

Science and Technology Create Perfection

# Installation and Operating Manual

## **SR988C1 SOLAR CONTROLLER**

For Split Pressurized Hot Water System



*Read the instruction carefully please before operation!*

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## 1. Safety information

### 1.1 Installation and commissioning

- When laying cables, please ensure that no damage occurs to any of the constructional fire safety measures presented in the building.
- The controller must not be installed in rooms where easily inflammable gas mixtures are present or may occur.
- The permissible environmental conditions can't be exceeded at the site of installation.
- Before connecting the device, make sure that the energy supply matches the specifications that controller requires.
- All devices connected to the controller must conform to the technical specifications of the controller.
- All operations on an open regulator are only to be conducted cleared from the power supply. All safety regulations for working on the power supply are valid.
- Connecting and /or all operations that require opening the regulator (e.g. changing the fuse) are only to be conducted by specialists.

### 1.2 About this manual

This manual describes the installation, function and operation of a solar thermal controller. When installing the remaining components e.g. the solar collectors, pump assemblies and the storage unit, are 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 controller. Improper installation can cause damages to material and person. This is the reason why we do not take over responsibility and liability for losses, damages or cost that might arise due to improper installation, operation or wrong utilization and maintenance or that occurs in some connection with the aforementioned. The manufacturer preserves the right to put changes to product, technical data or installation and operation instructions without prior notice. As long 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 Important remark

We have carefully checked the text and pictures of this manual and provided the best of our knowledge and ideas, however inevitable errors maybe exist. Please note that we cannot guarantee that this manual is given in the integrity of image and text, 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.

### 1.5 Description of symbols



Safety instruction:

The safety instructions in the manual are 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.

### 1.6 Operation button description



On/off



Clock



Manual heating



Holiday



Set



Exit/Confirm



Up



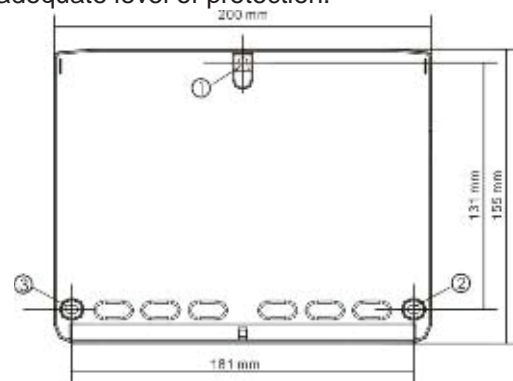
Next

## 2. Installation

### 2.1 Installing controller

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

- ▶ choose a suitable place
- ▶ drill the top fix hole
- ▶ fasten the screw
- ▶ move the cover plate
- ▶ hang the bottom plate on position ①
- ▶ mark the position of bottom fix hole ② ③
- ▶ take away the bottom plate
- ▶ drill hole
- ▶ rehang the bottom plate on ①
- ▶ fasten the bottom screw on ② ③ position



### 2.2 Wiring connection

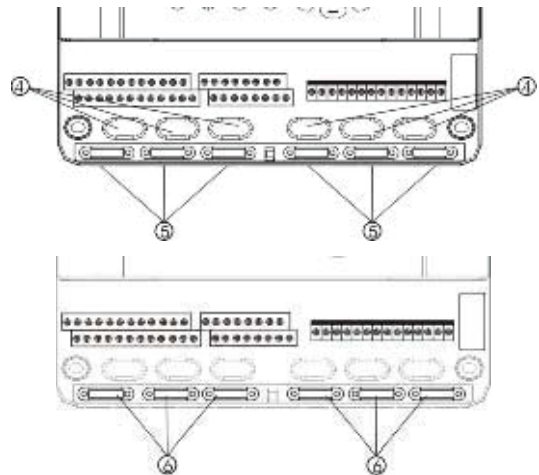
Depending on the type of installation, the cables may enter the device through the rear hole of the case

④ or the lower side hole of the case ⑤

Cable come from the rear ④: remove the plastic flaps from the rear side of the case using an appropriate tool.

Cable come from the below ⑤: cut the left and right plastic flaps using an appropriate tool (e.g. knife) and break them out of the case.

Notes: the flexible wire must be fastened on the case using the clamps ⑥ provided



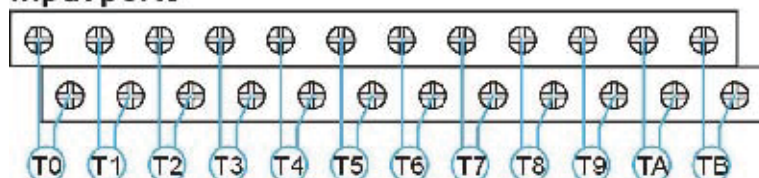
### 2.3 Terminal connection



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

#### ● Input terminal

#### Input ports



InputT0~T1: PT1000 temperature sensor, for measuring the temperature of collector.

InputT2~TB: NTC10K, B=3950 temperature sensor, for measuring the temperature of **tank** and pipe.

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

Only original factory equipped Pt1000 temperature sensors are approved for using on 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°C, not necessary to distinguish the positive and negative polarity of the sensor connection.

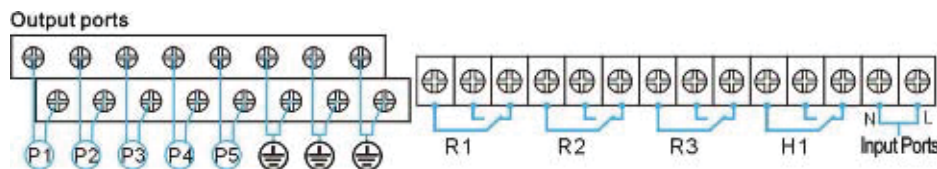
Only original factory equipped NTC10K,B=3950 temperature sensors are approved for using on tank and pipe, it is equipped with 1.5meter PVC cable, and they are temperature resistant up to 105°C, not necessary to distinguish the positive and negative polarity of the sensor connection.

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)

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.

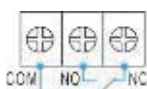
Sensor cables may be extended to a maximum length of ca. 100 meter, when cable's length is up to 50m, and then 0.75mm<sup>2</sup> cable should be used. When cable's length is up to 100m, and then 1.5mm<sup>2</sup> cables should be used.

### ● Output terminal



Output port	Description
Input Ports:	for power connection, L is live wire, N is naught wire.
Ground	
Output P1	Semiconductor relay (SCR relay), also suitable for RMP control, max. switching current 1A,
Output P2	Semiconductor relay (SCR relay), also suitable for RMP control, max. switching current 1A,
Output P3	Electromagnetic relay and max. Switching current 3.5A.
Output P4	Electromagnetic relay and max. Switching current 3.5A.
Output P5	Electromagnetic relay and max. Switching current 3.5A.
Output R1	Electromagnetic relay and max. Switching current 3.5A, for 3-way electromagnetic valve.
Output R2	Electromagnetic relay and max. Switching current 3.5A, for 3-way electromagnetic valve.
Output R3	Electromagnetic relay and max. Switching current 3.5A, for 3-way electromagnetic valve.
Output H1	Electromagnetic relay and max. Switching current 3.5A, for back-up device or 3-way electromagnetic valve.

### Note:



R1~R3 is electromagnetic valve (COM NC is for close) (COM NO is for open)  
Circuit pump connects (COM NO open)

Connected Pumps and sensors are depended on the selection of solar system; all wires should be protected by safety pipe.











### 3. Commissioning



Connect the sensors, pumps or switching valves to the controller before you connect the power supply!

After switching on power to the controller, firstly it will ask for to set the time, password, **application-system selection** and parameters of system.

#### 3.1 Set time/week


















- ▶ press  , time displays on screen, hour "00" blinks.
- ▶ Press   to adjust hour
- ▶ Repress  , minute "00" blinks.
- ▶ Press   to adjust hour, then,
- ▶ Repress  , Week "MO"blinks
- ▶ Press   to adjust week
- ▶ Press  to exit programm, or waiting for 20 seconds to exit automatically. Time and week are saved automarically.



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

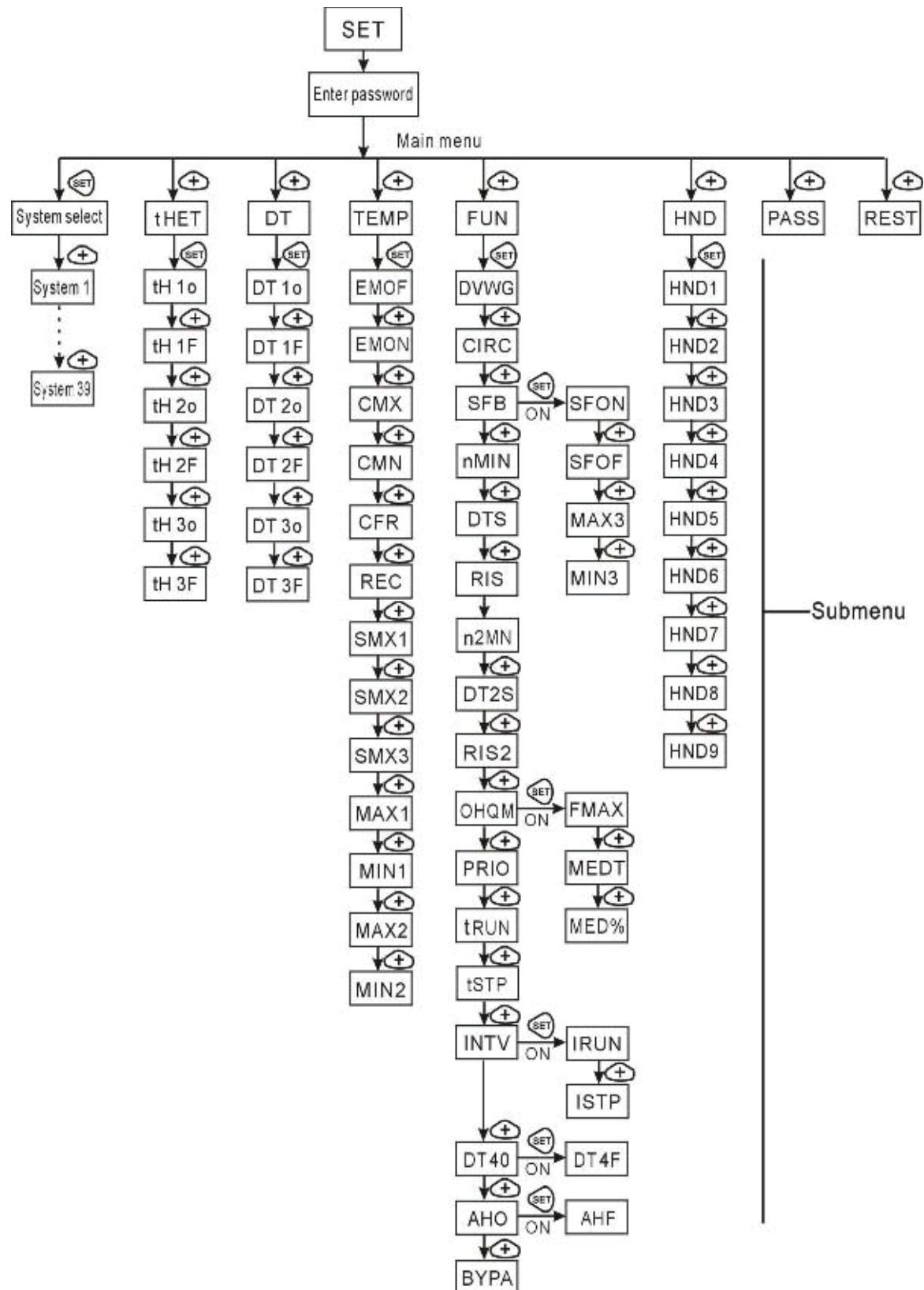
#### 3.2 SCH system selection

Under standby status,

- ▶ Press  , "PWD 0000"displays and the left figure blinks, require to enter password.(factory set password :0000)
- ▶ Press   , to enter the first figure
- ▶ Repress  , the second figure blinks
- ▶ Press   , to enter the second figure
- ▶ Repress  , the third figure blinks
- ▶ Press   , to enter the third figure
- ▶ Repress  ,the forth figure blinks
- ▶ Press   to enter the forth figure
- ▶ Repress  , enter main menu, "SCH 01"displays on the screen
- ▶ Repress  to enter selection program, "01"blinks, the first solar system displays on the screen
- ▶ Press   , to select desired solar system (system 1-39 are available)
- ▶ Press  to exit programm, or waiting for 20 seconds to exit automatically. Selected system is saved automarically.



### 3.3 Menu structure



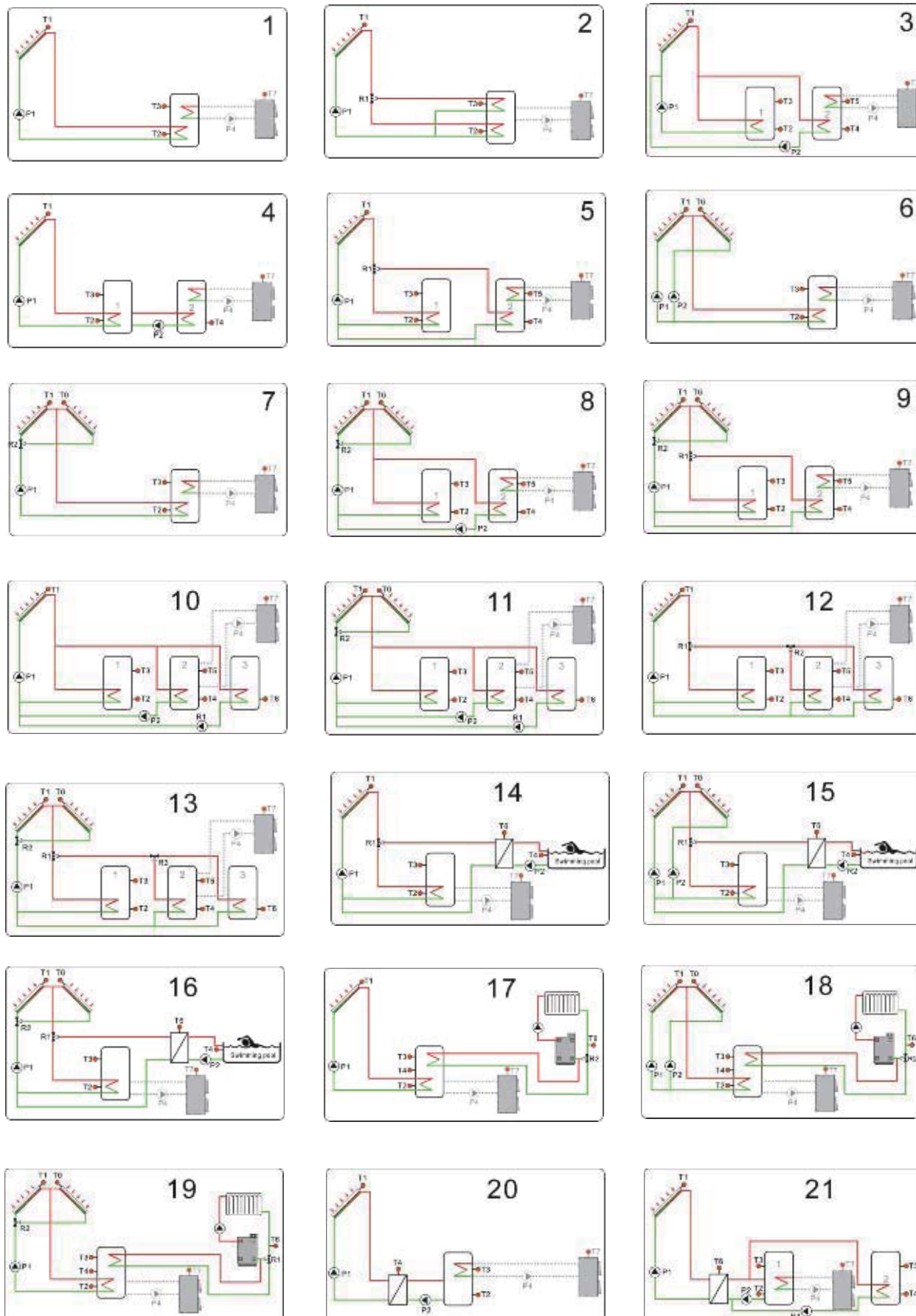
#### Submenu:

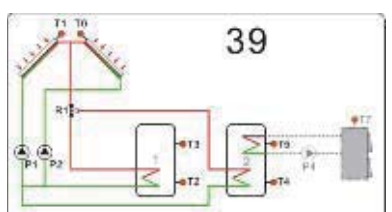
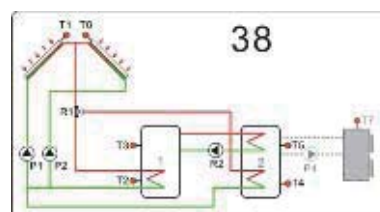
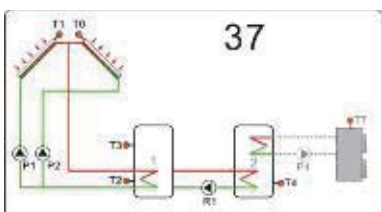
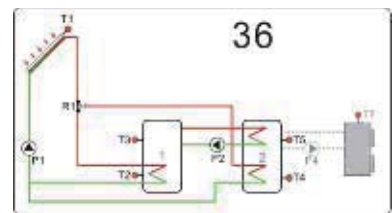
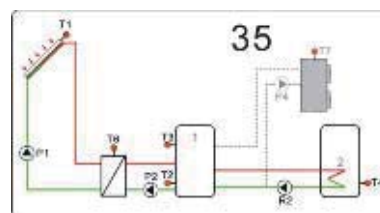
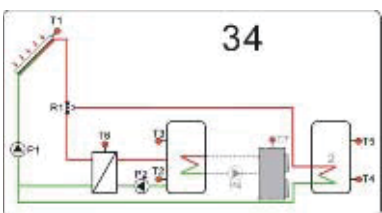
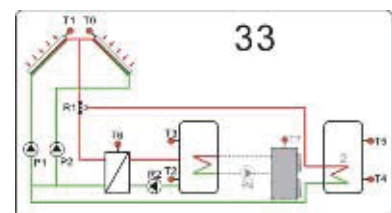
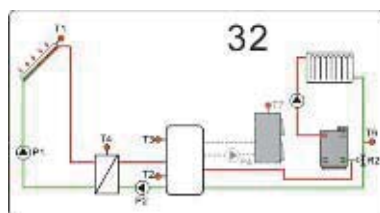
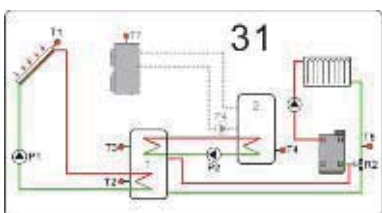
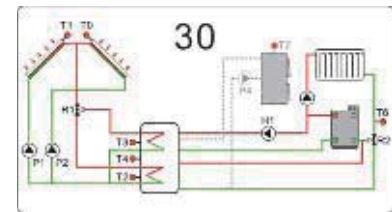
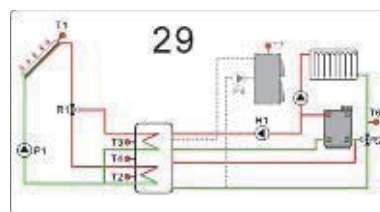
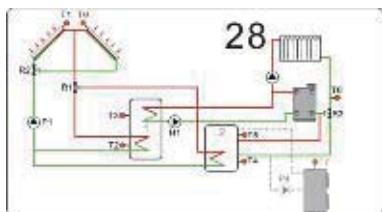
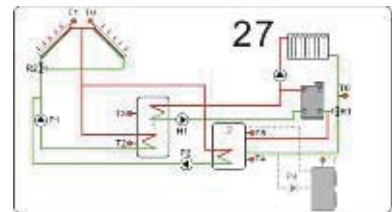
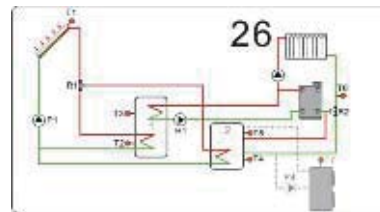
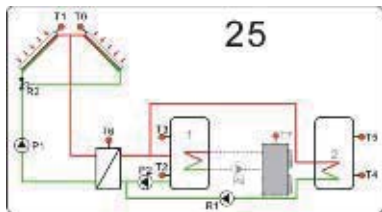
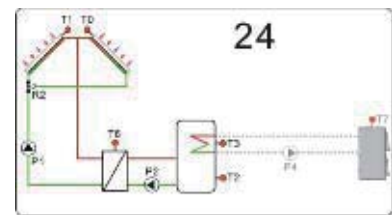
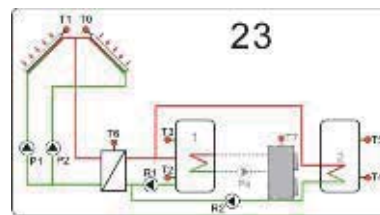
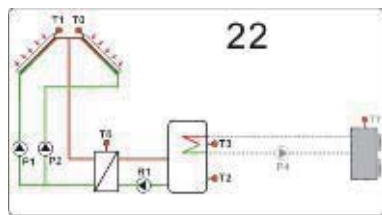
Through submenu, user can set the parameter as desired value, please check it carefully.  
Note: base on the selected solar system, menu contents are different.

