

# System Controller for Solar Heating Model SRK868V6

## Installation and Operation Instructions



## Solar Controller Kit



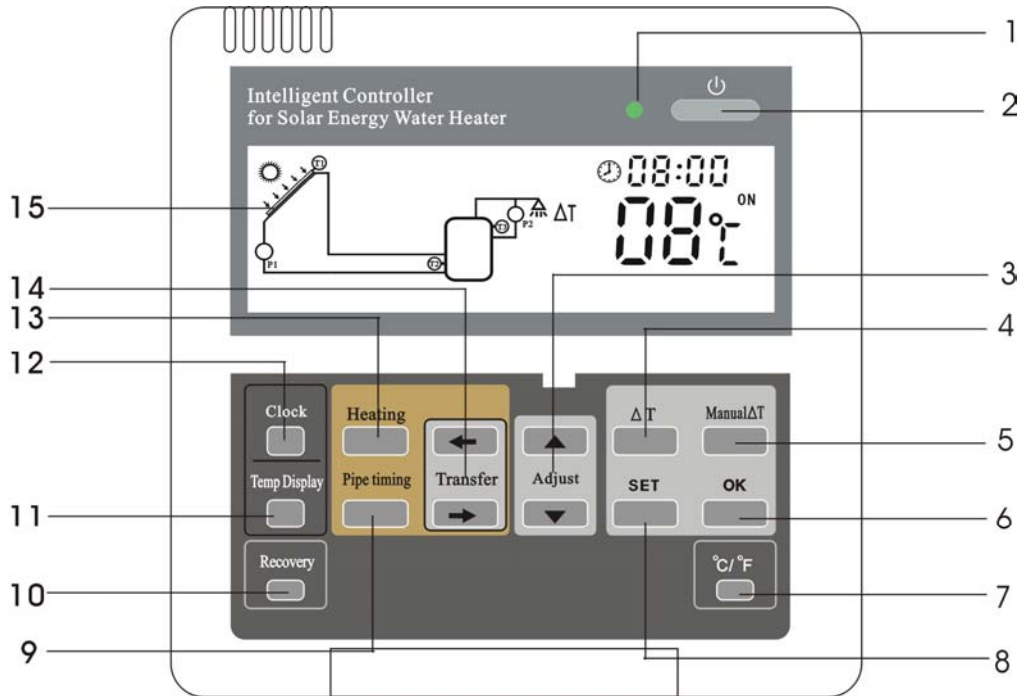
### Kit Contents:

Item	PCS	Description
1	1	Control Panel with LCD display and Control Key Pad
2	1	Power Module with Wiring Terminal strip
3	2	NTC Temp. Probes for Water Tank ( upper and lower )
4	1	NTC Temp. Probe for Hot Water Pipe ( Optional )
5	1	PT1000 Temp. Probe for Solar Panel
6	1	Mounting and wiring hardware
7	1	Installation and Operation Instructions manual

### Features:

- Suitable for most types of Solar Heating systems
- Internal real time Clock with backup
- 3 temperature sensor probes + 1 optional
- 1 Output for Solar panel circulating pump
- 1 Outputs for User Hot Water pipe circulating pump
- 1 High Power Output for water tank Booster Heating
- 1 Output for optional valve for overheat cooling
- Programmable Temperature Differential on the Solar Collector
- Programmable Water Tank Temperature and Time for the tank booster heating
- Programmable Time ( of day ) and Temp. for User Hot Water pipe circulation
- Programmable Tank overheat protection
- Programmable Solar Collector freeze protection with reheating
- Monitoring and display off all temperature sensors readings

## Control Panel



Item		Description
1	<b>Green lamp</b>	Supply Power ON indicator
2	<b>ON/OFF pushbutton</b>	Controller ON/OFF switch ( and special functions )
3	<b>“▲” “▼” Adjust</b>	Adjustment UP, DOWN buttons
4	<b>▲T</b>	Solar Temperature Difference preset mode
5	<b>Manual ▲T</b>	Manual ON/OFF switching of Solar circulating pump (P1)
6	<b>OK</b>	Activate / Deactivate selected function
7	<b>°C / °F</b>	Celsius / Fahrenheit selection
8	<b>SET</b>	Start of Programming modes or activation of special functions
9	<b>Pipe timing</b>	Timer Programming mode for Hot Water pipe circulating pump (P2)
10	<b>Recovery</b>	Reset the display to factory default settings
11	<b>Temp. Display</b>	Display the temperature readings
12	<b>Clock</b>	Set the Clock
13	<b>Heating</b>	Auto Time/Temperature Program and Manual control of Booster Heat
14	<b>“◀” “▶” Transfer</b>	Cursor control during preset
15	<b>Display screen</b>	LCD display with LED backlight

