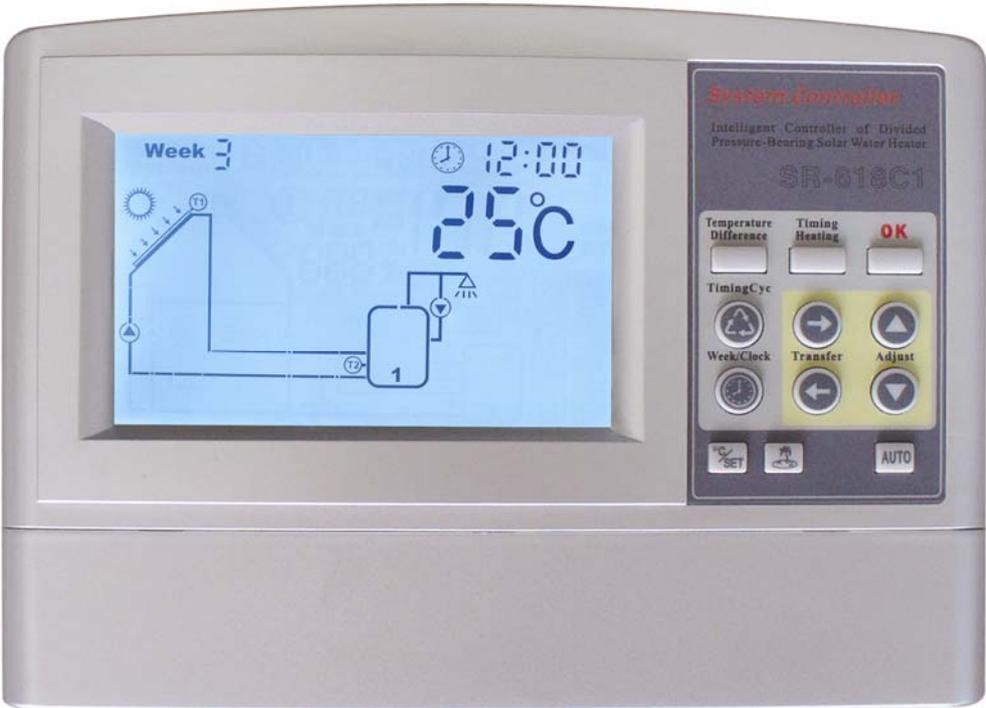


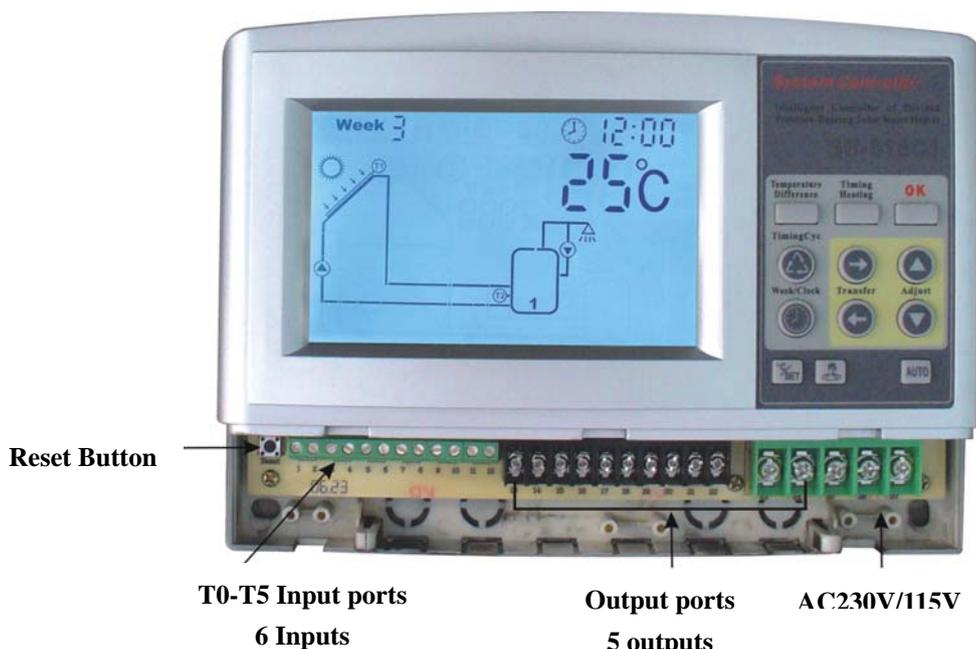
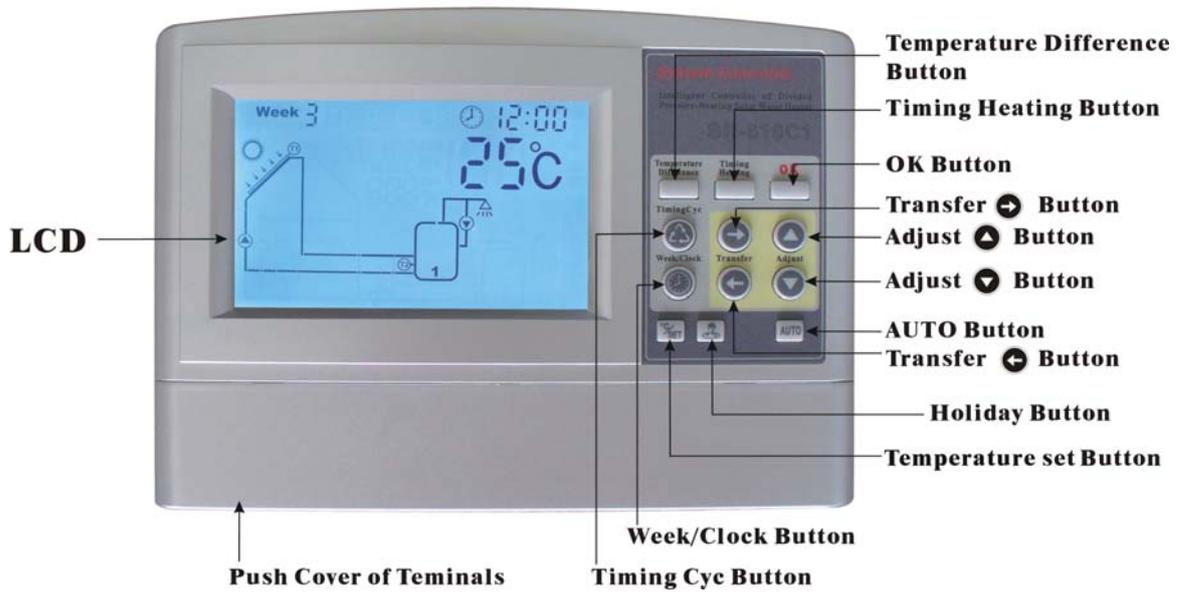
Installation and Operating Manual

SR618C1



System Regulator for Solar Thermal Systems

Display illustration



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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 must not be exceeded at the site of installation.
- Before connecting the device, make sure that the energy supply matches the specifications of controller on the type plate.
- 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, be sure to observe the appropriate installation instructions provided by each manufacturer.

Installation, electrical connection, commissioning and maintenance of the device may only be performed by trained professional personnel. The professional personnel must be familiar with this manual and follow the instructions contained herein.