## 3.4 Menu description

Main menu	Submenu	Next Submenu	Description
SCH			System
tHET			Timing heating
DT			Temperature difference
TEMP			Temperature
	EMOF		Collector emergency shutdown function activated
	EMON		Collector emergency shutdown function exit
	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 1
	SMX2		Maximum temperature of tank 2
	SMX3		Maximum temperature of tank 3
	MAX1		Maximum switch-off temperature (for heat transferring between tank and heating loop)
	MIN1		Minimum Switch-on temperature (for heat transferring between tank and heating loop)
	MAX2		Maximum switch-off temperature (for heat transferring between tank and heat exchanger)
	MIN2		Minimum Switch-on temperature (for heat transferring between tank and heat exchanger)
FUN			Assistant functions
	DVWG		Anti legionnaires' function
	CIRC		Temperature controlled hot water circulation pump
	SFB		On/off for 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
	nMIN		Speed adjusting of circulation pump 1 (pump1 RPM controlling )
	DTS		Standard temperature difference for circulation pump 1 ( speed adjusting)
	RIS		Gain for circulation pump 1 ( speed adjusting)
	n2MN		Speed adjusting of circulation pump 2 (pump 2 RPM controlling )
	DT2S		Standard temperature difference for circulation pump 2 ( speed adjusting)
	RIS2		Gain for circulation pump 2 ( speed adjusting)
	OHQM		Thermal energy measuring
		FMAX	Flow rate
		MEDT	Type of heat transfer liquid
		MED%	Concentration of heat transfer liquid
	PRIO		Tank priority
	tRUN		Interval heating <b>time</b>
	tSTP		Interval switch-off time
	INTV		Pump interval function
		IRUN	Pump running time
		ISTP	Pump interval time
	DT40		Switch-on temperature difference for circulation
		DT4F	Switch-off temperature difference for circulation
	AHO		Switch-on temperature of thermostat function
		AHF	Switch-off temperature of thermostat function
	BYPA		Bypass ( high temperature)
HDN			Manual control
PASS			Password set
REST			Recovery to factory set

### 3.5 System survey





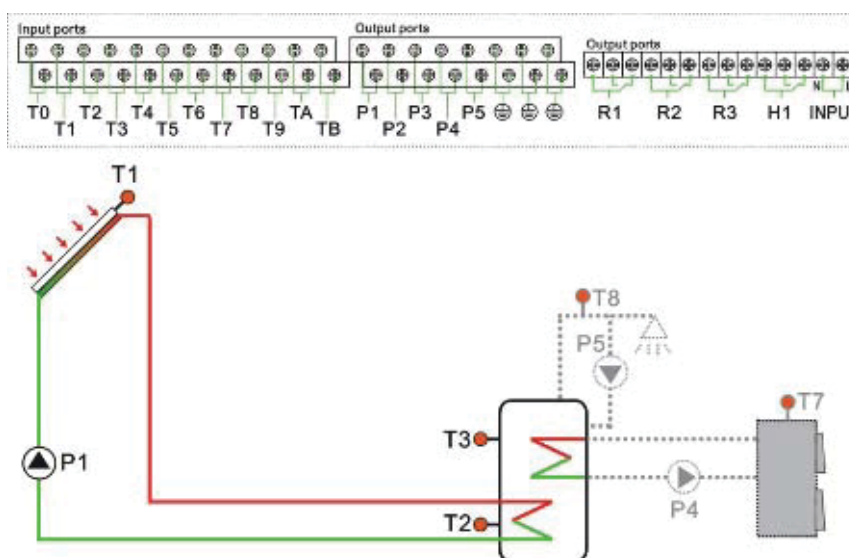
### 3.6 System Description

**Note:** temperature sensors of tanks, T3 and T5 are option sensors, when no T3, T5 sensors are installed, system will take sensors T2, T4 to control back-up heating or circuit pump.

#### System 1 (SCH 01) : Standard solar system , 1 tank

##### 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.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4		P5	
T5		R1	
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

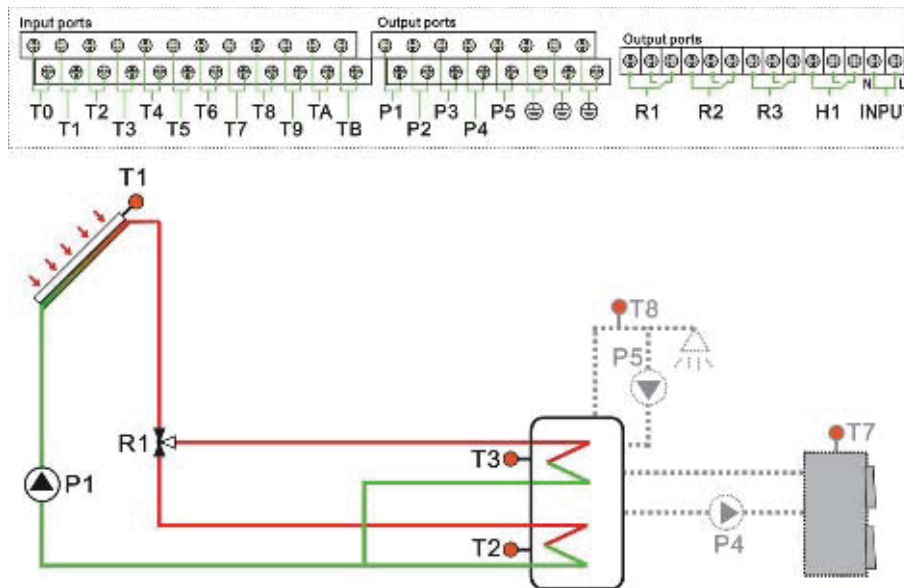
## System 2 (SCH 02): 1 tank + 3-ways valve layer heating

### Description:

Comparing the temperature difference between collector T1 and tank T2( $\Delta T1$ ), T3( $\Delta T2$ ), when this temperature difference is higher than or equal to the preset switch-on temperature difference, pump P1 is triggered, and simultaneously, through the switchover of valve R1, corresponding zone of tank is heated. If the temperature difference between the collector array (T1) and storage tank (T2,T3) 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.



Priority logic controls the top zone of tank is prior to heated, this is default factory set, impossible to be changed.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4		P5	
T5		R1	For 3-ways valve to layer heat
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

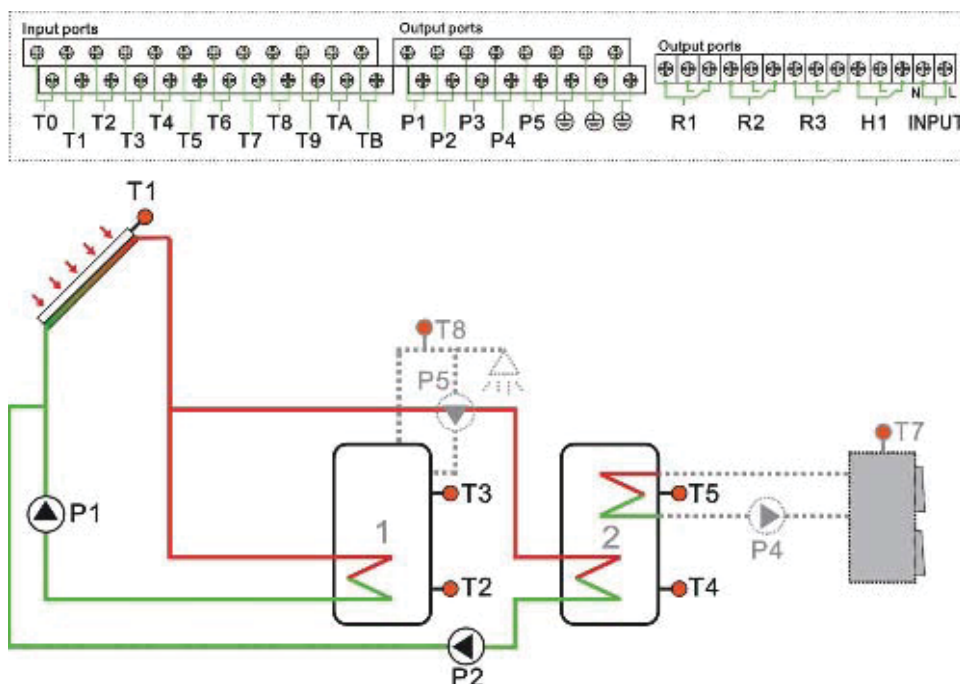
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

### System 3 (SCH 03): 2 tanks+ circuit pump control logic

#### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ )、T4 ( $\Delta T2$ ) , when this temperature difference is higher than or equal to the preset switch-on temperature difference, then corresponding pump P1/P2 is triggered to heat tank 1 or 2 until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ), or the temperature of storage tank reaches its preset maximum storage temperature. Then the solar circuit pump ( P1/P2) is switched off.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

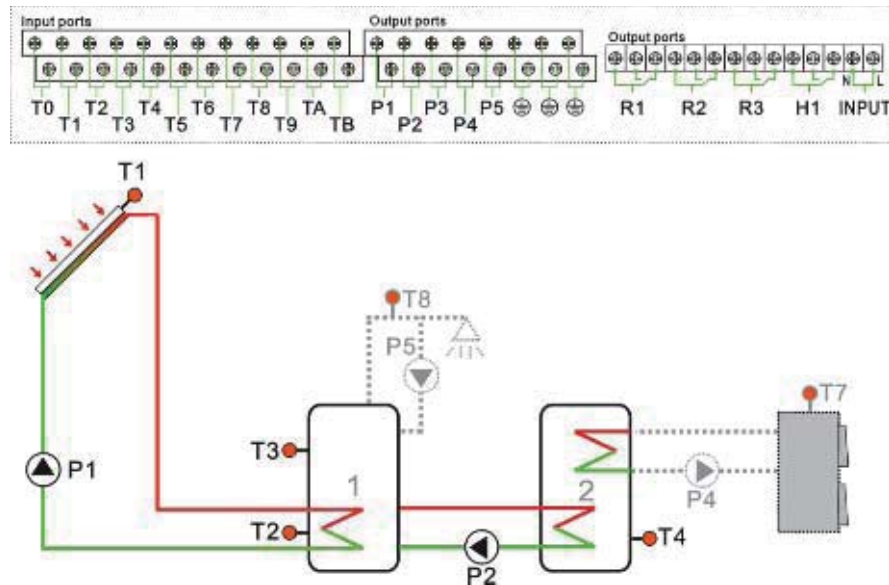
## System 4 (SCH 04): 2 tanks+ heat transferring control logic

### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), when this temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered to heat tank 1 until the temperature difference drops below the switch-off temperature difference ( $\Delta Toff$ ), or the temperature of storage tank 1 reaches its preset maximum storage temperature, then the solar circuit pump (P1) is switched off.



Other temperature difference between T3,T4 ( $\Delta T2$ ) controls pump 2 to transfer heat from tank 1 to tank 2.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5		R1	
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

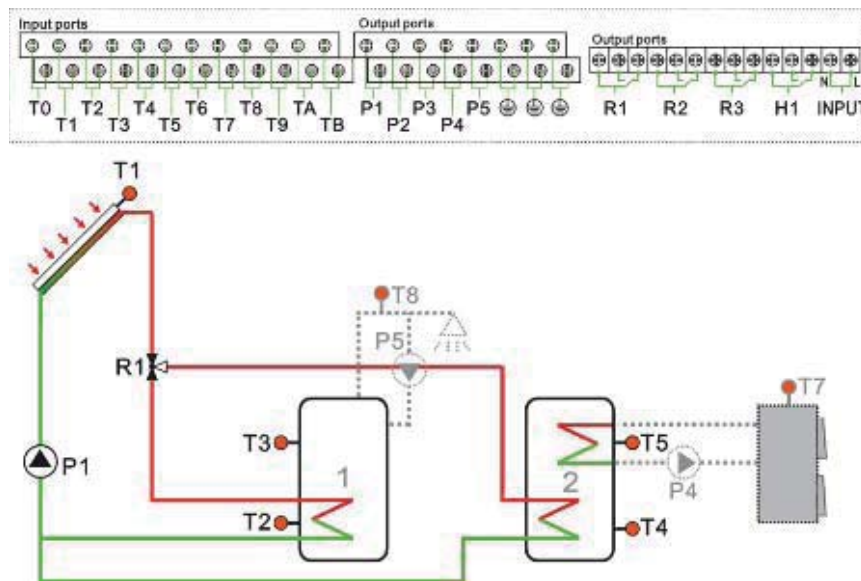
## System 5 (SCH 05): 2 tanks+ valve control logic

### Description:

Comparing the temperature difference between collector T1 and tank T2( $\Delta T1$ ), T4( $\Delta T2$ ), when this temperature difference is higher than or equal to the preset switch-on temperature difference, pump P1 is triggered, and simultaneously, through the switchover of valve R1, corresponding tank is heated. If the temperature difference between the collector array (T1) and storage tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ) drops below the switch-off temperature difference ( $\Delta T_{off}$ ), or the temperature of storage tank reaches the preset maximum storage temperature, then the solar circuit pump (P1) is switched off.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For valve switchover between tank 1 and tank 2
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

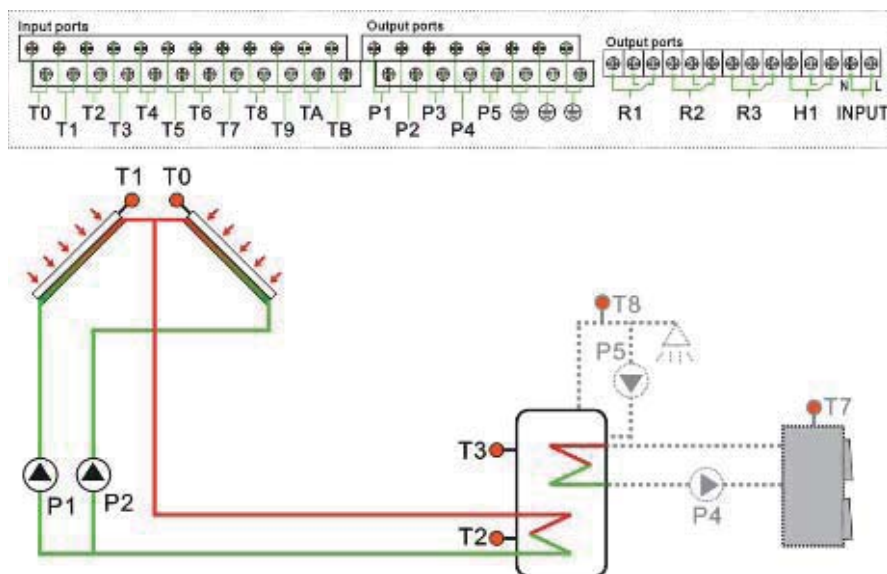
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 6 (SCH 06): east-west collectors + 1 tank

### Description:

Comparing the temperature difference between collector T1,T0 and tank T2, when this temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ), corresponding pump P1/P2 is triggered to heat tank until the temperature difference drops below the switch-off temperature difference ( $\Delta Toff$ ), or the temperature of storage tank reaches the preset maximum storage temperature. Then the solar circuit pump (P1/P2) is switched off.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5		R1	
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

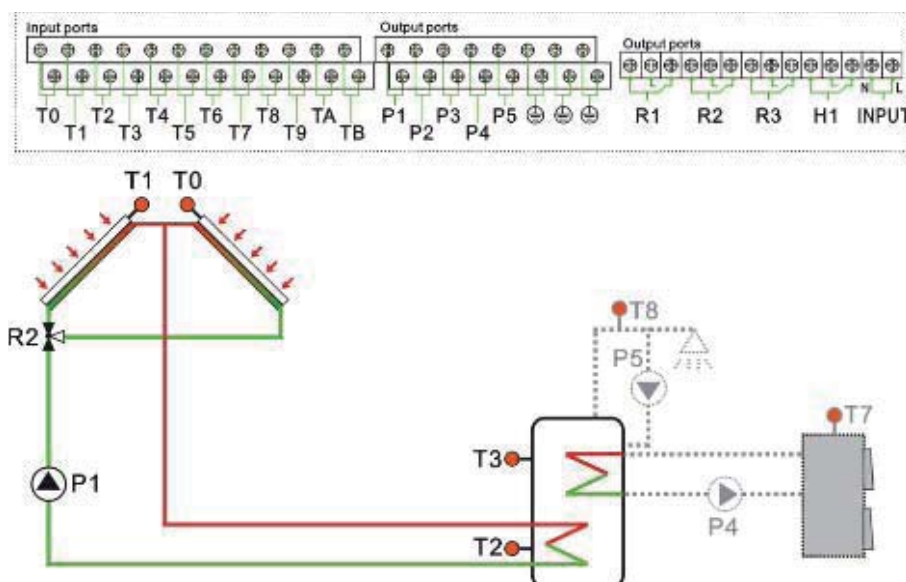
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 7 (SCH 07): east-west collectors + 1 tank +valve control logic

### Description:

Comparing the temperature difference between collector T1,T0 and tank T2, if one of two temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ), corresponding pump P1 is triggered, through the switchover of R2 to corresponding collector, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta Toff$ ) or when tank reaches its maximum temperature, then the solar circuit pump ( P1) is switched off.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4		P5	
T5		R1	For 3 ways valve switchover between collector 1 and 2
T6		R2	
T7		R3	
T8		H1	For back-up heating device
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

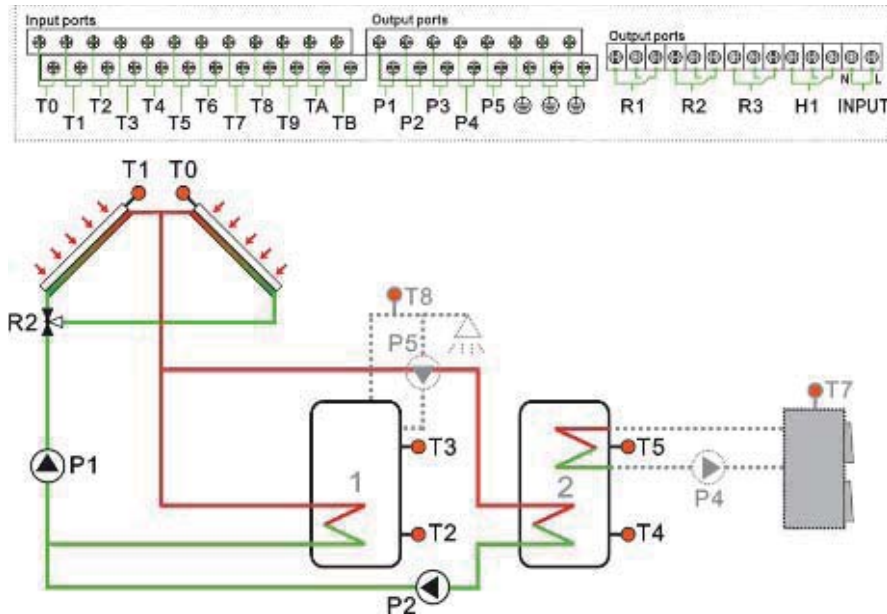
## System 8 (SCH 08): east-west collectors + 2 tanks +valve control logic

