

# Solar collector project controller

## Operation instruction

TNC-5 SEIRES

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○ Please read this manual carefully before using the product.

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# 1

## PREFACE

*Thanks for choosing our solar project controller, the system controller has been strict test and inspection. We have done initialization for the controllers, so it will run automatically after exactly installed and pow-on, no need for manual duty. And also it has power-off memory function.*

*Please read the instruction careful before using it, and familiar with the technical data, the function and attention and operating methods. Master correct installation method, in order to make our products to serve you better.*

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## 2 Safety information

### 2.1 Installation notice

- Before install it, please consider the fixed firmly and structural safety, wind, lightning and roof drainage, and other factors.
- We suggest fixed the controller to the wall of 50cm higher than the ground.
- When laying the circuit, to ensure that no damage to the fireproofing facilities in the building.
- Please don't install the controller in a room which has flammable and explosive materials.
- When connect power to the controller, please assure the power is match to the controller parameters. To avoid causing damage to the equipment.
- Equipment installation should be in the situation of power off, and all the circuit work should be follow safety rules.

### 2.2 About this instruction

This instruction gives detailed information about the connection, operation, and installation of the solar project controller, and to ensure the connecting and all operations are only to be conducted by specialists.

### 2.3 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.

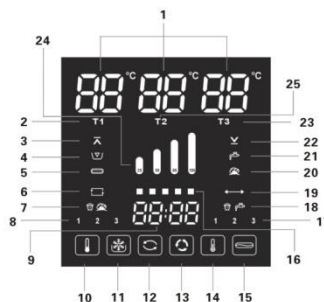
Improper installation can cause damages to material and persons. This is the reason why we do not take over responsibility and liability for losses, damages or cost that might arise due to improper installation, operation or wrong utilization and maintenance or that occurs in some connection with the aforementioned.

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.

## 3 Description of symbols

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### 3.1 Description of display panel



#### Display introduction

1. Temperature display zone
2. T1 Pipeline temperature
3. Max
4. Pressure boost
5. Heat preservation
6. Pipeline circulation
7. Timing heating
8. The times of timing heating
9. Time display
10. Constant-temp
11. Anti-freeze
12. Pipe temp-difference circulation
13. Collector temp-difference circulation
14. Temp-control
15. Constant level
16. Circulation indicator
17. The times of timing water loading
18. Timing water loading
19. Collector circulation
20. Heating
21. Water loading
22. Min
23. T3 Collector temperature
24. Water level display
25. T2 Tank temperature

### 3.2 Manual set panel



#### Set introduction

- 1: Heating function set
- 2: Pipeline circulation/+ set
- 3: Collector circulation/- set
- 4: Set button
- 5: Water supply set

## 4 Main Technical Data

Accuracy of temperature measuring: $\pm 1^{\circ}\text{C}$
Environment humidity: $\leq 60\%$
Range of temperature measuring: $0^{\circ}\text{C} \sim 99^{\circ}\text{C}$
Working Voltage: AC220V AC380V $\pm 10\%$ 50HZ or 60HZ (This can meet your requests)
Ambient temperature: $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$
Controlled Main board power: $\leq 5\text{W}$
Controlled electromagnetic Valve voltage and power: AC220V $\leq 600\text{W}$
Controlled booster pump voltage and power: AC220V $\leq 600\text{W}$
Controlled circulation pump voltage and power: AC220V $\leq 600\text{W}$
Controlled ribbon heater voltage and power: AC220V $\leq 1\text{KW}$
Controlled electric heater voltage and power: According to your requests
Input signals: temperature sensor and level sensor
Output signals: electric heater, pipeline circulation, collector circulation, booster, water loading, ribbon heater

## 5 Function introduction

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1. Time display: Display the time.

2. Water temperature display: Water temperature inside the water tank or collector or pipeline are shown.

3. Compulsory temp-difference circulation between solar energy and temperature-holder tank.

When the temp-difference is above the preset "Max temp-difference", the circulation pump starts automatically, and when the temp-difference is to the "Min temp-difference", the circulation pump closed.

4. Constant level in tank or timing water loading

When start constant water level function, the controller will auto water loading when the tank level is below the preset "Min level", and stop water loading when the level to the "Max level".