1.3 Liability waiver

The manufacturer cannot monitor the compliance with these instructions or the circumstances and methods used for installation, operation, utilization and maintenance of this controller. Improper installation can cause damages to material and persons. This is the reason why we do not take over responsibility and liability for losses, damages or cost that might arise due to improper installation, operation or wrong utilization and maintenance or that occur in some connection with the aforementioned. Moreover we do not take over liability for patent infringements or infringements – occurring in connection with the use of this controller- on third parties rights. The manufacturer preserves the right to put changes to product, technical date or installation and operation instructions without prior notice. As soon as it becomes evident that safe operation is no longer possible (e.g visible damage). Please immediate take the device out of operation. Note: ensure that the device cannot be accidentally placed into operation.

1.4 Description of symbols

Safety instruction:



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

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

Notes: Contains important information on operation or function, is written in blue color

2. Installation

2.1 Opening/closing the case of controller

 **Danger of electrocution! Before opening the case please ensure power is switched off.**

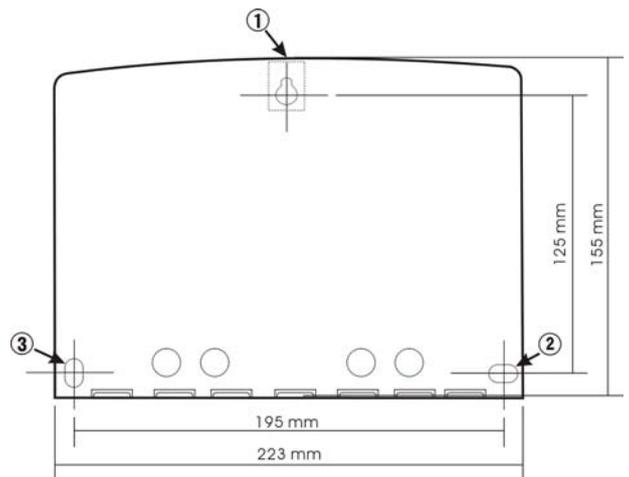
- ▶ Loosen the screw ① and remove the upper case ② in an upwards direction.
- ▶ Close the case: insert the hinge grooves of upper case into the retaining pegs of the lower case.
- ▶ pivot the upper case down.
- ▶ fasten the case tightly with the screw.



2.2 Installing the controller

Attention: the controller must only be installed in an area having an adequate level of protection.

- ▶ Choose a suitable location
- ▶ Drill the upper fastening hole
- ▶ Screw in the screw
- ▶ Remove the upper case
- ▶ Hang the bottom case in the recess ① in picture
- ▶ Mark the position of the lower fastening holes ② and ③
- ▶ Remove the bottom case again
- ▶ Drill the lower fastening holes
- ▶ Re-hang the case in the recess ①
- ▶ Screw the case firmly using the lower fastening holes ② and ③
- ▶ Mount the upper case.



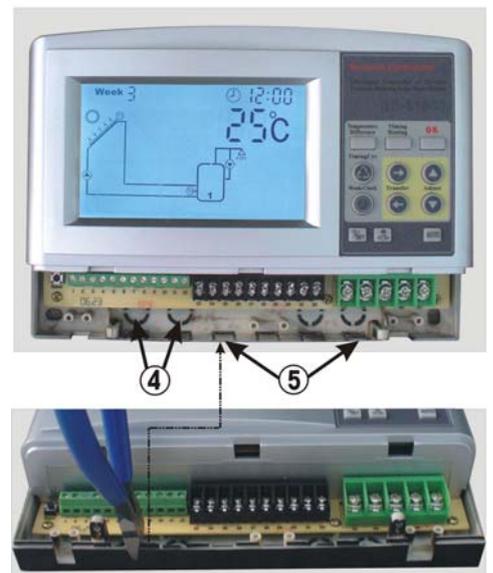
2.3 Electrical connections

 Remove the device from the mains supply before opening the case! All guidelines and regulations of the local electricity supplier must be observed!

2.3.1 Preparation before connections

Power can only be switched on when the housing of controller is closed, an installer must make sure that the IP protection class of the controller is not damaged during installation.

Depending on the type of installation, the cables may enter the device through the rear of the case ④ or the lower side 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 cabling must be fastened to the case using the strain-relief clamps provided

2.3.2 Terminal connection

<p>Power Connection</p> <ol style="list-style-type: none"> please note the type of power supply required from the type plate on the case of the device The protective conductor must be also be connected Cables type of H05VV-..... (NYM...) can be used 	<p>Outputs</p> <ol style="list-style-type: none"> Outputs P1& P2: electromagnetic relays max. switching current:3A Outputs P0/R1,R2: electromagnetic relays, maximal switching current:5A When using P0 circulation pump, connection ports are 17 and 18; when using R1 3-way electromagnetic valve, connection ports 17, 18 &19. When power is switched on. Port17 & 18 is shut off; port 17 & 19 is turned on. When using R2 controls circulation pump, connection ports are 20 and 21; when using R2 controls 3- way electromagnetic valve, connection ports 20, 21&22. When power is switched on. Port 20 & 21 is shut off; port 20 & 22 is turned on. Output H1: electromagnetic relay, max switching current 16A. 	<p>Inputs</p> <ol style="list-style-type: none"> Inputs T0 and T1: for PT1000 temperature sensors. Inputs T2-T5: for NTC10K sensors.

“Reset” : This button is on the terminal connection panel, when system program is out of working, press “Reset” to recover the program of system to the factory settings.

Advice regarding the installation of temperature sensors:

Only original factory equipped Pt1000 temperature sensors are approved for use with the collector, it is equipped with 1.5meter silicon cable and suitable for all weather conditions, the temperature sensor and

cable are temperature resistant up to 280°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 use with 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 0.75mm² cable should be used. When cable's length is up to 100m, and then 1.5mm² cable should be used.

Note: the connection of the pump and sensors depends on the chosen solar system, every port can only connect one cable, fine core cables should use wire end sleeves.

3. Commissioning



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

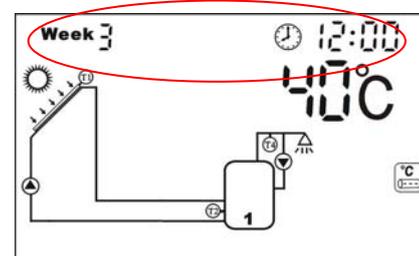
After switching on power to the controller, firstly it will ask for the "time" to be set and the correct "solar system" to be chosen.

3.1 Setting the Clock/ Week

After power is switched on, "week 1" "00:00" displays on LCD screen.

- ▶ Press "Clock/week" button, hour selection area "00" blinks on display screen.
- ▶ Press "▲" "▼" button to adjust hour of clock
- ▶ Press "Clock/week" button again, the minute selection area "00" blinks
- ▶ Press "▲" "▼" button to adjust minute of clock
- ▶ Press "Clock/week" button again, the week selection "week 1" blinks
- ▶ Press "▲" "▼" button to adjust week

After 6 seconds controller confirms the setting automatically, the current time and week are displayed on the screen.

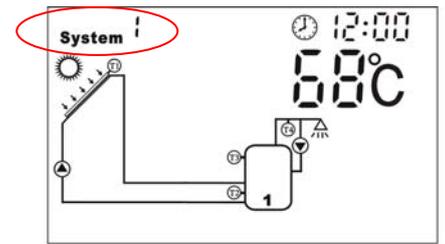


3.2 Choosing the solar system

The first solar system displays on the screen, the default setting is System 1.

- ▶ Press “OK” button for 3 minutes, “System 1” blinks on the screen.
- ▶ Press “▲” select system. 8 systems are available to be chosen (System 1-8).

After 6 seconds controller confirms the setting.