## INDEX

	<b>page</b>
<b>1. Safety information</b>	<b>5</b>
<b>2. Installation</b>	<b>6</b>
2.1 Control Panel installation	6
2.2 Power Module installation	6
2.2.1 Wall adaptor plate	6
2.2.2 Wiring	6
<b>3. System Setup and Operation</b>	<b>8</b>
3.1 ON /OFF button operation	8
3.2 Clock preset	8
3.3 Manual operation	9
3.4 Temperature display	9
3.5 System configuration examples	9
3.5.1 Configuration A	9
3.5.2 Configuration B	10
3.6 Differential Temperature control	10
3.7 Programmable, Temperature controlled heating booster	11
3.8 Time controlled user Hot Water circulation	12
3.9 Temperature controlled user Hot Water circulation	12
3.10 Anti Freeze protection	13
3.11 High temperature protection ( mode 1)	13
3.12 High temperature protection ( mode 2)	14
3.13 "°C/°F" button	14
3.14 System protection features	14
<b>4. Trouble shooting</b>	<b>15</b>
4.1 Error protection	15
4.2 Error messages	15
4.3 Preventing potential errors	15
<b>5. Specifications</b>	<b>17</b>

## 1. Safety information

- When laying cables, please ensure that no damage occurs to any of the safety installations in the building.
- The controller must not be installed in rooms with flammable gasses or materials.
- Make sure that the environmental conditions do not exceed the controller and other systems specifications.
- Before connecting the device, make sure that the Power Supply Line specifications match the controller.
- All devices connected to the controller must conform to the technical specifications of the controller.
- All installation must be performed ONLY when ALL POWER is disconnected. All local work and safety regulations must be followed. Wiring or any operations that require opening of electrical enclosures (e.g. even changing the fuse) should be performed by qualified personnel.
- Installation, electrical wiring, setup and maintenance of the device should be performed by trained, professional personnel familiar with this manual and should follow the instructions contained herein.

The manufacturer cannot monitor the compliance with these instructions or the circumstances and methods used during installation, operation and maintenance of this controller. Improper installation can cause damage to people and equipment. Therefore, the manufacturer and the retailer are not liable for any losses, damages or cost that might arise due to improper installation, operation or use and maintenance of the system.

If it becomes evident that safe operation is no longer possible (for instance visible damage), please make sure that the system is powered OFF and deactivated immediately.

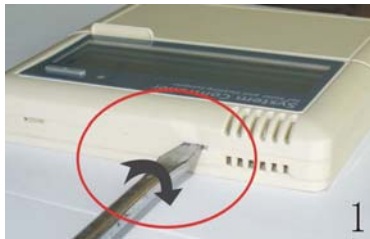
**Note:** Ensure that the device cannot be accidentally put into operation.

The manufacturer reserves the right to make changes to the product, technical specifications or installation and operation instructions without prior notice.

## 2. Installation

### 2.1 Control Panel Installation

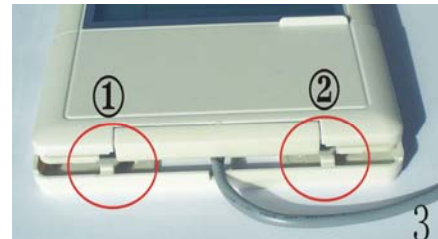
- ▶ Separate the back panel from the display using a screwdriver as shown in Pic. 1
- ▶ Fix the back panel on the wall using screws, see Pic. 2
- ▶ Reinsert the face of the display into the latches in the back panel, see Pic. 3



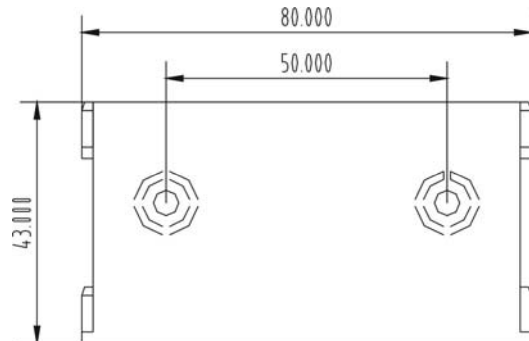
Pic. 1



Pic. 2



Pic. 3



### 2.2 Power Module Installation

#### 2.2.1 Wall adaptor plate

- ▶ Mark the holes position on the wall (Pic. 4)
- ▶ Install the anchors and fasten the adaptor plate with screws (Pic. 4)
- ▶ Hang the Power Module on the adaptor plate