When the timing time comes, it will auto start water loading and stopped when level at the preset "Timing water level".

The user can set 3 times timing water loading.

5. Constant temperature in tank or timing heating

When the water temperature is below the preset "Min temperature", it will automatically start heating (electric heater or heat pump), and stop heating when the temperature is up to preset "Max temperature".

When the timing time comes, it will auto start to heat and stopped when the temperature is at the preset "Timing temperature".

The user can set 3 times timing water loading.

6. Using both constant-temp circulation and temp-difference circulation between the water tank and using water pipeline. (This function can realize the true meaning of the "open the tap on the hot water!")

When the tank temperature is above preset "pipeline constant temperature", if the pipeline temperature is below the "pipeline constant temperature", the controller automatically starts the pipeline circulation pump, and the higher temperature water in the tank will be sent to the pipeline, and cold water in the pipeline will go back to water tank, and when the pipeline temperature is up to "pipeline constant temperature", the controller will automatically close circulation pump.

When the tank temperature is below the preset "pipeline constant temperature", if the temp-difference between the water tank and pipeline is  $\geq 7^{\circ}\text{C}$ , it will automatically start pipeline circulation, and closed the circulation function when the temp-difference is close to  $3^{\circ}\text{C}$ .

In order to avoid the circulation pump start frequently, after pipeline circulation works each one time it will not be restarted within the preset "start interval time".

## 5 Function introduction

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**7. Collector protection** (This function is to avoid breaking collector pipe, which caused by large temperature difference)

When the temp-difference between the collector and water tank is  $\geq 70^{\circ}\text{C}$ , it will not automatically start circulation function.

**8. Anti-dry protection** (This function can effectively avoid heating equipment dry fried because the water level is too low in tank.

When the water level in tank below 50%, it will not automatically start heating function.

**9. When the water level in tank below 50%, it will not automatically start circulation pump or pipeline circulation.**

**10. Anti-freeze function**

When collector temperature is  $< 4^{\circ}\text{C}$ , circulation pump will automatically starts, and the higher temperature water in the tank will go into the header tank, the circulation will automatically stops when the collector temperature up to  $7^{\circ}\text{C}$ .

The system leaving another independent anti-freeze temperature interface. When the temperature is  $< 4^{\circ}\text{C}$ , the system is equipped with independent output interface, can be used for the function of anti-freeze. It will be automatically cut-off the output when the temperature rises to  $7^{\circ}\text{C}$  (Start interval time is 5 minutes)

**11. Avoiding start frequently**

The collector automatic circulation function will not restart again within 5 minutes after it stops work.

The pipeline circulation function will not restart again within "start interval time" after it stops work.

The anti-freeze function will not restart again within 5 minutes after it stops work.

**12. Automatic pressure boost**

Choose this function when the water pressure is relatively low, during water loading, the controller opens the electromagnetic valve while starting up the booster pump for pressurizing water supply; When the water tank is full, the el. valve and booster pump both are closed at the same time.

**13. Water quality set**

Cause using for a long time or using pure water, the sensor's detection sensitivity will become poor and can't give a right water level, now the user can use set function to improve sensitivity.

**14. Manual control function**

Manually press      buttons to control corresponding functions.

**15. Power off memory**

In case power failure occurs, controller keeps the parameter settings unchanged for a long time.

**16. Parameters reset function**

Open distribution box, there is a button at the back of display boards, it will be return to the factory default settings when pressing this button.

**17. Electric leakage protection**

The controller will stop the electric heater function when there has electric leakage to ensure the user's safety.

**18. The controller has manual emergency buttons, (Can be customized according to your requests).** Please see the detailed information in the Setting introduction at below.











Pic 1.

## 6 Setting introduction

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### 6.1 Parameter set






**The 1st screen (Time display)**

Press  button, entry the set state, now the time  blinks, first to set the hour, pressing  button or  button to set, then press  button again, now the time  blinks, pressing the  button or  button to set the minutes.












**The 2nd screen (water sensitivity)**

When finishing the 1st screen, pressing  button entry into 2nd screen, now  blinks, pressing  button or  button to set the sensitivity. The default set is "LL", normally we just use "LL", the high sensitivity "HH" just be used for very pure water.