### Description:

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if one of two temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2$ ), corresponding pump P1/P2 is triggered, through the switchover of R2 to corresponding collector, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) when tank reaches its maximum temperature, then the solar circuit pump (P1/P2) is switched off.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between collector 1 and 2
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

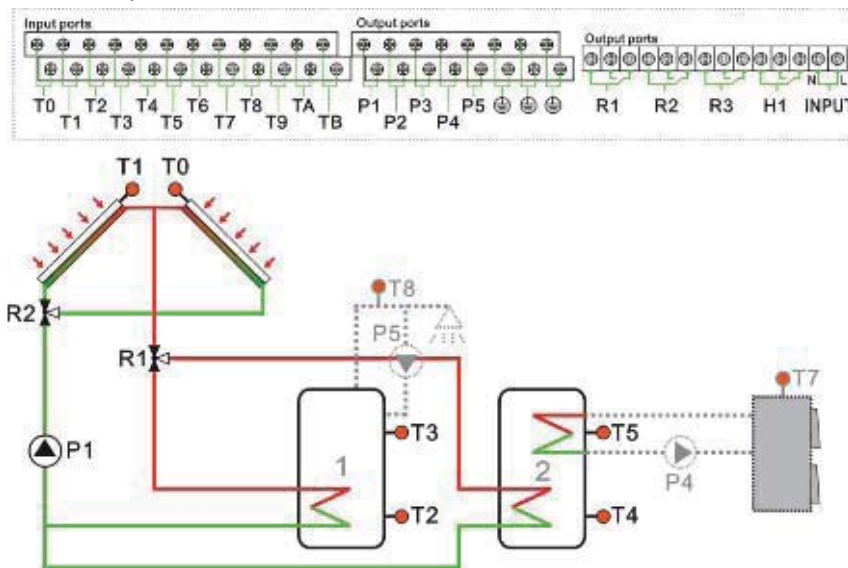
## System 9 (SCH 09): east-west collectors + 2 tanks +valve control logic

### Description:

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ )、T4 ( $\Delta T2$ ) , if one of two temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2$ ) , corresponding pump P1 is triggered, through the switchover of R2 to corresponding collector, and switchover of R1 to corresponding tank, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) when tank reaches its maximum temperature, then the solar circuit pump ( P1 ) is switched off.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump
T1	Tem.sensor on collector east	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2
T6		R2	For 3 ways valve switchover between collector 1 and 2
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

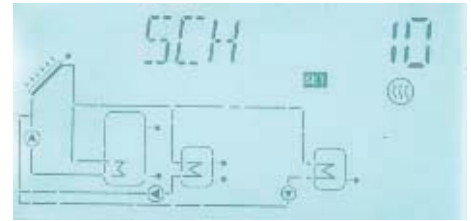
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

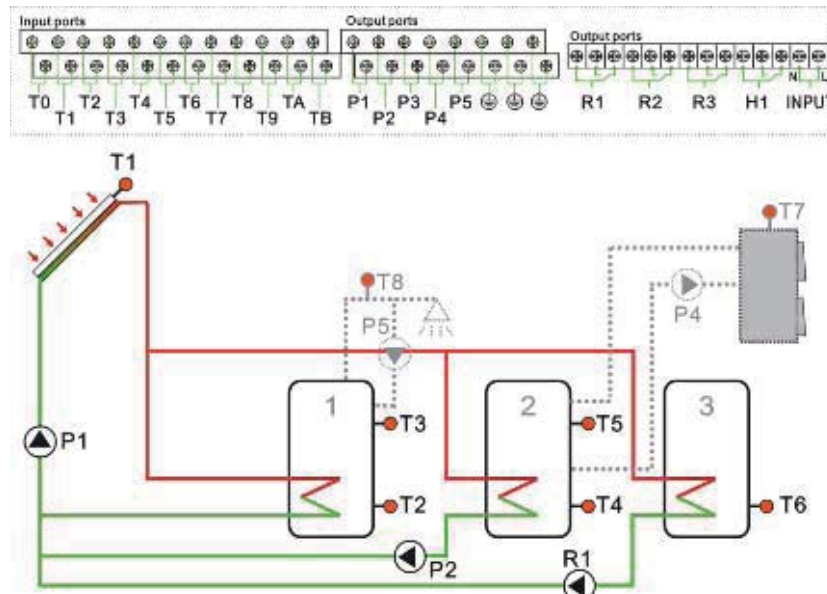
## System 10 (SCH 10): 3 tanks + pump control logic

### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ) and T6 ( $\Delta T3$ ), if this temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ,  $\Delta T2$ ,  $\Delta T3$ ), then corresponding pump P1,P2,R1 is triggered, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1,P2,R1 is closed.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For Solar circuit pump 3
T6	Tem.Sensor on tank 3	R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

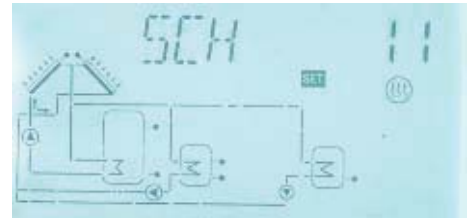
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

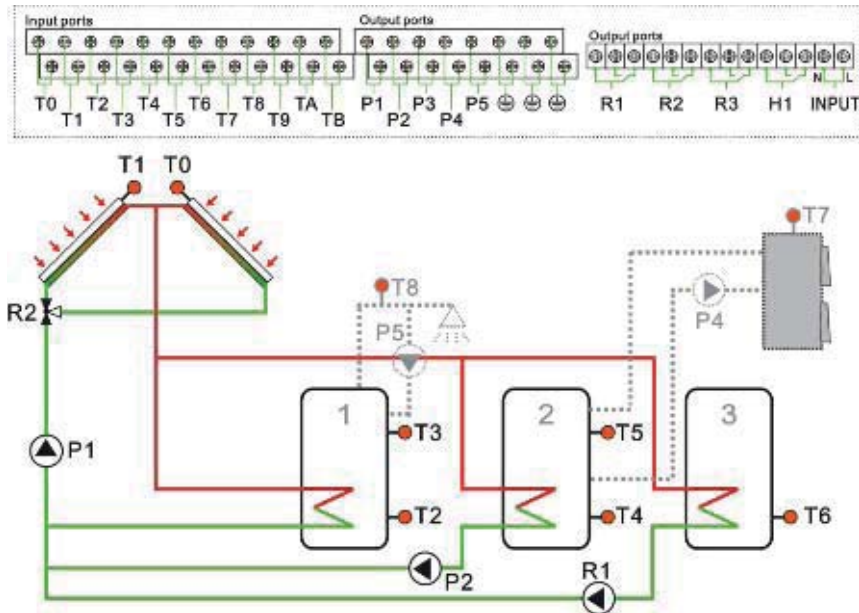
## System 11 (SCH 11): east-west collector+3 tanks +pump+valve control logic

### Description:

Comparing the temperature difference between collector T1 ,T0 and tank T2 ( $\Delta T1$ )、T4 ( $\Delta T2$ ) and T6 ( $\Delta T3$ ) , if this temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2, \Delta T3$ ) , then corresponding pump P1,P2,R1 is triggered, through the switchover of R2 to corresponding collector, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1,P2,R1 is closed.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For Solar circuit pump 3
T6	Tem.Sensor on tank 3	R2	For 3 ways valve switchover between collector 1 and 2
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

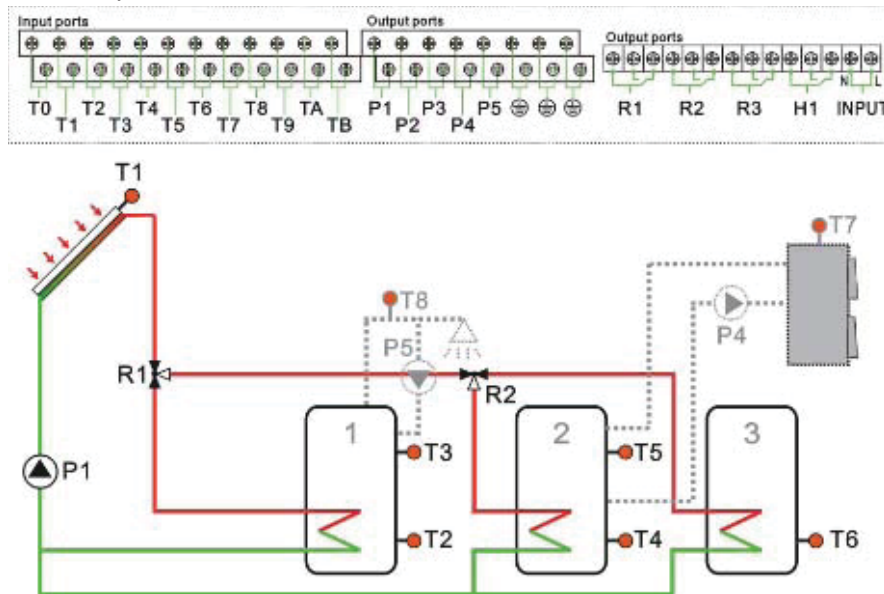
Above assistant functions can be activated in menu.

**System 12 (SCH 12): 3 tanks +valve control logic****Description:**

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ )、T4 ( $\Delta T2$ ) and T6 ( $\Delta T3$ ) , if this temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2, \Delta T3$ ) , then pump P1 is triggered, through the switchover of R1, R2 to the corresponding tank, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2,3
T6	Tem.Sensor on tank 3	R2	For 3 ways valve switchover between tank 2 and 3
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

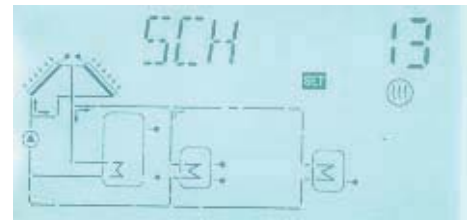
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

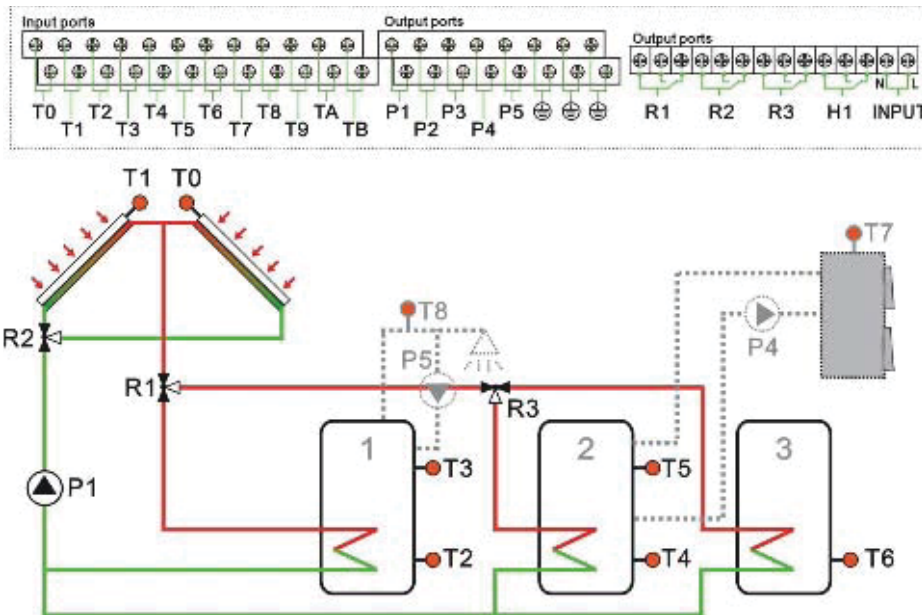
## System 13 (SCH 13): east-west collector+ 3 tanks +valve control logic

### Description:

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ )、T4 ( $\Delta T2$ ) and T6 ( $\Delta T3$ ) , if this temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ,  $\Delta T2$ ,  $\Delta T3$ ) , then pump P1 is triggered, through the switchover of R2 to corresponding collector , and then through R1, R3 to the corresponding tank, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta Toff$ ) or when tank reaches its maximum temperature, then P1 is closed.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump
T1	Tem.sensor on collector east	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2,3
T6	Tem.Sensor on tank 3	R2	For 3 ways valve switchover between collector 1 and 2
T7		R3	For 3 ways valve switchover between tank 2 and 3
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release

Above assistant functions can be activated in menu.

## System 14 (SCH 14): 1 tanks + swimming pool+ valve + heat exchanger control logic

### Description:

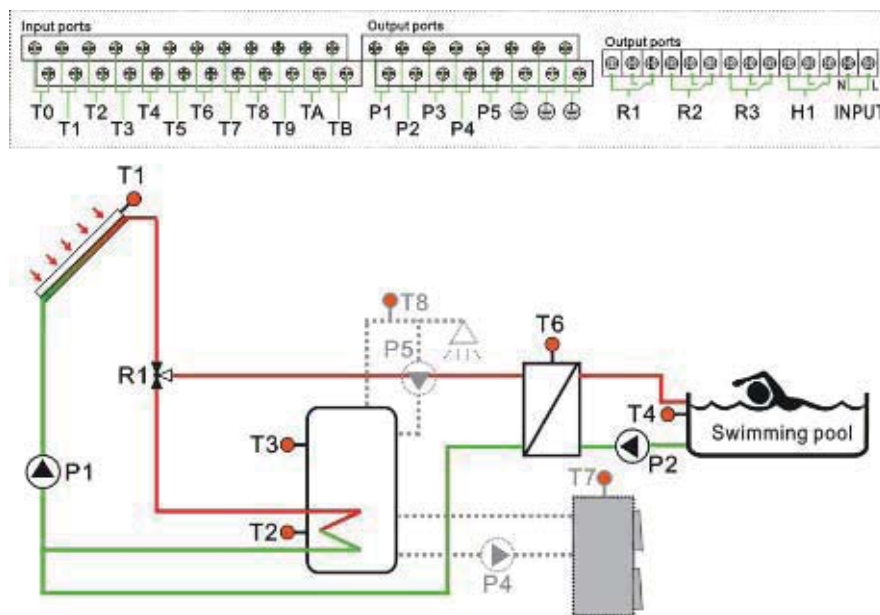
Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ )、swimming pool T4 ( $\Delta T2$ ) , if this temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2$ ) , then pump P1 is triggered, through the switchover of R1 to corresponding tank or swimming pool. Tank or swimming pool is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, and then P1 is closed.



Priority logic controls tank is prior to heat.

Other temperature difference between T6,T4 ( $\Delta T2$ ) P2 can heat swimming pool.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1 and swimming pool T4 ( $\Delta T2$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1, P2 and R1 are triggered simultaneously , and when the temperature difference between collector T1 and swimming pool T4 ( $\Delta T2$ ) reaches its switch-off temperature difference or the temperature of swimming pool reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump
T1	Tem.sensor on collector	P2	For swimming pool circuit pump
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on swimming pool	P5	
T5		R1	For 3 ways valve switchover between tank and exchanger
T6	Tem.Sensor on heat exchanger (option sensor)	R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 15 (SCH 15) : east-west collector +1 tanks + swimming pool+ valve + heat exchanger control logic

### Description:

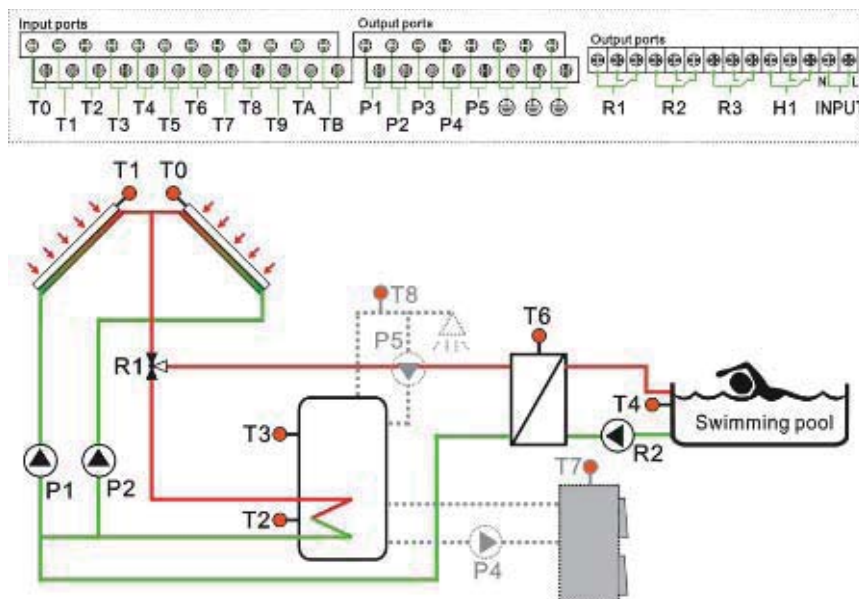
Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ )、swimming pool T4 ( $\Delta T2$ ) , if one of 2 temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2$ ) , then any corresponding pump or 2 pumps P1 and P2 are triggered, through the switchover of R1 to corresponding tank or swimming pool. Tank or swimming pool is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1, P2 is closed.



Priority logic controls tank is prior to heat.

Other temperature difference between T6,T4 ( $\Delta T2$ ) , R2 can heat swimming pool.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1,T0 and swimming pool T4 ( $\Delta T2$ ) is larger than or is equal to the switch-on temperature difference, then any corresponding pump (or 2 pumps P1 and P2) , and R2 are triggered simultaneously , and when the temperature difference between collector T1,T0 and swimming pool T4 ( $\Delta T2$ ) reaches its switch-off temperature difference or the temperature of swimming pool reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump P1
T1	Tem.sensor on collector east	P2	For Solar circuit pump P2
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on swimming pool	P5	
T5		R1	For 3 ways valve switchover between tank and exchanger
T6	Tem.Sensor on heat exchanger (option sensor)	R2	For Swimming pool pump 3
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 16(SCH 16) : east-west collector +1 tanks + swimming pool+ valve + heat exchanger control logic

### Description:

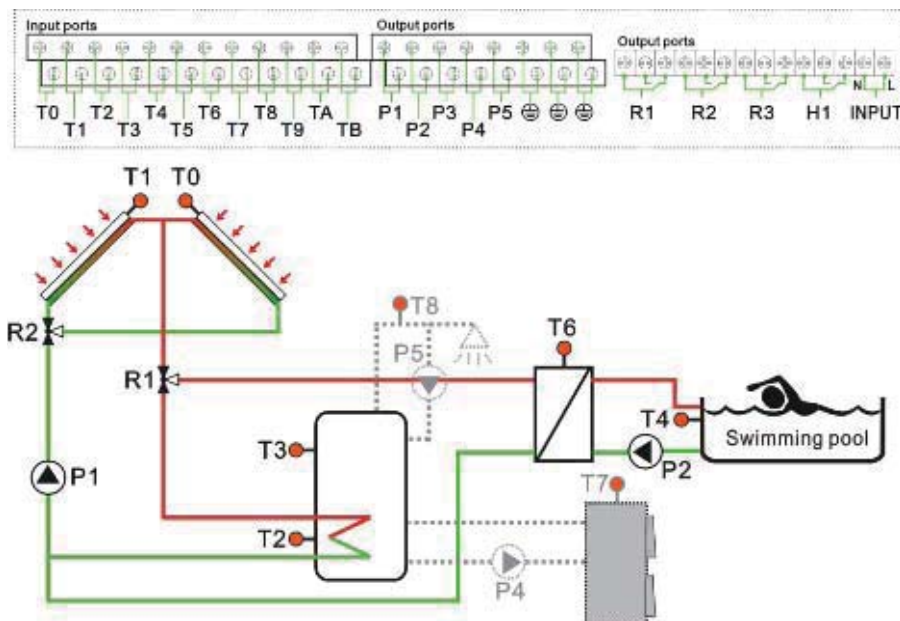
Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ )、swimming pool T4 ( $\Delta T2$ ) , if one of 2 temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1, \Delta T2$ ) , then pump P1 is triggered, through the switchover of R2 to corresponding collector, switchover of R1 to corresponding tank or swimming pool. Tank or swimming pool is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, and then P1 is closed.



Priority logic controls tank is prior to heat.