#### 2.2.2 Wiring



**Disconnect ALL Power supply before opening the enclosure !**

**All guidelines and local safety regulations must be observed.**

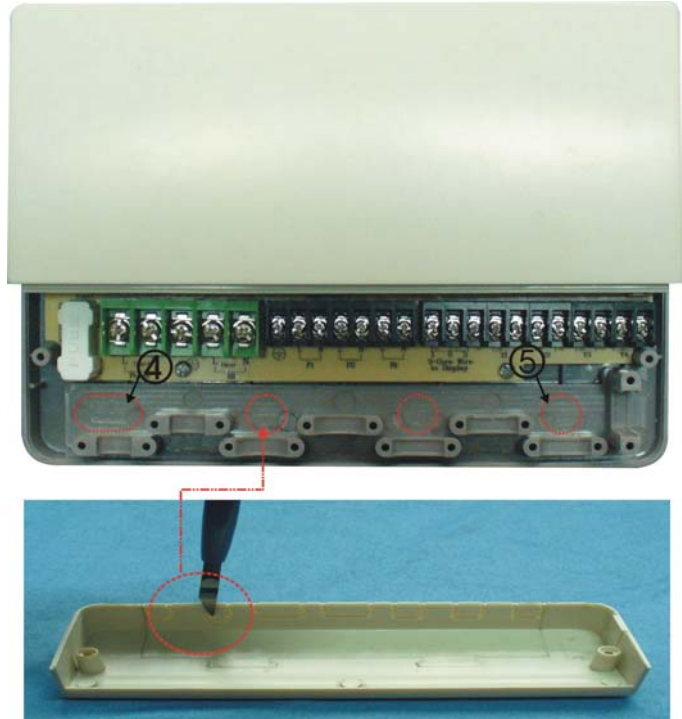
- ▶ To access the wiring compartment, loosen the screws (1,2) and remove the smaller terminal cover. ( Pic. 5 )



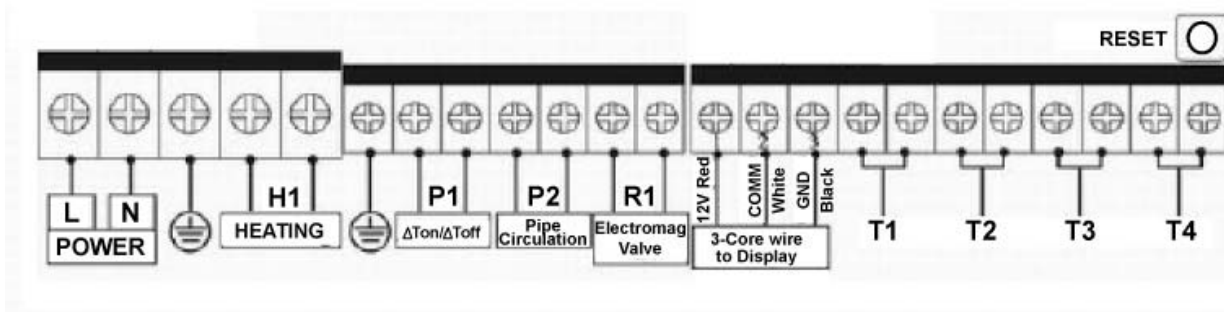
Pic. 5

**The Supply Power or the load power should ONLY be switched ON when the housing of the controller is CLOSED and secured. Make sure that the wiring and the enclosure are not damaged.**

If needed, the thin plastic tabs in the wall of the terminal compartment cover may be broken off to facilitate routing of the wires (See Pic. 6).



• **Wiring Terminals ( see Pic. 7)**



Pic. 7

Abbreviation	Function
T1	Solar Collector temperature sensor T1
T2	Tank temperature sensor T2, (Tank bottom)
T3	Tank temperature sensor T3 (Tank top)
T4	(Optional) User Hot Water pipe temperature sensor
3-core wire to Display	3-conductor cable Connection to Control Panel
Power	Power Supply Line
Heating	Output to control the Booster heating H1
▲Ton/▲Toff	To Solar circulating pump P1
Pipe circulation	To User Hot Water circulating pump P2
Electromagnetic Valve	To activate Tank high temperature protection valve (R1)

Inputs	Outputs	Power Supply connection
<ol style="list-style-type: none"> <li>Inputs <b>T1, T2</b> and <b>T3</b> (<b>T4 optional</b>) for temperature sensors wiring</li> <li>3-cond. cable connected to the Control Panel</li> </ol>	<ol style="list-style-type: none"> <li>Outputs <b>P1</b> and <b>P2</b>: electromagnetic relays max. Switching current: 5A</li> <li>Output <b>H1</b>: electromagnetic relay, max switching current 16A</li> <li>Output <b>R1</b>: electromagnetic relay, max switching current 5A</li> </ol>	<ol style="list-style-type: none"> <li>Make sure that the Power Line voltage is as specified for the controller model</li> </ol>

**System Reset:** This button is located above the screw terminals. Press to RESET the entire system to the factory settings.

**NOTE: Installation of the temperature sensors:**

Only the originally supplied Pt1000 temperature sensor should be used at the Solar collector. It has high temperature silicon jacketed cable that is suitable for all weather conditions. This temperature sensor and the cable can withstand temperatures up to +280°C (+536F). There is NO positive and negative polarity on the sensor connections.

Only the originally supplied NTC10K, B=3950 temperature sensors should be used at the tank and hot water pipe locations. They have PVC jacketed cable, that is temperature resistant up to +105°C (+221F). There is NO positive or negative polarity on the sensors connections.

