thermostate function is in active
🖑	Manual function is in active	
🏝	Holiday function is in active	

6.3 Set up clock/week

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

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

►Press' ⋀ ⋁ " button, to adjust hour.

►Repress "SET" button, minute area "00" blinks.

►Press' ⋀ ⋁ " button, to adjust minute.

►Repress "SET" button, to adjust week, week area "MO" blinks.

►Press' ⋀ ⋁ " button, to adjust week.

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

Code	Weekday
MO	Monday
TU	Tuesday
WE	Wednesday
TH	Thursday
FR	Friday
SA	Saturday
SU	Sunday

6.4 Manu structure
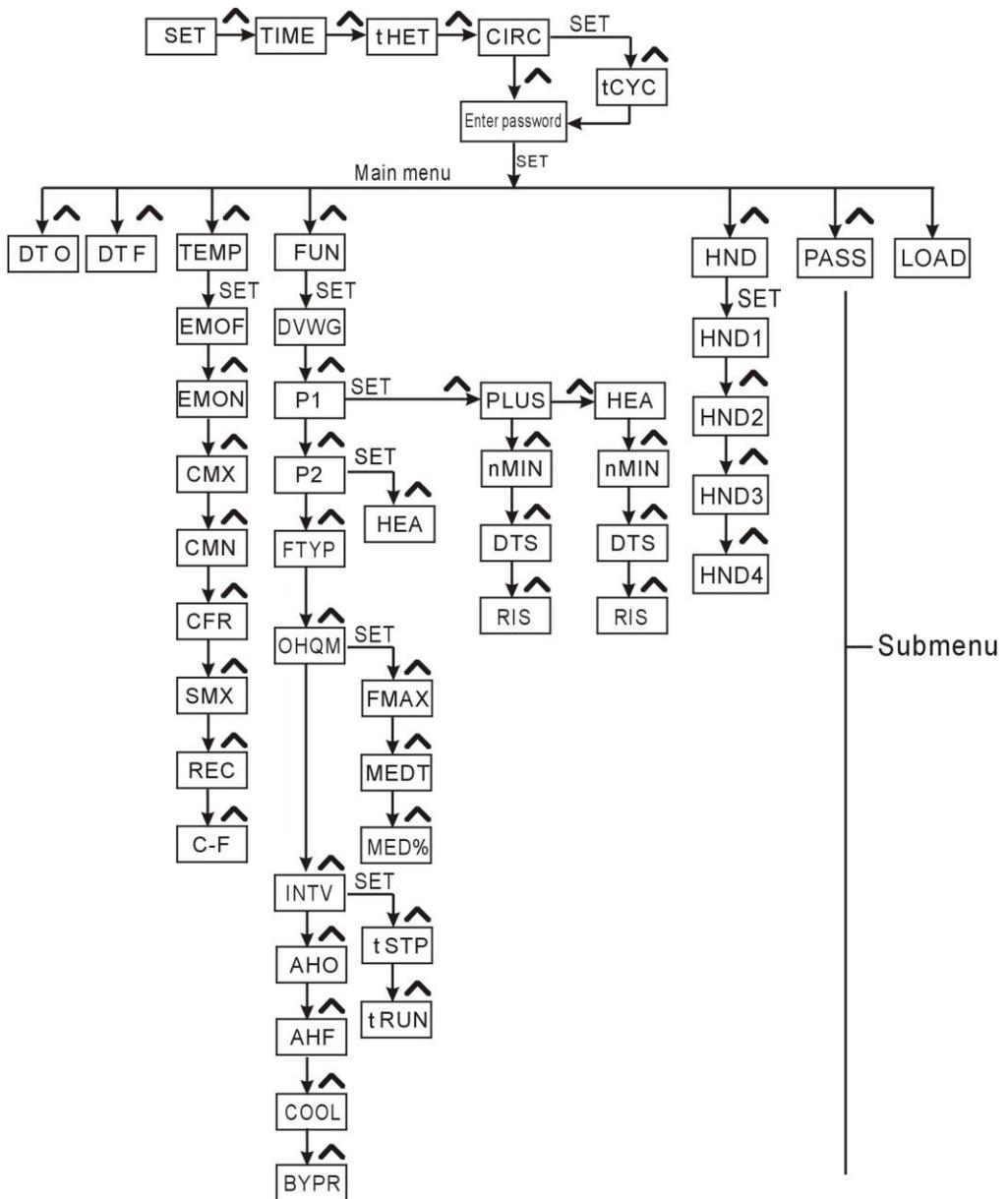
Submenu: Through submenu you can setup more detailed, please make sure to understand the content in submenu.

6.5 Menu description

Code Mainmenu	Code Submenue	Code submenu	Description
TIME			Time
tHET			Timing heating in three time sections
CIRC			DHW water circuilation function
tCYC			Tempeature or time setting for DHW pump in three time sections
DT O			Switch-on temperature difference
DT F			Switch-off temperature difference
TEMP			Temperature main menu
	EMOF		The maximum switch-off temperature of collector
	EMON		The maximum switch-on temperature of collector
	CMX		The maximum temperature of collector (Collector cooling function)
	CMN		Low temperature protection of collector
	CFR		Frost protection temperature of collector
	SMX		Maximum temperature of tank
	REC		Cooling temperature of Tank
	C-F		Switch between Celsius and Fahrenheit
FUN			Auxiliary functions
	DVWG		Anti legionnaires's bacteria function
	P1		P1 Pump operation mode selection(ONOF,PLUS,HEA)
		nMIN	Pump speed adjustment (RPM control function)
		DTS	Standard temperature difference of pump (for speed adjustment)
		RIS	Gain for circulation pump (for speed adjustment)

	P2		P2 Pump operation mode selection (ONOF, HEA)
	FTYP		Selection between electronic /mechanical flow meter
	OHQM		Thermal energy measuring
		FMAX	Flow rate setup
		MEDT	Heat transfer liquid type
		MED%	Concentration of heat transfer liquid
	INTV		**Intermission function**
		tSTP	Pump interval run-off time
		tRUN	Pump interval run-on time
	AHO		Switch-on temperature of thermostat function
	AHF		Switch-off temperature of thermostat function
	COOL		Tank cooling function
	BYPR		Bypass (high temperature)
HDN			Manual controlling
PASS			Password setup
LOAD			Recovery to factory set

6.6 System description

Description:

The solar circuit pump (P1) is switched on as soon as the switch-on temperature difference ($\triangle$Ton) 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 ($\triangle$Toff), or the temperature of storage tank (T3) reaches the preset maximum storage temperature, then the solar circuit pump (P1) is switched off.

Input/output collocation
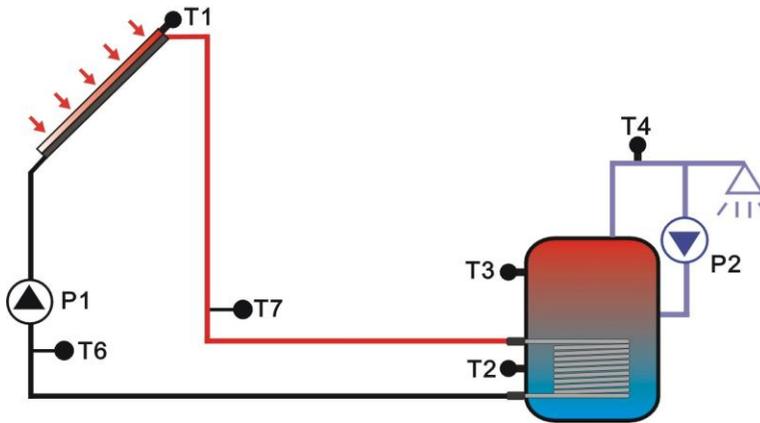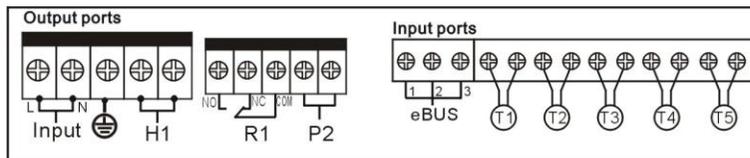
Input ports		Output ports	
T1	Sensor of Collector	P1	Pump of sola circuit
T2	Sensor on the bottom part of tank	P2	Pump of DHW
T3	Sensor on the top part of tank(optional)	R1	Selectable: (AHO): automatic tempature adjust (BYPA) pipe by-pass
T4	DHW sensor (Optional)	H1	Back-up heat resource
T5	Sensor of thermostat function		
T6	Sensor on the flow pipe		
T7	Sensor on the return pipe(SR916S no)		

Note: T3 is an 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.

