eco Hybrid Solar Contoller CA5J

User's Manual

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Thank you for purchasing the eco Hybrid Solar Controller CA5-J.
Please read through this manual carefully and completely in order to operate this controller at its best possible performance.

CONTENTS

1. General Instructions

These Installation and operating instructions contain important information and basic instructions .Please read the following information carefully before installing and operating the controller.

- Only qualified technicians are recommended to install and operate this controller. Please get familiar with all the safety regulations and operating instructions before commissioning the controller into service.

- This controller shall be operated with the correct power supply.

- This controller shall work within the scope of the technical data provided.

- Do not mount the controller in a location of high humidity or the possibility of water infiltration.

- Do not mount the controller in the vicinity of hazardous or corrosive material.

- The controller can only be used as per the listed functions; unauthorized modifications or installing additional components not provided or recommended may cause damage to the controller.

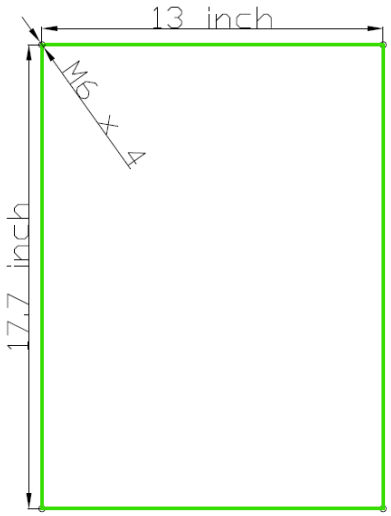
- The wiring connections need to be followed as per the diagrams in this manual, incorrect wiring connections may cause damage to the controller and the devices driven by this controller.

- Any modifications to the unit are not permitted without the written permission from eco Hybrid Solar, LLC.

2. Technical Data

1) Power Supply: 24VAC, 60Hz
2) Self-Consumption: < 20W
3) Temp. Sensor Precision:±1℉
4) Temp. Sensor Type:PT100
5) Total Output Power: 8kW
6) 5 Relays Designated : 24VAC, 200W
7) 1 Relay Undesignated : 24VAC, 200W
8) Rated Operating Leakage Current: 30mA/0.1S
9) Dimensions: 500×400×155mm
10) Installation Location: Indoors
11) Ambient Temperature: 32~130℉
12) Humidity: <85%

3. Installation and Wiring



The controller shall be wall-mounted in a location not susceptible to water damage and high humidity.

3.1 Mounting

The controller must be located indoors.

1. Locate the controller where it can be safely operated, drill four holes and attach M8 expansion bolts with a length of 17.7 inches and a width of 13 inches, see Fig.1.

2. Attach the controller with the enclosed screws (M6) and hangers

3.2 Wire Connections

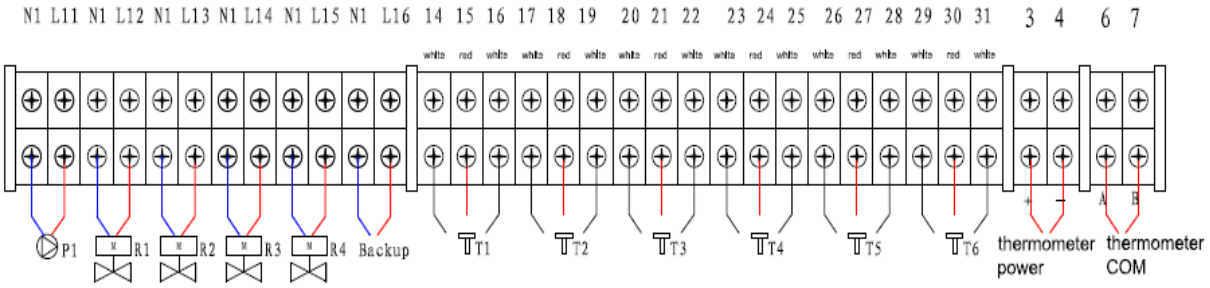


Fig. 2 Wire Connections

Inputs:

- 5 temperature sensors to be connected as Fig. 2.
- use 0.2~0.5mm^2 thick 3-wire shielded cable to connect all temperature sensors;
- thermometer power: use 0.5mm^2 thick 2-wire armored cable
- Thermometer COM: communication between thermometer and controller, use 0.2~0.5mm^2 thick 2-wire shielded cable.

Note: *attention on the wire color when connecting temp. sensors on terminals, it is White, Red and White color cable from left to right, do not reverse.*

Outputs:

- use 1mm^2 2-wire armored cable to connect pump P1 and/or valves R1, R2, R3 and R4 at 24VAC;
- if pump and/or valves are not 24V powered, use a relay between controller and loads;
- make water proof treatment for all cables.

3.3 Installation of Ultrasonic Flow Meter

Flow Meter:

- Working pressure <1.0Mpa
- Working temperature:39~203℉
- Connector: 1”
- Flow rate range: 0.3~30gal/min, rated flow rate: 15.4gal/min
- Battery: 3.6V lithium battery

- Remove any contaminants from the surface of the copper pipes where the meter is to be located in order to avoid inaccurate readings.

- Install the ultrasonic flow meter, including all the components where no exposure to water, frost, chemicals and EMC interference can occur.

- Ensure the arrow direction on the flow meter is the same as the water flows; make sure there is 6-12 inches of straight pipe before the flow meter and 4-6inch after the flow meter see Fig. 3.

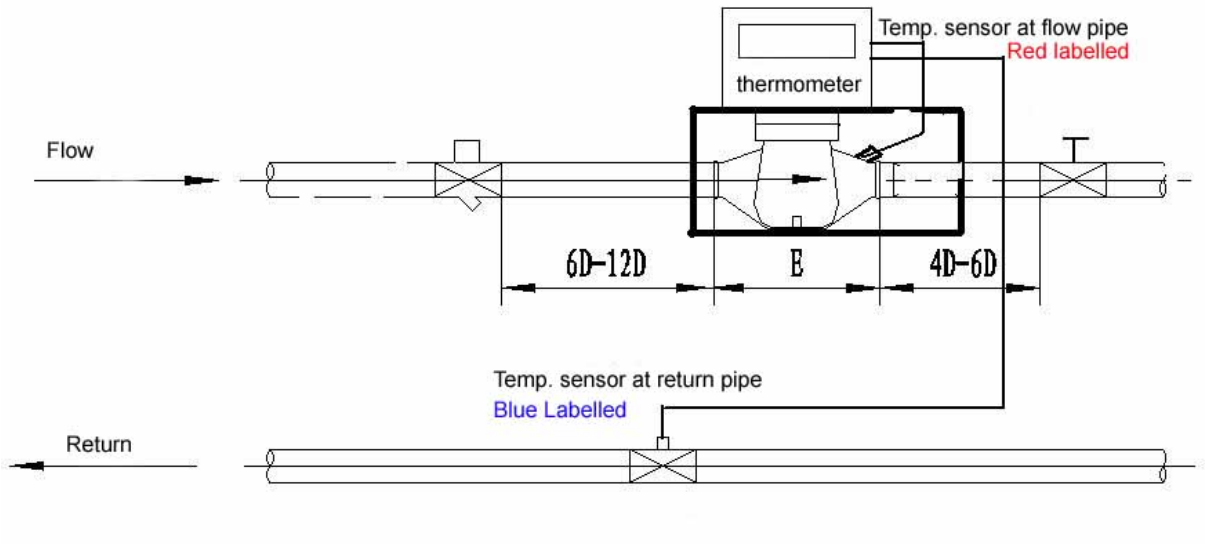


Fig. 3 Installation of the Flow Meter

BTU calculation

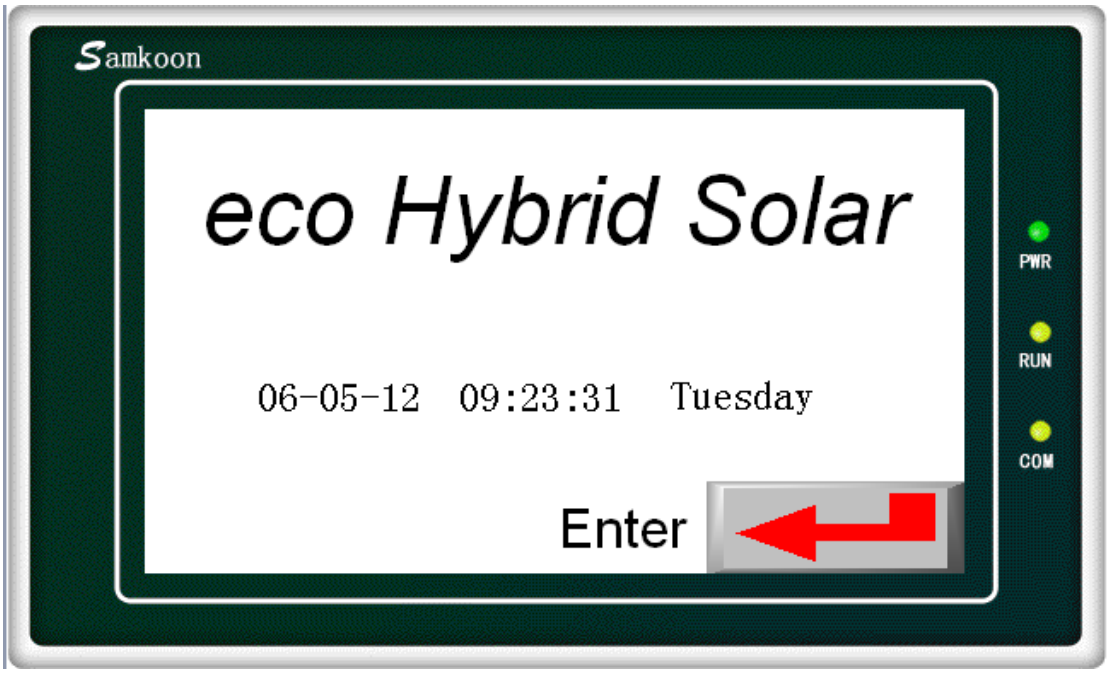
Use the Flow meter (with 2 extra temp. sensors T6 & T7) to calculate the heat gain of the whole system.