Other temperature difference between T6,T4 ( $\Delta T2$ ) , P2 can heat swimming pool.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1,T0 and swimming pool T4 ( $\Delta T2$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1, P2 are triggered simultaneously , and when the temperature difference between collector T1,T0 and swimming pool T4 ( $\Delta T2$ ) reaches its switch-off temperature difference or the temperature of swimming pool reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump
T1	Tem.sensor on collector east	P2	For Swimming pool pump
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on swimming pool	P5	
T5		R1	For 3 ways valve switchover between tank and exchanger
T6	Tem.Sensor on heat exchanger (option sensor)	R2	For 3 ways valve switchover between collector 1 and 2
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 17(SCH 17): 1 tanks + heating return control logic

### Description:

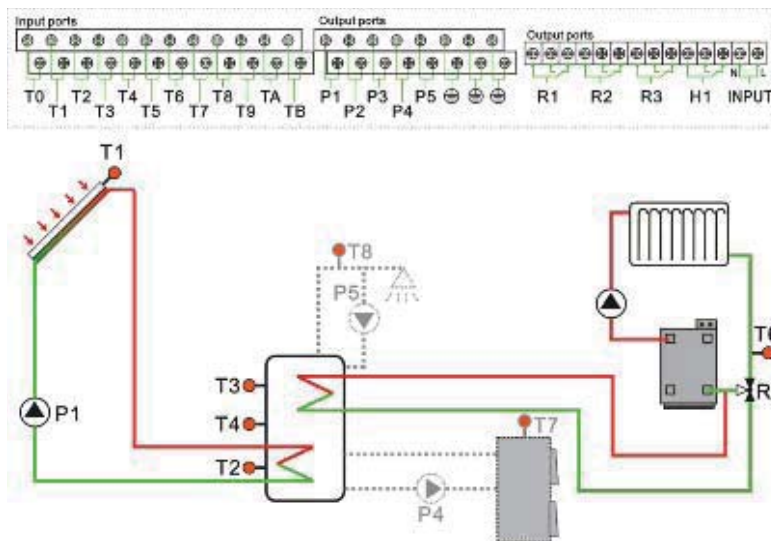
Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), if temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ), then pump P1 is triggered to heat tank until the temperature difference drops below the switch-off temperature difference ( $\Delta Toff$ ) or when tank reaches its maximum temperature, then P1 is closed.



Other temperature difference between T4,T6 ( $\Delta T2$ ), R2 can preheat heating-return.

Note: when T4 isn't installed, then R2 is controlled by the temperature difference between T3 and T6 ( $\Delta T2$ ), heating-return can be heated through R2.

when T3, T4 aren't installed, then R2 is controlled by the temperature difference between T2 and T6 ( $\Delta T2$ ), heating return can be heated through R2.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on middle of tank (option sensor)	P5	
T5		R1	
T6	Tem.Sensor for floor heating	R2	For 3 ways valve switchover to heating-return.
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 18(SCH 18): east-west collector + heating return control logic

### Description:

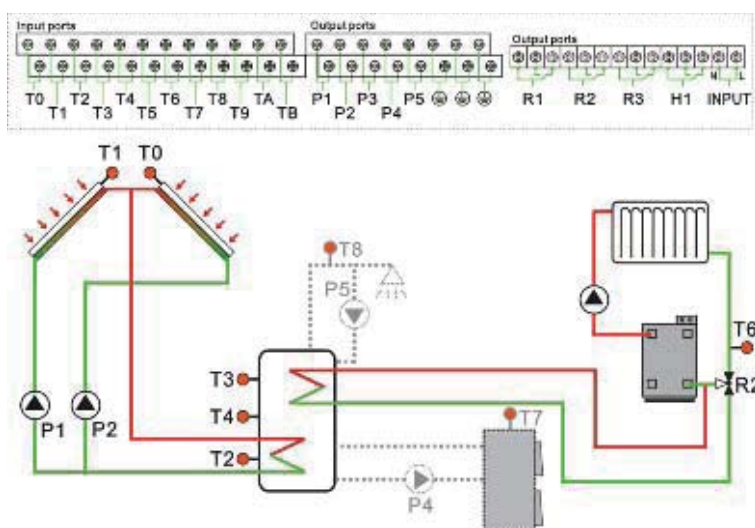
Comparing the temperature difference between collector T1 ,T0 and tank T2 ( $\Delta T1$ ) , if temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ) , then corresponding pump or P1,P2 all are triggered to heat tank until the temperature difference drops below the switch-off temperature difference ( $\Delta Toff$ ) or when tank reaches its maximum temperature, then P1,P2 is closed.



Other temperature difference between T4,T6 ( $\Delta T2$ ) , R2 can preheat heating-return.

Note: when T4 isn't installed, then R2 is controlled by the temperature difference between T3 and T6 ( $\Delta T2$ ) , heating-return can be heated through R2.

when T3, T4 aren't installed, then R2 is controlled by the temperature difference between T2 and T6 ( $\Delta T2$ ) , heating return can be heated through R2 .



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on middle of tank (option sensor)	P5	
T5		R1	
T6	Tem.Sensor for floor heating	R2	For 3 ways valve switchover to heating-return.
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 19(SCH 19): east-west collector +valve + heating return control logic

### Description:

Comparing the temperature difference between collector T1 ,T0 and tank T2 ( $\Delta T1$ ), if one of 2 temperature differences is higher than or equal to the preset switch-on temperature difference

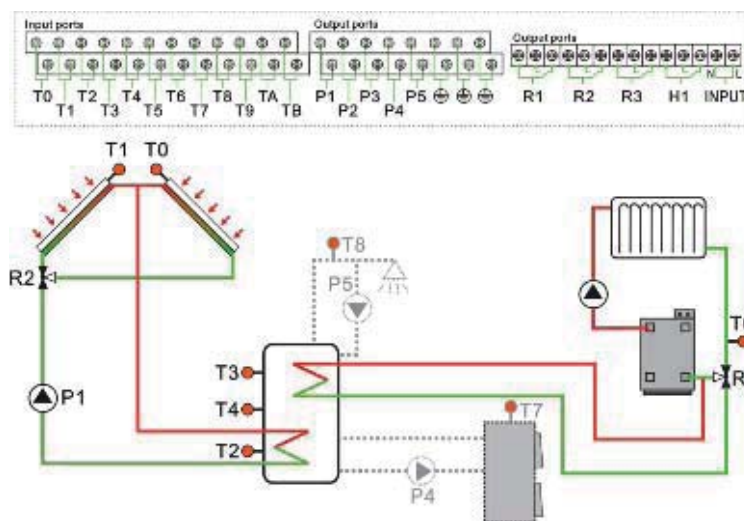
( $\Delta T1$ ) , then pump P1 is triggered, through the switchover of R2 to corresponding collector, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Other temperature difference between T4,T6 ( $\Delta T2$ ) , R1 can preheat heating-return.

Note: when T4 isn't installed, then R2 is controlled by the temperature difference between T3 and T6 ( $\Delta T2$ ) , heating-return can be heated through R2.

when T3, T4 aren't installed, then R2 is controlled by the temperature difference between T2 and T6 ( $\Delta T2$ ) , heating return can be heated through R2 .



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump
T1	Tem.sensor on collector east	P2	
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on middle of tank (option sensor)	P5	
T5		R1	For 3 ways valve switchover to heating-return.
T6	Tem.Sensor for floor heating	R2	For 3 ways valve switchover between collector 1 and 2.
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 20(SCH 20): standard solar system, heat exchanger control logic

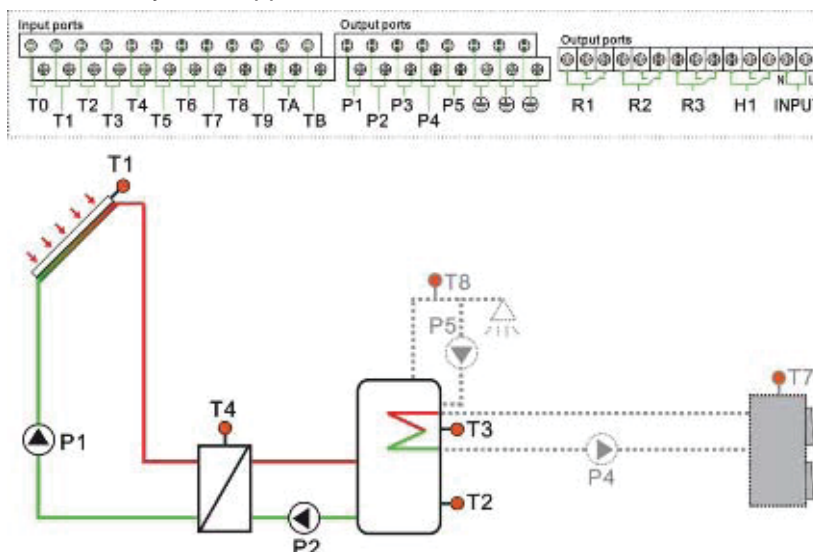
### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), if temperature difference is higher than or equal to the preset switch-on temperature difference ( $\Delta T1$ ), then pump P1 is triggered to heat exchanger, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1 is closed.



Other temperature difference between T4, T2 ( $\Delta T1$ ), P2 can preheat heating-return.

Note: In case that no sensor (T4) is installed, when the temperature difference between collector T1, and tank T2 ( $\Delta T1$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1, P2 are triggered simultaneously, and when the temperature difference between collector T1, and tank T2 ( $\Delta T1$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on heat exchanger (option sensor)	P5	
T5		R1	
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

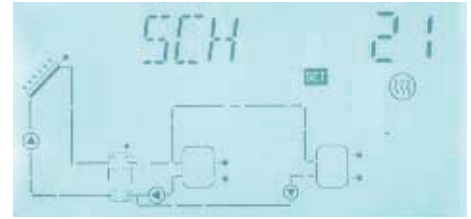
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 21(SCH 21): 2 tanks + heat exchanger control logic

### Description:

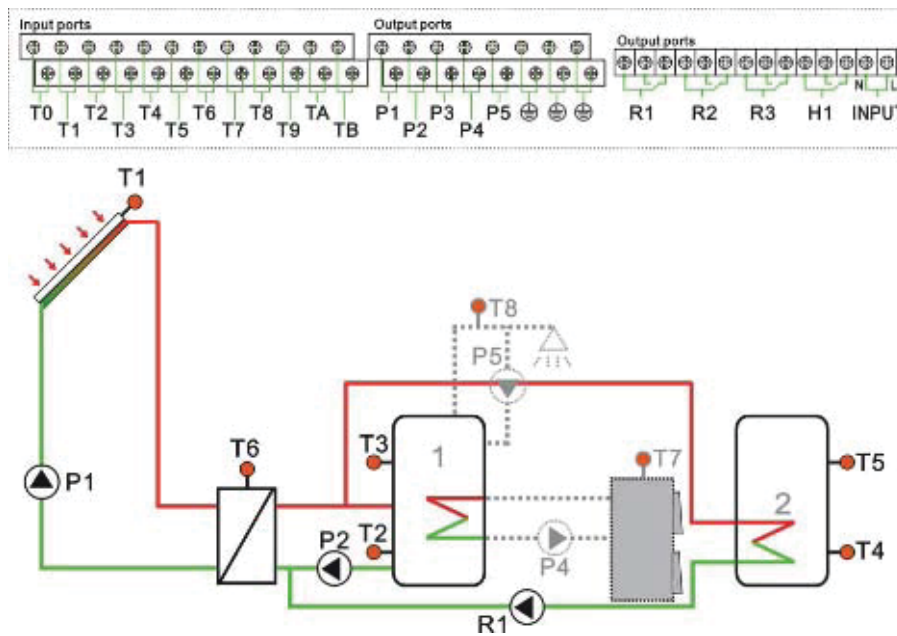
Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T_1$ ), T4 ( $\Delta T_2$ ), if temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered to heat exchanger, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1 is closed.



Other temperature difference between T6 and T2 ( $\Delta T_1$ ), T4 ( $\Delta T_2$ ) can heat tank through P2, R1.

Priority logic controls tank 1 is prior to heat.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1, and tank T2 ( $\Delta T_1$ ), T4 ( $\Delta T_2$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1&P2 or P1&R1 are triggered simultaneously, and when the temperature difference between collector T1, and tank T2 ( $\Delta T_1$ ), T4 ( $\Delta T_2$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For Solar circuit pump 3
T6	Tem.Sensor on heat exchanger (option sensor)	R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.



## System 23(SCH 23): east-west collector +2 tanks + heat exchanger control logic

### Description:

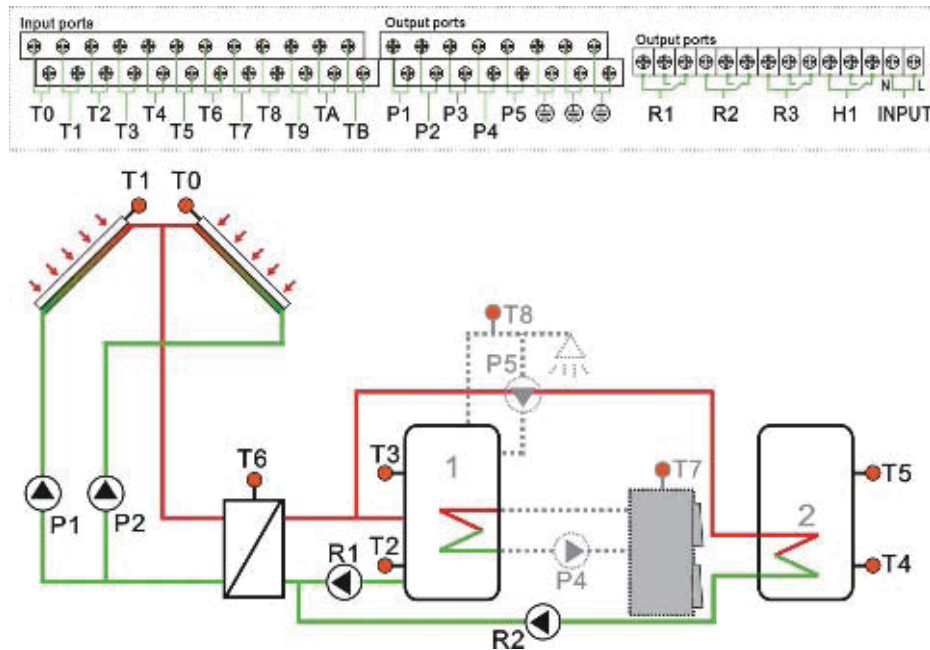
Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if temperature difference is higher than or equal to the preset switch-on temperature difference, then corresponding pump or 2 pumps P1,P2 are triggered to heat exchanger, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1,P2 is closed.



Other temperature difference between T6 and T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), it can heat tank through R1,R2.

Priority logic controls tank 1 is prior to heat.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1, T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ) is larger than or is equal to the switch-on temperature difference, then corresponding pump or 2 pumps P1,P2 are triggered simultaneously, it can heat tank through R1,R2 and when the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For Solar circuit pump 3
T6	Tem.Sensor on heat exchanger (option sensor)	R2	For Solar circuit pump 4
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 24(SCH 24): east-west collector + valve + heat exchanger control logic

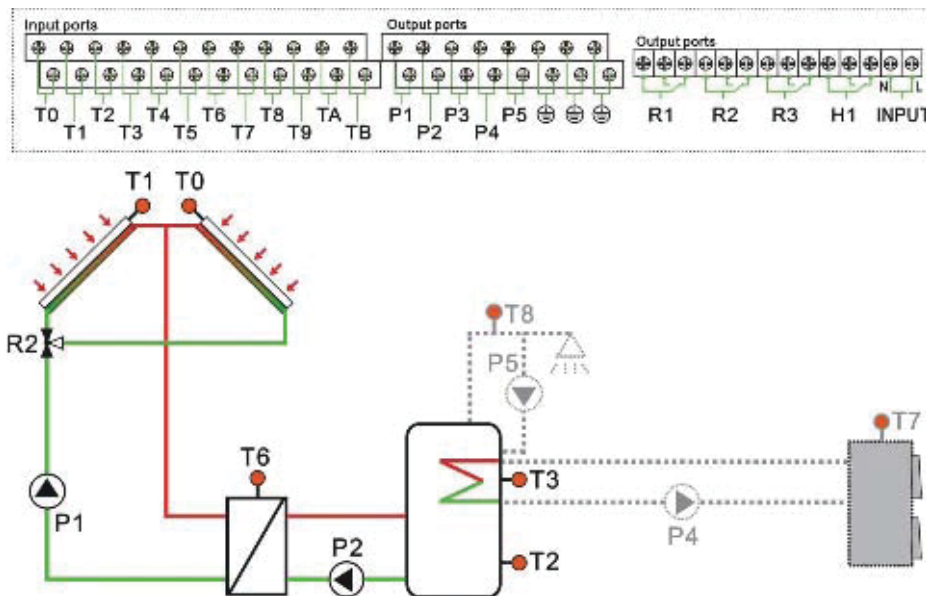
### Description:

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T_1$ ), if one of 2 temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, through the switchover of R2 to corresponding collector, exchanger is heated, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1 is closed.



Other temperature difference between T6 and T2 ( $\Delta T_1$ ), it can heat tank through P2.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1,T0 and tank T2 ( $\Delta T_1$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1&P2 are triggered simultaneously, and when the temperature difference between collector T1, T0 and tank T2 ( $\Delta T_1$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4		P5	
T5		R1	
T6	Tem.Sensor on heat exchanger (option sensor)	R2	For 3 ways valve switchover between collector east and west.
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 25(SCH 25): east-west collector + valve + 2 tanks + heat exchanger control logic

### Description:

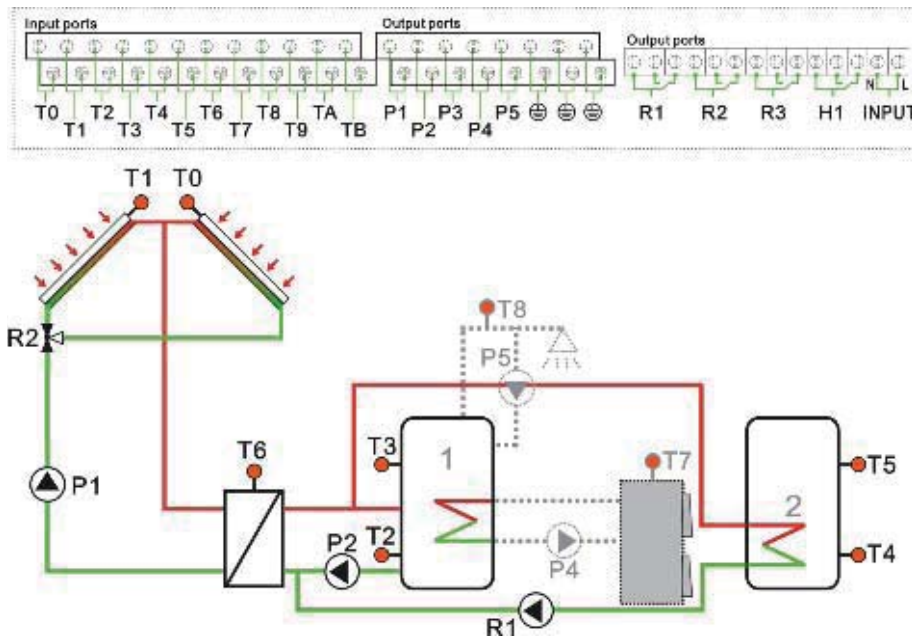
Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if anyone of 2 temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, through the switchover of R2 to corresponding collector, exchanger is heated, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1 is closed.



Other temperature difference between T6 and T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), it can heat tank through P2,R1..