- **Double pump station application**

If user needs a DHW pumpstation or auxiliary heating pumpstation, then it is possible to order double pumps station, see this picture.

Double pump station for DHW application
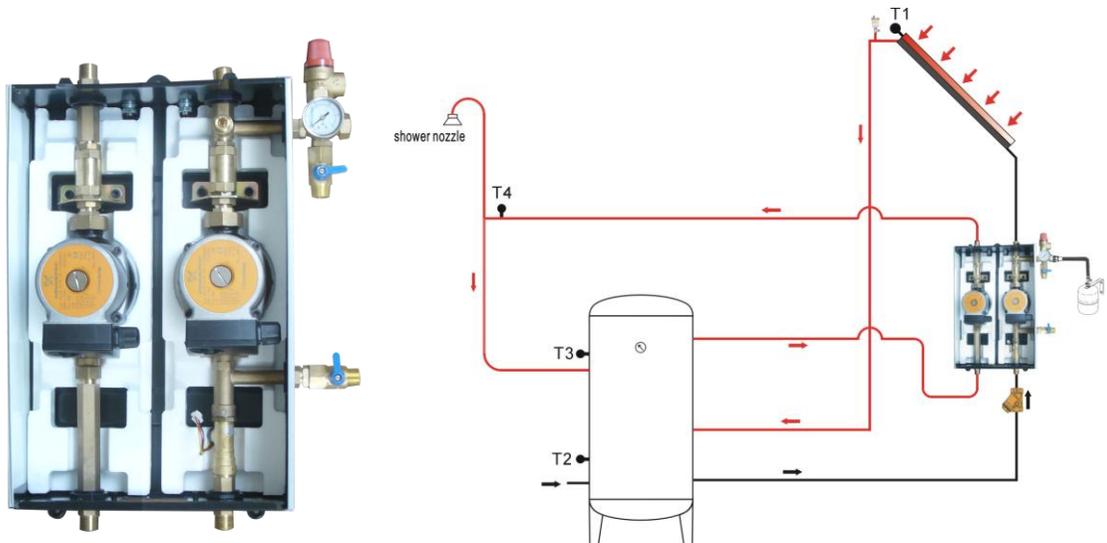
Double pump station for auxiliary heating application
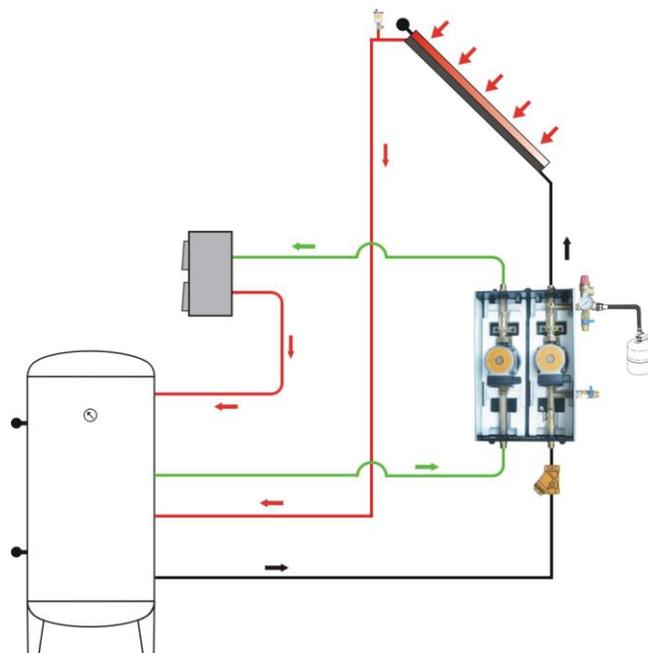
7. Functions operation and parameters setup (user grade)

7.1 THET Timing heating

Description:

Electrical heater, gas boiler or oil boiler can be integrated into solar system and used as back-up heat source; they can be triggered automatically at preset schedule by preset temperature.　Within a preset time section, when the temperature (T3) of top part of tank drops below the preset switching-on temperature of this function, back-up heating H1 starts to work, when T3 rises up to the preset turning off temperature, back-up heating H1 is stopped.　Within 24 hours, three time sections can be set with this controller.

Factory set:

- The first time section: back-up heating function starts at 4:00 and ends at 5:00 am. Within this time section, default switch-on temperature is 40°C; default switch-off temperature is 45°C.
- The second time section: starts at 10:00 and ends also at 10:00 am, it means no back-up heating in this time.
- The third time section: back-up heating function starts at 17:00 and ends at 22:00 pm. Within this time section, default switch-on temperature is 50°C; default switch-off temperature is 55°C.

The switch-on temperature adjustable range: $3\ ^{o}$C ~ (OFF-2 ^{o}C)

The switch-off temperature adjustable range: (ON+2 ^{o}C) ~ 80 ^{o}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, the second time section without this function, 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 drops to 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 controller is 24 hours mode, when you set time section, the

switch-off time of heating should be larger than 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 following: 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, repress ⋀ button，select the tHET menu.

►Press"SET"button, "tH 1o 04:00"shows on the screen，access the submenu of the switch-on time and temperature for the first time heating.

►Press"SET"button, hour"04" blinks on the screen.

► Press " ⋀ ⋁ " button to adjust hour.

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

► Press " ⋀ ⋁ " button to adjust minute of time.

► Repress "SET" button, temperature "40°C" blinks on the screen.

► Press ⋀ ⋁ " button, to set the switch-on temperature of heating.

► then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tH 1F 05:00" shows on the screen, access the submenu of the switch-off time and temperature for the first time heating function.

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

► Press ⋀ ⋁ "button to adjust hour of time.

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

► Press " ⋀ ⋁ "button to adjust minute of time.

► Repress "SET" button, temperature "45°C" blinks on the screen.

► Press ⋀ ⋁ "button, to set the switch-off temperature of heating.

►Then, press "ESC" to exit t and confirm the setting.automatically, value of the parameters are saved automatically

----

► Press " ⋀ " button, "tH 2o 10:00" shows on the screen, access the submenu of the switch-on time and temperature for the second time heating section.

► Press "SET" button, hour "10" blinks on the screen; the switch-on time and

temperature for the second time heating function can

be set.

► Press "▲ ▼" button to adjust hour.

► Repress "SET" button, minute "00" blinks on the

screen.

► Press ▲ ▼" button to adjust minute of time.

► Repress "SET" button, temperature "50°C" blinks on the screen.

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

► then, press "ESC" to exit and confirm the setting.

► Press "▲" button, "tH 2F 10:00" shows on the

screen, access the submenu of the switch-off time and

temperature for the second time heating function.

► Press "SET" button again, hour "10" blinks on the

screen.

► Press ▲ ▼ "button to adjust hour of time.

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

► Press "▲ ▼ "button to adjust minute of time.