**The 3rd screen (Temp-control water loading temperature or constant-temp release water)**

When finishing the 2nd screen, pressing  button entry into 3rd screen, now  are bright,  blinks, pressing  button or  button to set the temperature. ("tank temperature" is the temp-control mode temperature, and "collector temperature" is the constant-temp water release mode temperature)










**The 4th screen (Max or Min temperature of heating)**

When finishing the 3rd screen, pressing  button entry into 4th screen, now the  bright, and  blinks, now pressing  button or  button to set the max temperature of heating. Then pressing  button again, now  and  bright,  blinks, now pressing  button or  button to set the min temperature of heating.











**The 5th screen (Timing heating)**

When finishing the 4th screen, pressing  button entry into 5th screen, now the  and  blink, now pressing  button or  button to set the time of timing heating. (24:00 means the timing function is closed). Then pressing  button again, now timing heating temperature (tank temperature T2) blinks, now pressing  button or  button to set the temperature of timing heating.










**The 6th screen (Timing water loading)**

When finishing the 5th screen, pressing  button entry into 6th screen, now  and  bright, now pressing  button or  button to set the time of timing water loading. (24:00 means the timing function is closed). Then pressing  button again, now  blinks, now pressing  button or  button to set the level of timing water loading. Doing as this, the user finish 3 times timing water loading settings.











**The 7th screen (max and min water level set)**

When finishing the 6th screen, pressing  button entry into 7th screen, now  bright and  blinks, now pressing  button or  button to set the max level of water loading. Then pressing  button again, now  bright and  blinks, now pressing  button or  button to set the min level of water loading.

**The 8th screen (Pipeline constant-temp circulation)**

When finishing the 7th screen, pressing  button entry into 8th screen, now  bright and  blinks, now pressing  button or  button to set the pipeline constant-temperature. Then pressing  button again, now  bright and "start interval time" blinks (start interval time is the pipeline temperature range T1), now pressing  button or  button to set the interval time of pipeline circulation.

**The 9th screen (Collector temp-difference circulation)**

















When finishing the 8th screen, pressing  button entry into 9th screen, now  and  bright, and max temp-difference blinks (max temp-difference is the collector temperature range T3), now pressing  button or  button to set the max temp-difference of collector circulation. Then pressing  button again, now  and  bright, and min temp-difference blinks (min temp-difference is the collector temperature range T3), now pressing  button or  button to set the min temp-difference of collector circulation.

**The 10th screen**

When finishing the 9th screen, pressing  button to quit the settings.  
**Note:** in the set process (in any screen), press  button to quit the settings immediately.



### 6.2 Function set








- 1. Constant temperature heating:** pressing  button for a long time until the symbol  bright, now the constant-temp heating function is started, and long time press the button again when the symbol  dark, the function is cancelled.
- 2. Temp-control water loading, constant-level water loading:** pressing  button for a long time until the symbol  bright, now the function of temp-control water loading is started, and pressing button for a long time again until the  bright, now the function of constant-level water loading is started, and pressing the button for a long time again when the symbols dark to cancel the functions.
- 3. Pipeline temp-difference:** pressing  button for a long time until the symbol  bright, now the function of pipeline temp-difference circulation is started, and long time press the button again when the symbol  is dark, the function is cancelled.
- 4. Collector temp-difference:** pressing  button for a long time until the symbol  bright, now the function of collector temp-difference circulation is started, and long time press the button again when the symbol  is dark, the function is cancelled.
- 5. Anti-freeze:** pressing  button for a long time until the symbol  bright, now the anti-freeze function is started, and long time press  again when  is dark, the function is cancelled.
- 6. Function switch between temp-control water loading and constant-temp water supply:** Open the controller and press "Reset" button for a long time, please see the following pic.




Pic 2

Notes: this function is used by the qualified installation person, the user can't change it presumptuously.