Priority logic controls tank 1 is prior to heat.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1, T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1 is triggered simultaneously, and it can heat tank through P2,R1, when the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For Solar circuit pump 3
T6	Tem.Sensor on heat exchanger (option sensor)	R2	For 3 ways valve switchover between collector east and west.
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

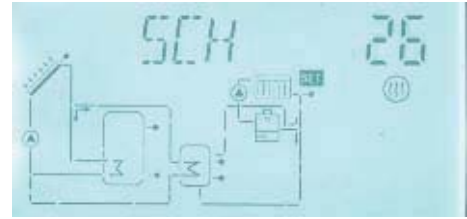
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 26(SCH 26): 2 tanks + valve + heating return control logic

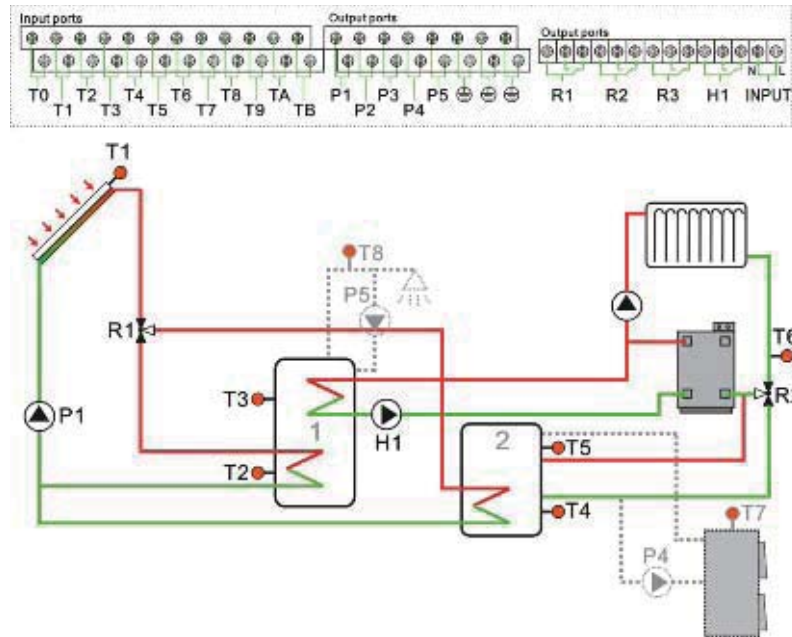
### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, through the switchover of R1 to corresponding tank, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Priority logic controls tank 1 is prior to heat.

Other temperature difference between T5 and T6 ( $\Delta T3$ ), it can heat heating - return through R2.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring (option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover to heating return
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 27(SCH 27): east-west collector +2 tanks + valve + heating return control logic

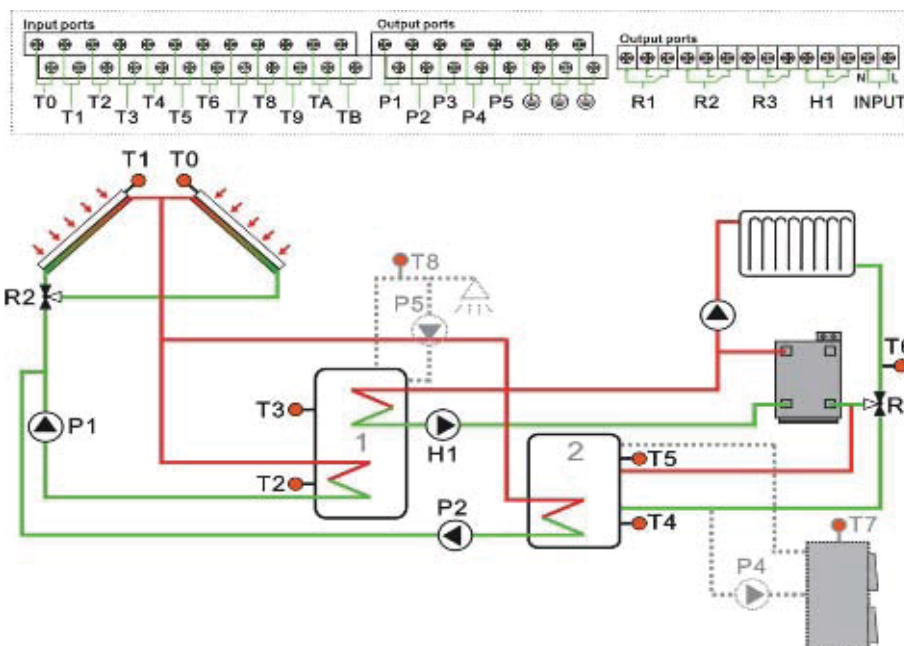
### Description:

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if anyone of 2 temperature difference is higher than or equal to the preset switch-on temperature difference, then corresponding pump P1/P2 is triggered, through the switchover of R2 to corresponding collector, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1/P2 is closed.



Priority logic controls tank 1 is prior to heat.

Other temperature difference between T5 and T6 ( $\Delta T3$ ), it can heat heating - return through R1.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover to heating return
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover between collector 1 and 2
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release

Above assistant functions can be activated in menu.

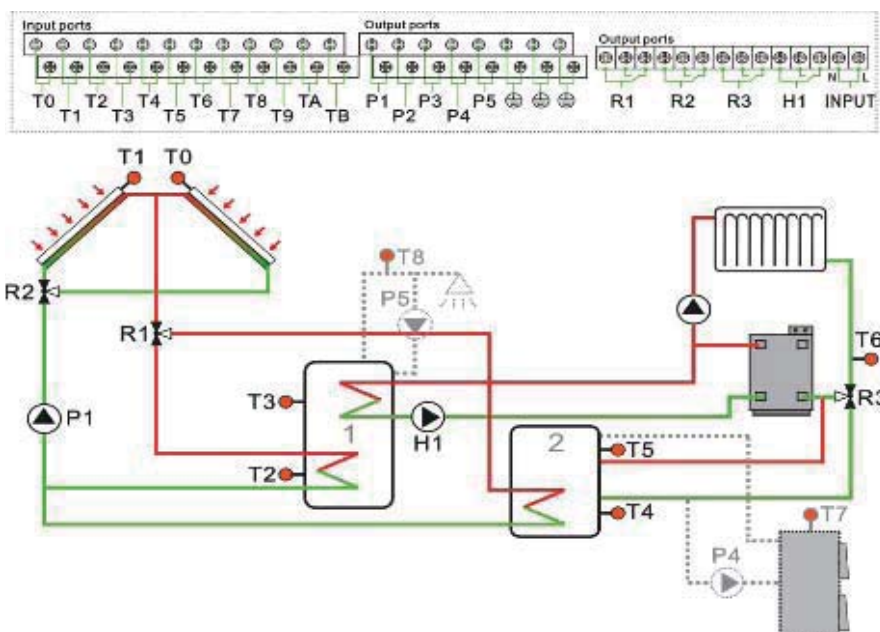
**System 28(SCH 28) : east-west collector +2 tanks + valve + heating return control logic****Description:**

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if anyone of 2 temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, through the switchover of R2 to corresponding collector, and through the switchover of R1 to corresponding tank, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Priority logic controls tank 1 is prior to heat.

Other temperature difference between T5 and T6 ( $\Delta T3$ ), it can heat heating - return through R3



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump
T1	Tem.sensor on collector east	P2	
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover between collector 1 and 2
T7		R3	For 3 ways valve switchover to heating return
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

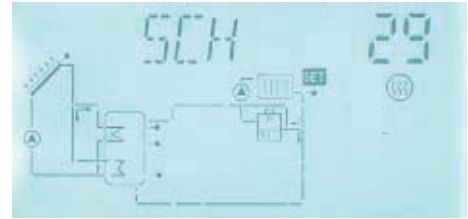
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release

Above assistant functions can be activated in menu.

## System 29(SCH 29): 1 tank+ valve layer heat + heating return control logic

### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), T3 ( $\Delta T2$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, and through the switchover of R1 to corresponding zone of tank, corresponding zone is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.

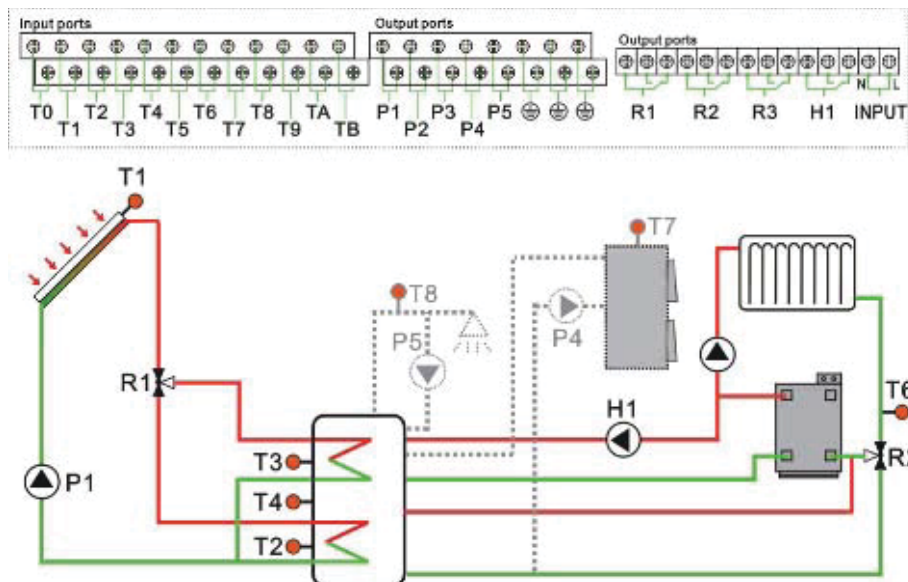


Priority logic controls top part of tank is prior to heat. This is the default factory set, it is impossible for reset.

Other temperature difference between T4 and T6 ( $\Delta T3$ ), it can heat heating - return through R2

Note: when T4 isn't installed, then R2 is controlled by the temperature difference between T3 and T6 ( $\Delta T3$ ), heating-return can be heated through R2.

when T3, T4 aren't installed, then R2 is controlled by the temperature difference between T2 and T6 ( $\Delta T3$ ), heating return can be heated through R2.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring ( option sensor)	P1	For Solar circuit pump
T1	Tem.sensor on collector	P2	
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on middle of tank	P5	
T5		R1	For 3 ways valve switchover between different layer of tank
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover to heating return
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 30(SCH 30): east-west collector+ valve layer heat + heating return control logic

### Description:

Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T3 ( $\Delta T2$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1,P2 is triggered, and through the switchover of R1 to corresponding zone of tank, corresponding zone is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1,P2 is closed.

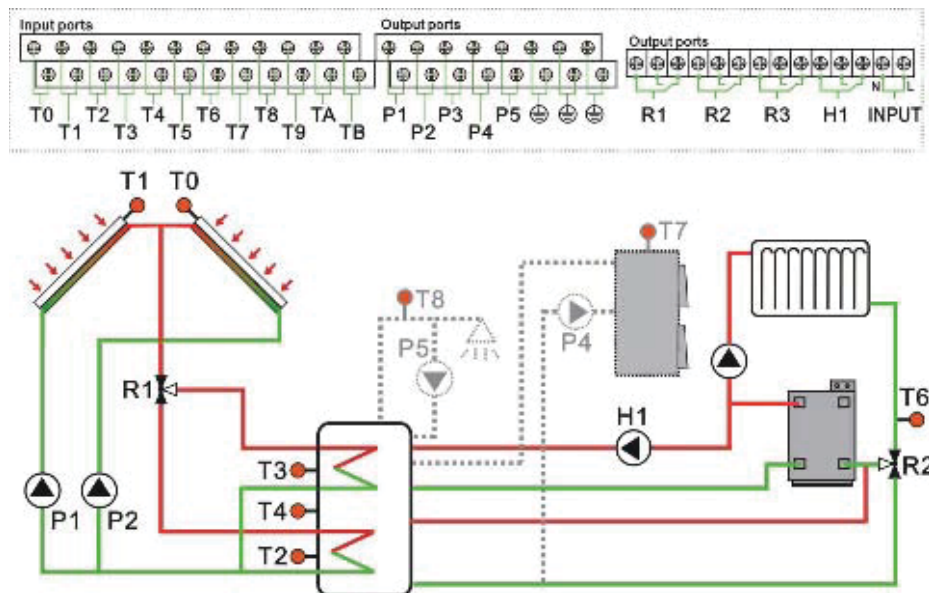


Priority logic controls top part of tank is prior to heat. This is the default factory set, it is impossible for reset.

Other temperature difference between T4 and T6 ( $\Delta T3$ ), it can heat heating - return through R2

Note: when T4 isn't installed, then R2 is controlled by the temperature difference between T3 and T6 ( $\Delta T3$ ), heating-return can be heated through R2.

when T3, T4 aren't installed, then R2 is controlled by the temperature difference between T2 and T6 ( $\Delta T3$ ), heating return can be heated through R2.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on middle of tank	P5	
T5		R1	For 3 ways valve switchover between different layer of tank
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover to heating return
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

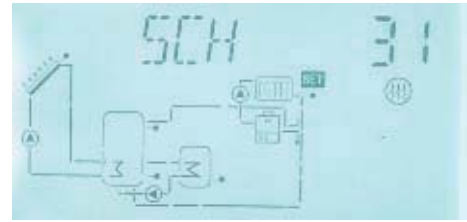
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 31(SCH 31): 2 tanks + heat transferring + heating return control logic

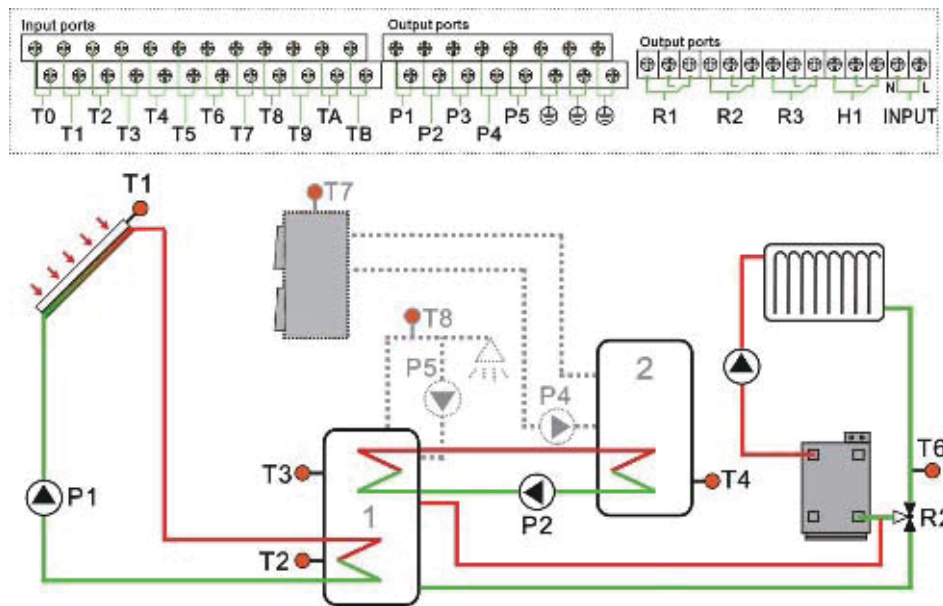
### Description:

Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Other temperature difference between T3 and T4 ( $\Delta T2$ ) controls pump P2. It transfers heat from tank1 to tank 2.

Other temperature difference between T3 and T6 ( $\Delta T2$ ), it can heat heating - return through R2



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring ( option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on tank 2	P5	
T5		R1	
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover to heating return
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 32(SCH 32): 1 tank + heat exchanger + heating return control logic

### Description:

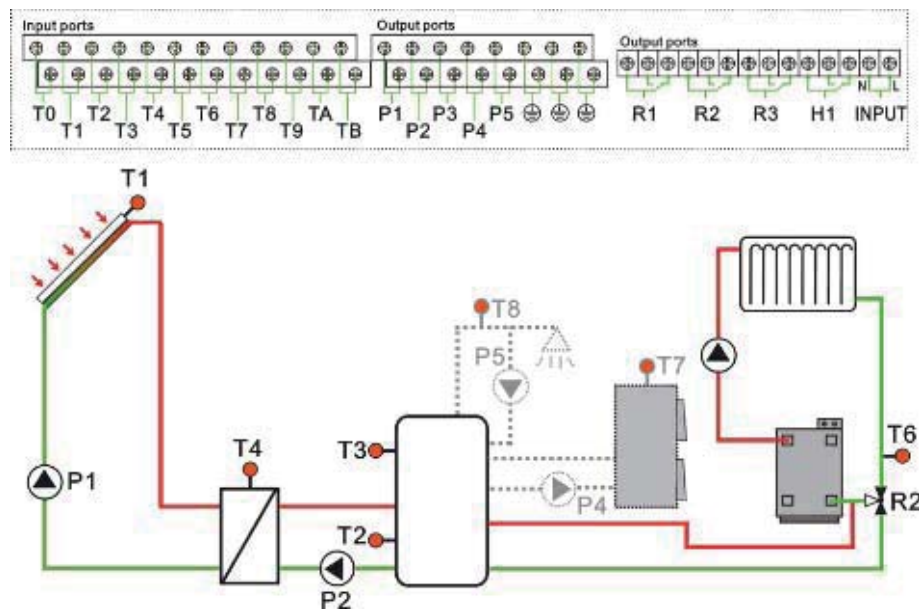
Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T1$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, heat exchanger is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1 is closed.



Other temperature difference between T4 and T2 ( $\Delta T1$ ) controls pump P2 to heat tank.

Other temperature difference between T3 and T6 ( $\Delta T2$ ) controls R2 to heat heating – return.

Note: In case that no sensor (T4) is installed, when the temperature difference between collector T1, and tank T2 ( $\Delta T1$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1, P2 are triggered simultaneously, and when the temperature difference between collector T1, and tank T2 ( $\Delta T1$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring ( option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank	P3	
T3	Tem.Sensor on top of tank (option sensor)	P4	
T4	Tem.Sensor on heat exchanger (option sensor)	P5	
T5		R1	
T6	Tem.Sensor on floor heating	R2	For 3 ways valve switchover to heating return
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

**System 33(SCH 33): east-west collector +2 tanks + valve + heat exchanger control logic****Description:**

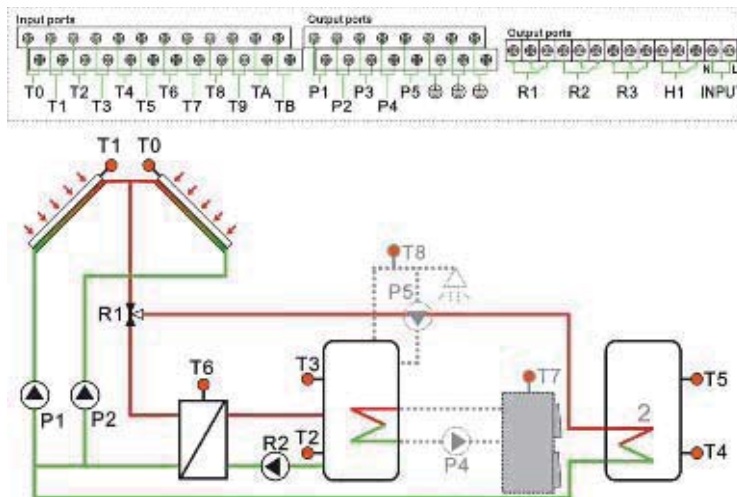
Comparing the temperature difference between collector T1,T0 and tank T2 ( $\Delta T1$ ), T4 ( $\Delta T2$ ), if anyone of 2 temperature difference is higher than or equal to the preset switch-on temperature difference, then corresponding pump or 2 pumps P1,P2 are triggered, through the switchover of R1 between exchanger and tank 2, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1,P2 is closed.



Other temperature difference between T6 and T2 ( $\Delta T1$ ) controls R2 to heat exchanger.