Flow meter is a DN25 connector;

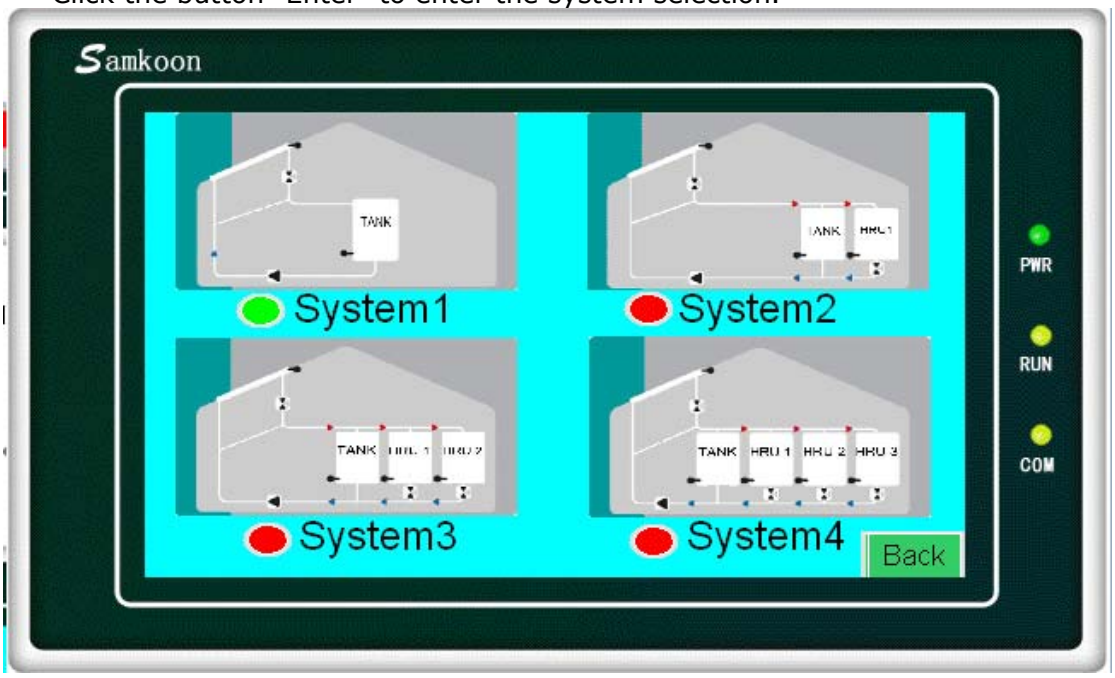
Controller reads the heat gain from the Flow meter and will display the final accumulative heat gain.

4. Touch Screen

Start Page



Click the button "Enter" to enter the system selection.



System selection: Click the system schematics to choose the system; Only one system can be selected; The system with a green lamp is the selected one

5. System 1 Function Survey

Inputs: 5 Temperature Sensors T1, T2

Outputs: 4 Relays @ 24VAC 200W, 60HZ (relays for solenoid valves) R1, R2 (L, N terminal)

1 Relay @ 24VAC 200W, 60HZ (relays for pump) P1 (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ undesignated

Temperature Differential Control:

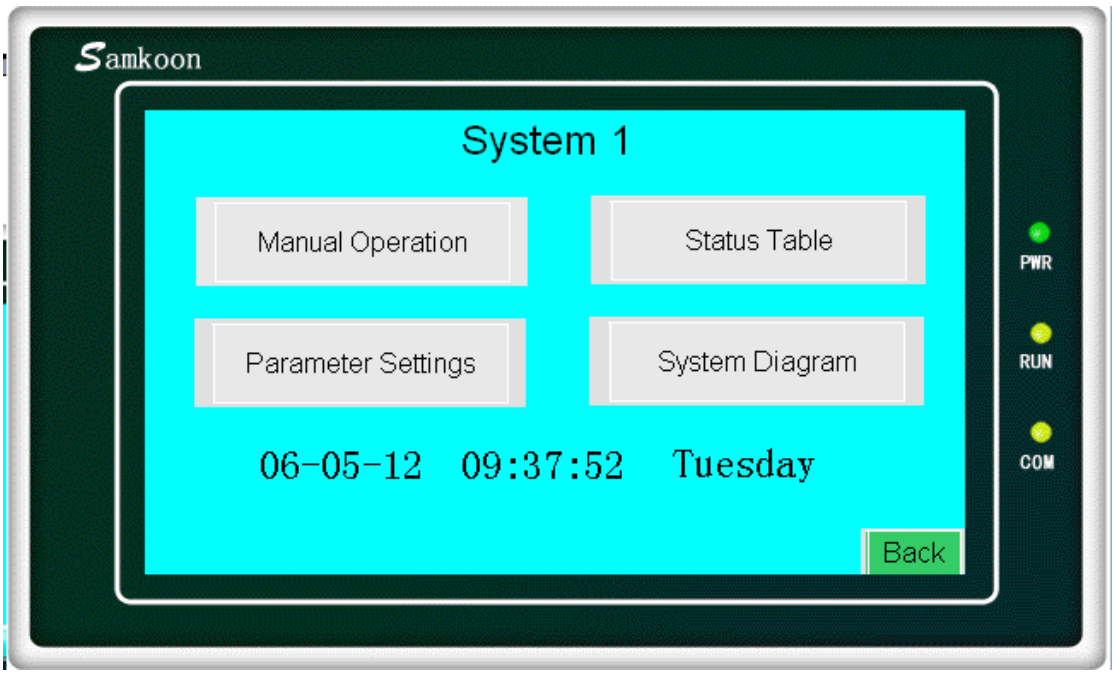
SOLAR T1-T2>45℉ (Adjustable)，Switch On R1 & P1；T1-T2<37℉ (Adjustable), Switch Off R1 & P1;

Switch off P1 when R1, R2, R3 and R4 are all switched Off.

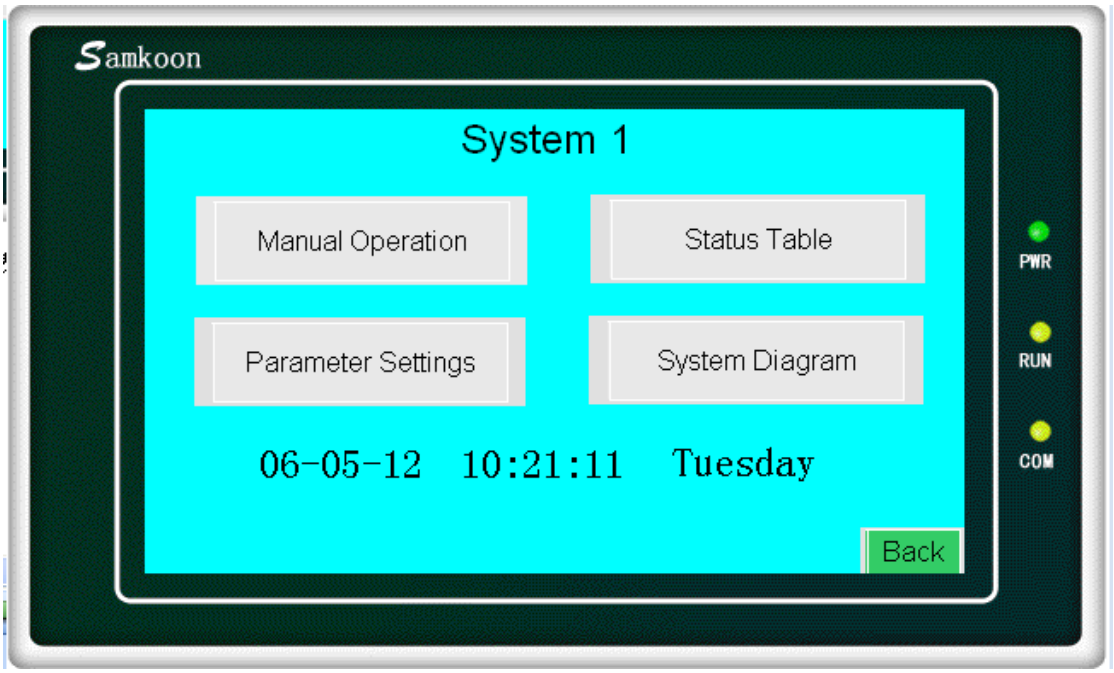
Collector Protection:High-Temp.:T1≥230℉, R1 Off; if T1≤210℉, P1 & R1 resume to Normal

Switch Off P1 when R1, R2, R3 and R4 are all switched Off

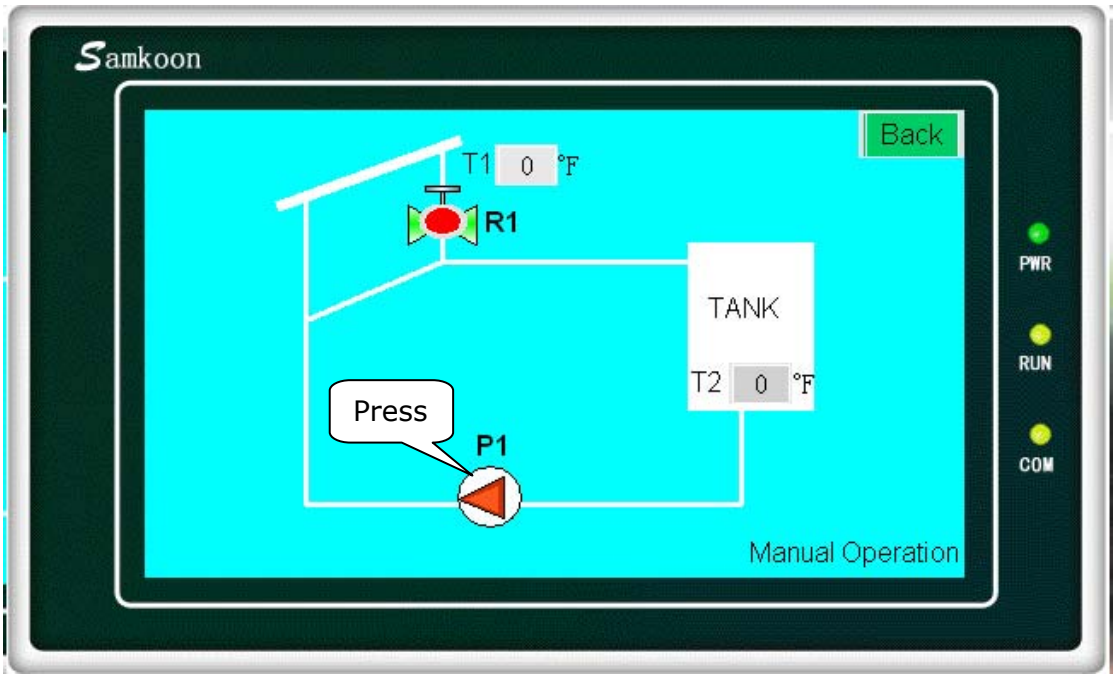
Storage Tank Protection: High-Temp. T2≥**140℉**, R1, R2, R3, R4 and P1 Off; if T2≤130℉, R1, R2, R3, R4 and P1 resume to Normal