3.3 Operation switch

Manual mode: when operating the device first time, or when testing the function, the outputs of controller can be operated manually. To do like the following steps:

- ▶ Press “Temperature set” button for 3 seconds; the temperature difference controlled circulation pump is triggered.
- ▶ Press “Temperature set” button again, shut off this output.
- ▶ Press “ Timing Cyc” button for 3 seconds, the hot water circulation pump is triggered.
- ▶ Press “ Timing Cyc” button again, shut off this output.
- ▶ Press “ Timing Heating” button for 3 seconds, the auxiliary electricity heating or gas, oil boiler is triggered.
- ▶ Press “ Timing Heating ” button again, shut off this output

3.4 Temperature query function

- ▶ Press “→” button to check the temperature value of T0-T5 one by one. After 2 minutes, only temperature of tank is displayed automatically on screen.

4. Device setup

4.1 Clock/Week display

- ▶ Press “Clock/week” button, the hour selection area “00” blinks on display screen.
- ▶ Press “▲”“▼” button to adjust hour of clock
- ▶ Press “Clock/week” button again, the minute selection area “00” blinks
- ▶ Press “▲”“▼” button to adjust minute of clock
- ▶ Press “Clock/week” button again, the week selection “week 1” blinks
- ▶ Press “▲”“▼” button to adjust week

After 6 seconds controller confirms the setting automatically, the current time and week are displayed on the screen.

4.2 Chosen systems

- ▶ Press “OK” button for 3 seconds, “System 1” blinks on the screen.
 - ▶ Press “▲” select system. Total 8 systems are available to be chosen. (System 1-8)
- After 6 seconds controller confirms the setting.

4.3 System 1

1 collector array – 1 storage tank – 1 pump

Description:

The solar circuit pump (P1) is switched on as soon as the switch-on temperature difference 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, or the storage tank (T2) reaches the maximum storage temperature, then the solar circuit pump is switched off.

T1: Temperature sensor for collector 1

T2: Temperature sensor in the bottom part of tank 1.

T3: Temperature sensor in the top part of tank (for control auxiliary heating)

T4: Temperature sensor on hot water pipe

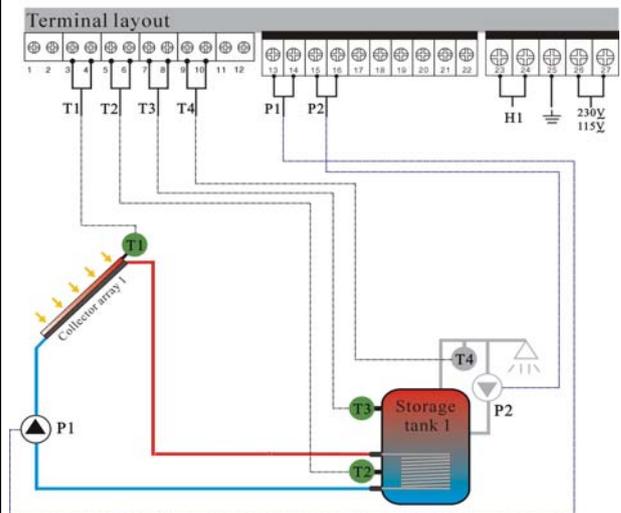
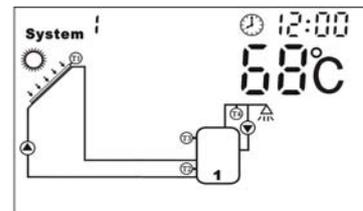
P1: Solar circuit pump 1

P2: Hot water circuit pump

Note:

- H1 is connected with auxiliary heating, suitable for system 1 – 8.
- T3, T4, P2 are suitable for system 1-8
- T3 is alternative, when no sensor (T3) is installed in the top part of sensor, controller will use the signal of sensor T2 automatically to control the auxiliary heating.

System 1 display



4.4 System 2

1 collector array – 2 storage tanks – 2 pump

Description:

If the switch – on temperature difference between the collector array (T1) and one of the two storage tanks (T2, or T5) is exceeded, then the appropriate solar circuit pump (P1) or (P0) is switched on. According to the priority switching, both storage tanks (T2, T5) are loaded one after the other, until either the relevant switch-off temperature difference between the collector array (T1) and storage tank (T2, T5) falls below the threshold, or the maximum storage temperature is reached.

T1: Temperature sensor for collector 1

T2: Temperature sensor in the bottom part of tank 1

T5: Temperature sensor in the tank 2

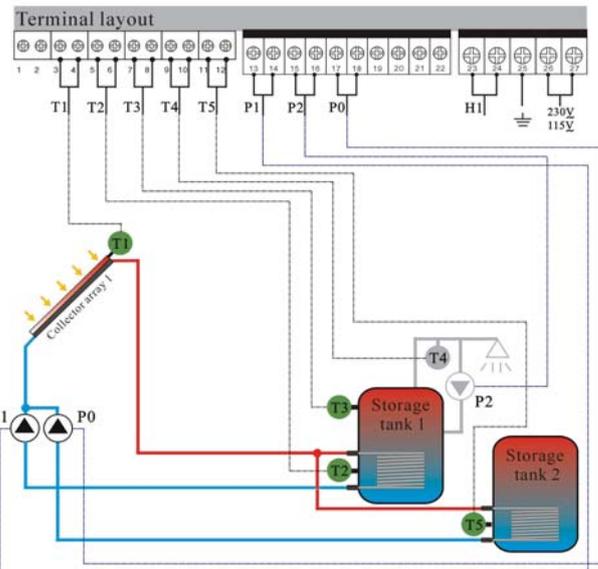
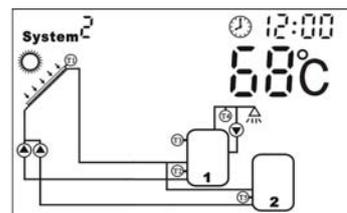
T4: Temperature sensor on hot water pipe

P1: Solar circuit pump 1

P0: Solar circuit pump 2

Note: the default priority tank is tank 1.

System 2 display



4.5 System 3

1 collector array – 2 storage tanks – 1 pump- 1 valve

Description:

If the switch – on temperature difference between the collector array (T1) and one of the two storage tanks (T2, T5) is exceeded, then the solar circuit pump (P1) is switched on and the switching valve (R1) is set to the correct position depending on the storage tank to be loaded. According to the priority switching, both storage tanks (T2, T5) are loaded one after the other, until either the relevant switch-off temperature difference between the collector array (T1) and two storage tanks (T2, T5) falls below the threshold, or the maximum storage temperature of T2 or T5 is reached.