### 6.3 Manual operating set

- 1. Manual heating:** press  button, it will start the heating function when the tank's temperature is below the max temperature, and press  button again will close the function.
  - 2. Manual water loading:** press  button, it will start water loading function when the water level in the tank is below the max level (press  button again to stop the function)
- When start water loading and the water level reaches the max level, it will close water loading function automatically after 1 minute delay.
- If the tank water level has reached the max level (but tank is not full), first add a water file then start to load water and automatically stop water load after 1 minute delay.
- 3. Manual pipeline circulation:** press  button, now tank temperature range T2 blinks (that is the circulation time), pressing  button or  buttons to set the pipeline circulation

time(minute), after finishing the set, press  button to quit.

And now the controller will start the pipeline circulation function immediately, and in this process, press  button again to stop this function.

- 4. Manual collector circulation:** press  button, now tank temperature range T2 blinks (that is the circulation time), pressing  button or  buttons to set the collector circulation time (minute), after finishing the set, press  button to quit.

And now the controller will start the collector circulation function immediately, and in this process, press  button again to stop this function

### 6.4 Manual emergency set

Manual emergency control switch (Red zone), when open the manual emergency functions, the user should close the function manually. When use the controller all the emergency switches should be closed, otherwise the controller can't work normally. For the emergency switches please the picture as following:



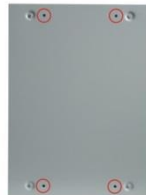
Pic 3

### 7.1 Installation of the solar project controller

Using the screws in the inside and backside of the controller to fix the controller to the wall which is 50cm higher than the ground, and avoid the controller meets water!



Inside



Backside

Pic 4

### 7.2 Open the door of controller



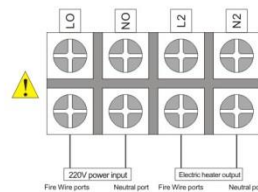
Pic 5

Using thumb to down and press the red zone to open the door and then connect wires or checking. Every controller is equipped with a key. Please see the picture 5.

### 7.3 Power lines install

Circuit diagrams please see the picture 6.

Using screwdriver to loosen the screw, and connect the power line to the screw, then fix it. Please see the picture.



Pic 6



Sample photo picture: (For reference)

The controller is match different electric heater output according to the user's requests. As following:

#### Power/Voltage

9KW/220V	9KW/380V	12KW/380V
18KW/380V	27KW/380V	36KW/380V
45KW/380V	54KW/380V	60KW/380V

## 7 Installation introduction

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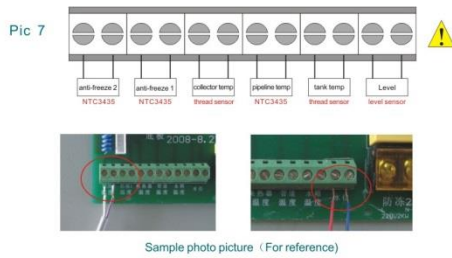
### 7.4 Installation of sensor

Every controller is equipped with 3 pieces NTC3435 sensor, used for anti-freeze 1, anti-freeze 2 and pipeline temperature, 2 pieces thread sensor which length is 22cm, used for tank temperature and collector temperature, 1 piece water level sensor, used for tank water level. For the water level sensor, we can supply 1.2M, 1.5M, 1.8M sensor according to customer requests.



Sensor connect diagram, please see the picture 7. Using screwdriver to loosen the sensor connect port screw, and connect the sensor cable to the screw, then fix it.

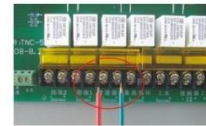
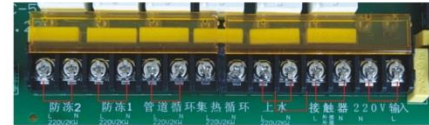
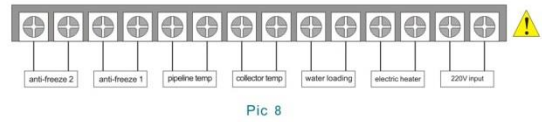
Note: water level sensor cable is four-cores, connect the red and blue cable to the sensor connect port screw, and two others for spare used.



⚠ AC220V, please ensure the controller is power-off!

### 7.5 Installation of terminal interface

Each terminal wiring seat has yellow protective cover, open the yellow cover, loosen the screw and connect the connect lines to the corresponding ports, then fix the screws. Finally, cover the protection cover. Please see the wiring diagram.