Menu for System 1

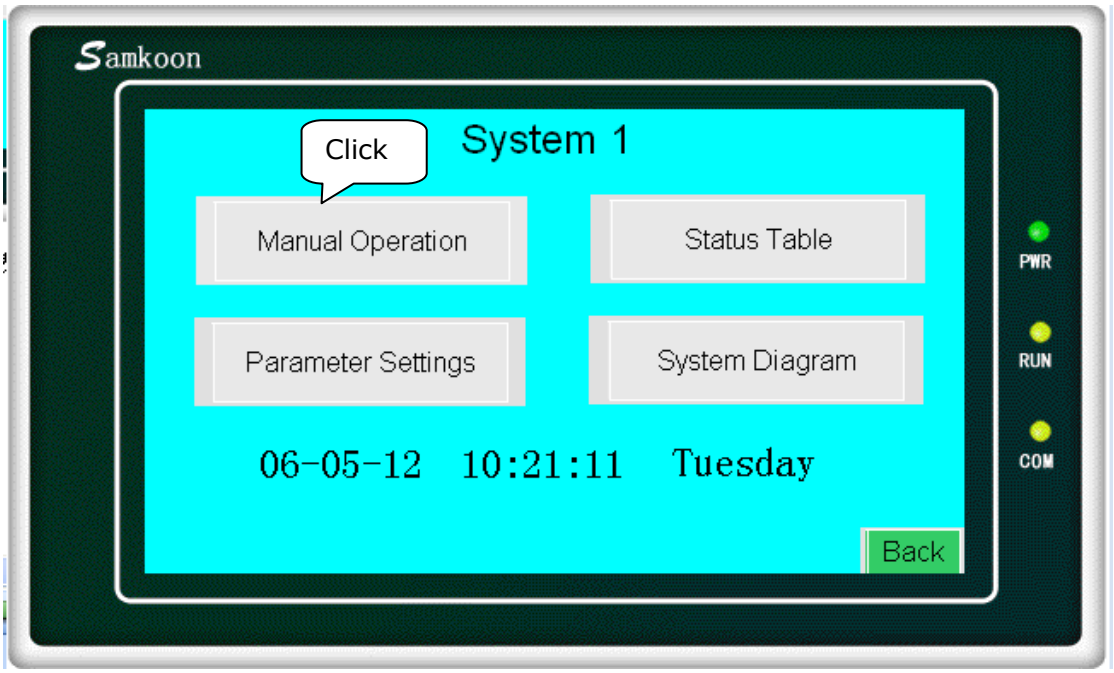


Click the "Manual Operation" button to enter the system operation in manual mode.

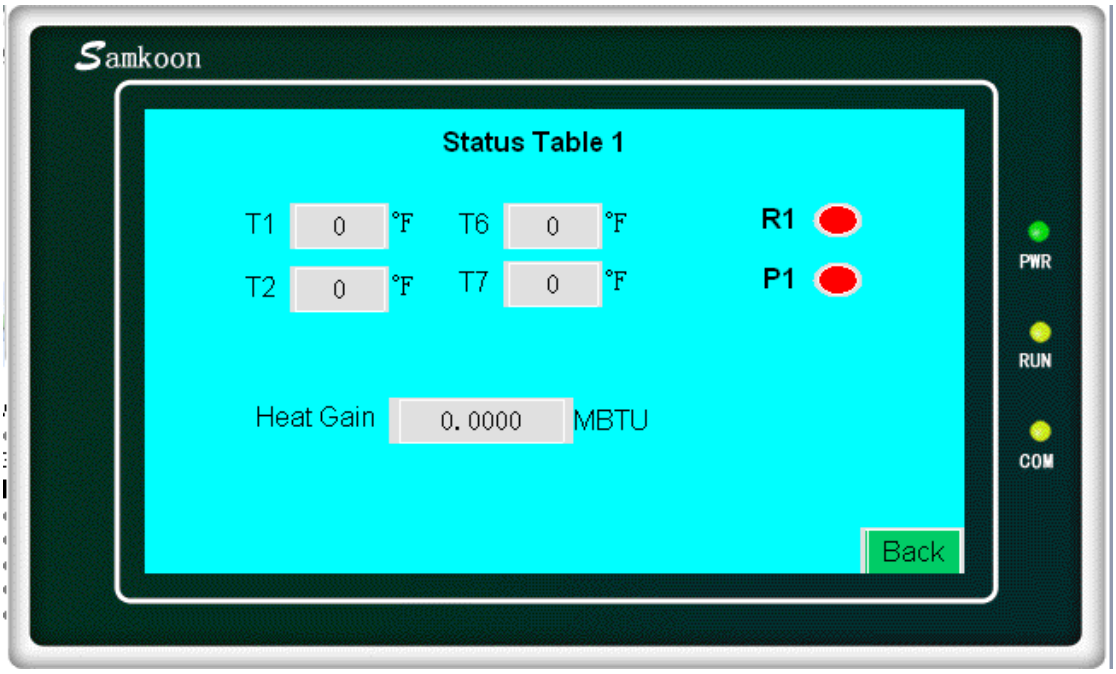


The Controller is now in manual mode once this page is shown. Click the load symbol on the schematic to activate/deactivate pump or valve. When the device is on, the light displays a green color, and then changes to a red color when the device is off.

Upon exit of the Manual Mode the controller will activate the Auto Mode.

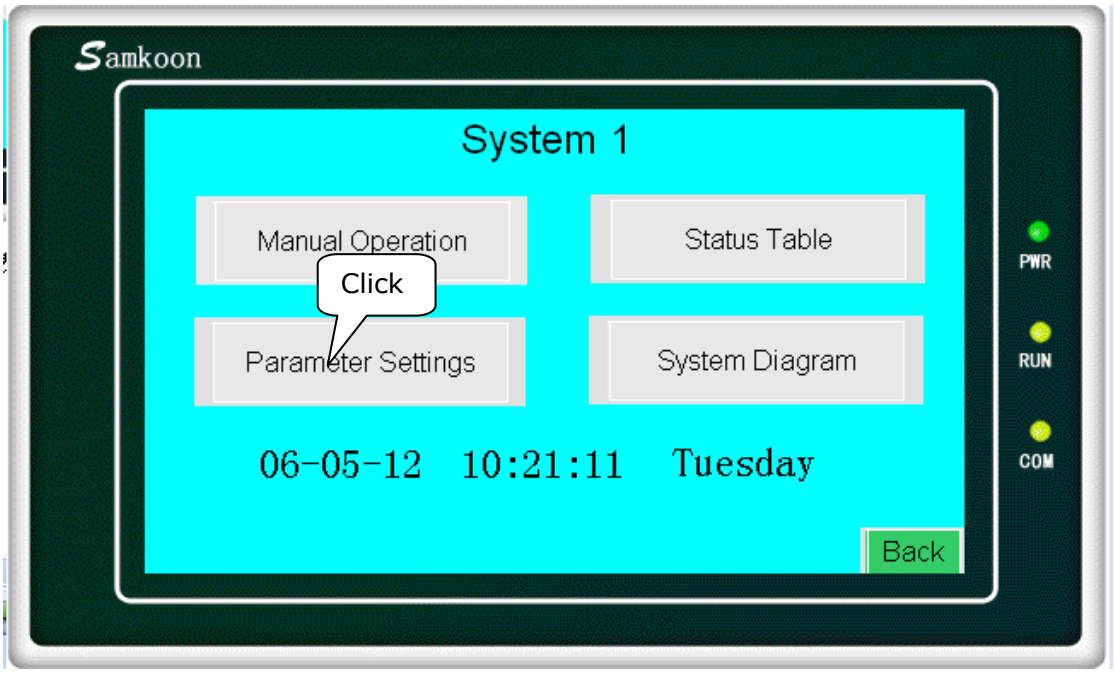


Click "Status Table" button to show as below:

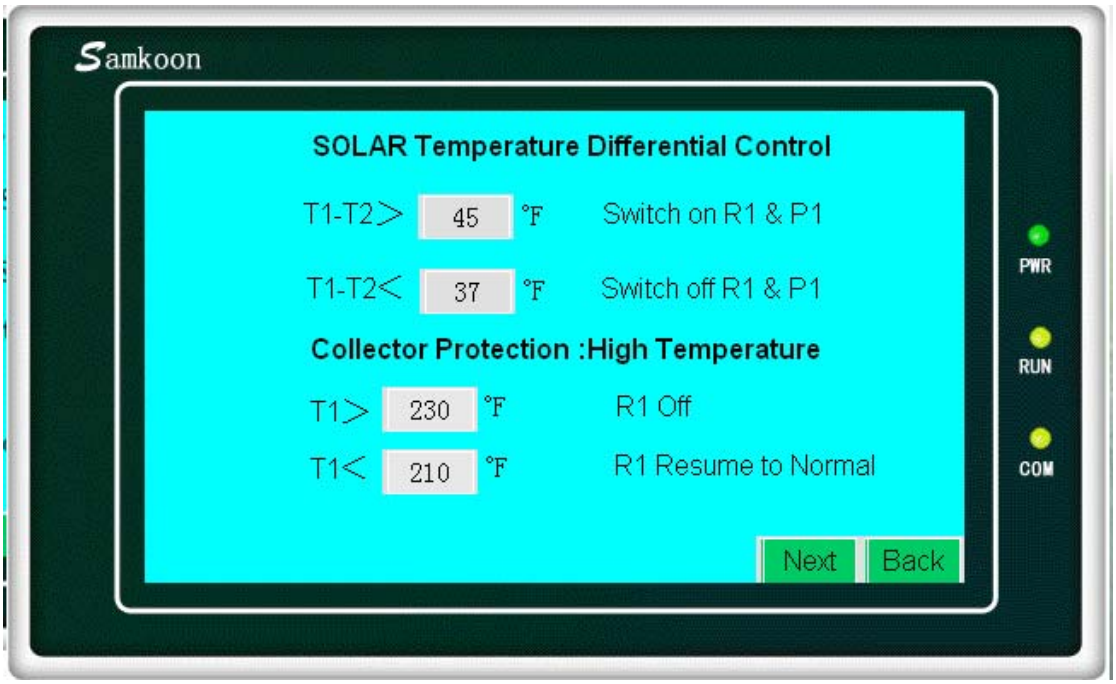


The actual system temperature, valve, pump status, and the accumulative heat gain will be displayed.