All sensor cables carry low voltage, and must not be laid close to any high voltage wiring like 120, 230 or 400-volt wiring. A minimum separation of at least 100 mm (4") is required.

If external electromagnetic fields are present, e.g. from heavy current cables, overhead train cables, transformer substations, radio and transmitters, radio stations, microwave devices etc, then the sensor cables may have to be adequately shielded.

The Sensor cables may be extended to a maximum length of appx. 100 meters ( 300 feet ). The longer the cable, the heavier (thicker) the cable gauge should be used.

### 3. System Setup and Operation



Remember to connect the sensors and the pumps to the controller before connecting the Power supply !  
After switching on the power to the controller, first set the controller "clock".

**Note, that the control panel LCD display has a back light that can turn itself off after appx. 30 minutes of not using any pushbuttons. The backlight will be reactivated immediately upon pressing of any button on the panel.**

#### 3.1 ON / OFF button operation

▶ Press and hold the "ON/OFF" button for 3 seconds. The entire controller will be deactivated but the tank temperature (T2) and current time ( clock ) will remain displayed on the screen.

When the "ON/OFF" button is pressed again, the controller will be reactivated.

#### 3.2 Clock preset

After power is switched on for the first time, the display will show the clock time as: "00:00".

- ▶ Press the "Clock" button. The clock hours will flash
- ▶ Press "▲" "▼" buttons to set the current hour.
- ▶ Press the "Clock" button again. The clock minutes will flash
- ▶ Press "▲" "▼" buttons to set the current minutes.

After 6 seconds the controller will store the setting automatically.



### 3.3 Manual operation

When powering up the controller for the first time, or during testing, the outputs of the controller may be operated manually as follows:

- **Manual operation of the Solar Panel Pump (P1)**

- ▶ Press the “**Manual ▲T**” button. The solar circulation pump (P1) will be switched ON. The display will indicate this status.
- ▶ Press the “**Manual ▲T**” button again. The solar circulation pump (P1) will be switched OFF or the program will deactivate it after 10 minutes automatically.

- **Manual operation of the Hot Water circulating pump (P2)**

- ▶ While the Supply Power is on, press the “**ON/OFF**” button to activate the hot water pipe circulation pump (P2). The display will indicate this status.
- ▶ Press the “**ON/OFF**” button again to shut-off this pump or the program will deactivate it after 3 minutes automatically.

- **Manual operation of the Heating booster (H1)**

- ▶ Press and hold the “**Heating**” button for 6 seconds. The booster heating output (H1) will be switched ON.
- ▶ Press the “**Heating**” button again to turn OFF this output immediately.

### 3.4 Temperature display

- ▶ Press the “**Temp. Display**” button repeatedly to review the current temperature readings for: the collector (T1), tank bottom (T2), tank top (T3) and the hot water pipe circulation sensor (T4). The temperature of the tank bottom sensor (T3) is displayed automatically when no operation is performed for at least 6 seconds.

### 3.5 System configuration examples

#### 3.5.1 Configuration A: 1 Collector array + 1 Storage tank + 1 Pump ( with 1 Sensor in the water tank )

##### Description:

The solar pump (P1) is turned ON when the switch-ON temperature difference between the collector array (T1) and the storage tank (T2) is reached. When the temperature difference between the collector array (T1) and the storage tank (T2) drops below the switch-OFF temperature difference, the solar pump (P1) is turned OFF.

T1: Temperature sensor in the solar collector

T2: Temperature sensor in the bottom part of tank (for solar circulation and optional heating booster control).

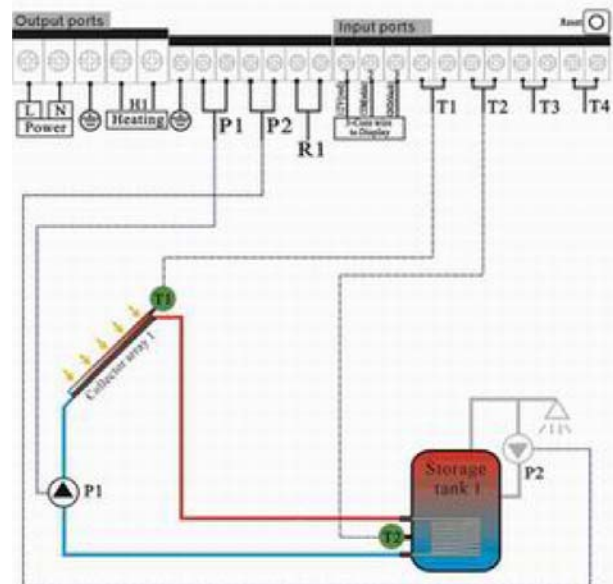
P1: Solar circulating pump

P2: ( Optional ) User hot water circulating pump

##### Notes:

H1: Terminals for connecting to the optional tank heating booster.

T4: Optional temperature sensor of the user hot water.