T1: Temperature sensor for collector 1

T2: Temperature sensor in the bottom part of tank 1

T5: Temperature sensor in the tank 2

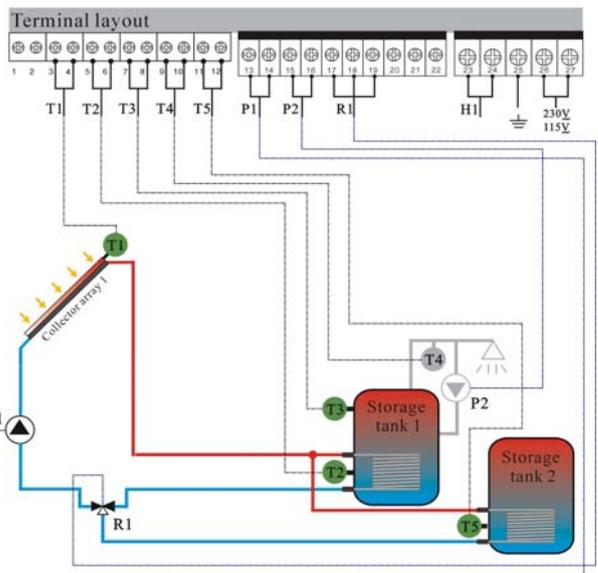
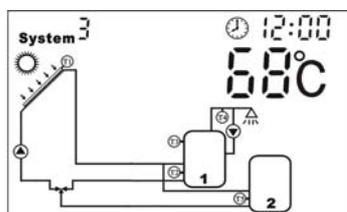
P1: Solar circuit pump 1

R1: 3-way switching valve (Ports 17,18 are shut off, Ports 17,19 are turned on)

Note: When no voltage is on the system, the switching valve (R1) must be set to storage tank 1(T2)

• The default priority tank is tank 1.

System 3 display



4.6 System 4

2 collector arrays(east/west roof) – 1 storage tank – 2 pumps

Description:

If the switch – on temperature difference between the storage tank (T2) and one or the other of the collector array (T1,T0) is reached, then the solar circuit pump (P1) for collector array 1 (T1) or solar circuit pump (P0) for collector array 2 (T0) is switched on, depending on where the temperature difference occurs. If the switch-on temperature difference is reached for both collector arrays (T1, T0), then both pumps (P1, P0) are switched on. The pumps switch off independently of each other. When either the relevant switch off temperature difference between one or both of collector arrays (T1, T0) and the storage tank (T2) falls below the threshold, or the maximum storage temperature is reached, and then the corresponding circuit pump is switched off.

T1: Temperature sensor for collector 1

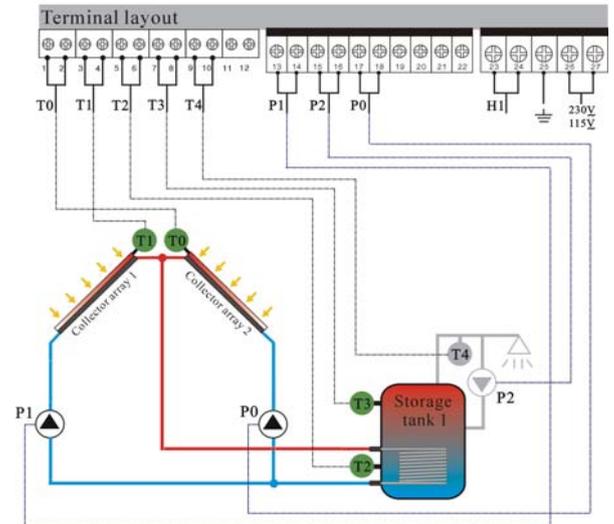
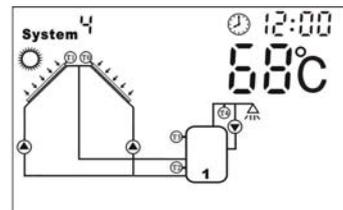
T0: Temperature sensor for collector 2

T2: Temperature sensor in the bottom part of tank 1

P1: Solar circuit pump 1

P0: Solar circuit pump 2

System 4 display



4.7 System 5

2 collector arrays(east/west roof) – 1 storage tank – 1 pump – 1 valve

Description:

The solar circuit pump (P1) is switched on as soon as the switch – on temperature difference between one of the two collector arrays (T1, T0) and storage tank 1(T2) is exceeded, the switch valve R1 is always set so that flow occurs through the warmer of the two collector arrays (T1, T2). The pump P1 switches off as soon as the switch-off temperature difference between the two collector arrays (T1, T0) and the storage tank (T2) falls below the threshold or the maximum storage temperature is reached.

T1: Temperature sensor for collector 1

T0: Temperature sensor for collector 2

T2: Temperature sensor in the bottom part of tank 1

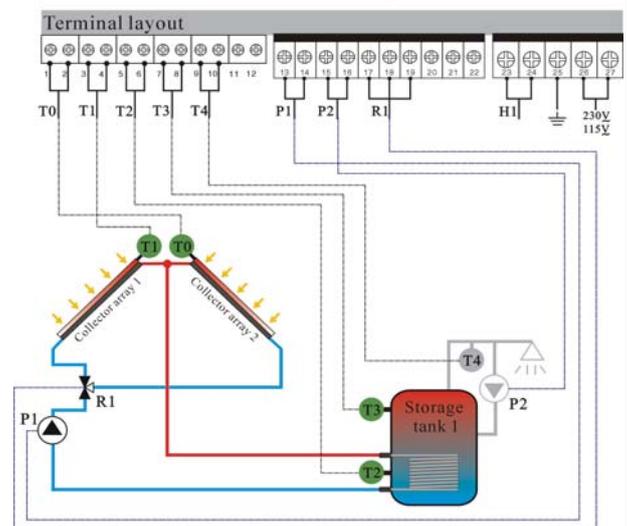
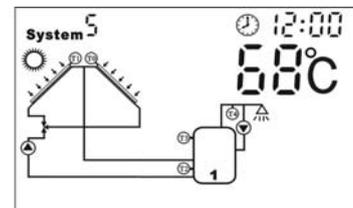
P1: Solar circuit pump 1

R1: 3-way switching valve (Ports 17,18 are shut off, Ports 17,19 are turned on)

Note:

When no voltage is on the system, the switching valve (R1)

System 5 display



must be set to collector array 1 (T1)

4.8 System 6

Valve-controlled 2 collector arrays (east/west roof) – 2 storage tanks – 1 pump – 2 valves

Description

If the switch-on temperature difference between one of the two tanks (T2, T5) and collector array1 (T1) or collector array 2 (T0) is exceeded, then the solar circuit pump (P1) is switched on, switching valve (R1) switches the relevant tank into the solar circuit, and switching valve (R2) switches the affected collector array (T1 or T2) into the solar circuit also. Switching valve 1 (R1) is always set so that flow occurs through the warmer of the two collector arrays (T1, T0). Switching valve 2 (R2) controls the loading of the storage tanks (T2, T5) according to the priority switching. Pump (P1) switches off when the switch-off temperature difference between either or both collector arrays and its corresponding storage tank1 (T2) and storage tank 2(T5) falls below the threshold or the maximum storage temperature (T2 or T5) is reached.

T1: Temperature sensor for collector 1

T0: Temperature sensor for collector 2

T2: Temperature sensor in the bottom part of tank 1

T5: Temperature sensor in the bottom part of tank 2

P1: Solar circuit pump 1

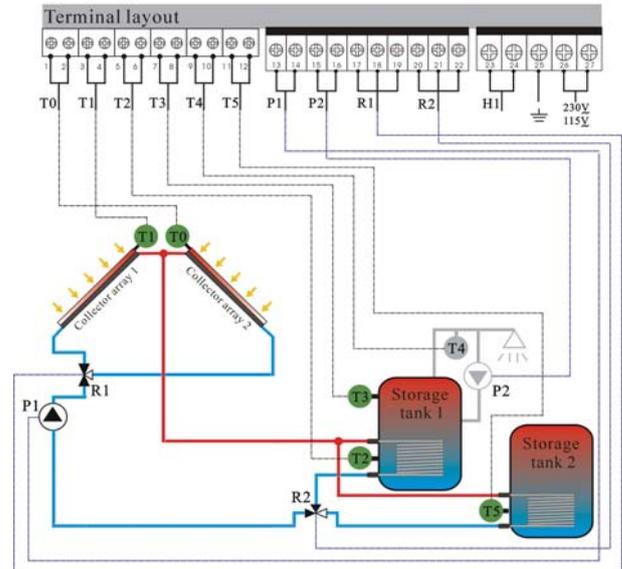
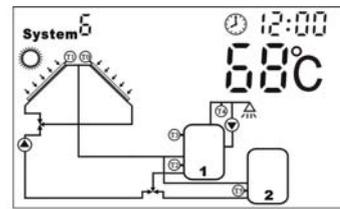
R1: 3-way switching valve 1 (Ports 17,18 are shut off, Ports 17,19 are turned on)