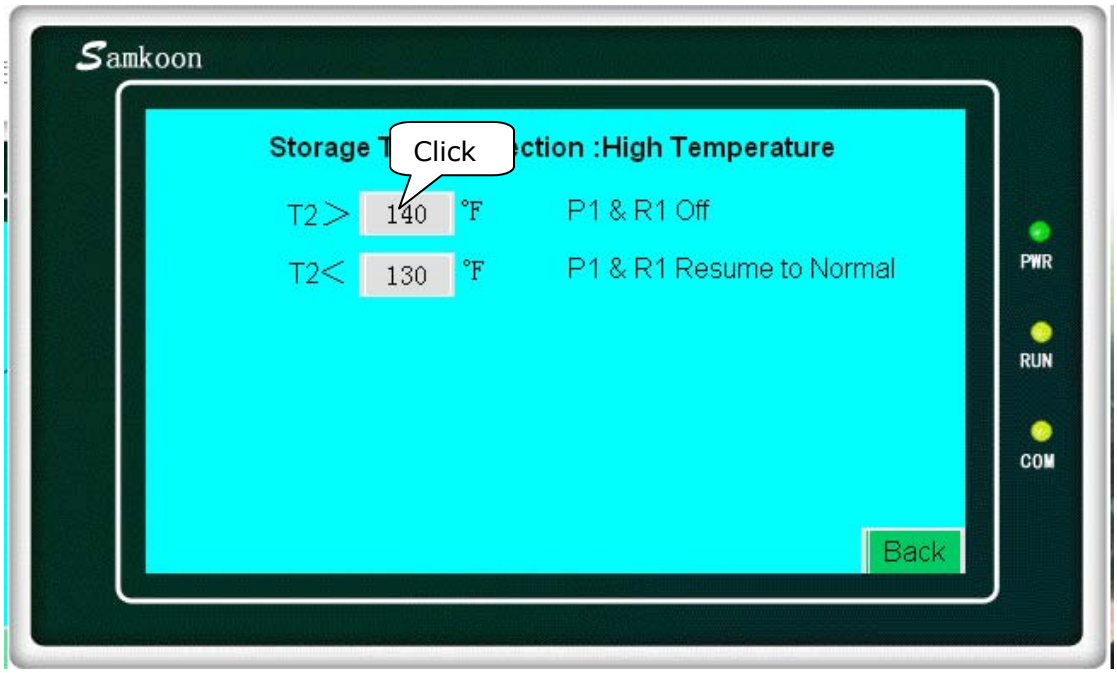
Note: When the lamp is a green color, the valve or pump is on;
When the Lamp is a red color, the valve or pump is off.

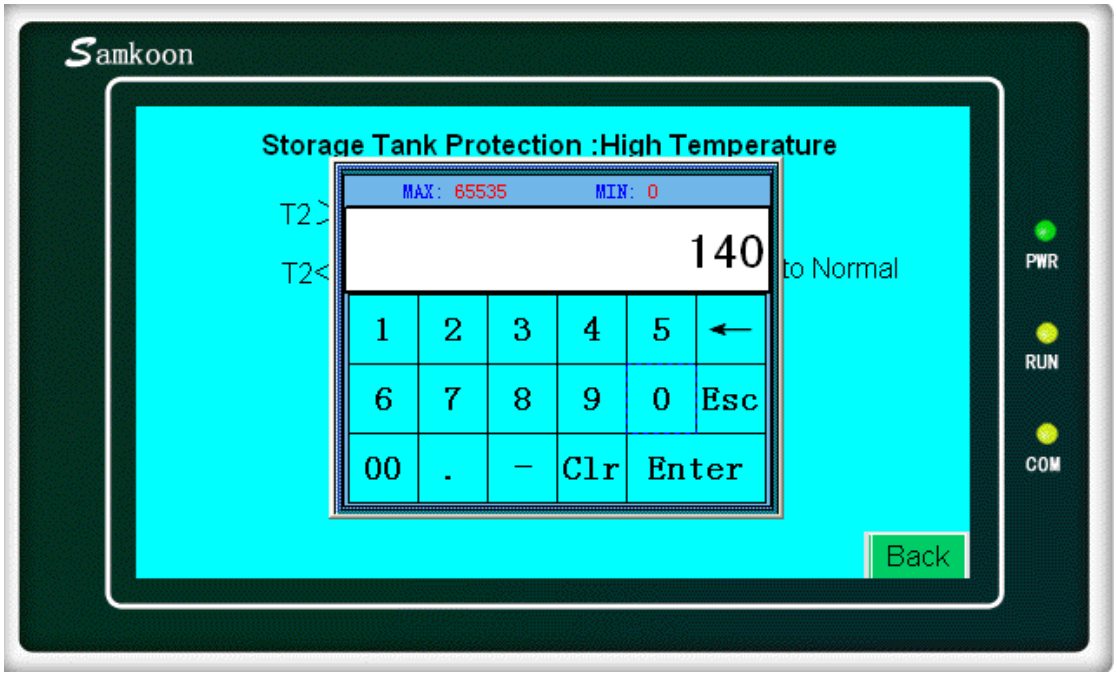


Click the "Parameter Settings" button to show the status:

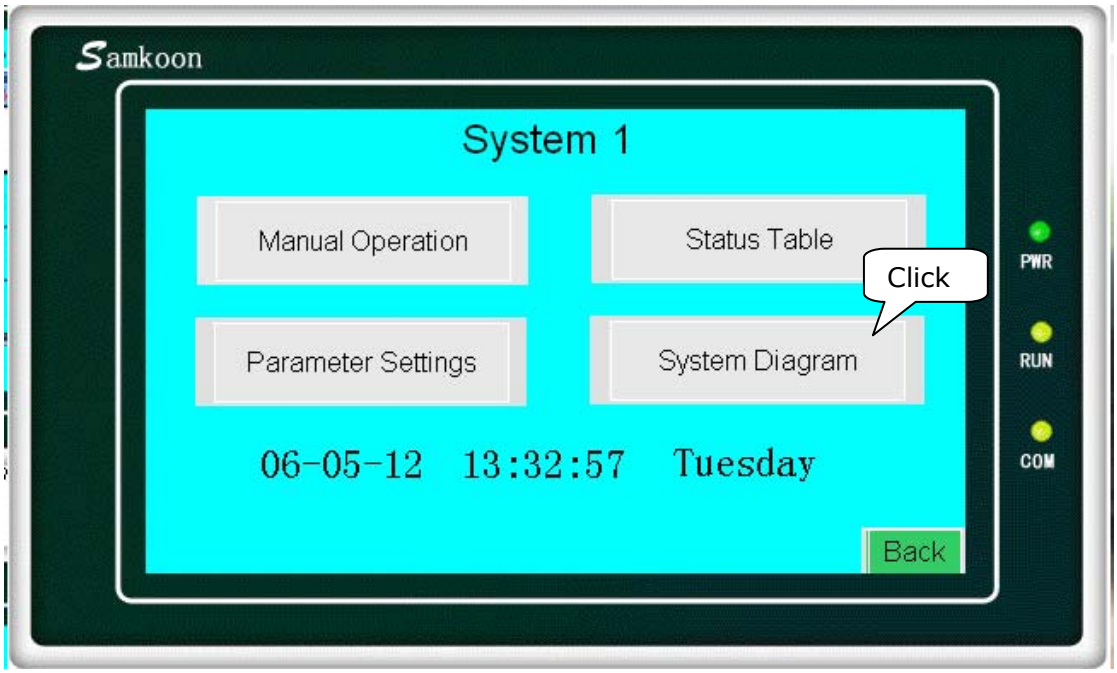


The default value of the parameter setting is displayed here. To change the setting, click the cell to input the desired value. To cancel one function, such as "Collector Protection: High Temperature", T1>230F change into T1>999F; To resume this function, input the desired value.

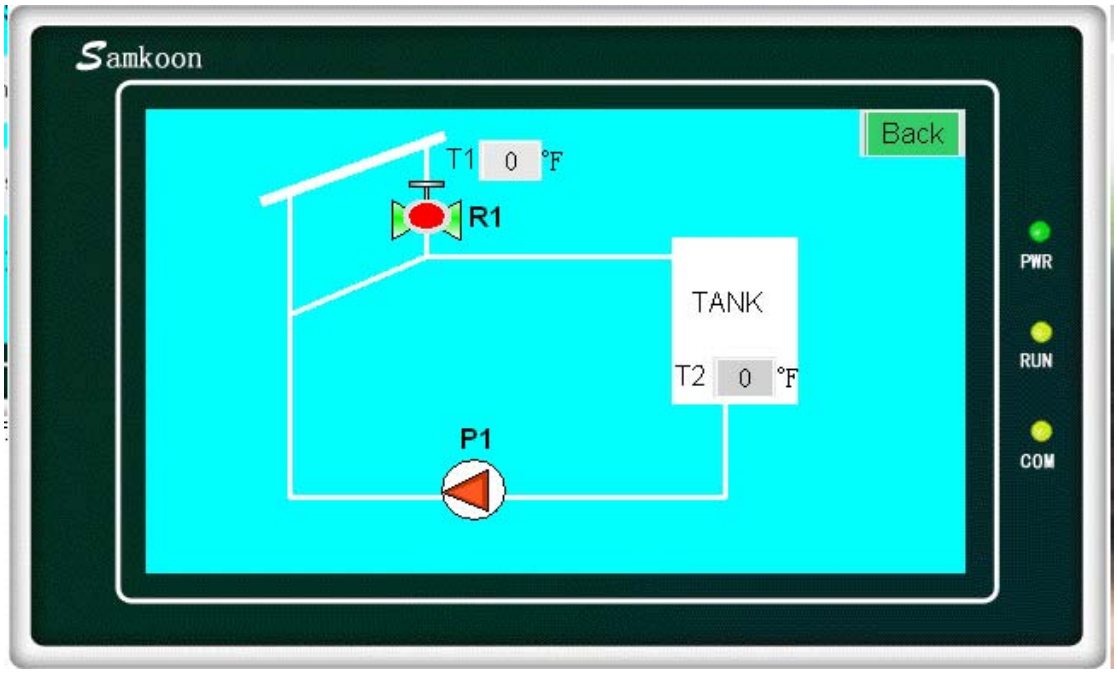




Input the value and click “Enter”



Click "System Diagram" to show the system schematics and real-time operation status.