Priority logic controls tank 1 is prior to heat.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1, and tank T2 ( $\Delta T1$ ) is larger than or is equal to the switch-on temperature difference, **corresponding pump or 2 pumps P1,P2 are triggered simultaneously, then, it's heat tank though R1 and R2.** When the temperature difference between collector T1, and tank T2 ( $\Delta T1$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between heat exchanger and tank
T6	Tem.Sensor on heat exchanger	R2	For Solar circuit pump 3
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 34(SCH 34): 2 tanks + valve + heat exchanger control logic

### Description:

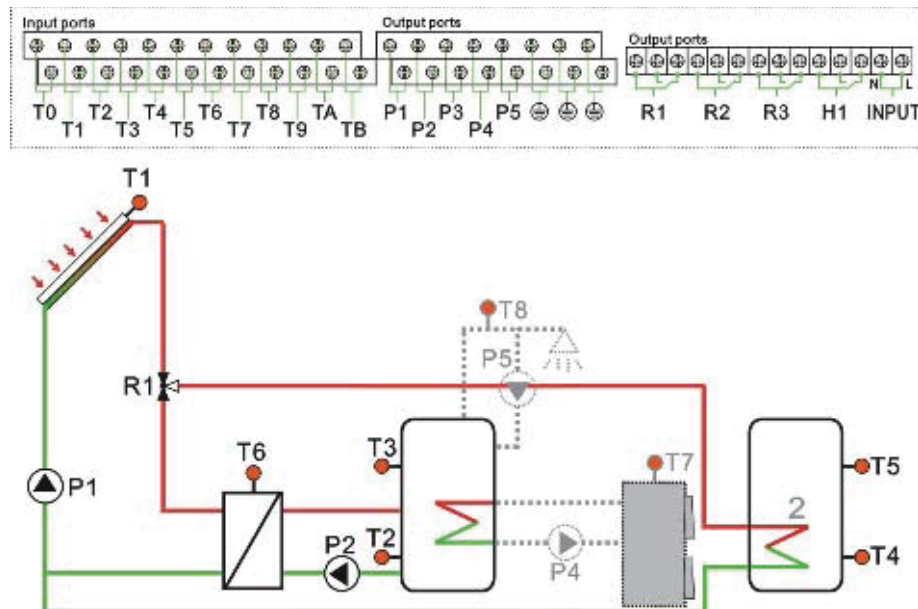
Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T_1$ ), T4 ( $\Delta T_2$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, through the switchover of R1 between exchanger and tank 2, it is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Other temperature difference between T6 and T2 ( $\Delta T_1$ ) controls P2 to heat tank 1.

Priority logic controls tank 1 is prior to heat.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1, and tank T2 ( $\Delta T_1$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1, P2 are triggered simultaneously, and when the temperature difference between collector T1, and tank T2 ( $\Delta T_1$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring ( option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover to heating return
T6	Tem.Sensor on heat exchanger (option sensor)	R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 35(SCH 35): 2 tanks + heat exchanger+ heat transferring control logic

### Description:

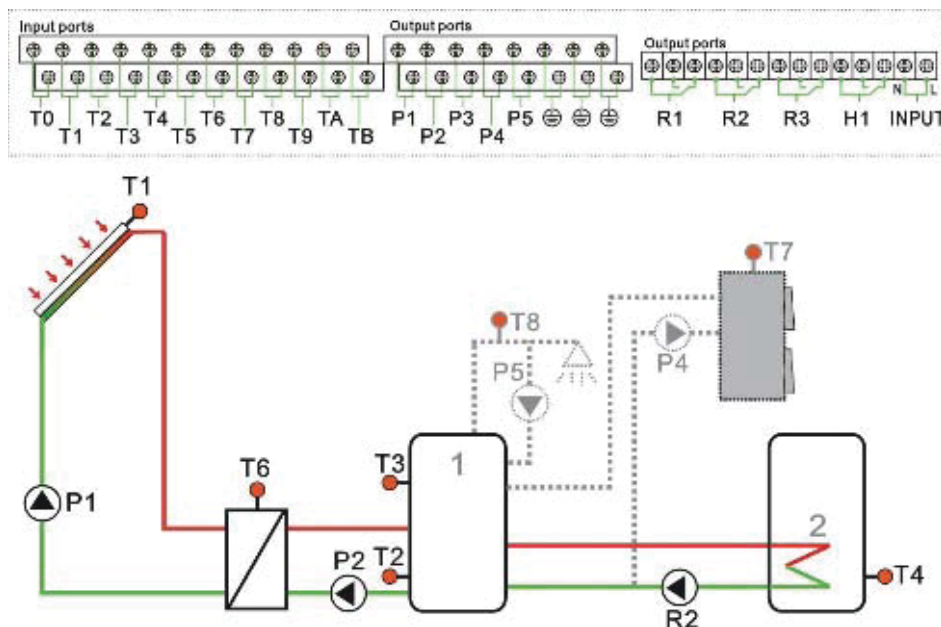
Comparing the temperature difference between collector T1 and tank T2 ( $\Delta T_1$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, heat exchanger is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when heat exchanger reaches its maximum temperature, then P1 is closed.



Other temperature difference between T6 and T2 ( $\Delta T_1$ ) controls P2 to heat tank 1.

Other temperature difference between T3 and T4 ( $\Delta T_2$ ) controls R2 to transfer heat from tank 1 to tank 2.

Note: In case that no sensor (T6) is installed, when the temperature difference between collector T1, and tank T2 ( $\Delta T_1$ ) is larger than or is equal to the switch-on temperature difference, then circulation pump P1, P2 are triggered simultaneously, and when the temperature difference between collector T1, and tank T2 ( $\Delta T_1$ ) reaches its switch-off temperature difference or the temperature of tank reaches its maximum temperature, then they are stopped.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring ( option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5		R1	
T6	Tem.Sensor on heat exchanger (option sensor)	R2	For Solar circuit pump 3
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 36(SCH 36): 2 tanks + valve+ heat transferring control logic

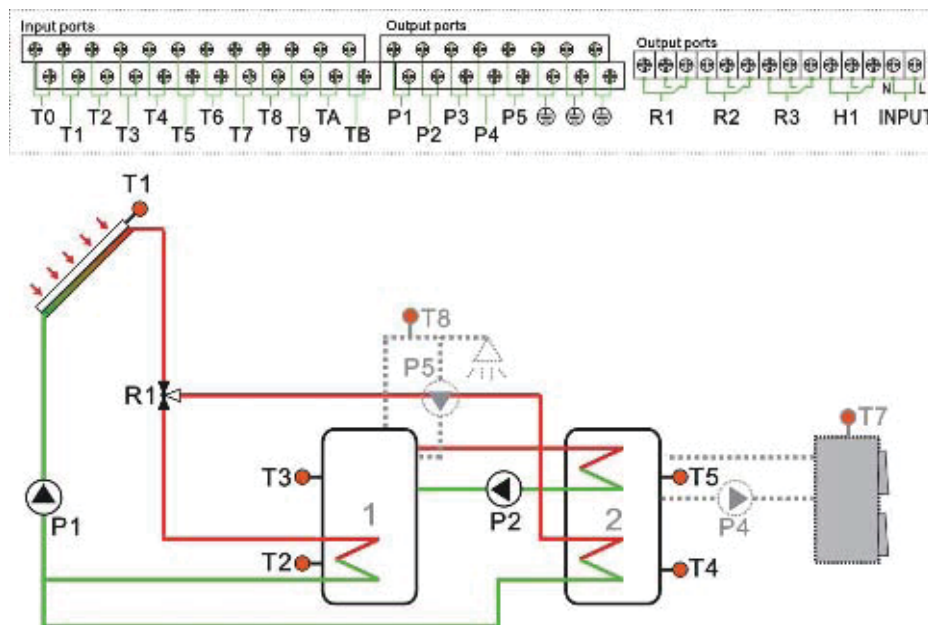
### Description:

Comparing the temperature difference between collector T1 and T2、T4 ( $\Delta T1$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then pump P1 is triggered, through the switchover of R1 between tank1 and 2, corresponding tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 is closed.



Priority logic controls tank 1 is prior to heat.

Other temperature difference between T5 and T3 ( $\Delta T2$ ) controls P2 to transfer heat from tank 2 to tank 1



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor for thermal energy measuring ( option sensor)	P1	For Solar circuit pump 1
T1	Tem.sensor on collector	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

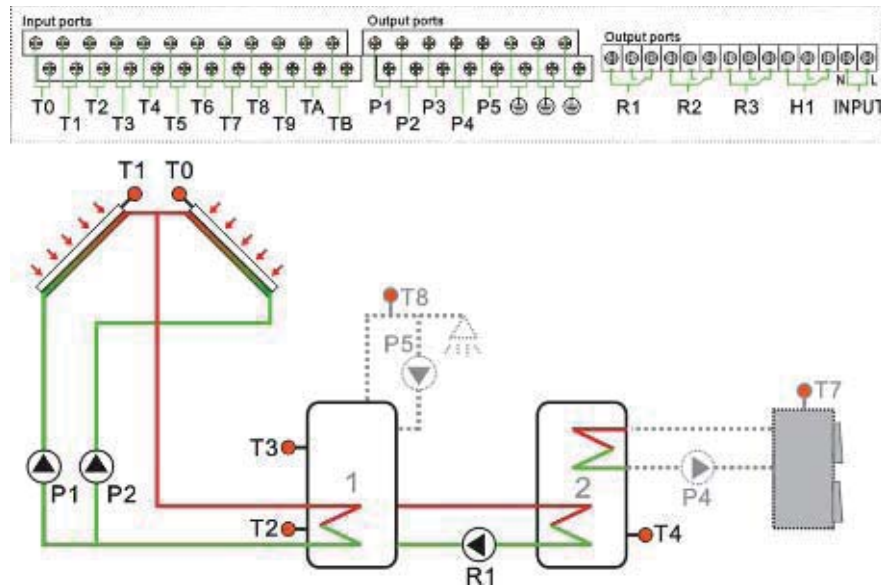
## System 37(SCH 37): east-west collector + 2 tanks + heat transferring control logic

### Description:

Comparing the temperature difference between collector T1,T0 and T2 ( $\Delta T1$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then corresponding pump or pump P1,P2 both are triggered, to heat tank, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 ,P2 is closed.



Other temperature difference between T3 and T4 ( $\Delta T2$ ) controls R1 to transfer heat from tank 1 to tank 2



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5		R1	For Solar circuit pump 3
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA, T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

## System 38(SCH 38): east-west collector + 2 tanks + valve + heat transferring control logic

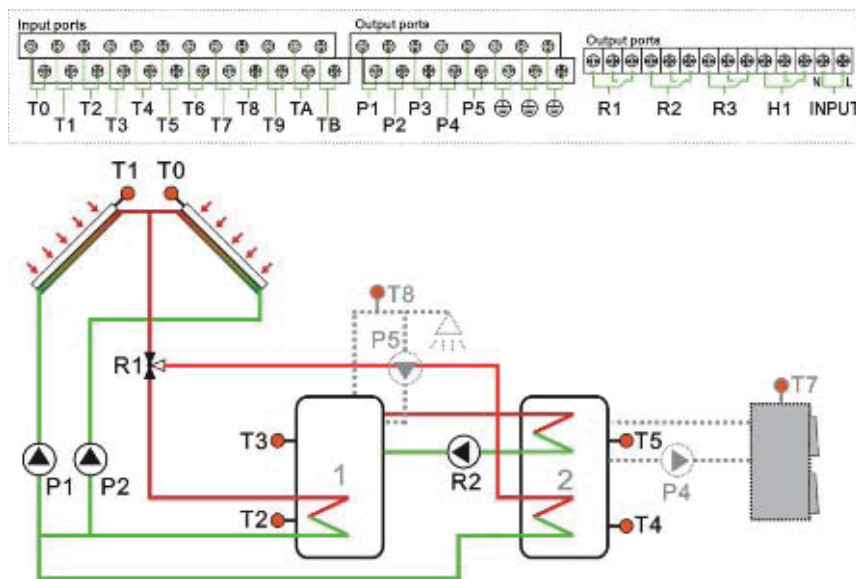
### Description:

Comparing the temperature difference between collector T1,T0 and T2, T4 ( $\Delta T1$ ), if the temperature difference is higher than or equal to the preset switch-on temperature difference, then corresponding pump or pump P1,P2 both are triggered to heat tank 1 or 2 which controlled by R1, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 ,P2 is closed.



Priority logic controls tank 1 is prior to heat.

Other temperature difference between T5 and T3 ( $\Delta T2$ ) controls P2 to transfer heat from tank 2 to tank 1



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2
T6		R2	For Solar circuit pump 3
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

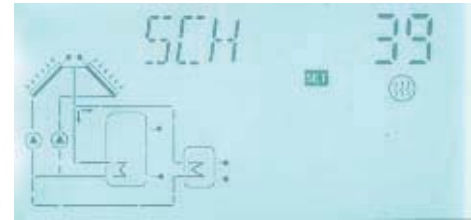
Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPASS) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

Above assistant functions can be activated in menu.

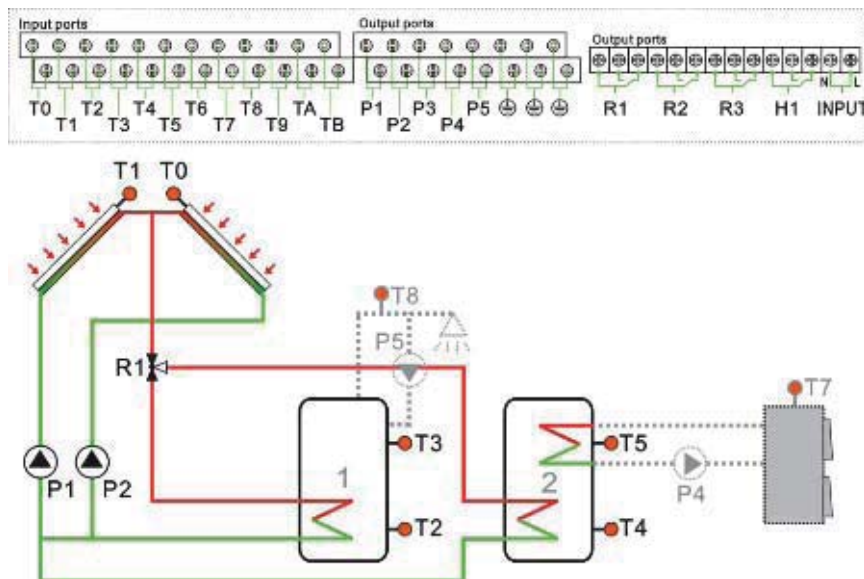
## System 39(SCH 39): east-west collector + 2 tanks + valve control logic

### Description:

Comparing the temperature difference between collector T1,T0 and T2 ( $\Delta T1$ ) , T4 ( $\Delta T2$ ) , if the temperature difference is higher than or equal to the preset switch-on temperature difference , then corresponding pump or pump P1,P2 both are triggered to heat tank 1 or 2 which controlled by R1, tank is heated until the temperature difference drops below the switch-off temperature difference ( $\Delta T_{off}$ ) or when tank reaches its maximum temperature, then P1 ,P2 is closed.



Priority logic controls tank 1 is prior to heat.



Sensor inputs	Description	Relay outputs	Description
T0	Tem.sensor on collector west	P1	For Solar circuit pump 1
T1	Tem.sensor on collector east	P2	For Solar circuit pump 2
T2	Tem.Sensor on bottom of tank 1	P3	
T3	Tem.Sensor on top of tank 1 (option sensor)	P4	
T4	Tem.Sensor on bottom of tank 2	P5	
T5	Tem.Sensor on top of tank 2 (option sensor)	R1	For 3 ways valve switchover between tank 1 and 2
T6		R2	
T7		R3	
T8		H1	For back-up heating device
T9			
TA			
TB			

List of assistant functions can be used in this system (selectable)

















Sensor inputs	Description	Relay outputs	Description
T7	Tem. Sensor for solid fuel boiler	P4	Pump for solid fuel boiler
T8	Pipe temperature sensor	P5	Pump for hot water circulation
TA、 T9	Temperature difference(TD) control between TA, T9 ( $\Delta T4$ )	P3	Option: ( $\Delta T4$ ) TD pump (BYPA) tank heat release
TB	Tem. Sensor for thermostat	R3	Pump for thermostat

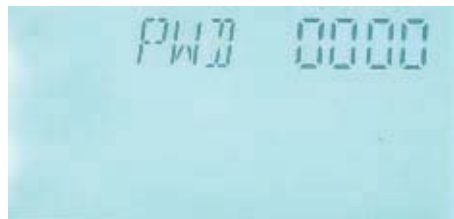
Above assistant functions can be activated in menu.


## 4. Functional parameter setup

### 4.1 Access main menu

Under standby status, doing like following to access main menu.









- ▶ press  button, "PWD 0000" appears on the screen, the left first digital blinks, ask for entering password, factory default set password is "0000"
- ▶ Press   button to enter first digital of password.
- ▶ Repress  button, the second digital blinks
- ▶ Repress   button, to enter second digital of password.
- ▶ Repeat press  button, the third digital blinks
- ▶ Repress   button, to enter third digital of password.
- ▶ Repeat press  button, the forth digital blinks
- ▶ Repress   button, to enter forth digital of password.
- ▶ Repress  button, to access the main menu.
- ▶ Press   button, select any menu you wanted.
- ▶ Press  button, you can exit main menu.



**Note:** default factory set password is "0000", if don't set new password, then press  four times, then you can access main menu interface.

### 4.2 Access submenu

After selecting main menu, do like following access submenu

- ▶ Press  button, to access submenu interface.
- ▶ Press   button to select submenu.
- ▶ Repress  button, to enter submenu.
- ▶ Press   button, to adjust parameter.
- ▶ Press  button, to exit submenu.
- ▶ then repress  button to exit main menu.



### 4.3 Main menu - THET timing heating

#### Description:

Electrical heater, gas boiler or oil boiler can be integrated into solar system used as back-up of solar system, and they can be triggered automatically at preset time by preset temperature. Within a preset time section, when the temperature (T3) on 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 time section: 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 time section: from 10:00 to 10:00 am, it means there is 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, 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 same value (for example, the second time section no this function, then you can set turning on/off time is 10:00 ~ 10:00)

When time is outside of the preset time section, 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 on the top part of tank (no T3 sensor), controller will take the signal of T2 (sensor on bottom of tank) automatically to control this function.
- The time format in this controller is 24 hours, 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 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, following steps descript in paragraph 4.1 to access main menu tHET


---

► Press  button, to access main menu interface.


► Press   button to pgup or pgdn menu, until main menu “tHET” appears on the screen.

► Press  button, access THET program to set parameter, “tH 1o 04:00” displays on screen, the switch-on time and temperature for first time section of heating function can be set





► Repress  button, “04” of hour time blinks on screen

► Press   button to adjust hour of time

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


► Press   button to adjust minute of time


► Repress  button again, “40°C” of temperature blinks on screen



► Press   button to adjust switch-on temperature teaming heating.











► Press  button to exit setting.

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











► Repress  button, “05” of hour time blinks on screen


► Press   button to adjust hour of time

- ▶ Repress  button again, "00" of minute time blinks on screen
- ▶ Press   button to adjust minute of time
- ▶ Repress  button again, "45°C" of temperature blinks on screen
- ▶ Press   button to adjust switch-off temperature teaming heating.
- ▶ Press  button to exit setting. Parameters are saved automatically.











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




- ▶ Repress  button, "10" of hour time blinks on screen
- ▶ Press   button to adjust hour of time
- ▶ Repress  button again, "00" of minute time blinks on screen
- ▶ Press   button to adjust minute of time
- ▶ Repress  button again, "50°C" of temperature blinks on screen
- ▶ Press   button to adjust switch-on temperature teaming heating.
- ▶ Press  button to exit setting.








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





- ▶ Repress  button, "10" of hour time blinks on screen
- ▶ Press   button to adjust hour of time
- ▶ Repress  button again, "00" of minute time blinks on screen
- ▶ Press   button to adjust minute of time
- ▶ Repress  button again, "55°C" of temperature blinks on screen
- ▶ Press   button to adjust switch-on temperature teaming heating.
- ▶ Press  button to exit setting. Parameters are saved automatically.


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




- ▶ Repress  button, "17" of hour time blinks on screen
- ▶ Press   button to adjust hour of time
- ▶ Repress  button again, "00" of minute time blinks on screen
- ▶ Press   button to adjust minute of time
- ▶ Repress  button again, "50°C" of temperature blinks on screen

► Press   button to adjust switch-on temperature teaming heating.


► Press  button to exit setting.

► Press  button, "tH 3F 22:00" displays on screen, the switch-off time and temperature for third time section of heating function can be set.