► Repress "SET" button, temperature "55°C" blinks on the screen.

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

►Then, press "ESC" to exit and confirm the setting.automatically, value of the

parameters are saved automatically

► Press "▲ " button, "tH 3o 17:00" shows on the screen, access the submenu of the

switch-on time and temperature for the third time heating section.

► Press "SET" button, hour "17" blinks on the screen;

the switch-on time and temperature for the third time

heating function can be set.

► Press "▲ ▼ " button to adjust hour.

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

► Press ▲ ▼ " button to adjust minute of time.

► Repress "SET" button, temperature "50°C" blinks on the screen.

► Press ⋀ ⋁ " button, to set the switch-on temperature of heating.

► Then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tH 3F 22:00" shows on the screen, access the submenu of the switch-off time and temperature for the third time heating function.

► Press "SET" button again, hour "22" blinks on the screen.

► Press ⋀ ⋁ "button to adjust hour of time.

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

► Press " ⋀ ⋁ "button to adjust minute of time.

► Repress "SET" button, temperature "55°C" blinks on the screen.

► Press " ⋀ ⋁ "button, to set the switch-off temperature of heating.

►Then, press "ESC" to exit this submenu, or waiting for 20 seconds to exit this menu automatically, value of the parameters are saved automatically

----

Note: when no gas or oil boiler is connected to the solar system, electrical heater can be installed as back-up device, when electrical heater is in stand-by status, (∰) sign shows on the screen; when electrical heater is running, (∰) sign flashes on the screen.

If customer uses 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 SR802 device with this controller, (SR802 detailed technical data see paragraph 14)
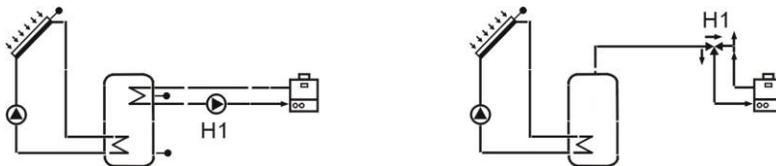
Application example

7.2 CIRC DHW water circuilation function

Under standby status,

►Press"SET"button, repress ⌃ button，select CIRC menu, "CIRC OFF" shows on the screen, factory set: OFF

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

► Press "SET" button, "CIRC ON" displays on the screen, it means DHW water circulation function is triggered.

►Press "ESC" button to exit menu, or waiting for 20 seconds to exit this menu automatically, value of the parameters are saved automatically
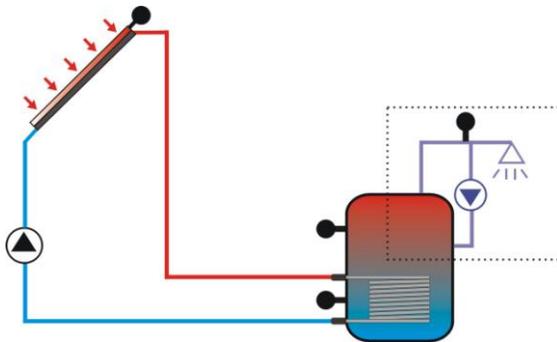
When sign inclosed by this dashed square shows on the screen, it means CIRC function is in stand-by status.

7.3 tCYC Tempeature or time setting for DHW pump in three time sections

When CIRC function is triggered, this menu just appears in the program menu, under this menu, you can set the temperature and time to run the DHW pump.

Temperature control description:

This controller has an output to run the DHW circulation pump which can be controlled by temperature, in this case, this function needs an extra circuit pump (connect with output P2) and an extra temperature sensor (connect with input T4) which mounted on the hot water return pipe. When the measured temperature T4 is lower than the switch-on temperature of circuit pump, pump is triggered, until temperature rises up to the switch-off temperature, pump is stopped.

Precondition of temperature controlling: tank temperature T3 should be higher than the preset switch-off temperature, and then DHW pump just can be triggered.

Time control description:

This controller has an output to run the DHW circulation pump which can also be controlled by time section; in this case, this function needs only an extra circuit pump (connect with output P2). Pump is triggered by time, within a running time section, as default set, pumps runs for 3 minutes and then ceases for 15 minutes, same process repeated within the running time section.

Default time section:

The first time section: starts at 05:00, stops at 07:00

The second time section: starts at 11:00, stops at 13:00

The third time section: starts at 17:00, stops at 22:00

If it is needed to close one time section, just set the start time and stop time at a same value (e.g. 05:00 starts, 05:00 stops)

Note:

- Temperature control mode is prior to time control mode
- When pipe temperature sensor T4 is installed, the controller is automatically stop time control mode and transfer to the temperature control mode.
- If it is necessary to install T4 sensor, in order to avoid measuring error, please be sure to install it at place minimum 1.5 m far away to tank.

Setup steps:

Under stand-by status, access tCYC menu,

► Press "SET" button to enter the tCYC menu, "tC 1o 05:00" shows on the screen, access the submenu of the switch-on time for the first time section

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

► Press " ∧ ∨ " button to adjust hour

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

► Press ∧ ∨ " button to adjust minute of time

► Repress "SET" button, minute "03Min" blinks on the screen

► Press ∧ ∨ " button, to set the running time of DHW pump

► then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tC 1F 07:00" shows on the screen, access the submenu of the switch-off time for the first time section

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

► Press ⋀ ⋁ "button to adjust hour of time

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

► Press " ⋀ ⋁ "button to adjust minute of time

► Repress "SET" button, minute "15Min" blinks on the screen

► Press ⋀ ⋁ "button, to set the interval time of DHW pump

►Then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tC 2o 11:00" shows on the screen, access the submenu of the switch-on time for the second time section

► Press "SET" button again, hour "11" blinks on the screen

► Press ⋀ ⋁ "button to adjust hour of time

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

► Press " ⋀ ⋁ "button to adjust minute of time

► Repress "SET" button, minute "03Min" blinks on the screen

► Press ⋀ ⋁ "button, to set the running time of DHW pump

► then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tC 2F 13:00" shows on the screen, access the submenu of the switch-off time for the second time section

► Press "SET" button again, hour "13" blinks on the screen

► Press ⋀ ⋁ "button to adjust hour of time

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

► Press " ⋀ ⋁ "button to adjust minute of time

► Repress "SET" button, minute "15Min" blinks on the screen

► Press ⋀ ⋁ "button, to set the interval time of DHW pump

►Then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tC 3o 17:00" shows on the screen, access the submenu of the switch-on time for the third time section

► Press "SET" button again, hour "17" blinks on the screen

► Press ⋀ ⋁ "button to adjust hour of time

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

► Press " ⋀ ⋁ "button to adjust minute of time

► Repress "SET" button, minute "03Min" blinks on the screen

► Press ⋀ ⋁ "button, to set the running time of DHW pump

► then, press "ESC" to exit and confirm the setting.

► Press " ⋀ " button, "tC 3F 22:00" shows on the screen, access the submenu of the switch-off time for the third time section

► Press "SET" button again, hour "22" blinks on the screen

► Press ⋀ ⋁ "button to adjust hour of time

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

► Press " ⋀ ⋁ "button to adjust minute of time

► Repress "SET" button, minute "15Min" blinks on the screen

► Press ⋀ ⋁ "button, to set the interval time of DHW pump

►Then, press "ESC" to exit this submenu, or waiting for 20 seconds to exit this menu automatically, value of the parameters are saved automatically.

Note: above is the setting steps for time control mode, temperature control mode is same like this steps

8. Functions operation and parameter setup (engineer grade)

8.1 Access main menu

Under standby status,

►Press "SET" button, repress ▲ button，select the "PWD 0000",factory set:password"0000".