6. System 2 Function Survey

Inputs: 5 Temperature Sensors T1, T2,T3

Outputs: 4 Relays @ 24VAC 200W, 60HZ (relays for solenoid valves) R1, R2, (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ (relays for pump) P1 (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ undesignated

Temperature Differential Control:

SOLAR T1-T2>45℉ (Adjustable)，Switch On R1 & P1；T1-T2<37℉ (Adjustable)，Switch Off R1 & P1;

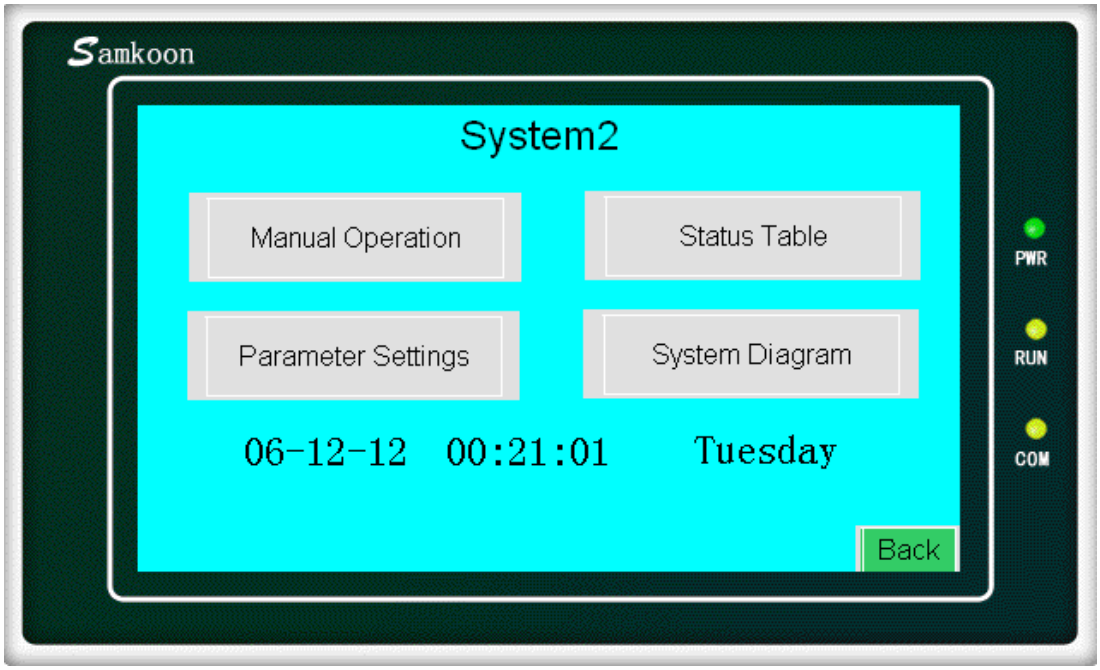
HRU 1 T3-T2>45℉(Adjustable)，Switch On R1 & R2 & P1；T3-T2<37℉ (Adjustable)，Switch Off R1 & R2 & P1;

Collector Protection:High-Temp.:T1≥230℉, R1 Off; if T1≤210℉, P1 & R1 resume to Normal

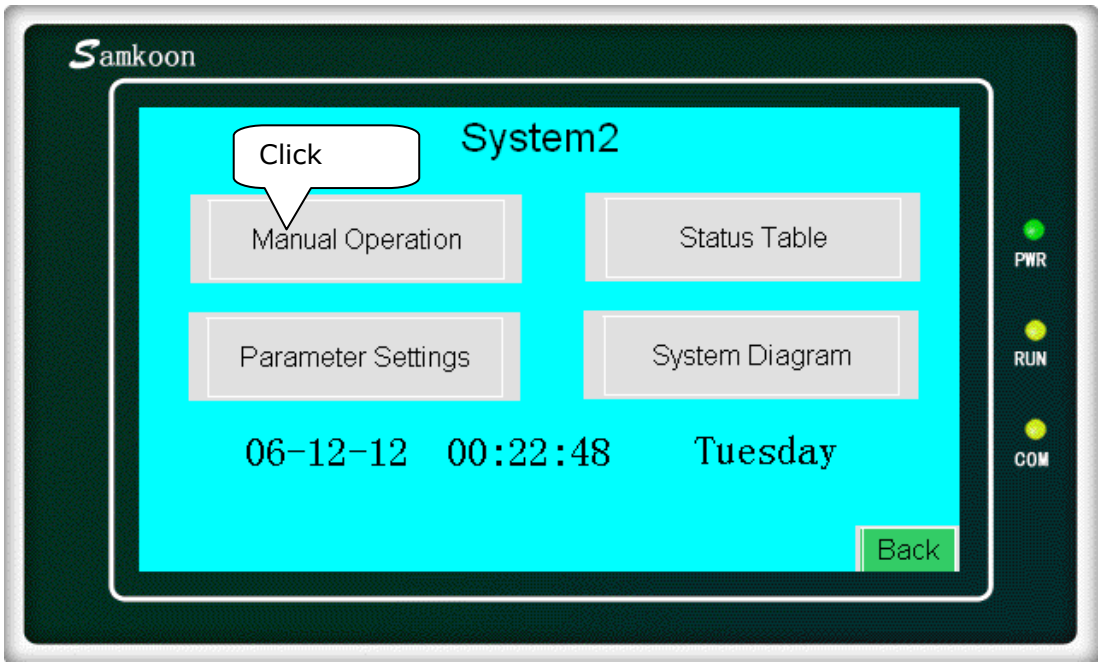
HRU 1 Protection: High-Temp.: T3≥230℉, R2 Off; if T3≤210℉, P1 & R2 resume to Normal

Switch Off P1 when R1, R2, R3 and R4 are all switched Off

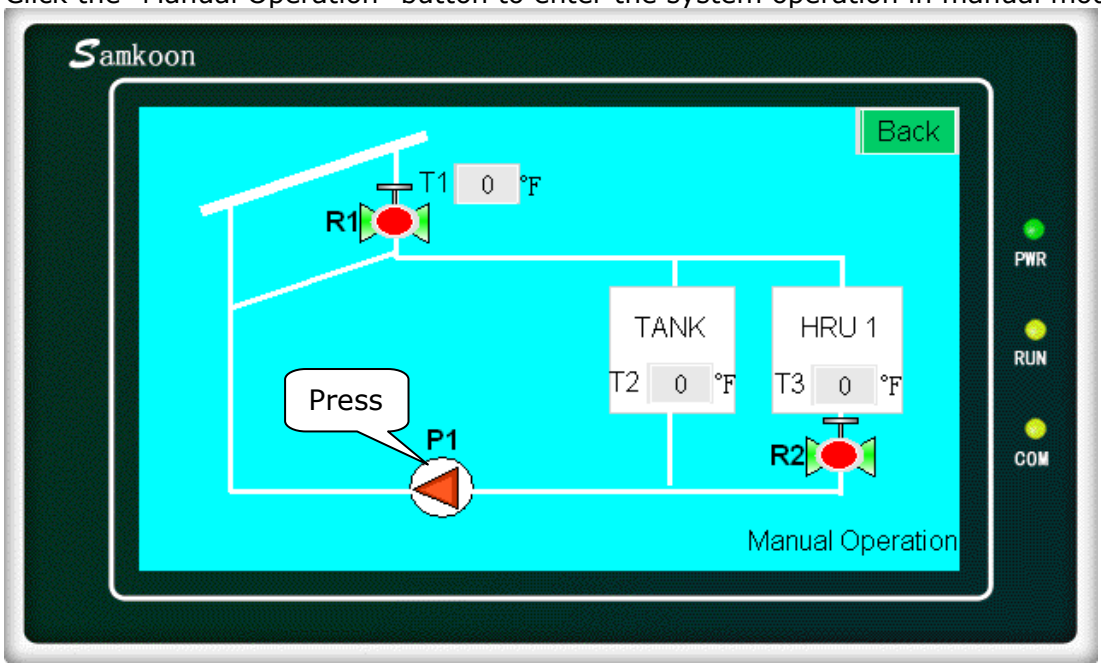
Storage Tank Protection: High-Temp. T2≥**140℉**, R1, R2, and P1 Off; if T2≤130℉, R1, R2, R3, R4 and P1 resume to Normal



Menu for System 2

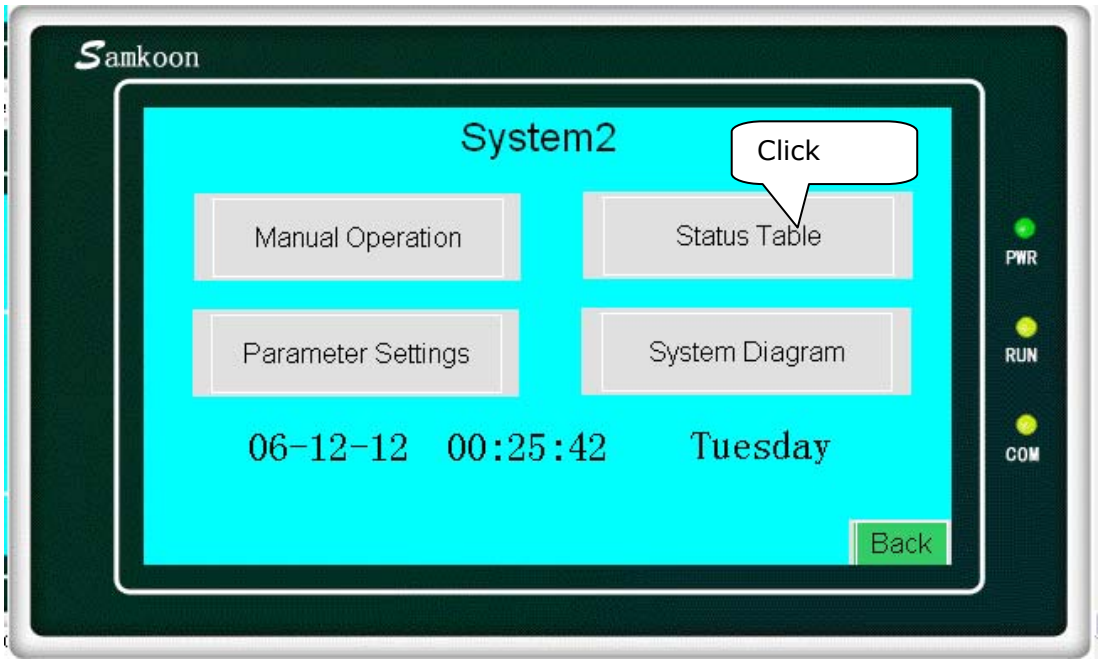


Click the "Manual Operation" button to enter the system operation in manual mode

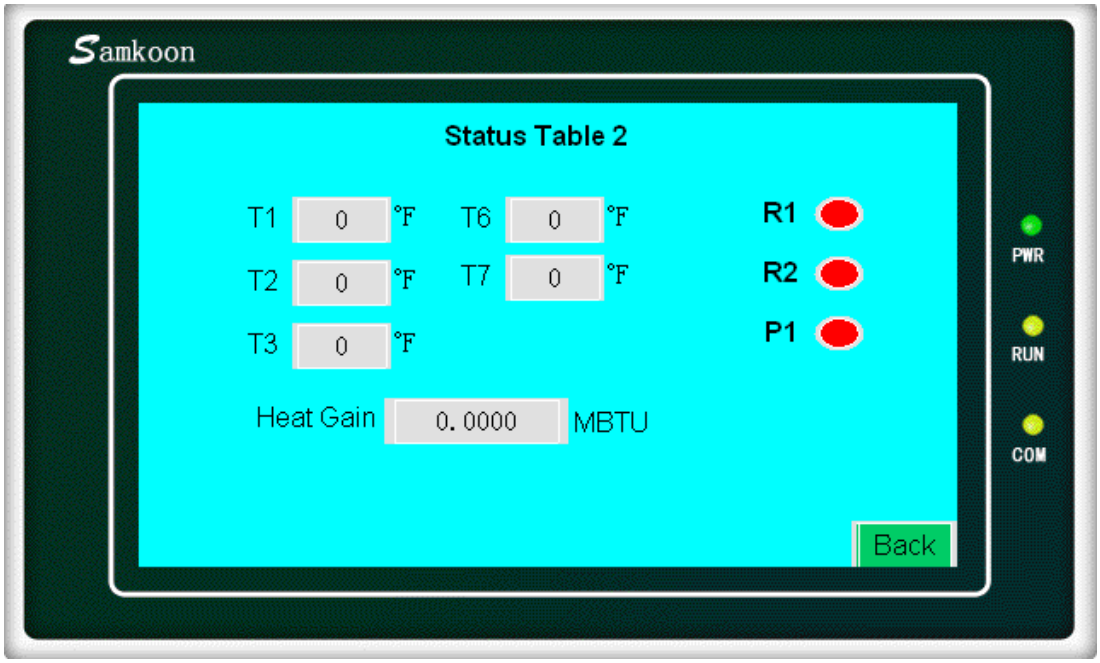


The Controller is now in manual mode once this page is shown. Click the load symbol on the schematic to activate/deactivate pump or valve. When the device is on, the light displays a green color, and then changes to a red color when the device is off.