### 3.5.2 Configuration B: 1 Collector array + 1 Storage tank + 1 Pump ( with 2 Sensors in the water tank )

#### Description:

The solar pump (P1) is activated when the switch-ON temperature difference between the collector array (T1) and the storage tank (T2) is reached. When the temperature difference between the collector array (T1) and the storage tank (T2) drops below the switch-OFF temperature difference, the solar pump (P1) is turned OFF.

T1: Temperature sensor in the solar collector

T2: Temperature sensor in the bottom part of the tank (for solar circulation).

T3: Temperature sensor in the top part of the tank (for optional heating booster).

P1: Solar circulating pump.

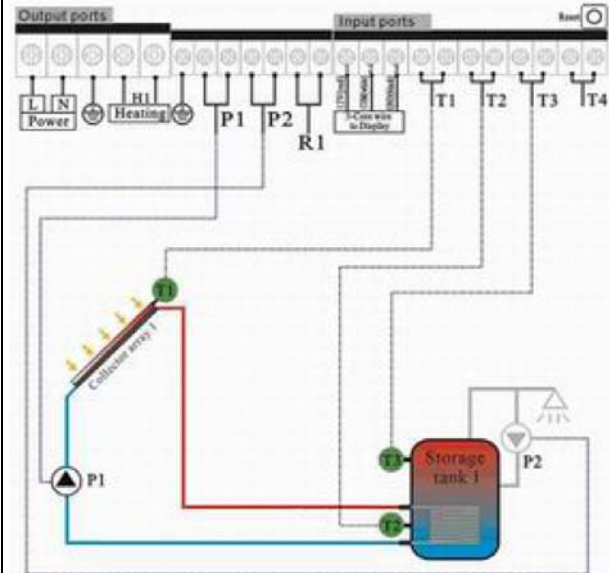
P2: ( Optional ) User hot water circulating pump.

#### Notes:

H1: Terminals for connecting to the optional tank heating booster.

T4: Optional temperature sensor of the user hot water pipe.

T3: If the sensor T3 is damaged or not installed, the controller will use the signal from the sensor T2 instead, for the control of the heating booster.



## 3.6 Differential Temperature control

#### Functional description:

The Solar panel pump P1 is controlled by the temperature difference. As long as the temperature difference between the collector and the tank is higher than the preset value, this pump remains ON.

For example: If the switch-ON temperature difference is set to 8°C (14F), and the switch-OFF temperature difference is 4°C (7F), then for instance:

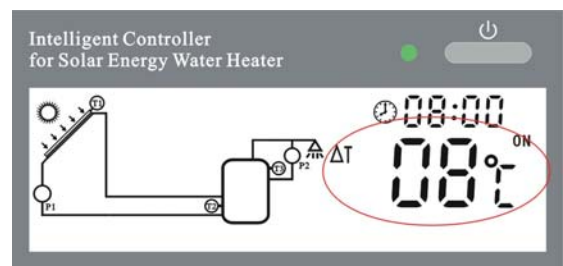
When the temperature in the bottom part of the tank is +20°C (+68F), the collector temperature must rise above +28°C (+82F) to turn ON the pump P1, and the pump will be switched OFF when the temperature falls below +24°C (+75F).

**Important information:** The controller default switch-ON temperature difference is set to 8°C (14F) and the switch-OFF difference is set to 4°C (7F). These are usual standard solar system recommended settings. They should be altered only in special applications like for instance in very large systems.

**Note:** To prevent errors, the controller minimum differential ( $\Delta T_{on} - \Delta T_{off}$ ) is limited to 2°C ( 4F ).

#### Setup procedure:

- ▶ Press the “▲T” button. The temperature display will flash.
- ▶ Press “▲” “▼” button to adjust the switch-ON temperature difference. Adjustable range: 2°C to 15°C (4F to 27F). The default value = 8°C (14F).
- ▶ Press the “▲T” button again.
- ▶ Press “▲” “▼” button to adjust the switch-OFF temperature difference. Adjustment range: 0°C (0F) to [▲T - 2°C (4F)]. The default value = 4°C (7F). After 6 seconds, the controller will lock-in the setting.

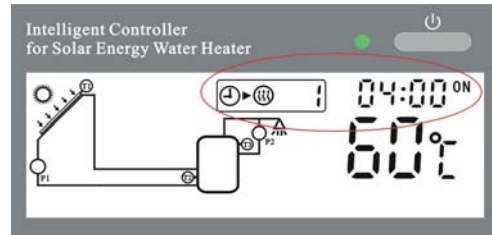


### 3.7 Programmable, Temperature controlled Heating Booster for UP TO 3 periods per day

The solar controller can be combined with an optional heating booster that can automatically control the tank water temperature during the time periods for heating. During these ( up to ) 3 programmed periods of the day the heating booster output (H1) is activated when the temperature (T3), usually located at the top part of the tank, is 6°C (11F) below the programmed switch-OFF temperature. When T3 exceeds or equals the preset temperature, this output is turned OFF.