R2: 3-way switching valve 2 (Ports 20,21 are shut off, Ports 20,22 are turned on)

Note:

- When no voltage is on the system, the switching valve 2 (R2) must be set to tank 1 (T2), the switching valve 1 (R1) must be set to collector array 1(T1)
- Default priority tank is tank 1(T1)

System 6 display



4.9 System 7

Valve-controlled 2 collector arrays (east/west roof) – 2 storage tanks – 2 pumps – 1 valve

Description:

If the switch-on temperature difference between one of the two tanks (T2, T5) and collector array 1(T1) or collector array 2 (T0) is exceeded, then the switching valve R2 switched the corresponding collector array (T1 or T0) into the solar circuit. Depending on which storage tank has reached the switch-on temperature, solar circuit pump (P1) for storage tank 1 (T2) or solar circuit pump (P0) for storage tank 2 (T5) is switched on. The switching valve R2 is always set so that flow occurs through the warmer of the two collector arrays. Both storage tanks (T2, T5) are loaded one after the other, according to the priority switching, until either the relevant switch-off temperature difference falls below the threshold, or the maximum storage temperature(T2 or T5) is reached.

T1: Temperature sensor for collector 1

T0: Temperature sensor for collector 2

T2: Temperature sensor in the bottom part of tank 1

T5: Temperature sensor in the bottom part of tank 2

P1: Solar circuit pump 1

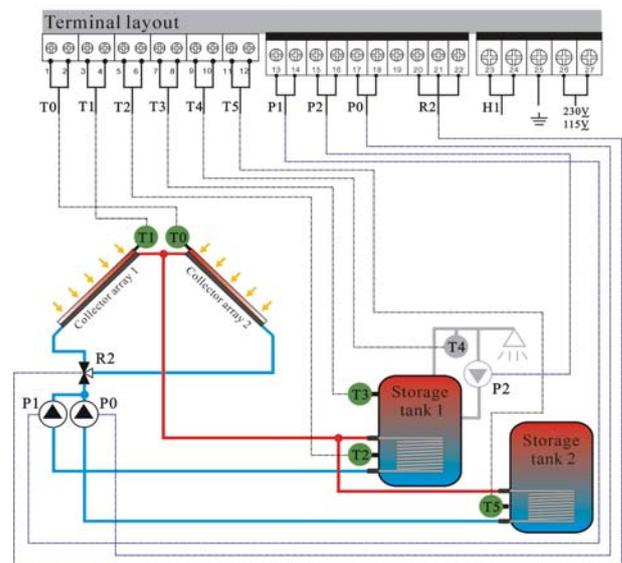
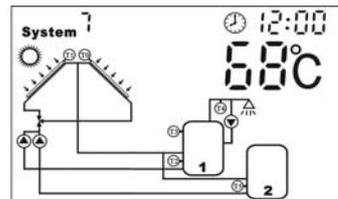
P0: Solar circuit pump 2

R2: 3-way switching valve 1 (Ports 20,21 are shut off, Ports 20,22 are turned on)

Note:

- When no voltage is on the system, the switching valve (R2) must be set to collector array 1(T1)
- Default priority tank is tank 1(T1)

System 7 display



4.10 System 8

pump controlled 2 collector arrays(east/west roof) – 2 storage tanks – 2 pumps – 1 valve

Description:

If the switch-on temperature difference between one of the two tanks (T2, T5) and collector array1 (T1) and collector array 2 (T0) is exceeded, then the switching valve (R2) switches the relevant storage tank (T2, or T5) into the solar circuit. If the switch-on temperature difference between the storage tanks (T2, T5) and one of the collector arrays (T1, T0) is reached, then either solar circuit pump P1 for collector array1 (T1) , or solar circuit pump P0 for collector array(T0) is switched on, depending on where the temperature difference occurs. If the switch-on temperature difference is reached for both collector arrays (T1, T0), then both pumps (P1, P0) are switched on. The switching valve (R2) controls the loading of the storage tank (T2, t5) according to the priority switching. The pumps (P1, P0) switch off independently of each other, when either the relevant switch-off temperature for one or both of the collector arrays (T1, T0) with regard to the storage tanks (T3 or T4) falls below the threshold, or the maximum storage temperature is reached.

T1: Temperature sensor for collector 1

T0: Temperature sensor for collector 2

T2: Temperature sensor in the bottom part of tank 1

T5: Temperature sensor in the bottom part of tank 2

P1: Solar circuit pump 1

P0: Solar circuit pump 2

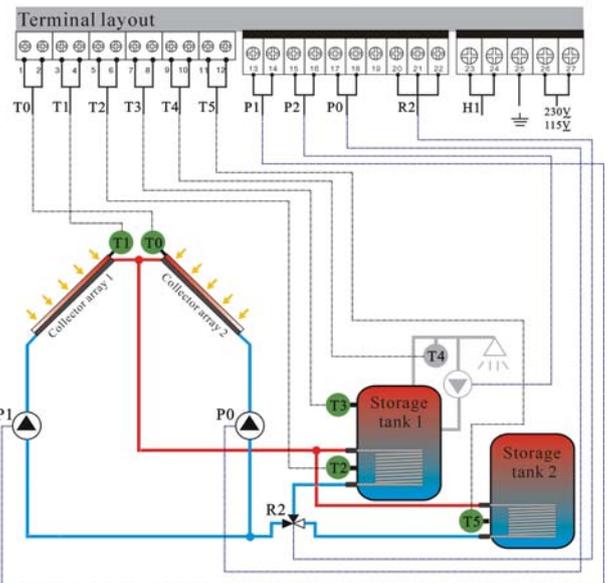
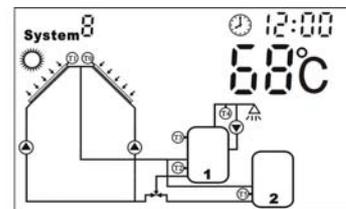
R2: 3-way switching valve 1 (Ports 20,21 are shut off, Ports 20,22 are turned on)

Note:

- When no voltage is on the system, the switching valve (R2) must be set to collector array 1(T1)

Default priority tank is tank 1(T1)

System 8 display



4.11 On/off of temperature difference controlling function

Functional description:

Solar circuit pump P1 is triggered by temperature difference function, so long as the preset temperature difference between collector and tank is reached, solar pump is switched on.

When there are two tanks or two collector arrays, controller will compare the temperature between one tank and one collector, one extra number indicates the correspondingly tank or collector.

For example: when we set the switch-on temperature difference is 8 °C, the switch-off temperature difference is 4°C, and the temperature in bottom part of tank is 20°C, in this case, when the collector temperature reaches 28°C, pump is triggered, when collector temperature falls below 24°C, pump stops.