Upon exit of the Manual Mode the controller will activate the Auto Mode.

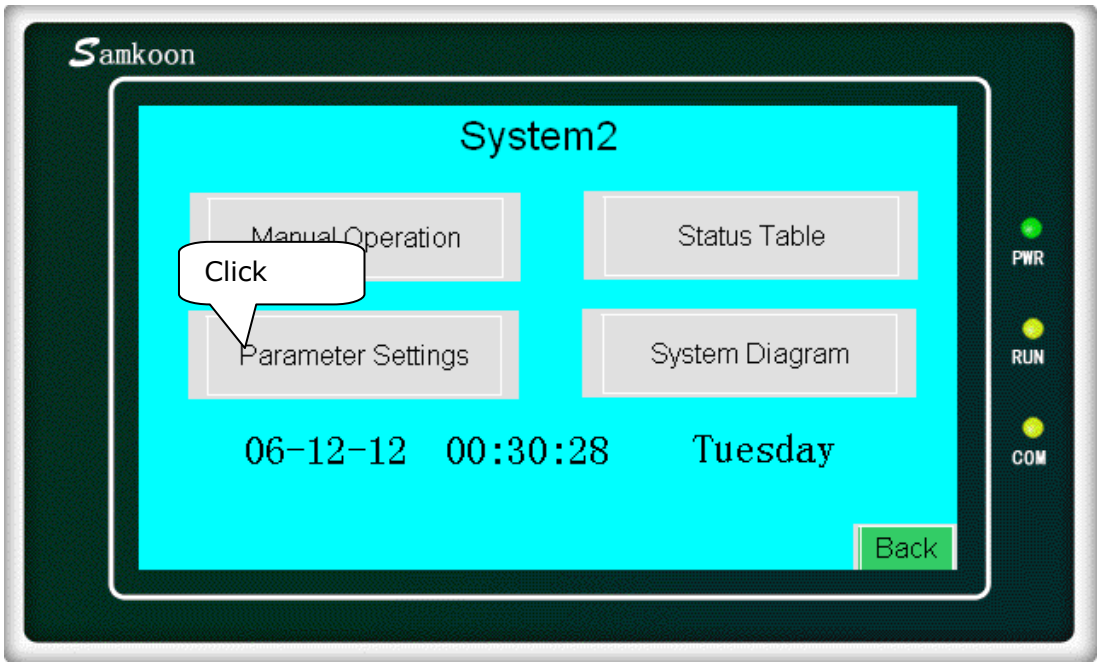


Click "Status Table" button to show as below:

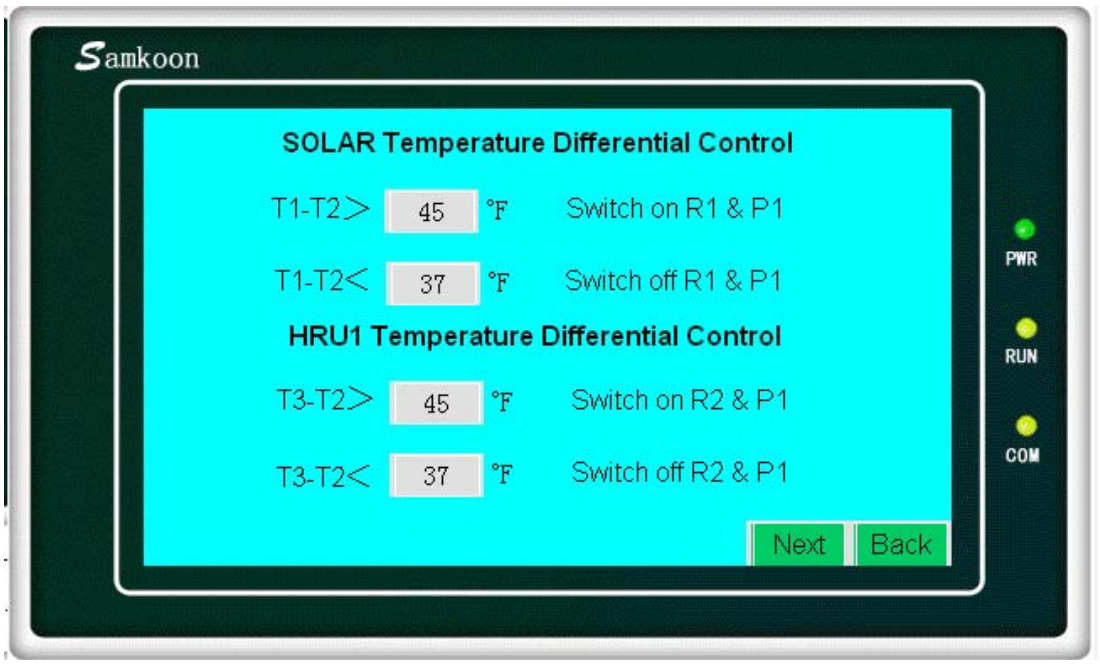


The actual system temperature, valve, pump status, and the accumulative heat gain will be displayed.

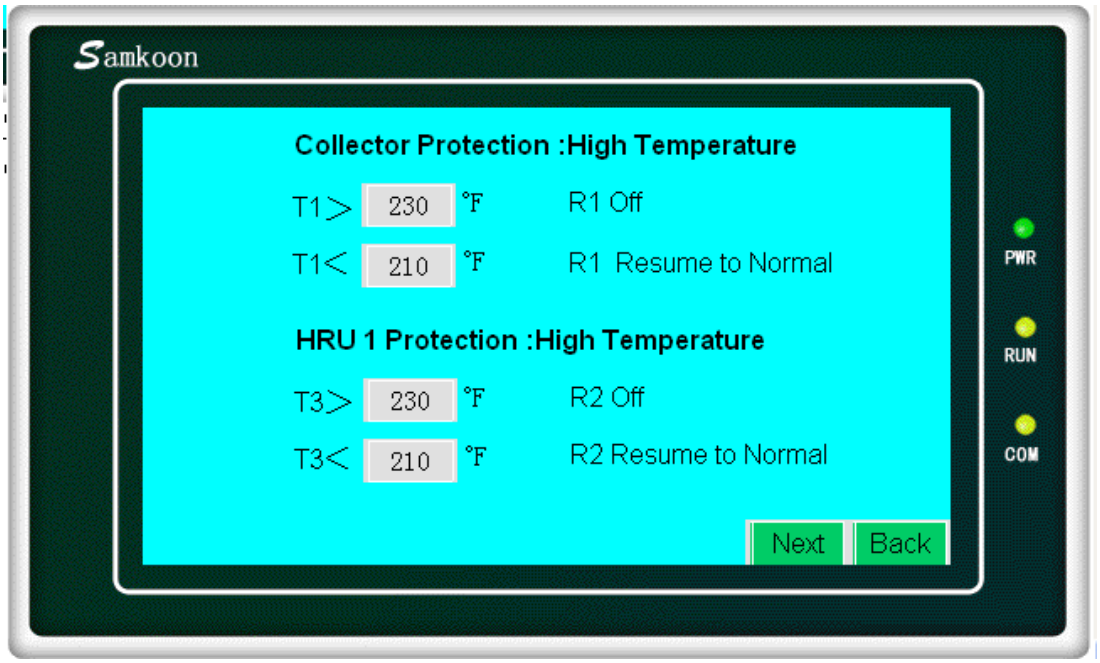
Note: When the lamp is a green color, the valve or pump is on;
When the Lamp is a red color, the valve or pump is off.