►Press " ▲ ▼ " button, to enter the first figure of password

► Press "SET" button, the second figure flashes

► Press " ▲ ▼ "button, to enter the second figure of password

► Press "SET" button, the third figure flashes

► Press " ▲ ▼ "button, to enter the third figure of password

► Press "SET" button, the fourth figure flashes

►Press " ▲ ▼ utton, to enter the fourth of password

► Press "SET" button again to access main menu

► Press " ▲ ▼ "button, to select a main menu

► Press "ESC" button, to exit main menu

8.2 Access submenu

After select and confirm main menu,

►Press "SET" button to enter the submenu

►Press " ▲ ▼ "button, to select a submenu

►Press "SET" button to aceess this submenu

►Press " ▲ ▼ "button, to adjust parameter

►Press "ESC"button, to exit submenu

►Press "ESC" button, to exit main menu

8.3 DT Temperature difference for solar circuit pump

Description:

Solar circuit pump P1 is triggered by the temperature difference function, so long as the temperature difference between collector and storage reaches the switch-on DT, solar circuit pump is triggered. And when the temperature difference between collector and storage drops to the switch-off DT, solar pump is ceased.

For example: the switch-on DT is 8°C, switch-off DT is 4°C, if the temperature on the bottom part of storage 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 ^{o}C and 4 ^{o}C are standard system setting according to many years' experience, only in special application cases it may be changed, (e.g. far distance heat transferring), normally we recommend using default set. Switch-on and switch-off DT are alternating set. To avoid mistake the minimum difference between two temperature differences (ΔTon –ΔToff) is set as 2 ^{o}C.

Setup switch-on temperature difference

Under the menu of DT

▸ Press"SET"button, "DT O 08oC" display on the screen ,"08oC" flashed,the switch-on temperature difference can be set.

►Press " ∧ ∨ " button, to adjust the value of switch-on DT O, adjustable range (DT F+2 ^{o}C） ～20 ^{o}C, factory setting is 8 ^{o}C

►Press "ESC" button to exit this setting, parameter is saved automatically.

►Press " ∧ " button, "DT F 04°C" shows on the screen, "04 ^{o}C" flashed, the switch-off temperature difference can be set.

►Press " ∧ ∨ " button, to adjust the value of switch-off DT F, adjustable range : ON～(DT O-2 ^{o}C), factory setting is 4 ^{o}C

►Press "ESC" button to exit this setting, or after seconds to exit automatically, parameter is saved automatically.

8.4 TEMP Temperature main menu

For solar system, the factory set parameters are for the best operation condition, which 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 rely on the system design, it means not all the

parameters is suitable for all solar systems,

Following submenu can be accessed though TEMP main menu.

Paragraph	Tem. Code	Function of temperature	Adjustable range	Factory set	Function exit tem.
8.4.1	**EMOF**	Maximum switch-off temperature of collector	(ON+3°C)~200 ^{o}C	130 ^{o}C	
8.4.1	**EMON**	Maximum switch-on temperature of collector	(OFF-3 ^{o}C)~197°C	120 ^{o}C	
8.4.2	**CMX**	Maximum limited temperature of collector (collector cooling function)	90 ^{o}C ~180 ^{o}C	110 ^{o}C	107 ^{o}C
8.4.3	**CMN**	Low temperature protection of collector	0 ^{o}C~90 ^{o}C	OFF	
8.4.4	**CFR**	Frost protection temperature of collector	-10 ^{o}C~10 ^{o}C	OFF	
8.4.5	**REC**	Recooling temperature of tank		OFF	
8.4.6	**SMX**	Maximum temperature of tank	2 ^{o}C~95 ^{o}C	70 ^{o}C	68 ^{o}C
8.4.7	**C - F**	Switch between Celsius and Fahrenheit	^{o}C $\sim$^{o}F	^{o}C	

8.4.1 EMOF Maximum switch-off temperature of collector (for collector emergency close function)

Function description:

When collector temperature rises up to this maximum switch-off temperature (EM), collector emergency function is activated, solar circulation pump is stopped in order to avoid the damage of system's other components caused by high temperature. The adjustable range of EMOF temperature is （EMON+3 ^{o}C～200 ^{o}C）, factory set is 130 ^{o}C. If the temperature of collector rises up to EMOF limited temperature, solar circuit pump is ceased, but when collector temperature drops to the collector maximum switch-on temperature EMON（factory set is 120°C）, solar circuit pump will be recovered, and

collector emergency close function is deactivated.

● **EMOF Maximum switch-off temperature of collector**

Setup steps:

To access main menu TEMP, then select submenu
EMOF, "EMOF 130°C" shows on the screen

►Press "SET" button, parameter "130 ^{o}C" flashes.

►Press " ▲ ▼ " button, to adjust this maximum
switch-off temperature, adjust range (EMON+3°C）～
200°C, factory set is 130°C

►Repress "SET" button to activate or deactivate this function, if deactivate the function,
"EMOF - - -" shows on the screen.

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

● **EMON Maximum switch-on temperature of collector**

Setup steps:

To access main menu TEMP, then select submenu EMON, "EMON 120°C" shows on the
screen

►Press "SET" button, parameter "120 ^{o}C" flashes.

►Press " ▲ ▼ " button, to adjust this maximum
switch-on temperature, adjust range (EMOF-3°C）～
197°C, factory set is 120°C

►Repress "SET" button to activate or deactivate this function, if deactivate the function,
"EMON - - -" shows on the screen.

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

☀ ⚠ When these 2 signs of collector emergency close function simultaneously

blink on the screen, it indicates the function is activated, and tank temperature reaches
up to its maximum limitation.

⚠ When only this sign of collector emergency close function blinks on the screen, it

indicates the function is also activated, but temperature of tank doesn't reach to its maximum limited temperature

8.4.2 CMX Maximum limited temperature of collector (collector cooling function)

Function description:

If hot water in tank isn't used for long time, then the capacity that solar system absorbs solar energy reduces, when tank temperature rises to its preset maximal temperature, solar circuit pump is ceased compulsively even the temperature difference is satisfied. then when more solar irradiation shines in, as a result collector temperature will rise continuously, temperature of collector maybe rise up to the evaporated temperature of heat fluid, this phenomenon names collector - overheat, it should be avoided. Through set the Maximum limited collector temperature (collector cooling function) can delay 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 using the heat losses occurring on pipelines and storage cylinder.

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 drops because of 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 emergency stop function is activated, and tank temperature is ≥95°C

Setup steps:

To access main menu TEMP, then select submenu CMX, "CMX 110 oC" shows on the screen

▸ Press "SET" button, "110 oC" blinks.

▸ Press " ⋀ ⋁ " button to adjust collector limited

maximum temperature , adjust range：（110 oC～190 oC）, Factory set is 110 oC

▸ Press "SET" button to activate and deactivate this function, if deactivate the function, "CMX - - -" shows on the screen.

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

☀ CMX sign displays on the screen, it indicates that collector cooling function is activated.

8.4.3CMN Low temperature protection of collector

Description:

When the actual temperature of collector is below the preset CMN temperature, solar circuit pump is ceased, even when the temperature difference between collector and storage exceeds switch-on temperature difference, solar pump doesn't work yet. When the temperature of collector is $2^{o}C$ higher than the preset CMN temperature, solar circuit pump is standby to work, controller exits this program.

Setup steps:

To access main menu TEMP, then select submenu CMN, "CMN - - -" shows on the screen, default set is OFF.

►Press "SET" button, default off sign "- - -" blinks on the screen.

►Repress "SET" button to activate or deactivate this function.

►Press " ⋀ ⋁ " button to adjust the low protection temperature of collector CMN, adjustable range (00 ^{o}C ～90 ^{o}C), after activate the function, factory set is 10 ^{o}C

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

❄ CMN sign displays on the screen, it indicates that this function is activated.