► Repress  button, "10" of hour time blinks on screen


► Press   button to adjust hour of time


► Repress  button again, "00" of minute time blinks on screen

► Press   button to adjust minute of time

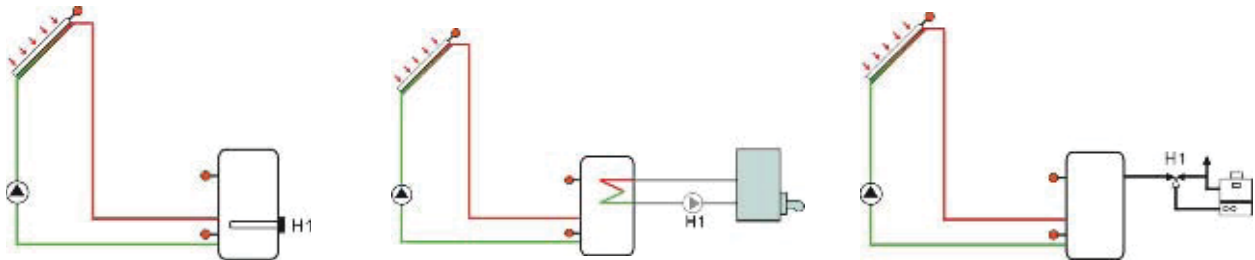
► Repress  button again, "55°C" of temperature blinks on screen

► Press   button to adjust switch-on temperature teaming heating.

► Press  button to exit setting. Parameters are saved automatically.

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

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 10 spare parts)

#### 4.4 Main menu - DT Temperature difference

##### Description:


Solar circuit pump P1/P2 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 on 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 recommend 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 temperature difference:


Under standby status, following steps descript in paragraph 4.1 to access main menu DT



► Press  button, to access settings program of main menu DT, "DT 1o 08 °C" displays on screen, "08 °C" blinks, the first 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  button to exit this setting, parameter is saved automatically.

► Press  button, “DT 1F 04 °C” displays on screen, the first switch-off temperature difference can be set.

► Press  button, “04 °C” blinks

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

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



**Note:** As every system is different to each other, maximum 3 sets temperature difference (DT1o, DT1F) (DT2o, DT2F) (DT3o, DT3F) can be set, setting steps are same like above description.

#### 4.5 Main menu - TEMP Temperature

For every 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 selected system, not all the parameters can be adjusted in every solar system.
- Because of different of system, the content of following submenus is also different.

Following submenu can be access though TEMP main menu.

Tem. Code	Function of temperature	Adjustable range	Factory set	Function exit tem.	Paragraph
EMOF	Collector emergency shutdown activated	63 °C~200 °C	130 °C		4.5.1
EMON	Collector emergency shutdown function exit	60 °C~197 °C	120 °C		4.5.2
CMX	Maximum limited collector temperature (collector cooling function)	60 °C~190 °C	110 °C	107 °C	4.5.3
CMN	low temperature protection of collector	0 °C~90 °C	OFF		4.5.4
CFR	frost protection of collector	-10 °C~10 °C	OFF		4.5.5
REC	Tank re-cooling function		OFF		4.5.6
SMX1	Maximum temperature of tank 1	2 °C~95 °C	60 °C	58 °C	4.5.7
SMX2	Maximum temperature of tank 2	2 °C~95 °C	60 °C	58 °C	4.5.8
SMX3	Maximum temperature of tank 3	2 °C~95 °C	60 °C	58 °C	4.5.9
MAX1	Maximum switch-off temperature (for heat transferring between tank and heating loop)	(MIN1+2 °C) ~ 95 °C	60 °C		4.5.10
MIN1	Minimum switch-on temperature (for heat transferring between tank and heating loop)	10°~ (MAX1-2 °C)	30 °C		4.5.11
MAX2	Maximum switch-off temperature (for heat transferring between tank and heat exchanger)	MIN2+2 °C~95 °C	60 °C		4.5.12

<b>MIN2</b>	Minimum switch-on temperature (for heat transferring between tank and heat exchanger)	10°~ (MAX2-2 °C)	30 °C		4.5.13
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#### 4.5.1 EMOF Collector emergency shutdown function activated



##### Function description:


When collector temperature rises up to this maximum switch-off limited temperature (EM), this 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 EMOF temperature is (120 °C~200 °C), factory set is 130 °C. If the temperature of collector rises up to EMOF limited temperature, solar circuit pump is ceased, but when collector temperature drops emergency shutdown exit temperature EMON (factory set is 120 °C), solar circuit pump will be reset, and this function is deactivated.


##### Setup steps:

to access main menu TEMP, then select submenu EMOF (see 4.1 and 4.2), "EMOF 130 °C" displays on screen

► Press  button, parameter "130 °C" blinks.

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

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


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






#### 4.5.2 EMON Collector emergency shutdown function exit


##### Setup steps:

to access main menu TEMP, then select submenu EMON (see 4.1 and 4.2), "EMON 120 °C" displays on screen

► Press  button, parameter "120 °C" blinks.

► Press   button, to adjust this maximum exit temperature, adjust range (OF-3 °C) ~200 °C, factory set is 120 °C

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

► Press  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 in activated, and at this moment temperature of tanks 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



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

##### Function description:

If hot water in tank isn't used for long time, then the capacity that solar system absorbs solar irradiation reduce, 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) it 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 in 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 temperature is  $\geq 95^{\circ}\text{C}$


#### Setup steps:


to access main menu TEMP, then select submenu CMX (see 4.1 and 4.2), "CMX 110 °C" displays on screen




► Press  button, "110 °C" blinks.

► Press   button to adjust collector limited maximum temperature ,adjust range : ( $60^{\circ}\text{C} \sim 190^{\circ}\text{C}$ ) , Factory set is  $110^{\circ}\text{C}$

► Press  button to activate and deactivate this function, if deactivate the function, "CMX - -" displays on screen.

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

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

### 4.5.4 CMN low temperature protection of collector


#### Description:

When the temperature of collector is below preset CMN temperature, solar circuit pump is ceased, even when the temperature difference between collector and tank exceeds switch-on temperature difference, solar pump doesn't work yet. When temperature of collector is  $3^{\circ}\text{C}$  higher than the preset CMN temperature, solar circuit pump is restarted, controller exits this program.



#### Setup steps:


to access main menu TEMP, then select submenu CMX (see 4.1 and 4.2), "CMN - -" displays on screen, default set is OFF.




► Press  button, default off signal "- -" blinks on screen.

► Repress  button to activate and deactivate this function

► Press   button to adjust the low protection temperature of collector CMN, adjustable range ( $00^{\circ}\text{C} \sim 90^{\circ}\text{C}$ ), after activate the function, factory set is  $10^{\circ}\text{C}$

► Press  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.

### 4.5.5 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 transfer hot water from tank to collector and heat collector. Besides when tank temperature (T2) drops to 6°C, electrical heater is triggered automatically and it is in operation until tank temperature T2 raises up to 20 °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 system, 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 (see 4.1 and 4.2), "CFR ----" displays on screen, default set is off.

► Press  button, default off "--" blinks.

► Repress  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  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 in 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 only few days. If safety requirement is very high, then anti-freezing is necessary, we suggest using suitable anti-freezing liquid to avoid frost problem.

## 4.5.6 REC Tank re-cooling function


### Description:


If tank temperature rises up to 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 reduced 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, (see 4.1 and 4.2), "REC OFF" displays on screen, default set is off.

► Press  button, parameter "OFF" blinks on screen

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

► Press  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.


## 4.5.7 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 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 SMX1, (see 4.1 and 4.2) "SMX1 60 °C" displays on screen.

► Press  button, parameter "60 °C"blinks

► Press   button to adjust the value of maximum temperature of tank1, adjustable range is (2 °C~95 °C) , default set is 60 °C

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

► Press  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.






### 4.5.8 SMX2 Maximum temperature of tank 2


#### Setup steps:

To access main menu TEMP, then select submenu SMX2, (see 4.1 and 4.2) "SMX2 60 °C" displays on screen.

► Press  button, parameter "60 °C"blinks

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

► Repress  button to activate and deactivate this function, if function deactivated, "SMX2 - - -" displays on the screen.


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






### 4.5.9 SMX3 Maximum temperature of tank 3


#### Setup steps:

To access main menu TEMP, then select submenu SMX3, (see 4.1 and 4.2) "SMX3 60 °C" displays on screen.

► Press  button, parameter "60 °C"blinks

► Press   button to adjust the value of maximum temperature of tank1 adjustable range is (2 °C~95 °C), default set is 60 °C

► Repress  button to activate and deactivate this function, if function deactivated, "SMX3 - - -" displays on the screen.

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



### 4.5.10 MAX1 Maximum switch-off temperature (for heat transferring between tank and heating loop)

**Function description of heat heating - return:** take system SCH26 as example


If temperature difference between tank (T5) and heating return (T6) reaches  $\Delta T3$  switch-on temperature,



then 3-way valve R2 is turned to heating -return, tank will heat heating-return. When temperature difference between tank (T5) and heating return (T6) reaches  $\Delta T3$  switch-off temperature, or when tank temperature T5 drops to minimum switch-on temperature (MIN1), or when temperature of heating return rises up to its maximal switch-off temperature (MAX1), then close 3-ways valve (R2).


#### Setup steps:

To access main menu TEMP, then select submenu MAX1, (see 4.1 and 4.2) "MAX1 60°C" displays on screen.



► Press  button, parameter "60°C" blinks

► Press   button to adjust the value of maximum switch-off temperature, adjustable range is (MIN1+ 2°C) ~ 95°C, default set is 60°C


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



#### 4.5.11 MIN1 Minimum switch-on temperature (for heat transferring between tank and heating loop)


#### Setup steps:

To access main menu TEMP, then select submenu MIN1, (see 4.1 and 4.2) "MIN1 30°C" displays on screen.



► Press  button, parameter "30°C" blinks

► Press   button to adjust the value of maximum switch-off temperature, adjustable range is 10°C ~ (MAX1- 2°C), default set is 30°C

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

#### 4.5.12 MAX2 Maximum switch-off temperature (for heat transferring between tank and heat exchanger)


**Function description of heat heat-exchanger:** take system SCH14 as example



If temperature T3 rises up to its maximal temperature, then it is permit to heat swimming pool. Then when temperature difference between collector (T1) and swimming pool (T4) reaches  $\Delta T2$  switch-on temperature, solar circuit pump (P1) is triggered to heat swimming pool. When temperature difference between collector (T1) and swimming pool (T4) drops below  $\Delta T2$  switch-off temperature, or when temperature of heat-exchanger rises up to its MAX2 temperature. then solar circuit pump (P1) is ceased; Also, when temperature difference between heat exchanger (T6) and swimming pool (T4) caters  $\Delta T2$  switch-on temperature, pump (P2) is triggered, when temperature difference between heat exchanger (T6) and swimming pool (T4) drops below  $\Delta T2$  switch-off temperature, or when temperature of heat-exchanger (T6) is less than its minimum switch-on temperature MIN2, pump (P2) is ceased.



#### Setup steps:

To access main menu TEMP, then select submenu MAX2, (see 4.1 and 4.2) "MAX2 60°C" displays on screen.

► Press  button, parameter "60°C" blinks

► Press   button to adjust the value of maximum switch-off temperature, adjustable range is (MIN1+ 2°C) ~ 95°C, default set is 60°C

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


automatically.



#### 4.5.13 MIN2 Minimum switch-on temperature (for heat transferring between tank and heat exchanger)


##### Setup steps:

To access main menu TEMP, then select submenu MIN2, (see 4.1 and 4.2) "MIN2 30 °C" displays on screen.



► Press  button, parameter "30 °C"blinks

► Press   button to adjust the value of maximum switch-off temperature , adjustable range is 10 °C ~( MAX2- 2 °C) , default set is 30 °C

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

## 4.6 Main Menu - FUN Auxiliary function

The auxiliary function 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. For different system, activated or deactivated statuses for following auxiliary functions in submenu are different.

Following submenu can be accessed through menu “FUN”

Submenu below Fun	Description	Paragraph
DVWG	Anti legionnaires' function	4.6.1
CIRC	Temperature controlled hot water circulation pump	4.6.2
SFB	On/off for solid fuel boiler	4.6.3
	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
nMIN	Speed adjusting of circulation pump 1 (pump1 RPM controlling )	4.6.4
DTS	Standard temperature difference for circulation pump 1 ( speed adjusting)	4.6.5
RIS	Gain for circulation pump 1 ( speed adjusting)	4.6.6
n2MN	Speed adjusting of circulation pump 2 (pump 2 RPM controlling )	4.6.7
DT2S	Standard temperature difference for circulation pump 2 ( speed adjusting)	4.6.8
RIS2	Gain for circulation pump 2 ( speed adjusting)	4.6.9
OHQM	Thermal energy measuring	4.6.10
	FMAX	Flow rate
	MEDT	Type of heat transfer liquid
	MED%	Concentration of heat transfer liquid
PRIO	Tank priority	4.6.11
tRUN	Interval heating timer	4.6.12
tSTP	Interval switch-off time	4.6.13
INTV	Pump interval function	4.6.14
	IRUN	Pump running time
	ISTP	Pump interval time
DT40	Switch-on temperature difference for circulation	4.6.15
	DT4F	Switch-off temperature difference for circulation
AHO	Switch-on temperature of thermostat function	4.6.16
	AHF	Switch-off temperature of thermostat function
BYPA	Bypass ( high temperature)	4.6.17
HDN	Manual control	4.6.18
PASS	Password set	4.6.19
REST	Recovery to factory set	4.6.20




### 4.6.1 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 the seventh day of the 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 access main menu FUN, then select submenu DVWG, (see 4.1 and 4.2) "DVWG OFF" displays on screen. Default set is "OFF".

- ▶ Press  button, parameter "OFF" blinks on the screen.
- ▶ Repress  button, "DVWG ON" blinks on the screen, function is triggered.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



## 4.6.2 CIRC Temperature controlled hot water circulation pump

### Description:

Solar system can provide temperature-controlled hot water circulation function; this function needs an extra hot water circulation pump (connect output port P5) and a sensor, which is installed on the return pipe of hot water (connect input port T8). When the temperature signal of sensor T8 is less than the preset turning on temperature of circulation pump, the hot water circulation pump (P5) triggers and works till the temperature exceeds the turning off temperature.







**Factory set:** the desired hot water temperature is 40°C, when return temperature T8 drops to 35°C, circulation pump P5 is triggered, when T8 rises up to 40°C, circulation pump P5 is ceased.

**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.

**Note:** in order to avoid large measuring error, the sensor T8 on hot water return pipe should be installed 1.5m far away from tank. This function isn't available in all systems.

### Setup steps:

To access main menu FUN, then select submenu CIRC, (see 4.1 and 4.2) "CIRC-----" displays on screen, factory set is off.

- ▶ Press  button, parameter "- - -" blinks on screen.
- ▶ Repress  button, parameter "40 °C" blinks on screen
- ▶ Press   button, to adjust the temperature of hot water return, adjustable range: 2 °C~95 °C), after function is activated, factory set is 40 °C.
- ▶ Repress  button again, "- - -" blinks on screen, function is deactivated
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



## 4.6.3 SFB On/off for solid fuel boiler

### Description:




Heating by solid fuel boiler: take system 1 as example, under standby status of SFB solid fuel boiler

If tank temperature (T3) drops below the switch-on temperature (SFON), and the temperature of solid fuel boiler (T7) is between its minimum temperature MIN3 and maximum temperature MAX3, then solar fuel boiler (P4) is triggered, when tank temperature (T3) rises up to its switch-off temperature (SFOF), or when solid fuel boiler (T7) temperature exceeds its minimum temperature MIN3 and maximum temperature MAX3, then solid fuel boiler (P4) is ceased.

**Note:** "MIN3" must be minimum 1 °C higher than "SFOF", e.g, SFON is set as 50 °C, SFOF is set as 55 °C, then MIN3 must set as 56 °C, namely 1 °C higher than SFOF (55 °C), when tank temperature is below 50 °C, solid fuel boiler can be triggered, when tank temperature rises up to 55 °C, solid fuel boiler is ceased.

### Setup steps:

To access main menu FUN, then select submenu SFB, (see 4.1 and 4.2) "SFB OFF" displays on screen. Default set is "OFF".





- ▶ Press  button, parameter "OFF" blinks on the screen.
- ▶ Repress  button, to activate this function
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.3.1 SFON Minimum switch-on temperature of tank

### Setup steps:

To access main menu FUN, SFB, then select submenu SFON, (see 4.1 and 4.2) "SFON 50 °C" displays on screen.





- ▶ Press  button, parameter "50 °C" blinks on the screen.
- ▶ Repress   button, to adjust switch-on temperature value, adjustable range: (10 °C~78 °C) , factory set is 50 °C.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.3.2 SFOF Maximum switch-off temperature of tank

### Setup steps:

To access main menu FUN, SFB, then select submenu SFOF, (see 4.1 and 4.2) "SFOF 55 °C" displays on screen.





- ▶ Press  button, parameter "55°C" blinks on the screen.
- ▶ Repress   button, to adjust switch-off temperature value, adjustable range: (12 °C~80 °C) , factory set is 55 °C.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.



#### 4.6.3.3 MAX3 Maximum switch-off temperature of solid fuel boiler

### Setup steps:

To access main menu FUN, SFB, then select submenu MAX3, (see 4.1 and 4.2) "MAX3 60 °C" displays on screen.

- ▶ Press  button, parameter "60 °C" blinks on the screen.
- ▶ Repress   button, to adjust switch-on temperature value, adjustable range: (12 °C~95 °C) , factory set is 60 °C.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.







#### 4.6.3.4 MIN3 Minimum switch-on temperature of solid fuel boiler

##### Setup steps:

To access main menu FUN, SFB, then select submenu MIN3 (see 4.1 and 4.2) "MIN3 30 °C" displays on screen.



- ▶ Press  button, parameter "30 °C" blinks on the screen.
- ▶ Repress   button, to adjust switch-on temperature value, adjustable range: (10 °C~93 °C) , factory set is 30 °C.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

#### 4.6.4 nMIN Speed adjusting of circulation pump 1 (pump1 RPM controlling)

##### 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 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 FUN, then select submenu nMIN (see 4.1 and 4.2) "nMIN 100" displays on screen.



- ▶ Press  button, parameter "100" blinks on the screen.
- ▶ Repress   button, to adjust pump speed. adjustable range: (30~100%) , factory set is 100%.
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

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





##### Description:

This controller has preset default minimum pump speed is 30%. When the switch-on temperature difference ( $\Delta T$  ON) reaches, solar pump is triggered, and then within 10 seconds, pump speed reaches to its minimum speed (30%). Thereafter, controller checks temperature continuously, when the 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 main menu FUN, then select submenu DTS (see 4.1 and 4.2) "DTS 08 °C" displays on screen.



- ▶ Press  button, parameter "08°C" blinks on the screen
- ▶ Press   button, to adjust standard DTS, adjustable range (2 °C~30 °C) , factory set is 08°C
- ▶ Press  button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved

automatically.



#### 4.6.6 RIS Gain for circulation pump 1 (speed adjusting)


##### Setup steps:

To access main menu FUN, then select submenu RIS (see 4.1 and 4.2) "RIS 01 °C" displays on screen.



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

#### 4.6.7 n2MN Speed adjusting of circulation pump 2 (pump 2 RPM controlling)

##### Description:

P2 output can be configured to function either as RPM controlled output or simple switch output.

When n2MN is set as 30-90%, P2 output used as RPM output.



When n2MN is set as 100%, it means P2 output used as switch output. (e.g. valve or pump with integrated RPM)


##### Setup steps:

To access main menu FUN, then select submenu n2MN (see 4.1 and 4.2) "n2MN 100" displays on screen.



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

► Repress   button, to adjust pump speed. adjustable range: (30~100%) , factory set is 100%.

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

#### 4.6.8 DT2S Standard temperature difference for circulation pump 2 (speed adjusting)

##### Description:



This controller has preset default minimum pump speed is 30%. When the switch-on temperature difference ( $\Delta T$  ON) reaches, solar pump is triggered, and then within 10 seconds, pump speed reaches to its minimum speed (30%). Thereafter, controller checks temperature continuously, when the standard temperature difference (DT2S) reaches, the speed of pump increases one grade (10%), temperature difference (RIS2) increases every 1°C, speed of pump increases 10% until it reaches to its maximum speed 100%. Through setting the temperature difference increase rate (RIS2) 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 main menu FUN, then select submenu DT2S (see 4.1 and 4.2) "DT2S 08 °C" displays on screen.