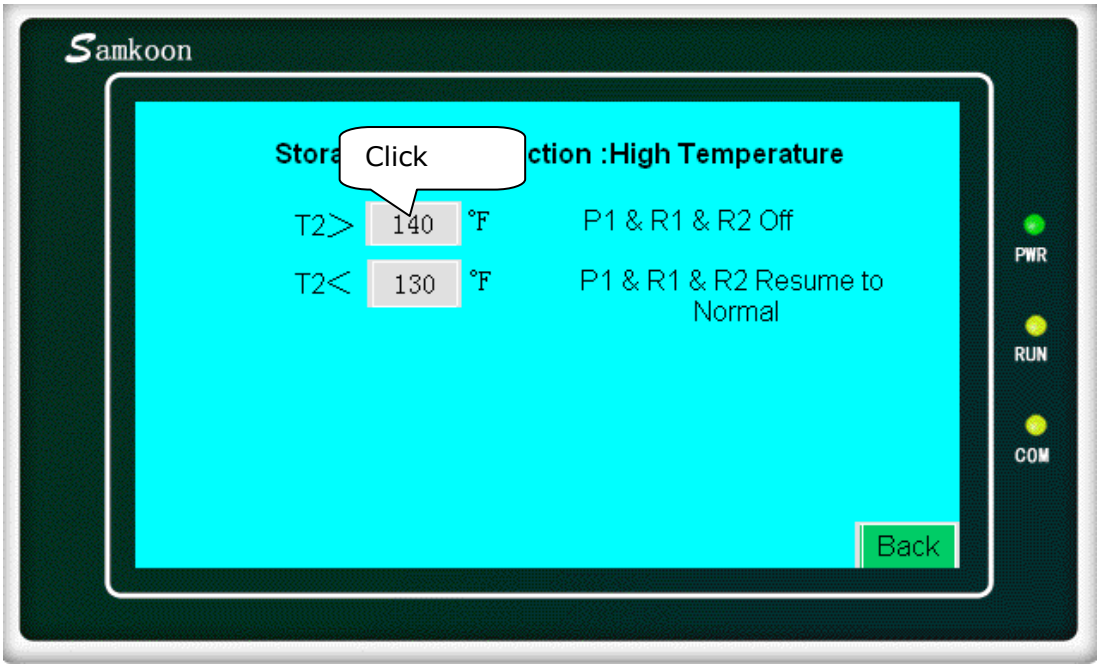


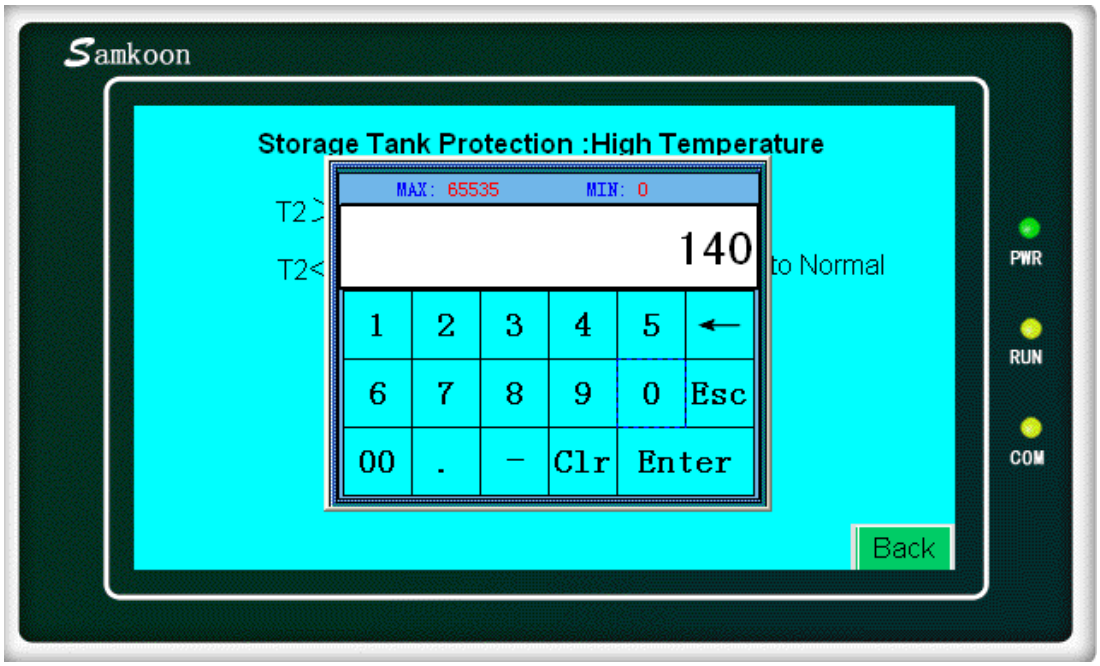
Click the "Parameter Settings" button to show the status:



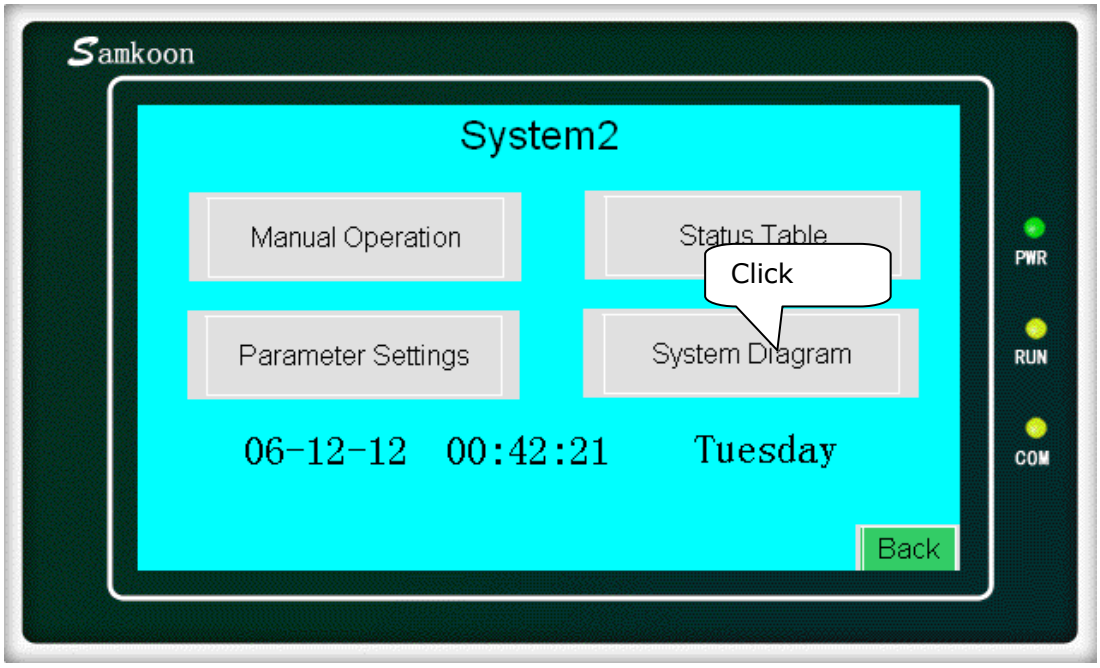
The default value of the parameter setting is displayed here. To change the setting, click the cell to input the desired value. To cancel one function, such as "SOLAR Temperature Differential Control", T1-T2>45F change into T1-T2>999F; To resume this function, input the desired value.


Samkoon
Collector Protection :High Temperature
T1> 230 °F R1 Off
T1< 210 °F R1 Resume to Normal
HRU 1 Protection :High Temperature
T3> 230 °F R2 Off
T3< 210 °F R2 Resume to Normal
Next
Back
PWR
RUN
COM

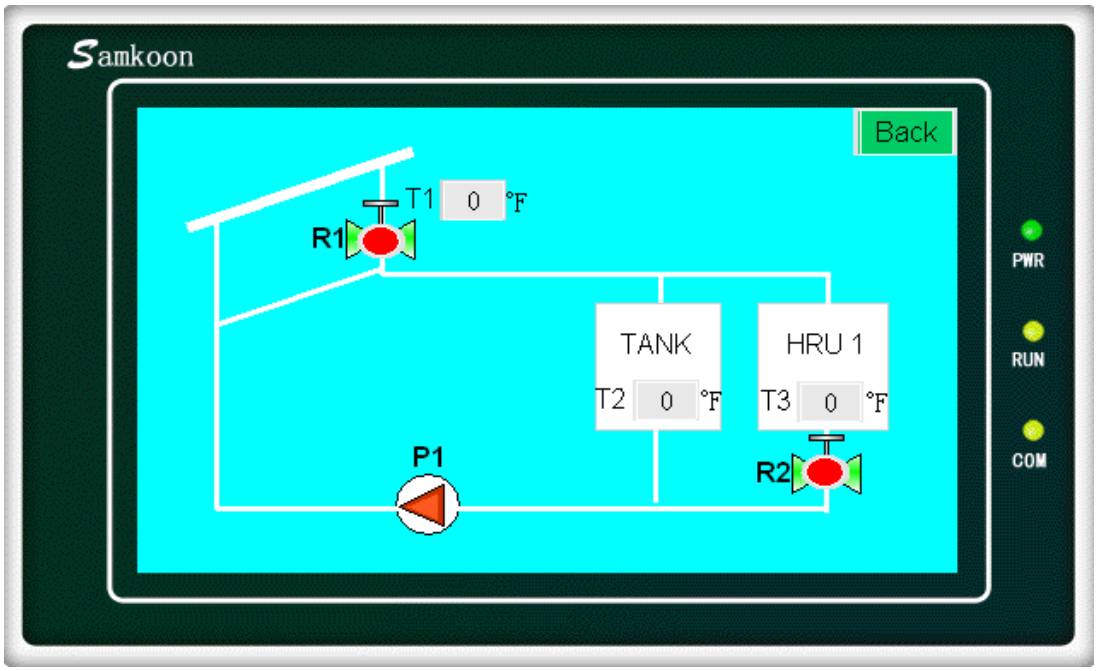

Samkoon
Click
ction :High Temperature
T2> 140 °F P1 & R1 & R2 Off
T2< 130 °F P1 & R1 & R2 Resume to Normal
Back
PWR
RUN
COM



Input the value and click "Enter"



Click "System Diagram" to show the system schematics and real-time operation status.



7. System 3 Function Survey

Inputs: 5 Temperature Sensors T1, T2,T3,T4

Outputs: 4 Relays @ 24VAC 200W, 60HZ (relays for solenoid valves) R1, R2, R3, (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ (relays for pump) P1 (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ undesignated

Temperature Differential Control:

SOLAR T1-T2>45℉ (Adjustable)，Switch On R1 & P1；T1-T2<37℉ (Adjustable)，Switch Off R1 & P1;

HRU 1 T3-T2>45℉(Adjustable)，Switch On R1 & R2 & P1；T3-T2<37℉(Adjustable)，Switch Off R1 & R2 & P1;

HRU 2 T4-T2>45℉(Adjustable)，Switch On R1 & R3 & P1；T4-T2<37℉(Adjustable)，Switch Off R1 & R3 & P1;

Switch Off P1 when R1, R2, R3 and R4 are all switched Off.

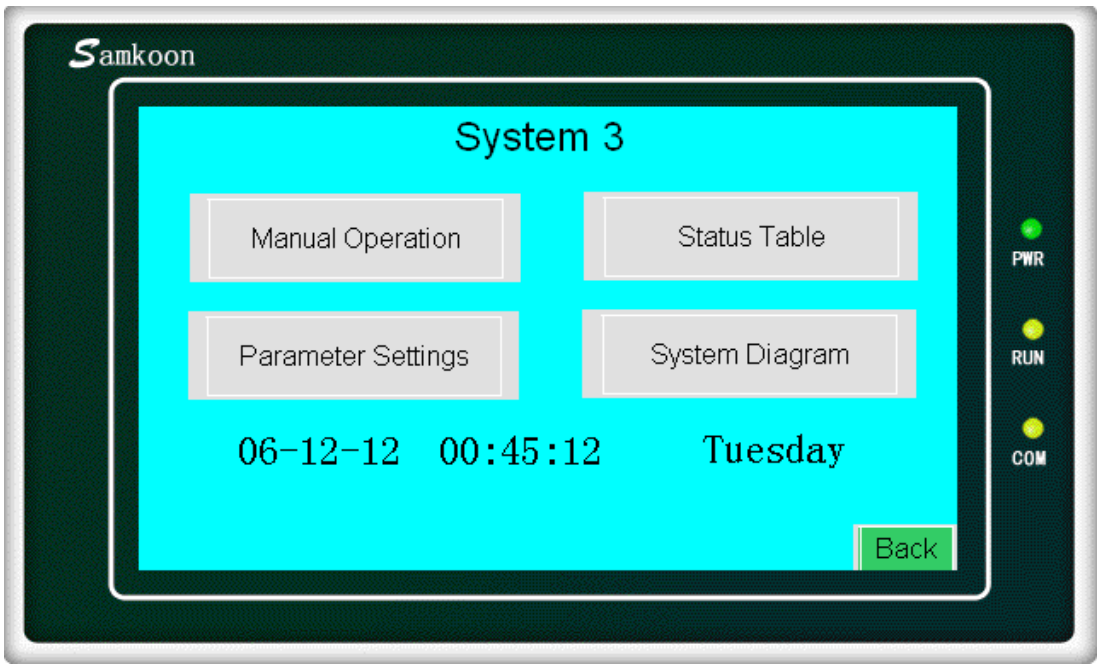
Collector Protection:High-Temp.:T1≥230℉, R1 Off; if T1≤210℉, P1 & R1 resume to Normal