8.4.4 CFR frost protection temperature of collector

Description:

In winter when the temperature of collector is below the preset frost protection

temperature CFR, solar circuit pump is triggered to transfer hot water from tank to collector and to heat collector by this reversed circuit. And when tank temperature (T2) drops to 6°C, electrical heater is triggered automatically and it keeps running until tank temperature T2 rises up to 20°C or it is stopped when program of CFR is exited. When collector temperature rises up to more than 3°C, solar circuit pump is ceased, program of CFR exits automatically.

This function is used in system, which uses 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 ----" shows on the 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 is 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 sign shows on the screen, it indicates that this function is activated.

Note: this function is only available in special solar system which using un-anti-freezing liquid; this kind of system is only suitable in area where the ambient temperature is near to 0°C only for a few days. If safety requirement is very high, then anti-freezing liquid is necessary, we suggest using suitable anti-freezing liquid to avoid frost problem.

8.4.5 SMX Maximum temperature of tank

Description:

When the DT between collector T1 and tank T2 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 the top part of tank is higher than the maximum temperature of tank, when T3 is higher than the preset maximum tank

temperature SMX, solar pump is ceased even at the case that DT caters condition. When tank temperature drops and is 2°C below the SMX temperature, solar pump restarts when DT caters condition.

Setup steps:

To access main menu TEMP, then select submenu SMX, "SMX 70 ^{o}C" shows on the screen.

►Press "SET" button, parameter "70 ^{o}C" blinks

►Press "⋀ ⋁" button to adjust the value of maximum temperature of tank, adjustable range is（2 ^{o}C～95 ^{o}C）, default set is 70 ^{o}C
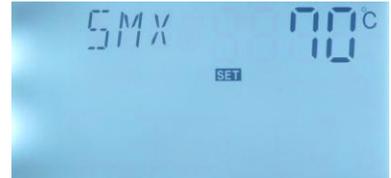
►Repress "SET" button to activate or deactivate this function, if function deactivated, "SMX - - -" displays on the screen.

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

☀ SMX sign shows on the screen, it indicates that this function is activated.

8.4.6 REC Recooling temperature of tank

Description:

If storage temperature rises up to its maximum temperature(SMX), and at the same time, collector(T1) temperature is 5°C lower than storage temperature, then solar pump can be triggered, through this reversed circulation, tank temperature is reduced by heat loss occurs in collector, solar pump keeps in working until tank temperature drops below its maximum temperature(SMX).

Setup steps:

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

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

►Repress "SET" button to activate or deactivate this function; or function activated,

factory set is "REC ON"

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

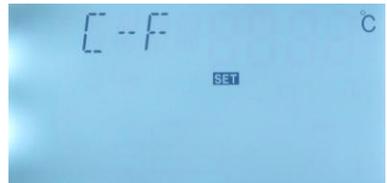parameters are saved automatically.

☀ REC sign blinks on the screen; it indicates that this function is activated.

8.4.7 C__F Switch between Celsius and Fahrenheit

Setup steps:

To access main menu TEMP, then select submenu C_F, "C_F ^{o}C" shows on the screen

►Press "SET" button, displayed parameter ^{o}C blinks on

the screen

►Press " ⋀ " button, to select Celsius or Fahrenheit

temperature unit, default set is ^{o}C

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

parameters are saved automatically.

8.5 FUN Auxiliary functions

The auxiliary functions of this controller can be set under menu "FUN"; it is possible to

activate several auxiliary functions at the same time.

Note:

Sometimes, the selected function needs controller to have an extra input to connect a

temperature sensor or an extra output to control a pump or electromagnetic valve. Under

main menu "FUN", some submenu functions maybe deactivated, so the displayed

contents for below mentioned submenu functions maybe different.

Following submenu can be access though FUN main menu.

Paragraph	Fun. code	Function description	Adjustable range	Factory set
8.5.1	**DVWG**	Anti legionnaires' function	5°C~95°C	OFF
8.5.2	**P1**	P1 Pump operation mode selection	ONOF: switch control PLUS: normal pump HEA: high efficiency pump	ON/OF switch control

8.5.3	**nMIN**	Pump speed adjustment	30～100%（HEA20～100%）	30%
8.5.3.1	**DTS**	Standard temperature difference of pump (for speed adjustment)	2 ℃～30 ℃	8 ℃
8.5.3.2	**RIS**	Gain for circulation pump (for speed adjustment)	1 ℃～20 ℃	1 ℃
8.5.4	**P2**	P2 Pump operation mode selection	ONOF: switch control HEA: high efficiency pump	ON/OF switch control
8.5.5	**FTYP**	Flow meter type selection	01: mechanical flow meter 02: Electronic flow meter	01: mech. flow meter
8.5.6	**OHQM**	Thermal energy measuring	ON/OFF	OFF
8.5.6.1	**FMAX**	Flow rate	0.1～20L/min	2.0L/min
8.5.6.2	**MEDT**	Type of heat transfer liquid	00: Water 01: Propylene glycol 02: Glycol 03: Tyfocor LS/G-LS	01: Propylene glycol
8.5.6.3	**MED%**	Concentration of heat transfer liquid	20～70	40
8.5.7	**INTV**	Intermission function	ON/OFF	OFF
8.5.7.1	**tSTP**	Pump interval run-off time	2～60m	30m
8.5.7.2	**tRUN**	Pump interval run-on time	5～120s	15s
8.5.8	**AHO**	Thermostat function	0～95 ℃	45 ℃
	AHF	Thermostat function	0～95 ℃	40 ℃
8.5.9	**COOL**	Tank cooling function	5 ℃～95 ℃	80 ℃
8.5.10	**BYPR**	By-pass (high temperature)	5 ℃～120 ℃	80 ℃

8.5.1 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 seventh day, auxiliary heating system is triggered automatically to heat water until its temperature rises up to 70°C, bacteria is killed by high temperature, and then function is deactivated.

Setup steps:

To select submenu DVWG, "DVWG ---" shows on the screen. Default set is "OFF".

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

►Press "SET" button to activate this function, and then "DVWG 70°C" shows on the screen.

►Press " ∧ ∨ " button to adjust temperature of anti legionnarier's function, adjustable range: 5°C ~ 95°C.

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

8.5.2 P1 Pump P1 operation mode selection

Description:

P1 output mode can be configured to function as one of below three modes:

● ON/OF mode: for normal pump, switch on/off mode
● PLUS mode: for normal pump, pulse control
● HEA mode: mode for high efficiency pump. RPM control

Setup steps:

To access main menu FUN and then select submenu P1 pump operation mode selection, "P1 ONOF"displays on the screen,

►Press "SET" to access the menu, "P1 ONOF" shows and blinks on the screen; factory set is "ON/OF mode".

►Press " ▲ " button, "P1 PLUS" shows on the
screen, then pump output is pulse controlled.

►Press " ▲ " button, "P1 HE A" shows on the screen,
then pump output is high efficiency mode (RPM
controlled)

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

Note:

when pump mode is set as" P1 ONOF", pump is running with fixed speed, RPM control is
deactivated.

When pump model is set as"P1 PLUS" , pump speed is changed with scope 30%~ 100%

when pump mode is set as "P1 HE A", pump speed is changed with scope 20%~ 100%.

8.5.3 nMIN Pump speed adjustment（RPM control）

Only in the case that you select the output mode of pump P1 is PLUS (for normal pump)
or HE A (for high efficiency pump), then you can see the submenu nMIN (pump speed
adjustment).

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

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

Setup steps:

To access main menu FUN, select submenu "nMIN",
"nMIN 30" shows on the screen.

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

►Press " ▲ ▼ " button, to adjust pump speed. adjustable range: (30～100%),

factory set is 30%.