#### Setup steps:

- ▶ Press the “**Heating**” button. The time will flash.
- ▶ Press “▲” “▼” button to set the ON hours
- ▶ Press “←”、“→” button to shift to the ON minutes
- ▶ Press “▲” “▼” to set the minutes
- ▶ Press “←”、“→” again to shift to the OFF temperature preset
- ▶ Press “▲” “▼” to set the OFF temperature value
- ▶ Press “**Heating**” button again to set the OFF time
- ▶ Press “▲” “▼” button to set the OFF hours
- ▶ Press “←”、“→” button to shift to the OFF minutes
- ▶ Press “▲” “▼” to set the minutes



- After 6 seconds, the controller will lock-in the settings.
- Repeat the above steps three times for the 3 different periods per day. The number (1-3) on the display will indicate the time period being preset.

#### • Default settings:

- 1-st heating period: From 4:00 AM (ON) till 5:00 AM (OFF)
- 2-nd heating period: the booster is deactivated. The settings are 10:00 AM (ON) till 10:00 AM (OFF)
- 3-rd heating period: 5:00 PM (ON) till 10:00 PM (OFF)

NOTE: The Default OFF temperature for the booster is 55°C (131F).

#### NOTES:

- To turn OFF the heating booster for one of the 3 periods, set the ON (start) time and the OFF (stop) time to the same time.
- Pressing the “Heating” button will display the programmed settings.

#### MANUAL operation:

To turn ON the booster heating (H1) manually, press the “**HEATING**” button 3 times while the temperature T3 is lower than +50°C (+131F).

To turn OFF the heating manually, press the button again once.

The booster heating control output will be automatically switched OFF when the temperature (T3) reaches +55°C (+131F).



**HEAT**

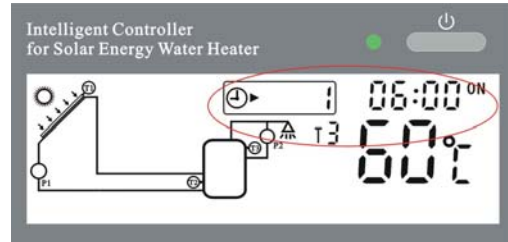
Note: The heating booster output (H1) is active when this symbol is shown on the display.

### 3.8 Time controlled user Hot Water circulation for UP TO 3 periods per day

The controller can be programmed for up to 3 periods of each day to activate the P2 output that can be used to control a pump to circulate the hot water in the user hot water pipe. During each of the programmed time periods the pump control output (P2) will be switched ON for 3 minutes and then OFF for 15 minutes. This sequence will continue throughout each of the 3 preprogrammed periods of each day.

#### Setup procedure:

- ▶ Press the “**Pipe timing**” button to set the START time of circulation. The time will flash.
  - ▶ Press “▲”“▼” button to adjust the START hour
  - ▶ Press “←”、“→” button to go to minutes
  - ▶ Press “▲”“▼” button to adjust the START minutes
  - ▶ Press the “**Pipe timing**” button again to set the END time of circulation
  - ▶ Press “▲”“▼” button to adjust the END hour
  - ▶ Press “←”、“→” button to go to minutes
  - ▶ Press “▲”“▼” button to adjust the END minutes
- After 6 seconds, the controller will lock-in the settings.



Perform the above procedure for all three time period for the day. A number 1-3 displayed on the screen to indicate the preset time period.

#### NOTES:

- To turn OFF the timed circulation for one of the 3 periods, set the ON (start) time and the OFF (stop) time to the same value.
- During normal operation, pressing the “**Pipe timing**” button will display the programmed settings.

#### Manual operation:

During normal operation, the hot water circulation pump control output (R1) can be turned ON manually by pressing the “**ON/OFF**” button. The “Pipe circulation” symbol will be displayed and the R1 output will be activated for a 3 minute period, then it will stop automatically.

To stop the pump P2 manually, press the “**ON/OFF**” again.

### 3.9 Temperature controlled user Hot Water circulation

**Note:** T4 sensor is not included with the standard controller. The user needs to have an extra temperature sensor T4 to be able to use this function.

The controller can provide a temperature-controlled hot water circulation function. This function needs an extra hot water circulation pump ( P2) and a sensor (T4), which should be placed on the house hot water return pipe. When the temperature sensed by the sensor T4 is lower than the preset ON temperature, the hot water circulation pump (P2) is activated and works until the temperature exceeds the OFF temperature.

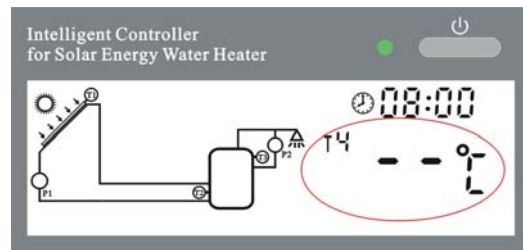
For instance: if the preset ON temperature is 40°C, then when T4 is lower than 40°C, the P2 pump is activated and it will be turned OFF when the temperature is higher than 45°C.