Important information: the switch-on temperature difference 8°C and the switch-off temperature 4°C are standard system setting according to many years' experiences. Only in special application cases it is possible to change (e.g. far distance heat transferring), switch-on and switch-off temperature difference 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 steps:

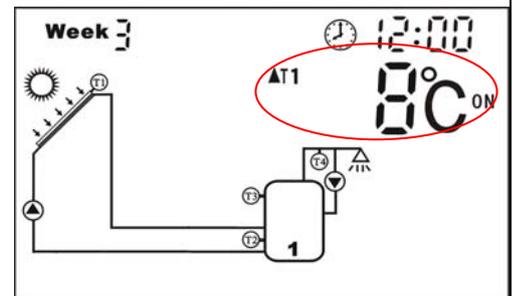
▶: Press “Temperature difference” button, switch-on delta T setting area blinks.

▶: Press “▲”“▼” button to adjust switch-on temperature difference, adjustable range: (OFF + 2°C) ~ 20°C, default value is 8°C.

▶ Press “Temperature difference” button again, switch –off delta T blinks

▶: Press “▲”“▼” button to adjust switch-off temperature difference, adjustable range: 0°C ~ (On-2°C), default value is 4°C.

After 6 seconds, controller confirms the setting.



4.12 Maximum tank temperature (protection of tank at high temperature)

Functional description:

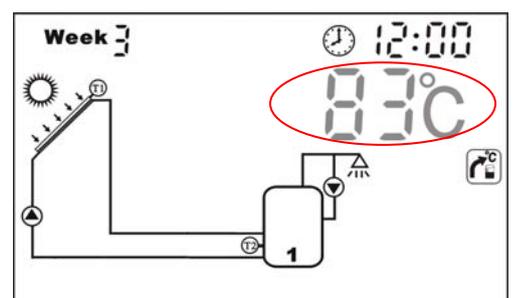
To avoid the temperature in tank is too high; controller will start its maximal tank temperature protection function. Controller checks the temperature which getting from bottom part of tank and compares it with turning-on and turning-off temperature of this function, when the temperature is higher than the turning-on temperature, solar circuit pump is stopped, when the temperature is lower than tuning-off temperature, solar circuit pump is triggered automatically. When the temperature of tank is higher than the maximum tank temperature, even the condition of temperature difference circulation is reached, solar pump is still forbidden to trigger.

Activate/deactivate this function:

▶ Press “Temperature set” button 2 times, the maximum tank temperature setting area blinks, default setting is 90°C.

▶ Press “▲”“▼” button to adjust the maximum tank temperature (adjustable range: 50°C – 95°C). After 6 seconds, controller confirms the setting automatically.

▶ In the status of setting maximum tank temperature, press “OK” button to deactivate this function, displays”----“





When signal of maximum tank temperature is displayed on screen, it indicates this function activated.

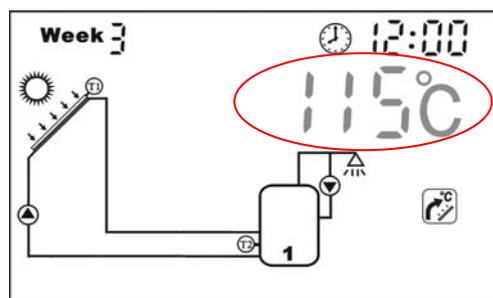
4.13 Maximum collector temperature (collector cooling function)

Functional description:

If the hot water in tank isn't used, temperature in solar circulation will rise automatically after long time sunshine, it is possible to avoid evaporating of heat transfer fluid by the restricted maximum collector temperature. The heat loss through the collector will increase with the rising of temperature of heat transfer liquid; this can be realized by the operation of solar circuit pump. . Through setting the maximal temperature of collector can realize the cooling of collector.

Activate/deactivate this function:

- ▶ Press "Temperature set" button 3 times, the maximum collector temperature setting area blinks, default setting is 115°C.
- ▶ Press "▲" "▼" button to adjust the maximum collector temperature (adjustable range: 100°C –140°C), after 6 seconds, controller confirms the setting automatically.
- ▶ In the status of setting collector maximum temperature, press "OK" button to deactivate this function, displays "-----"



When signal of maximum collector temperature is displayed on screen, it indicates this function activated.

4.14 Collector emergency cut-off

Functional description:

When the temperature of collector exceeds 130°C, in order to protect the other components of solar circuit, solar circuit pump is shut off compulsively. **Restart conditions: the temperature of collector drops below 100°C and tank temperature drops below the maximum tank temperature.**

4.15 Protection of collector at low temperature

Functional description:

When the temperature of collector is below 15°C, even when the temperature difference exceeds switch-on temperature difference, solar pump doesn't work.

When the temperature of collector is above 20°C, solar pump starts to work.

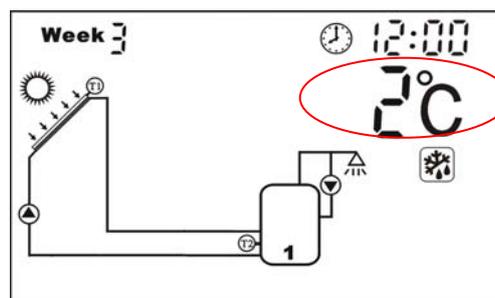
4.16 Collector frost protection

Functional description:

In Winter when the temperature of collector is below the preset frost protection temperature (2-15°C), electrical booster and solar pump starts work simultaneously. When the temperature of collector exceeds the switch-off temperature of frost protection, controller stops solar pump and electrical booster and exits the program.

Activate/deactivate this function:

- ▶ Press “temperature set” button 1 time, the frost protection setting area blinks; default setting of 2°C is displayed.
- ▶ Press “▲” “▼” button to adjust the switch-on temperature of frost protection, (adjustable range: 0°C –15°C), after 6 seconds, controller confirms the setting automatically.
- ▶ In the status of setting frost protection temperature, press “OK” button to deactivate this function, display “----”.



When the signal displays on screen, it indicates frost protection function is activated.

4.17 Temperature-controlled hot water circuit pump

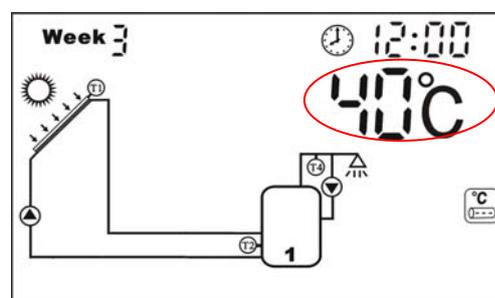
Functional description:

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

The default turning on temperature is 39°C; default turning off temperature is 45°C.

Activate/deactivate this function:

- ▶ Press “Temperature set” button 4 times, the hot water circulation temperature setting area blinks, default setting is “OFF” mode, “----”displays.
- ▶ Press “OK” button to activate this function.
- ▶ Press “▲” “▼” button to adjust the temperature of circulation pump, (adjustable range: 20°C –50°C), after 6 seconds, controller confirms the setting automatically.
- ▶ In the status of setting the temperature for circulation pump, press “OK” button to deactivate this function



Note: the position of the sensor T4 should be minimum 1.5m far from tank, so that avoid the measuring error.

4.18 Time-controlled hot water circuit pump

Function description:

Solar system can provide time-controlled hot water circulation function, this function needs a extra circulation pump (P2), this pump can be triggered by preset time. Within the preset time section pump operates for three minutes, and then stops for 15 minutes, same process continues so. Three time sections can be set within one day.

Setup steps:

▶ Press “ Timing Cyc” button, timing setting area blinks, to set the start time of circulation.