► Press  button, parameter "08°C" blinks on the screen

► Press   button, to adjust standard DT2S, adjustable range (2 °C~30 °C) , factory set is 08°C

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

#### 4.6.9 RIS2 Gain for circulation pump 2 (speed adjusting)

##### Setup steps:

To access main menu FUN, then select submenu RIS2 (see 4.1 and 4.2) "RIS2 01 °C" displays on screen.



- ▶ Press button, parameter "01 °C" blinks on the screen
- ▶ Press button, to adjust standard RIS2, adjustable range (1 °C~20 °C), factory set is 1 °C
- ▶ Press button to exit the menu or wait for 20 seconds to exit automatically, parameters are saved automatically.

#### 4.6.10 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 T0 on 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.

**Note:** when T0 input is used, (for example, east/west collector), OHQM thermal energy measuring function is deactivated,

Factory set of OHQM is off.

##### Setup steps:

To access main menu FUN, then select submenu OHQM, (see 4.1 and 4.2) "OHQM OFF" displays on screen,



- ▶ Press button, parameter "OHQM OFF" blinks on the screen
- ▶ Repress button to activate this function, "OHQM ON" appears on the screen
- ▶ Press 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 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 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 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.

#### 4.6.10.1 FMAX Flow rate



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


**Setup steps:**

To access main menu FUN, then select submenu FMAX (see 4.1 and 4.2), "FMAX 2.0" displays on screen.



▶ Press  button, parameter "2.0" blinks on the screen

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

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

#### 4.6.10.2 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 access main menu FUN, then select submenu MEDT, "MEDT 01" displays on screen.

▶ Press  button, parameter "01" blinks on the screen

▶ Press   button, to adjust type of heat transfer liquid, adjustable range (00~03)

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

#### 4.6.10.3 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 access main menu FUN, then select submenu MED%, "MED% 40" displays on screen.



▶ Press  button, parameter "40" blinks on the screen

▶ Press   button to adjust concentration, adjustable range (20~70)

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

#### 4.6.11 PRIO Tank priority

##### Description:

If set "PRIO 01" or "PRIO 02" priority option, then corresponding tank will be prior to heated. If priority tank doesn't cater switch-on condition, controller will check next tank in turn, if it caters the switch-on condition, then it is heated provisionally, the heating duration is decided by parameter interval heating time tRUN, within tRUN time, circuit pump works, tank is heated, duration runs out, then process is shifted to switch-off duration (tSTP), circuit pump stops, if during tSTP duration, priority tank caters switch-on condition, then priority tank is heated. If temperature of priority tank rises up to its maximum tank temperature, in turn, the next tank is heated, and this time this heating is no more temporary.

Tank priority function and parameter are available in system with more tanks. If priority option is set as 00, that means tank priority option is deactivate. Then tanks can be heated at the same time. (01 indicates tank 1 is priority tank, 02 indicates tank 2 is priority one, 03 indicates tank 3 is priority one).




##### Setup steps:

To access main menu FUN, then select submenu PRIO, "PRIO 01" displays on screen.

► Press  button, parameter "01" blinks on the screen

► Press   button to adjust tank priority, adjustable range (00~03), factory set is 01.

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

	Default set	Adjustable range
Priority tank (PRIO)	01	00-03
Interval switch-off time (tSTP)	2 minute	01-30 minute
Interval heating time (tRUN)	15 minute	01-30 minute

#### 4.6.12 tRUN Interval heating timer



##### Description:


Interval switch-off time (tSTP), Interval heating time (tRUN), with the temperature rising of collector, controller is monitoring whether the temperature difference between collector and tank caters the switch-on temperature difference, if TD for priority tank isn't enough, then check next tank, if TD for next tank caters condition, then it is heated, but the heating duration is controlled by interval heating time tRUN. tRUN is out, and then heating is broken off. The process is shifted to interval switch-off time (tSTP), controller keeps on checking temperature of collector, if TD of priority tank is still not enough, and then continue to heat next tank. If TD of priority tank caters the switch-on condition. Then priority tank is heated. Interval heating is no more available.

##### Setup steps:

To access main menu FUN, then select submenu tRUN, "tRUN 15" displays on screen.

► Press  button, parameter "15" blinks on the screen

► Press   button to adjust heating time, adjustable range (01~30), factory set is 15

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





#### 4.6.13 tSTP Interval switch-off time


##### Setup steps:

To access main menu FUN, then select submenu tSTP, "tSTP 02" displays on screen.



► Press  button, parameter "02" blinks on the screen

► Press   button to adjust heating switch-off time, adjustable range (01~30), factory set is 02

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

#### 4.6.14 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, within the preset interval, solar pump is triggered like pulse, so that the hot water inside collector can flow to 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 06:00 ~20:00.


During the period that solar pump is in operating, (the duration of running time can be set by parameter "IRUN"), controlled check the temperature signal of sensor, if the temperature increases less than 1°C, then solar pump is ceased automatically. After the break time (interval can be set by parameter "ISTP"), same process repeats.


During the period that solar pump is in operating, if measured temperature increases over 1°C, then the next interval is omitted, this omitting repeats when it caters condition and until the switch-on temperature difference is catered or no more temperature can be measured. After that, pump interval function recovers to pulse rate-controlled mode.

##### Setup steps:

To access main menu FUN, then select submenu INTV, "INTV OFF" displays on screen.

► Press  button, parameter "OFF" displays and blinks, factory set is "OFF"

► Press  button, to activate this function, "INTV ON" displays on the screen.

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






##### 4.6.14.1 ISTP Pump interval time


##### Setup steps:

To access main menu FUN, then select submenu ISTP, "ISTP 30" displays on screen.



► Press  button, parameter "30" displays and blinks, factory set is "30 minute"

► Press   button, to adjust time, adjustable range 2~60 minutes.

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

#### 4.6.14.2 IRUN Pump running time

##### Setup steps:

To access main menu FUN, then select submenu IRUN, "IRUN 15" displays on screen.



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

► 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.

#### 4.6.15 Δ T4 temperature difference for circulation

This function is used to control output (P3) by temperature difference of (TA and T9), it is used to control back-up heating device or circuit pump etc.

##### Setup steps:

To access main menu FUN, then select submenu DT40, "DT40 ----" displays on screen.



► Press **SET** button, "---" blinks, factory set "OFF"

► Repress **SET** button, to activate the function, display "DT40 08 °C" and (08 °C blinks)



► Press **+** **-** button to adjust switch-on temperature difference, adjustable range (OFF+2 °C) ~20 °C, factory set: 8 °C

► Press **ESC** button to exit submenu.

► Press **+** button, display "DT4F 04 °C", can set switch-off DT.



► Repress **SET** button, "04 °C" blinks.

► Press **+** **-** button to adjust switch-on temperature difference, adjustable range 0 °C ~ (ON- 2 °C), factory set: 4 °C

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



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

#### 4.6.16 AHO Thermostat function

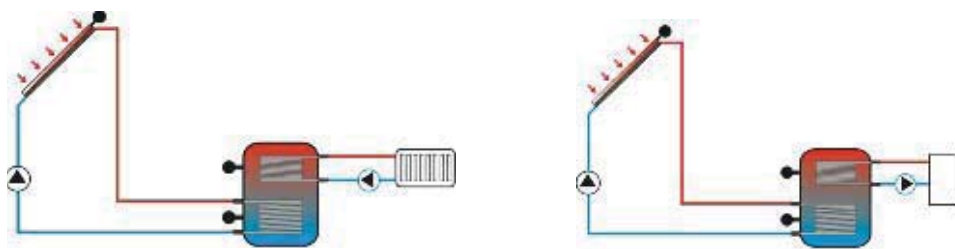
##### Description:

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.

##### Note:

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

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



### Setup steps:

To access main menu AHO, "AHO ----" displays on screen.

► Press button, parameter "50 °C" blinks. Factory set "50 °C"

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

► Press button to exit menu.

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



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

### 4.6.17 BYPR Bypass (high temperature)

#### Description:

High-temperature bypass function is independent of the solar system's operation; the extra thermal energy of tank can be transferred to other application through this function, as a result the constant tank temperature can be kept. In order to transfer the extra energy, it needs an extra pump or electromagnetic valve. (Connect to output port R3).

#### For example:

If we set the temperature of bypass is 70 °C, then when tank temperature (T2) rises up to 71 °C, this by-pass function is triggered, electromagnetic valve or circuit pump (P3) and TD controlled circuit pump (P1) will be triggered simultaneously. When tank temperature (T2) drops to 67 °C, electromagnetic valve or circuit pump (P3) and TD controlled circuit pump (P1) will be ceased simultaneously.

### Setup steps:

To access main menu FUN, then select submenu BYPR, "BYPR-----" displays on screen.

► Press button, " - - -" blinks on screen, default set is "OFF"

► Repress button, to activate by-pass function, "BYPR 95 °C" displays on the screen, ("95 °C" blinks)

► Press button to adjust this parameter, adjustable range (5 °C~120 °C)

► Press 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 by-pass function is activated.

#### 4.6.18 HND Manual control

When using this controller first time or when debugging this controller, output of this controller (P1, P2, P3, P4, P5, R1, R2, R3, H1) can be triggered manually "On, OFF" control.

##### Setup steps:

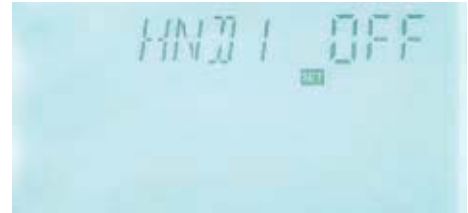
To access main menu HND,

► 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 **+** 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

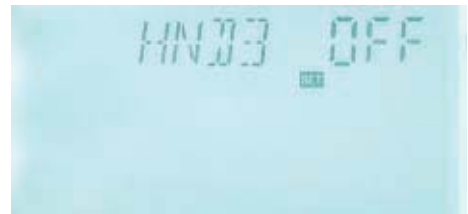


► Press **+** button, "HND3 off" displays on the screen, P3 output manually set

► Repress **SET** button, "HND3 on" displays on the screen, P3 output is switched-on

► Repress **SET** again, "HND3 off" displays, P3 output is switched-off

► Press **ESC** to exit P3 set program



► Press **+** button, "HND4 off" displays on the screen, P4 output manually set

► Repress **SET** button, "HND4 on" displays on the screen, P4 output is switched-on

► Repress **SET** again, "HND4 off" displays, P4 output is switched-off

► Press **ESC** to exit P4 set program



► Press **+** button, "HND5 off" displays on the screen, P5 output manually set

► Repress **SET** button, "HND5 on" displays on the screen, P5 output is switched-on

► Repress **SET** again, "HND5 off" displays, P5 output is switched-off

► Press **ESC** to exit P5 set program



► Press **+** button, "HND6 off" displays on the screen, R1 output manually set

► Repress **SET** button, "HND6 on" displays on the screen, R1 output is switched-on

► Repress **SET** again, "HND6 off" displays, R1 output is switched-off

► Press **ESC** to exit R1 set program



► Press **+** button, "HND7 off" displays on the screen, R2 output manually set

► Repress **SET** button, "HND7 on" displays on the screen, R2 output is switched-on

► Repress **SET** again, "HND7 off" displays, R2 output is switched-off

► Press **ESC** to exit R2 set program



► Press **+** button, "HND8 off" displays on the screen, R3 output manually set

► Repress **SET** button, "HND8 on" displays on the screen, R3 output is switched-on

► Repress **SET** again, "HND8 off" displays, R3 output is switched-off

► Press **ESC** to exit R3 set program




► Press **+** button, "HND6 off" displays on the screen, R1 output manually set

► Repress **SET** button, "HND6 on" displays on the screen, R1 output is switched-on

► Repress **SET** again, "HND6 off" displays, R1 output is switched-off

► Press **ESC** to exit R1 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.

#### 4.6.19 PASS Password set

##### Setup steps:

To access main menu PASS,

► Press  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  button, the second digital blinks


► Press   button to enter the second digital


► Repress  button, the third digital blinks


► Press   button to enter the third digital

► Repress  button, the fourth digital blinks

► Press   button to enter the fourth digital

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

► Press  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  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  and hold down, then recover the power supply.

► Buzzer makes "du-----" 3 times, then release  button. Controller recovers to factory set, a new password can be reset now.





#### 4.6.20 REST Recovery to factory set


##### Setup steps:

To access main menu REST,

► Press  button, "YES" displays on the screen.

► Hold down  button, buzzer makes "du-----" 3 times,



then release  button. Controller recovers to factory set, new paramters can be reset now.

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



## 4.7 On/OFF button

Under the standby status,

- ▶ Press  button for 3 seconds; controller is switched off, "OFF" displays on the screen.
- ▶ Repress  button, controller is switched-on again.

## 4.8 Holiday function

### Description:



This function activates in night, solar liquid will flow from storage tank to collector to cool the tank, and therefore to prevent overheating 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 temperature of collector is 8 °C below the storage tank temperature (T2), solar circuit pump starts to work until the temperature of collector is 2 °C below the tank temperature, and then 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 on bottom of tank is below 35 °C.

### Activate/ deactivate this function:

- ▶ Press  button for a long time until the signal of holiday function displays on the screen, and then holiday function is activated.
- ▶ Repress  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.




## 4.9 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 3 °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 3 °C higher than tank temperature.

### Activate/deactivate the function:

- ▶ Press  button, temperature "60 °C" blinks on the screen.
- ▶ Press   button to adjust switch-on temperature, adjustable range 10 °C~80 °C, factory set is 60 °C.



After 20 seconds, this function is activated, signal  displays on the screen, and heating signal  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.

## 4.10 Temperature query function

Under standby status,

► Press   button, you can check the value of temperature sensors T0~ TB, pump speed (n %), accumulative operation time of circuit pump (Hp), daily thermal energy (DKWH), accumulative thermal energy (KWH) or (MWH), week and time.

When checking temperature, T0 – TB displays one by one, corresponding sensor signal  blinks. TST means the temperature of tank 1.

► Press  button, TST: tank 1 temperature displays.

**Note:**

- Since the difference of selected system, the values you can check are different.
- Daily thermal energy (DKWH) and accumulative thermal energy (KWH) or (MWH) can only be checked after triggering of OHQM thermal energy measuring function.

## 5. Protection function

### 5.1 Memory protection

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



### 5.2 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. Trouble shooting

### 6.1 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 signals





  are showed on the display. If control unit does not work correctly, please check following indications.

► Press   button to check error code,   signal displays on the LCD screen

Error message on LCD screen	Meaning	Cause of error	Error rectification
  T0 ---	T0 sensor problem	Sensor wiring short or open	Check resistance value or replace
	Thermal measuring function is triggered	T0 not connected	Connect T0 or switch-off function (OHQM)
  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
  T6 ---	T6 sensor problem	Sensor wiring short or open	Check resistance value or replace
  T7 ---	T7 sensor problem	Sensor wiring short or open	Check resistance value or replace
  T8 ---	T8 sensor problem	Sensor wiring short or open	Check resistance value or replace
	Temperature controlled hot water circuit pump function is triggered.	T8 not connected	Connect T8 or switch-off function (CIRC)
  T9 ---	T9 sensor problem	Sensor wiring short or open	Check resistance value or replace
	$\Delta$ T4 TD controlled circuit function is triggered.	T9 not connected	Connect T9 or switch-off function (DT4O)
  TA ---	TA sensor problem	Sensor wiring short or open	Check resistance value or replace
	$\Delta$ T4 TD controlled circuit function is triggered.	TA not connected	Connect TA or switch-off function (DT4O)
  TB ---	TB sensor problem	Sensor wiring short or open	Check resistance value or replace
	AHO thermostat function is triggered.	TB not connected	Connect TB or switch-off function (AHO)

## 6.2 Trouble checking

The 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 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 appear to function at all	Display shows nothing, no display illumination	Controller power supply is interrupted or program is out of work	Check the controller power cable and fuse.
The solar pump doesn't operate, despite the fact that switch-on conditions are satisfied	The pump symbol in the display blinks	Pump power supply is interrupted	Check the pump power cable
Pump doesn't operate	The pump symbol in the display doesn't blink.  lighted or  blinked	The maximum storage tank temperature (SMX1) has been reached The maximum collector temperature (EM) has been reached.	No fault
	  T1 - - - Error message displays on the screen	Sensor fault (short circuit or open circuit)	Check values of every connected sensor; 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 in 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.,
One function can't be activated	no function selected in submenu	All inputs and outputs are used; inputs and outputs can't be used doubly.	No fault on controller



**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, and then measure its resistance, and compare the measured value with the figures in the table below, small deviation ( $\pm 1\%$ ) is acceptable,

### PT1000 resistance value

°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

°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

## 7. 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.





## 8. Technical data

Specification	Parameter
Appearance of controller	200mm×155mm×45mm
Power supply	AC230V±10%
Power consumption	< 3W
Accuracy of temperature measuring	±2°C
Range of collector sensor measuring	-10~220°C
Range of tank sensor measuring	0~100°C
Suitable power of pump	9个, ≤ 200W
Suitable power of electrical heater	1个, ≤ 1500W
Inputs	2 x Pt1000 sensor (≤500°C) for collector (silicon cable≤280°C), 10 x NTC10K, B3950 sensor (≤ 135°C) for tank or pipe, (PVC cable ≤105°C),
Outputs	9 relays for circulation pumps or 3-way electromagnetic valve 1 relay for electrical heater
Ambient temperature	-10~50 °C
Water proof grade	IP40

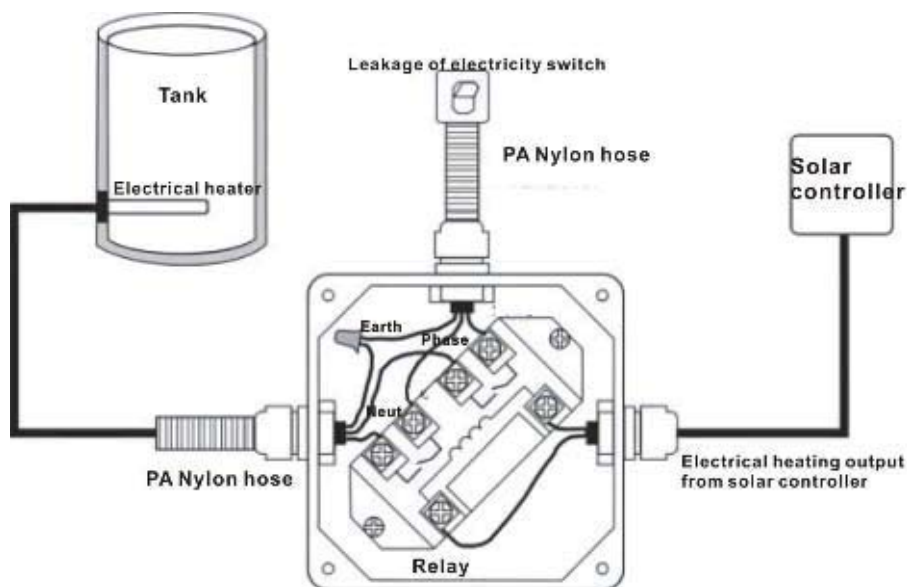
## 9. Delivery scope

Lists	Amount
Controller	1
Operation manual	1
PT1000 sensor (size: Φ6*50mm,cable1.5m)	2
NTC10K (size: Φ6*50mm,cable 3m)	5
Plastic expansion screw	3
Screw	3
Strain-relief clamp	1

## 10. Device matchable to this controller

<b>Sensor for collector:</b> high accuracy PT1000 sensor(A01) Parameter: PT1000, $\Phi$ 6X50mm,1.5m cable	
<b>Sensor for tank:</b> high accuracy NTC 10K sensor (A02) Parameter: NTC10K,B=3950, $\Phi$ 6X50mm, 3m cable	
<b>Thermowell of sensor:</b> stainless thermowell ( A05) Parameter: 1/2' male thread, $\Phi$ 8X200mm.	
<b>Contactor unit of high power: SR802</b> When user selects electrical heater as back-up device, we recommend using SR802 unit connecting controller and electrical heater. <b>Technical data of SR802</b> Dimension: 100*100*65mm Power supply:180V~264V/AC 50/60Hz Suitable power: $\leq 4000W$ Available ambient temperature: -10 ~ 50°C Water proof grade: IP43	

### SR802 CONNECTION DIAGRAM:



**Note:** open the case of SR802 should be done by qualified person, and switch-off the power.