#### To Enable / Disable this function:

- ▶ Press the “**SET**” button 2 times. The hot water circulation temperature setting will flash. The default setting is “OFF” indicated on the display as: “-- --”.
- ▶ Press “**OK**” button to activate this function.
- ▶ Press “▲”“▼” button to adjust the temperature of circulation pump.

Adjustable range: 20°C(68F) to 50°C (122F).

After 6 seconds, the controller will lock-in the settings.



- ▶ To deactivate this function press “**OK**” button while in the circulation temperature preset mode. The display will indicate: “----”.

**IMPORTANT NOTE: Do not set the time period that cross over the 24:00 hrs (12 midnight ). The controller may not schedule the timing properly.**

Note:

- The Temperature controlled hot water circulation function has higher priority than the Time controlled hot water circulation function.
- If the Temperature controlled hot water circulation function is deactivated, then the Time controlled hot water circulation function is activated automatically.
- The location of the sensor T4 should be at least 1.5m (5 Ft) away from the tank in order to prevent undesired operation.

### 3.10 Anti Freeze protection



**Note:** this function should only be used in systems that do not use anti-freeze liquid.

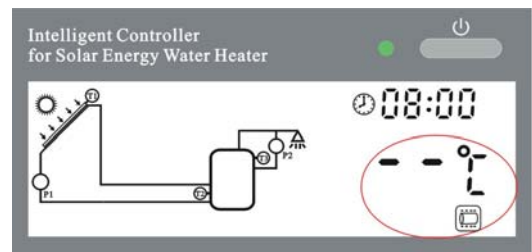
A) If this function is enabled, the solar pump control output (P1) will be switched ON when the temperature of the collectors (T1) falls below the preset ON temperature of the anti-freeze protection.

When the collector temperature T1 rises 5°C (9F) higher than the preset ON temperature of the freeze protection, the controller will turn OFF the solar pump output (P1).

B) If this function is enabled and the tank temperature (T2) falls below +10°C (+50F), the heating booster output (H1) will be switched ON automatically and it will be switched OFF when the water temperature (T2) rises above +15°C (59F).

**To Enable / Disable this function:**

- ▶ Press the “**SET**” button once. The freeze protection temperature setting will flash.  
(The default setting is OFF, display: “-- --”)
- ▶ Press the “**OK**” button to enable this function.
- ▶ Press “**▲**” “**▼**” button to adjust the switch-ON temperature of the freeze protection.  
Adjustment range: +2°C to +10°C (+36F to +50F).  
After 6 seconds, the controller will lock-in the settings.



- ▶ To disable this function, press the “**OK**” button while the function is enabled. The display will show: “-- --”.



This symbol on the display indicates that the high temperature protection (1) is enabled.

**NOTE:** In areas where freezing temperatures occur often, we suggest that a solar system with anti-freeze liquid be used rather than water as the heat exchange medium.

### 3.11 High temperature protection ( mode 1 )

this mode operates in order to prevent overheating of the water in the tank, the controller checks the temperature of the tank on T2 sensor. When T2 rises above +95°C (+203F), the solar pump (P1) is deactivated. When the temperature T2 drops below +85°C (+185F), the system returns to normal operation.

Note: This function default parameters are permanently preset and cannot be altered by the user.



This symbol on the display indicates that the high temperature protection (1) is enabled.

### 3.12 High temperature protection ( mode 2 )



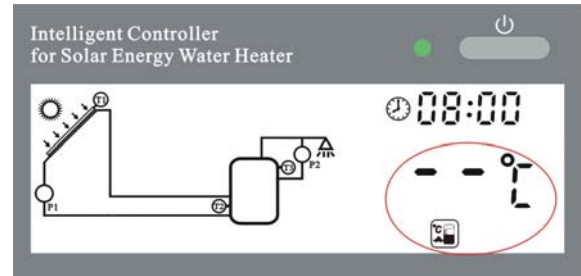
**Note:** this function is only useful in the solar systems that use a tank with two heat exchangers.

In this mode, an optional, external valve should be installed on the water tank hot water outlet pipe and connected to the R1 output. The controller will check the tank temperature on the sensor T2. If T2 temperature is higher than the preset Maximum temperature for this function, the valve control output (R1) will be switched ON.

When T2 drops 5°C (9F) below the Maximum temperature, the R1 output will be switched OFF.

#### To Enable / Disable this function:

- ▶ Press the **“SET”** button 3 times.  
The maximum tank temperature setting will flash.  
(The default setting is OFF, display: “-- --”)
- ▶ Press the **“OK”** button to activate this function.
- ▶ Press **“▲”** **“▼”** button to adjust the maximum temperature.  
Adjustment range: +80°C to +99°C (+176F to +211F).  
After 6 seconds, the controller will lock-in the settings.



- ▶ To disable this function press the **“OK”** button while in the Maximum temperature preset mode.  
The display will indicate: “-- --”.