▶ Press “▲”“▼” button to adjust hour

▶ Press “←”、“→” transfer button to minute area

▶ Press “▲”“▼” button to adjust minute

▶ Press “ Timing Cyc” button again to set the end time of circulation

▶ Press “▲”“▼” button to adjust hour

▶ Press “←”、“→” transfer button to minute area

▶ Press “▲”“▼” button to adjust minute

• After 6 seconds, controller confirms setting automatically

• Doing like above steps. Within one day, three time sections can be set (1-3 displays on screen)

• If you want to shut off one timing circulation, then you set the turning on time and turning off time same value (for example, deactivate the function in the second time section, then you can set turning on/off time is 10:00 ~ 10:00)

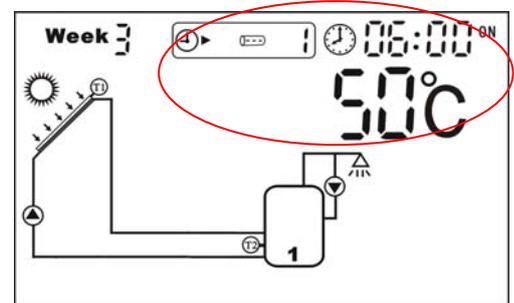
• Controller has memory function, the setting is remembered, don't need to set everyday.

• The setting can be checked by pressing “Timing Cyc” button after setting.

Manual operation:

Press “ Timing Cyc” button for 3 seconds, the hot water circuit pump is triggered。 If the time of this operation is happened at the preset time section, it works as normal situation, namely works for 3 minutes, then stops for 15 minutes, same process continues. If the time of this operation is not within the preset time section, it works for 3 minutes, and then it stops automatically.

At the status that hot water circuit pump is working, press “ Timing Cyc” again to stop pump immediately.



4.19 Temperature controlled auxiliary heating at preset time sections

Functional description:

Solar system can be combined with electrical booster or gas, oil boiler, controller can achieve automatically temperature and timing controlled heating, during the preset time sections electrical booster starts working when the temperature (T3) of top part of tank is below the preset turning on temperature, when T3 exceeds the preset turning off temperature, electrical booster stops heating.

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

Setup steps:

▶ Press “Timing heating” button, timing area blinks on display, you can set turning on time and temperature of electrical heating now,

▶ Press “▲”“▼” button to set hour,

▶ Press “←”、“→” button to shift to minute setting,

▶ Press “▲”“▼” to set minute.

▶ Press “←”、“→” again to shift to temperature area,

▶ Press “▲”“▼” to set turning on temperature of electrical heating.

▶ Press “Timing heating” button again, you can set turning off time and temperature of electrical heating

▶ press “▲”“▼” button to set hour,

▶ press “←”、“→” button to shift to minute setting,

▶ press “▲”“▼” to set minute.

▶ Press “←”、“→” again to shift to temperature setting,

▶ Press “▲”“▼” to set turning off temperature of electrical heating.

• 6 seconds later controller confirms the settings

• Doing like above described steps, three timing sections can be set.(1-3 displays)

• Default setting:

➢ First heating time section: 4:00 turning on, 5:00 turning off

➢ Second heating time section: not working, setting is 10:00 ~10:00

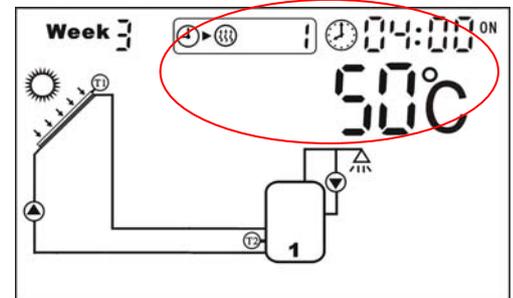
➢ Third heating time section: 17:00 turning on, 22:00 turning off

➢ Default turning on temperature of electrical booster is 50°C, turning off temperature is 55°C.

• If you want to shut off one timing heating, then you 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)

• Controller has memory function, your setting is remembered, and you don't need to set everyday.

• The setting can be checked by pressing “Timing heating” button.



Manual operation:

▶ Press “Timing heating” button for three seconds, electrical booster is triggered immediately, the corresponding signal is lighted,

▶ Press “timing heating” button again, electrical booster switches off immediately.



Note: when no temperature sensor (T3) is installed in the top part of tank or T3 is damaged, controller will take the signal from bottom temperature sensor (T2) automatically and thereof control auxiliary heating function.

When this signal displays on screen, it indicates the function activated.

4.20 Holiday function

Function description:

This function activates nightly storage tank back cooling and prevents high thermal loads of the solar system due to completely heated storage tank. The function is activated when the collector temperature falls 8K below the storage tank temperature at night between 10 pm and 6 am,.

Activate this function if:

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

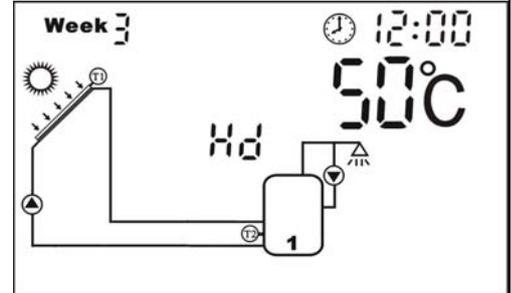
The function is deactivated when the temperature in lower section of storage tank falls down to 35°C.

Activating/deactivating the function

- ▶ Press “Holiday” button for 3 seconds, “Hd” blinks on display screen, it indicates the function is active
- ▶ Press “Holiday” button for 3 seconds again, “Hd” hides, the function is deactivated.

Note:

- In the case of multi-storage tank systems, only storage tank 1 is used for storage tank back cooling.
- This function is only activated when you are not at home for long time, when you come back, please make sure to deactivate it.



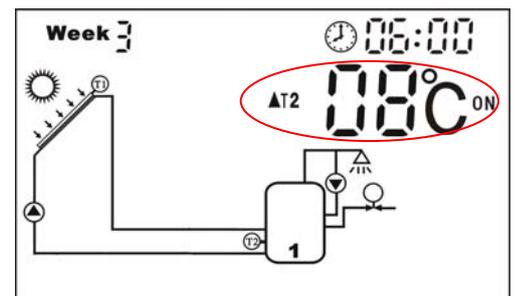
4.21 Auxiliary function

Note: the following described functions need an extra output port R2 to control pump or electromagnetic valve, when all outputs are occupied, the desired function can't be activated.

a. Temperature difference controlling ($\Delta T2$)

setup steps:

- ▶ Press “OK” button for 3 seconds, systems blinks
- ▶ Press “→” one time and chosen the symbol which displays on screen, chosen R2 temperature difference controlled output.
- ▶ Press “OK” to confirm setting, or 6 seconds later controller confirms setting automatically



This function allows through temperature difference (sensor T0 and T5) to control a output port R2, it is used to control additional space heating or circulation.

- ▶ Press “Temperature difference” button three times, “ $\Delta T2$ ON” displays on screen.
- ▶ Press “▲”“▼” button to adjust switch-on temperature difference, adjustable range: (OFF+2°C) ~ 20°C, default is 8°C.
- ▶ Press “Temperature difference” button again, “ $\Delta T2$ OFF” displays on screen.
- ▶ Press “▲”“▼” button to adjust switch-off temperature difference, adjustable range: 0°C ~ (ON-2°C), default is 4°C.