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

8.5.3.1 DTS Standard temperature difference of pump (for speed adjustment)

Description:

When the temperature difference between collector and tank meets the switch-on temperature difference, solar pump starts to work; subsequently, pump speed reaches to its minimum speed of 30% after 20 seconds. And then controller checks temperature continuously, when a standard temperature difference (DTS) reaches, the speed of pump is adjusted automatically; under the precondition that flow rate is over the preset maximum flow rate, pump runs at the speed to approach the standard temperature difference (DTS) and in result to get the energy as more as possible. Pump speed can be adjusted automatically according the parameters: the preset maximum flow rate and standard temperature difference DTS. If temperature difference drops to the switch-off temperature difference ($\triangle$T OFF), circuit pump is ceased.

Setup steps:

To access main menu FUN, select "DTS" submenu, "DTS 08°C" shows on the 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.

8.5.3.2 RIS Gain for circulation pump (speed adjusting)

Setup steps:

To access main menu FUN, select "RIS" submenu, "RIS 01°C" shows on the screen.

►Press "SET" button, parameter "01°C" blinks on the screen

►Press " ▲ ▼ " button, to adjust standard RIS, adjustable range:1°C～20 ^{o}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.

8.5.4 Pump P2 operation mode selection

Description:

P2 output mode can be configured to function as one of below two modes:

● ONOF mode: for normal pump, switch on/off mode

● HEA mode: mode for high efficiency pump. RPM control

Setup steps:

To access main menu FUN and then select submenu P2 pump operation mode selection, "P2 ONOF"displays on the screen,

►Press "SET" to access the menu, "P2 ONOF" blinks on the screen; factory set is "ONOF mode".

►Press "⋀   " button, "P2 HE A" shows on the screen, then pump output is high efficiency mode (RPM controlled)

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

8.5.5 FTYP Flow meter type selection

FTYP: Flow meter type selection option, adjustable between : 01、02

Type of flow meter:

01: mechanical flow meter

02: electronic flow meter

Select FTYP submenu, "FTYP 01" displays on the screen
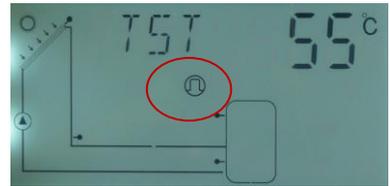
►Press "SET" button, "01" blinks on the screen

►Press "⋀ ⋁ " button, to adjust flow meter type, adjustable range: 01 or 02

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

Note:If user select the digital flow meter,the

sign" ⬛ "show on the screen (see right picture)

8.5.6 OHQM Thermal energy measuring

Description:

Controller has function of thermal energy measuring; 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 T1 and T6 (installed on the flow and return pipe). Thermal energy get 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.

OHQM Thermal energy measuring, factory set of OHQM is OFF

Setup steps:

To select submenu OHQM,

►Press "SET" button, "OHQM" shows on the screen,

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

►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.

Note:

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

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

8.5.6.1 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.

8.5.6.2 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 adjust 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.

8.5.6.3 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.

8.5.7 INTV pump Intermission function

Description:

This function is useful when collector sensor isn't installed on collector (sensor installed

on the outlet pipeline of collector). When circuit pump is in standby status (since

switch-on DT is not reached), in order to measure the actual temperature of collector,

solar pump is triggered to run for 15 seconds (it is set by tRUN) in every 30 minutes (it is

set by tSTP), as the result, the hot water inside the collector can flow through the pipeline,

where sensor is mounted, and the actual temperature of collector can be measured and

controller can monitor whether the temperature difference reaches the switch-on

condition. This function is only in action during a preset time section, default time section

is from 07:00~18:00.

Setup steps:

To access submenu INTV, "INTV" displays on the screen.

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

the screen, default is "OFF"

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

►Press "SET" button to activate this function, "INTV

ON" shows on the screen

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

parameters are saved automatically.

8.5.7.1 tSTP Pump interval run-off time

Setup steps:

To select submenu tSTP, "tSTP 30" displays on the

screen.

► Press "SET" button, parameter "30" displays and

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.

8.5.7.2 tRUN Pump interval run-on time

Setup steps:

To select submenu tRUN, "tRUN 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.

8.5.8 AHO /AHF Automatical thermostat function

Automatical 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 a electromagnetic valve or circuilation pump R1, corresponding temperature is T5.
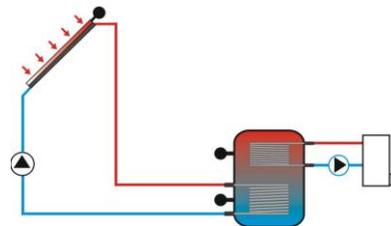
Note:

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
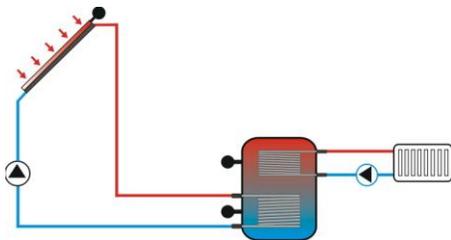
AHO>AHF, extra heat release   AHO<AHF, back-up heating

To access submenu AHO, "AHO- - -" displays on the screen.

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

►Repress "SET" button, "AHO 45°C" appears on the screen, and "45°C" blinks on the screen

►Press ' ∧ ∨ " button to adjust switch-on temperature of this function, adjustable range (0 ^{o}C ～95°C）

► Press "ESC" button to exit and confirm the setting.

►Press " ∧ " button, "AHF 40°C" appears on the screen, and "40°C" blinks on the screen

►Press"SET"button,AHF"40" blinks,factory default: 40°C

►Press ' ∧ ∨ " button to adjust switch-off temperature of this function, adjustable range (0°C ～95°C）

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

 When this sign shows on the screen, it indicates that the thermostat function is activated.

8.5.9 COOL Tank cooling function

Description:

Tank cooling function is independent from solar system, it is used to transfer the extra thermal energy from tank to other heat release device, and as a result, tank temperature can be kept at a constant value. So for this function, an extra pump R1 should be installed in the system, temperature controlled by T3.

For example:

We set the temperature of 80°C is the condition to run the cooling function, then when tank temperature T3 rises up to 80°C, cooling function is activated automatically, pump R1 starts to work, when tank temperature drops to 77°C, the pump R1 is stopped.

Setup steps:

To access submenu COOL, "COOL - - -" displays on the screen.

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

►Repress "SET" button to activate or deactivate this function; after function activated, "COOL 80°C" displays on the screen and 80°C blinks,

►Press " " button to adjust temperature, adjustable range (5 °C ～95°C）

► Press "ESC" button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.
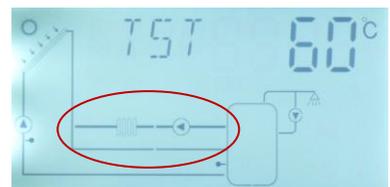
When this sign shows on the screen, it means tank cooling function is activated.

Application example for reference

Released the extra heat stored in tank

8.5.10 BYPR Bypass function (high temperature)

Description:

In the case that tank temperature rises up to its maximum temperature (SMX), and if the collector temperature T1 rises up to BYPR temperature, then solar pump P1 can be triggered, at the same time, electromagnetic T-valve R1 is triggered also to release extra heat by radiator or pipe. Collector temperature drops and when it is 10°C below the BYPR temperature or when tank temperature T3 is below its maximum tank temperature (SMX), then P1 and R1 are stopped at the same time.
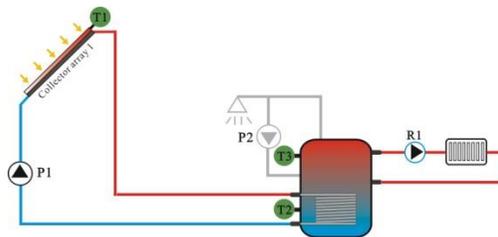
Setup steps:

To access submenu BYPR, "BYPR - - -" displays on the screen.