This symbol on the display indicates that the high temperature protection (mode 2) is enabled.

### 3.13 “°C/°F” button

- ▶ Press the “ °C/°F ” button to toggle between the Celsius and Fahrenheit units.

### 3.14 System Protection features

#### A. Memory protection in case of power failure

In case of the power failure, the controller saves the settings unchanged. When the power is restored, the controller recovers to the preset mode.

#### B. System Restore ( default ).

If an error or malfunction occurs in the system, press the **“OK”** button on the panel. The system will recover to the factory default settings.

## 4. Trouble shooting




### 4.1 Error protection

When an open or a short circuit is detected on the temperature sensors connection, the controller will switch OFF the corresponding functions. At the same time an error message will be indicated on the display.

### 4.2 Error messages

If the control unit is not working correctly, please check the following error messages and follow the error correction procedure.

Error messages flashing on the LCD display:

Error message	Description	Cause of error	Error correction
T1  flashing	T1 sensor fault	Sensor wiring open or shorted	Check sensor resistance value, replace sensor if necessary
T2  flashing	T2 sensor fault	Sensor wiring open or shorted	Check sensor resistance value, replace sensor if necessary
T3 99°C flashing	T3 sensor fault	Sensor wiring open or shorted	Check sensor resistance value, replace sensor if necessary
E0 	Connection fault between display and controller	Connecting cable is open or shorted	Check and replace if necessary

### 4.3 Preventing potential errors

Review carefully the information below. Call for the controller repair only when you are sure that none of the problems listed below is responsible for the malfunction.

A potentially defective sensor can be tested using an Ohmmeter. To do this, the sensor wiring must be disconnected, its resistance tested and compared with the values in the table below. A small deviation is acceptable, ( [Note: Disconnect all power before opening the case](#) )

#### PT1000 resistance values

°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 values

°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

**Possible Causes of errors**

<b>Symptoms</b>	<b>Secondary symptoms</b>	<b>Possible cause</b>	<b>Procedure</b>
Controller does not appear to function at all	Display shows nothing, no display illumination	Controller power supply is interrupted	Check the controller power wiring and connection cable between the controller and the display.
The solar pump does not operate despite all correct conditions being satisfied	The pump symbol on the display is flashing	Pump power supply is interrupted	Check the pump power cable
Pump does not operate	The pump symbol on the display is not flashing, error message signal is flashing	Fault ( short circuit or open circuit) in the temperature sensor or its wiring	On the controller, read the current values from all connected temperature sensors, replace all defective sensors and /or wiring
The solar pump DOES operate despite the "ON" conditions NOT being satisfied	The pump symbol on the display is flashing	The freeze protection function is activated.	No problem, it is normal. If necessary, disable the corresponding functions.



## 5. Specifications

- Supply: Models for 120Vac or 208-240Vac  $\pm 10\%$ , or 12/24Vac , 50/60Hz
- Power consumption: < 4VA
- Temperature test units: Celsius or Fahrenheit ( selectable )
- Temperature test accuracy:  $\pm 1^{\circ}\text{C}$  (  $\pm 2\text{F}$  )
- Temperature test range: 0 ~ 121  $^{\circ}\text{C}$  ( 32 ~ 250 F )
- Internal Real Time Clock: Yes
- Clock backup: Internal lithium battery ( or self-recharging backup )
- Program Memory: Internal, non-volatile
  
- 4 test Inputs: 4 wired temperature sensor probes,
  - ✓ 1 Pt1000 sensor ( $\leq 500^{\circ}\text{C}$ ) for collector (silicon cable  $\leq 280^{\circ}\text{C}$ ),
  - ✓ 1 or 2 NTC10K, B3950 sensors ( $\leq 135^{\circ}\text{C}$ ) for tank, (PVC cable  $\leq 105^{\circ}\text{C}$ ),
  - ✓ (optional) 1 NTC 10K, B3950 sensor ( $\leq 135^{\circ}\text{C}$ ) for hot water circul. pump (PVC cable  $\leq 105^{\circ}\text{C}$ ),
  
- Inputs wiring connection: Screw terminal
  
- 4 Outputs ( SPST, N.O. relays ):
  - ✓ 1 for Heating booster, 16Amp, 240Vac max. ( max. 2000W resistive load )
  - ✓ 1 for Solar circulating pump, 5Amp, 240Vac max. ( max. 600W load )
  - ✓ 1 for Hot Water circulating pump, 5Amp, 240Vac max. ( max. 600W load )
  - ✓ 1 for electromagnetic valve, 5Amp, 240Vac max. ( max. 600W load )
  
- Outputs wiring connection: Screw terminal
  
- Control Panel display: LCD with LED backlight
- Control Panel dimensions: 120mm x120mm x18mm
- Power Module dimensions: 200mm x140m x 45mm
  
- Operating ambient temperature :  $-10^{\circ}\text{C}$  ~  $50^{\circ}\text{C}$ .
- Enclosure rating: Water proof grade IP40.