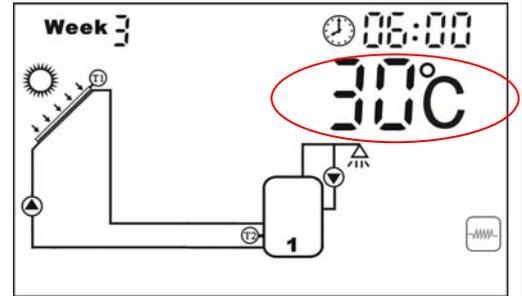
6 seconds later, controller confirms setting automatically.

b. Heating return increase

Function description:

This function allows temperature –dependent control of a switching valve for increasing the return temperature of the heating circuit.

If the temperature difference between the solar storage tank and the heating return rises above the “on” value, then the switching valves is controlled so that the heating return flows through the solar storage tank. By this way, the solar heat from the storage tank can be used in the heating circuit. If the temperature difference falls below the “off” value, then the switching valve switches the heating return back to the back-up heating system.



Setup steps:

- ▶ Press “OK” button for 3 seconds, “Systems” blinks.
- ▶ Press “→” two times, return circuit symbol displays on screen, chosen heating return circuit.
- ▶ Press “OK” to confirm setting, or 6 seconds later controller confirms setting automatically

This function allows through temperature difference (sensor T0 and T2) to control a output port R2, it is used to control additional space heating or circulation.

- ▶ Press “Temperature difference” button three times, “ Δ T2 ON” displays on screen.
- ▶ Press “▲”“▼” button to adjust switch-on temperature difference, adjustable range: (OFF+2°C) ~ 20°C, default is 8°C.
- ▶ Press “Temperature difference” button again, “ Δ T2 OFF” displays on screen.
- ▶ Press “▲”“▼” button to adjust switch-off temperature difference, adjustable range: 0°C ~ (ON-2°C), default is 4°C.

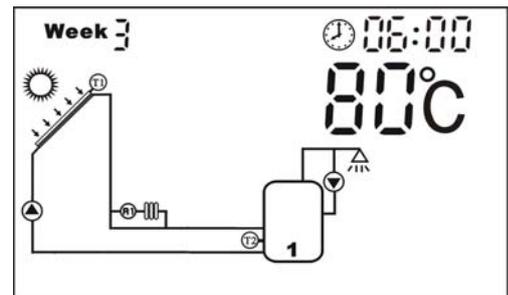
6 seconds later, controller confirms setting automatically

c. High temperature by-pass

Function description:

This function allows reducing the temperature in tank by using radiator, if the temperature in tank is too high, this function is triggered.

- ▶ Press “OK” button for 3 seconds, “Systems” blinks.
- ▶ Press “→” three times, by-pass symbol displays on screen, chosen high temperature by-pass
- ▶ press “▲”“▼” to adjust the switch-on temperature (T2) for high temperature by-pass. Adjustable range: 50°C ~ 99°C.
- ▶ Press “OK” to confirm setting, or 6 seconds later controller confirms setting automatically



4.22 Auto function

- ▶ Press “ Auto” button, all values of system parameters are set to the factory settings.

4.23 Protection function

a. memory protection when power is failure

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

b. anti-bacteria protection

in order not to effect the health of customer and to prevent to occur bacteria when tank temperature 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 70oC during the period, then at the default time of 23:00 on the seventh day of the period auxiliary heating system is triggered automatically, when the temperature rises to 70oC, the auxiliary heating stops, bacteria is killed.

c. anti- dry heating protection

In case that no enough water is in tank when electrical heating is in operation, in order to avoid the damage of electrical booster caused by dry heating, controller will start the anti-dry heating protection, “E1” displays on screen and controller switches off all outputs. In this case, it ought to switch off power supply, check and resolve the problems, and then switch on the power, controller restarts to work normally.

5. Trouble shooting

5.1 Trouble protection

a. When there is a break or short circuit between the connection of temperature sensors, controller switches off the corresponding functions and no more output signals are given, at the same time error indications are showed on the display.

b. Error messages indication

If control unit does not work correctly, please check following points, “warning” signal is displayed on screen. Error messages and handling indication (LCD display warning signal blinks)

Error message	meaning	Cause of error	Error rectification
T0  blinks	There is a break or short circuit between sensor connections	Sensor wiring interrupted, not connected or short circuit	Check resistance value, replace sensor if necessary
T1  blinks	There is a break or short circuit between sensor connections	Sensor wiring interrupted, not connected or short circuit	Check resistance value, replace sensor if necessary
T2  blinks	There is a break or short circuit between sensor connections	Sensor wiring interrupted, not connected or short circuit	Check resistance value, replace sensor if necessary
T3 “00”			
T4  blinks	There is a break or short circuit between sensor connections	Sensor wiring interrupted, not connected or short circuit	Check resistance value, replace sensor if necessary
T5  blinks	There is a break or short circuit between sensor connections	Sensor wiring interrupted, not connected or short circuit	Check resistance value, replace sensor if necessary

Note: when the error of sensor appears, its corresponding function will be switched off automatically.

5.2 Error checking

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

a. A potentially defective sensor can be checked using an ohmmeter. To do this, the sensor must be disconnected, its resistance measured, and the value compared with the figures in the table below, small deviation are acceptable, ([note: remove the device from the mains supply before opening the case](#))

PT1000 resistance value

oC	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

oC	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

b. Cause of failures

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	Check the controller power cable
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	The maximum storage tank temperature has been reached The maximum collector temperature has been reached.	No fault
	The pump symbol in the display doesn't blink, error message signal "T" blinks on the display screen. 	Fault (short circuit or open circuit) in a temperature sensor	On the controller, request the current values from all connected temperature sensors, replace all defective sensors and /or cabling.
The solar pumps operated, despite the fact that the switch-on conditions are not satisfied.	The pump symbol in the display blinks.	The holiday function is activated The frost protection function is activated.	No problem, it is normal. If necessary to deactivate the corresponding functions.

C. Guarantee

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

6. Technical data

- Appearance of controller: see product itself (dimension: 210mm x145mm x48mm)
 - Power supply: AC220V \pm 10%
 - Power consumption: < 3W
 - Accuracy of temperature measuring: \pm 2°C
 - Range of temperature measuring: 0 ~150 °C
 - Suitable power of pump: 4 pumps possible to be connected, power of each pump < 600W
 - Suitable power of electrical booster: standard \leq 2000W, selectable variant \leq 3000W (must be noted in order)
 - Inputs: 6 sensors,
Pt1000 sensor (\leq 500°C) for collector (silicon cable \leq 280°C),
NTC10K, B3950 sensor (\leq 135°C) for tank, (PVC cable \leq 105°C),
 - Outputs: 5 relays, one for electrical booster, 4 for circulation pumps or 3-way electromagnetic valve
 - Ambient temperature : -10°C ~ 50°C.
 - Water proof grade: IP40.
- Socket : choice by customer

Annex: parameters setting

Nr.	function	Factory settings	remark
1	Collector frost protection	on	See. Chapter 4. 16
2	Tank maximum temperature protection	on	See. Chapter 4. 12
3	Collector maximum temperature	on	See. Chapter 4. 13
4	Temperature controlled hot water circulation	off	See. Chapter 4. 17
5	System mode	system1	Available system mode 1~ 8
6	Temperature sensors T0: PT1000 T1: PT1000 T2: NTC 10K B3950 T3: NTC 10K B3950 T4: NTC 10K B3950 T5: NTC 10K B3950		T3:if T3 is not installed or is damaged, controller uses sensor T2 automatically.