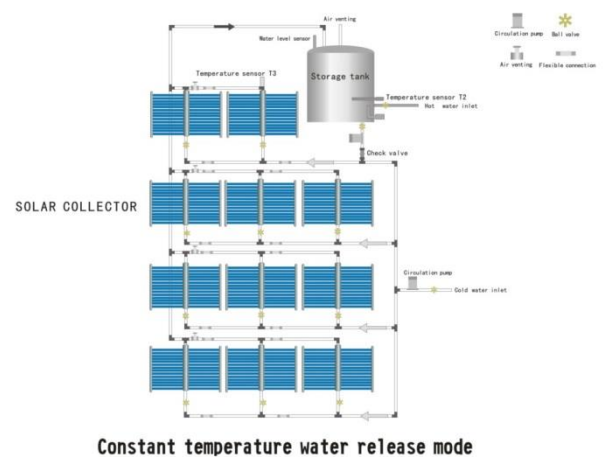
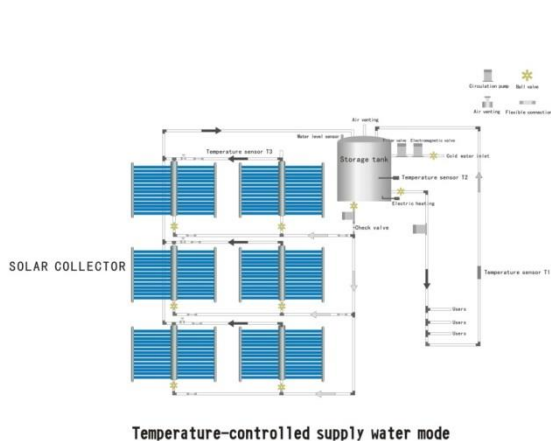
Sample photo picture (For reference)

⚠ AC220V, please ensure the controller is power-off!

## 7 Installation introduction

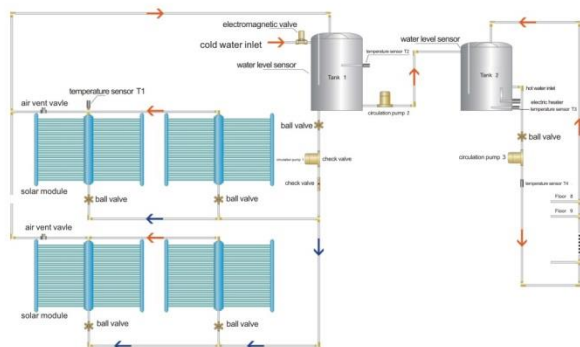
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### 7.6 Installation Instruction



● The two mode can be shifted by pressing Reset button for 3 seconds.

## 7 Installation introduction



Double tanks mode

## 8 Regular failure and obviate method

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Error message	Cause of error	Obviate method
No screen display	Not connect with power	Check the power
Temperature display "..."	Corresponding signal wire interrupted	Check signal wire
	Corresponding sensor error	Change the sensor
Temperature display 99℃ all the time	Corresponding signal wire short circuit	Check signal wire
Water level display 20% and 100%	Water level signal wire interrupted	Check signal wire
	Water level sensor error	Change the sensor
All water level display all the time	Water level signal wire short circuit	Check signal wire
Can't supply water manually	Electromagnetic valve blockage or damaged	Clean or change the el. valve
	Electromagnetic valve output line loosened	Check the control-line
Can't timing supply water	Timing supply water is not open	Adjust the parameters set
	The level is at the timing water loading level	Adjust the parameters set
	Water level signal line interrupted	Check signal wire
Can't constant-level supply water	Water level sensor error	Change the sensor
	Water level signal line interrupted	Check signal wire
	water level hasn't reached the preset min level	Adjust the parameters set
Can't temp-controlled water loading (or constant-temp water release)	water level has reached the max level	Adjust the parameters set
	Water level signal interrupted	Check signal wire
	Water level sensor error	Change the sensor
	water temp has not reached the set value	Adjust the parameters set
	temperature sensor signal wire interrupted	Check signal wire
	temperature sensor error	Change the sensor