►Press "SET" button, parameter "- - -" blinks on the screen, default set is OFF.

►Repress "SET" button to activate or deactivate this function; after function activated, "BYPR 80°C" displays on the screen and 80°C blinks.

►Press " ∧ ∨ " button to adjust temperature, adjustable range (5 ^{o}C ～120°C）

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

When this sign shows on the screen, it means tank cooling function is activated.

Application example (only for reference)

Heat released by radiator

Heat released by pipeline

Note: the one of three functions BYPR、AHO、COOL is activated, then the rest 2 functions are deactivated automatically.

8.6 HND Manual control

When using this controller first time or when debugging this controller, outputs of this controller (P1, P2,R1,H1）can be triggered manually with "On, OFF" control.
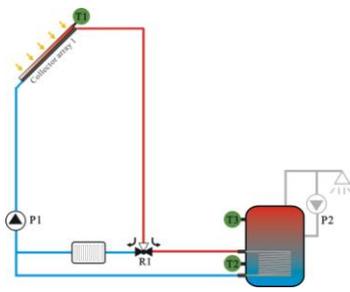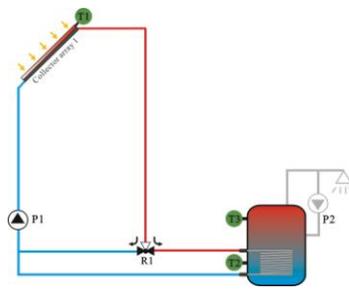
Setup steps:

To access main menu HND

►Press "SET" button, "HND1 off" displays on the screen, P1 output manually set

►Repress "SET" button, "on" blinks on the screen, P1 output is switched-on

►Repress "SET" again, "off" blinks on the screen, P1 output is switched-off

►Press "ESC" to exit setup P1

►Press " ⋀ " button, "HND2 off" displays on the screen, P2 output manually set

►Press "SET" button, "on" blinks on the screen, P2 output is switched-on

►Repress "SET" again, "off" blinks on the screen, P2 output is switched-off

►Press "ESC" to exit setup P2

►Press " ⋀ " button, "HND3 off" displays on the screen, R1 output manually set

►Press "SET" button, "on" blinks on the screen, R1 output is switched-on

►Repress "SET" again, "off" blinks on the screen, R1 output is switched-off

►Press "ESC" to exit setup R1

►Press " ⋀ " button, "HND4 off" displays on the screen, H1 output manually set

►Press "SET" button, "on" blinks on the screen, H1 output is switched-on

►Repress "SET" again, "off" blinks on the screen, H1 output is switched-off

►Press "ESC" to exit setup H1

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

8.7 PASS Password set

Setup steps:

To access main menu PASS,

►Press "SET" button, "PWDC 0000" appears on the screen

► Prepress "SET"the left figure blinks, ask for entering current password (factory set is "0000")

►Press ⋀ ⋁ ""button to enter the first figure

►Repress "SET" button, the second figure blinks

►Press " ⋀ ⋁ "button to enter the second figure

►Repress "SET" button, the third figure blinks

►Press" ⋀ ⋁ " button to enter the third figure

►Repress "SET" button, the fourth figure blinks

►Press" ⋀ ⋁ " button to enter the fourth figure

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

►Press "SET" button, "PWDG 0000" shows on the screen, ask for reentering the new password, doing like above to reenter the new password, "PWOK" shows 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 impossible 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 " $\textcircled{\textcircled{\scriptsize 0}}$ " button and hold it down, then reconnect the power supply.

►Buzzer makes "du-----" 3 times, then release " $\textcircled{\textcircled{\scriptsize 0}}$ " button. Controller recovers to the factory set passowr (factory set possword is 0000), a new password can be reset now.

8.8 LOAD Recovery to factory set

Setup steps:

To access main menu LOAD (recovery to factory set),

►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 paramters can be reset now.

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

8.9 "ON/OFF" Controller switch on/off button

Under standby status,

►Press " $\textcircled{\textcircled{\scriptsize 0}}$ " button for 3 seconds, controller is closed, "OFF" displays on the screen

►Repress " $\textcircled{\textcircled{\scriptsize 0}}$ " button, Controller recovers to open status.

8.10 Holiday function

Description:

This function activates in night, solar liquid will flow from storage tank to collector to cool

the tank, and as a result to prevent overheating problem of the solar system in the case that tank is already heated completely. The function is activated at night between 10 pm and 6 am, when the temperature of collector is 8 ^{o}C below the tank temperature (T2), solar circuit pump starts to work until the temperature of collector is 2 ^{o}C below the tank temperature, and then solar circuit pump is ceased.
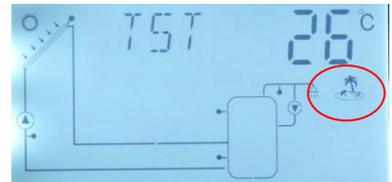
Activate this function if:

● You intend to leave home for an extended period (holiday)

● No hot water is consumed in an extended period.

● Pump is ceased when the temperature on bottom part of tank is below 35 ^{o}C.

Activate/ deactivate this function:

►Press " (⛱) " button for 3 seconds, sign of holiday function displays on the screen, holiday day number "07" flashes on the screen.

►Press " ⋀ ⋁" button to adjust the holiday period, adjustable range is 1-60 days.

►Press " (⛱) " button, holiday sign disappears, holiday function is deactivated.

Note: when you return from holiday, please deactivate this function in time.

8.11 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 temperature of top part tank (T3) is 2 ^{o}C below the preset switch-on temperature, back-up heating will be triggered. When the temperature on the top part tank (T3) rises up to the preset temperature, then heating is ceased.

Conditions for triggering manual heating function: the preset switch-on temperature of this function should be 2 ^{o}C higher than the tank actual temperature.

Activate/deactivate the function:

►Press " (⟨⟩) " button, temperature "60 ^{o}C" blinks on the screen.

►Press ' ⋀ ⋁ " button to adjust switch-on temperature, adjustable range 10 ^{o}C～80

^{o}C, factory set is 60 ^{o}C.

After 20 seconds, this function is activated, signal $\binom{lm}{l}$ displays on the screen, and

heating sign (((())) blinks also.

►Press " (((()))) " 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.

8.12 Manually control DHW pump

It is possible to manually trigger DHW pump P2 at any time, default running time is 3 minutes, after 3 minutes, pump P2 is stopped automatically.
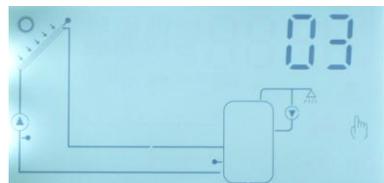
Setup steps:

► Press " (⏻) " button, "03" displays and blinks on the screen

► Press " ⋀ ⋁ " button to adjust running time of pump P2, (default running time is 3 minutes, adjustable range is 1-60 minutes)

The fuction was activated after 20 seconds automatically,and manually control sign $\binom{lm}{l}$ display on the screen and DHW pump sign blink on the screen.

►Press (⏻) button,and switch off manually control DHW pump.

Note:

Only when CIRC activate,the function "manually control DHW pump" can be available.

8.13 Temperature checking function

Under standby status

►Press ' ⋀ ⋁ "button, you can check the value of temperature sensors T1~ T7, week and time.

When checking temperature, T1 – T7 displays one by one, corresponding sensor sign ——● blinks. (TST) tank temperature.

Note: Due to the different system, the available checking information is different.

9. Protection function

9.1 Memory protection

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

9.2 Screen protection

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

9.3 Pump dry running protection

Pump station is monitored that no liquid flows trough pump for 30 seconds, then pump is stopped for 3 minutes; this monitoring is repeated for 3 times, pump is ceased, "P1" blinks on the contoller screen, dry running protection is activted.

Reasons of no flow:

- Leakage on the pipeline
- Blade of electronic flow meter is jammed.

10. Trouble shooting

10.1 Trouble protection

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 sign ⚠ shows on the screen. If controller does not work correctly, please check following situations.

►Press " ⋀ ⋁ "button to check error code (warning sign ⚠ blinks on the LCD screen)

LED displayed error code	Code meaning	Cause of error	Error rectification
⚠ T1 - - -	T1 sensor problem	Sensor wiring short or open	Check resistance value or replace
⚠ T2 - - -	T2 sensor problem	Sensor wiring short or open	Check resistance value or replace
⚠ T4 - - -	T4 sensor problem	Sensor wiring short or open	Check resistance value or replace
⚠ T5 - - -	T5 sensor problem	Sensor wiring short or open	Check resistance value or replace
⚠ T6 - - -	T6 sensor problem	Sensor wiring short or open	Check resistance value or replace

10.2 Trouble checking

The built-in controller is a qualified product, which is conceived for years of continuous trouble-free operation. If a problem occurs, the most of causes is from the peripheral components but no relation with controller itself. The following description of some well-known problems should help the installer and operator to isolate the problem, so that the system can be put into operation as quickly as possible and to avoid unnecessary cost. 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 appear any functions at all	Display shows nothing, no display illumination	Controller power supply is interrupted	Check the controller power cable and fuse
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
Solar circuit pump doesn't operate	The pump symbol in the display doesn't blink. ☀ Lighting or ⚠ blinks	The maximum storage tank temperature (SMX) has been reached, or The maximum tank temperature 95°C reached.	No fault, normal case
	☀ Lighting or ⚠ blinks	The maximum collector temperature (EMOF) reached	No fault, normal case
	⚠ T1 - - - Error code displays on the screen	Sensor fault (short circuit or open circuit)	Check values of every connected sensor; replace all defective sensors and /or wiring.
Solar pump operated, despite the fact that the switch-on conditions are not	The pump symbol on the screen flashes.	Holiday function or Frost protection function or tank re-cooling function is activated.	No problem, it is normal. If necessary to deactivate the corresponding

satisfied			functions.
One of functions can't be used	In submenu, this function may not be activated.		No fault
Pump works, but flow rate is 0.0L/min	Filter valves are not installed on the flow and return pipeline	Balde of electrical flow meter is jammed	Dismantle the connected pipe of pump station, clean pipeline with high pressure water gun, And if figure of flow meter is changed means a normal status.
"P1" flashes on the screen		1. Balde of electrical flow meter is jammed 2.No heat transfer liquid in system 3. Pump is damaged.	1. Dismantle the connected pipe of pump station, clean pipeline with high pressure water gun, 2. Refill heat transfer liquid 3. Replace pump

⚠️ **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 numerical value compared with the figure in the table below, small deviation (±1%) is acceptable.

PT1000 resistance value

^{o}C	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

^{o}C	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

11. 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 quality warranty expires within 18 months after the date of purchasing the controller.

12. Product specification

Parameter	Value
Power supply	200～240V/AC, 50～60Hz
Power consumption	＜2W
Measure accurate	±2°C
Measure scope of collector sensor	-10～200°C
Measure scope of tank sensor	0～100°C
Available power of R1 electrical thermal trace	＜500W
Available pump P2 can be controlled	pump power ＜200W
Available electrical heater can be controlled H1	1 heater, heater power≤ 1500W

T1	Collector : 1* PT1000 , ≤ 300°C (Silicon cable ≤ 280°C）
T2、T3	NTC10K, B=3950, ≤135 °C（PVC cable ≤105 °C）
T4、T5	Optional sensor: NTC10K, B=3950, ≤135 °C（PVC cable ≤105 °C）
Ambient temperature	-10～50 °C
Water proof grade	IP42

13. Package list

| Components	Quantity
Solar pump station	1 pc.
User manual	1 pc.
PT1000 sensor (φ6*50mm, cable length 1.5m）	1 pc.
NTC10K sensor (φ6*50mm, cable length 3m）	2 pcs.
Mounting accessories (expansion screw, clamps)	1 bag
Power cable AC250V/10A	1 pc

14. Device matched to this pump station

Products listed in below table are useful accessories for this pump station; it is not included in the standard package, if you need, please buy it separately.

- Sensor for collector: high accuracy PT1000 sensor(A01)
  Parameter: PT1000, Φ6X50mm

- Sensor for tank: high accuracy NTC 10K sensor (A02)
  Parameter: NTC10K,B=3950, Φ6X50mm
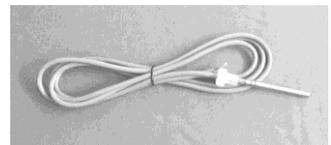
- Thermowell of sensor: stainless thermowell (A05)
  Parameter: 1/2' male thread, Φ8X200mm.

● Contactor unit of high power: SR802

When user selects electrical heater as back-up device, we recommend using SR802 unit connecting controller and electrical heater.

● Technical data of SR802

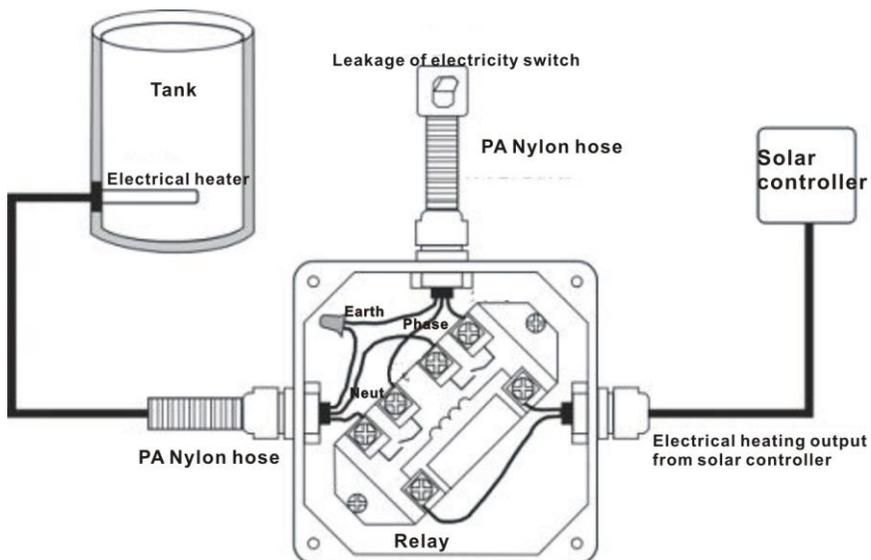Dimension: 100mmx100mmx65mm

Power supply:180V～264V/AC 50/60Hz

Suitable power: ≤ 4000W

Available ambient temperature: -10 ~ 50°C

Water proof grade: IP43

SR802 CONNECTION DIAGRAM:

Note: Switch-off power, and perform by profession installer.

● Cable wired remote display（SR805）

Dimension：130*10*20mm

Available ambient temperature：-10 ^{o}C～50 ^{o}C

Water proof grade：IP40

Application see the manual(5.2 Terminal connection),

Operational application: connect remote display by cabel wires

● Wireless remote display（SR805W）

Dimension：130*10*20mm

Available ambient temperature：-10 ^{o}C～50 ^{o}C

Water proof grade：IP40

Application see the manual(5.2 Terminal connection),

Operational application: wireless connect remote display.