HRU 1 Protection: High-Temp.: T3≥230℉, R2 Off; if T3≤210℉, P1 & R2 resume to Normal

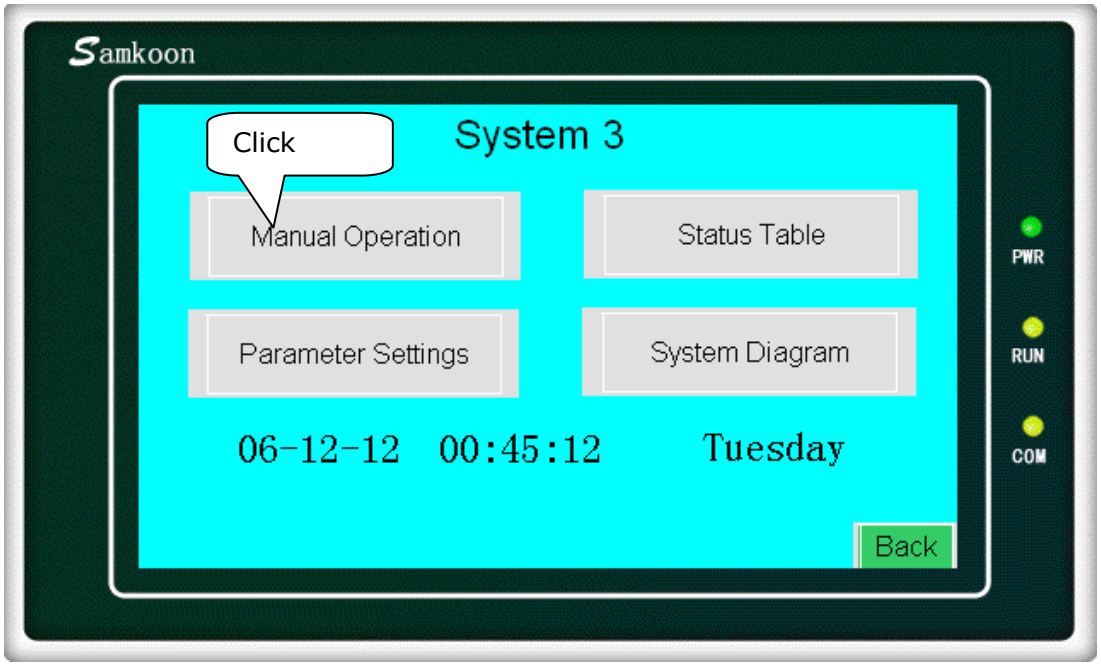
HRU 2 Protection: High-Temp.: T4≥230℉, R3 Off; if T4≤210℉, P1 & R3 resume to Normal

Switch Off P1 when R1, R2, R3 and R4 are all switched Off

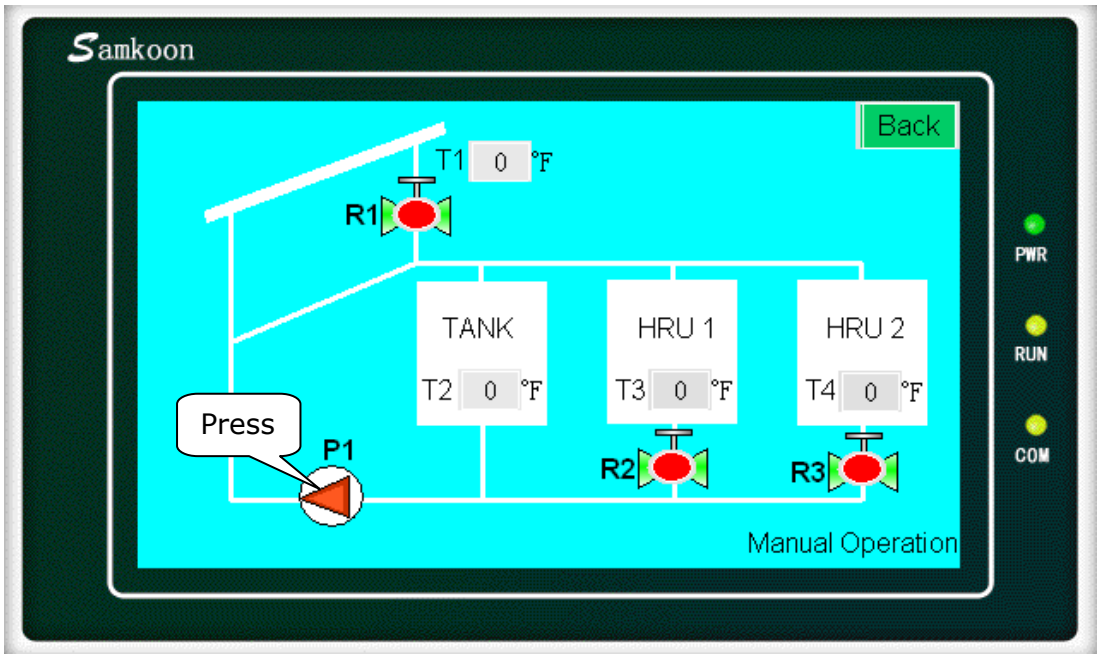
Storage Tank Protection: High-Temp. T2≥**140**℉, R1, R2, R3, R4 and P1 Off; if T2≤130℉, R1, R2, R3, R4 and P1 resume to Normal



Menu for System 3

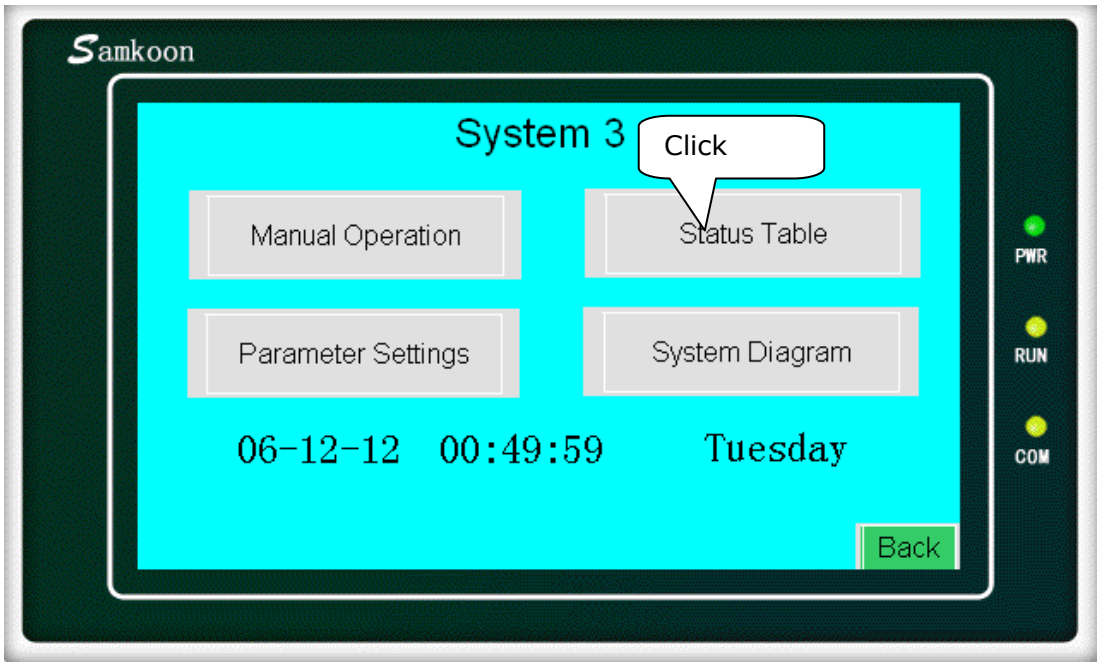


Click the "Manual Operation" button to enter the system operation in manual mode

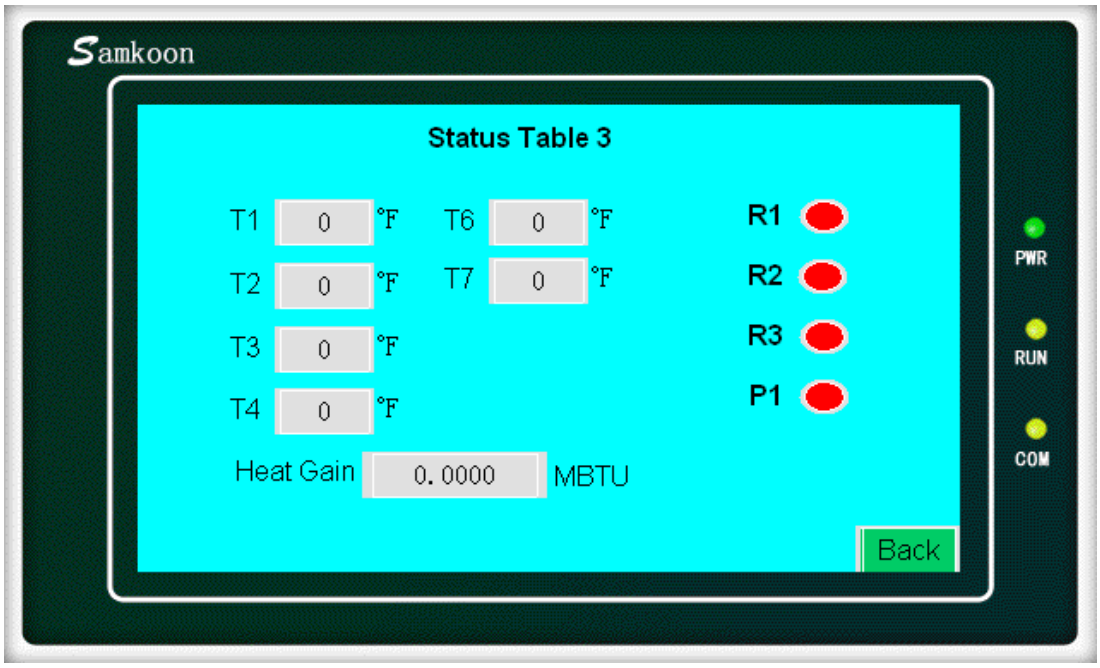


The Controller is now in manual mode once this page is shown. Click the load symbol on the schematic to activate/deactivate pump or valve. When the device is on, the light displays a green color, and then changes to a red color when the device is off.

Upon exit of the Manual Mode the controller will activate the Auto Mode.

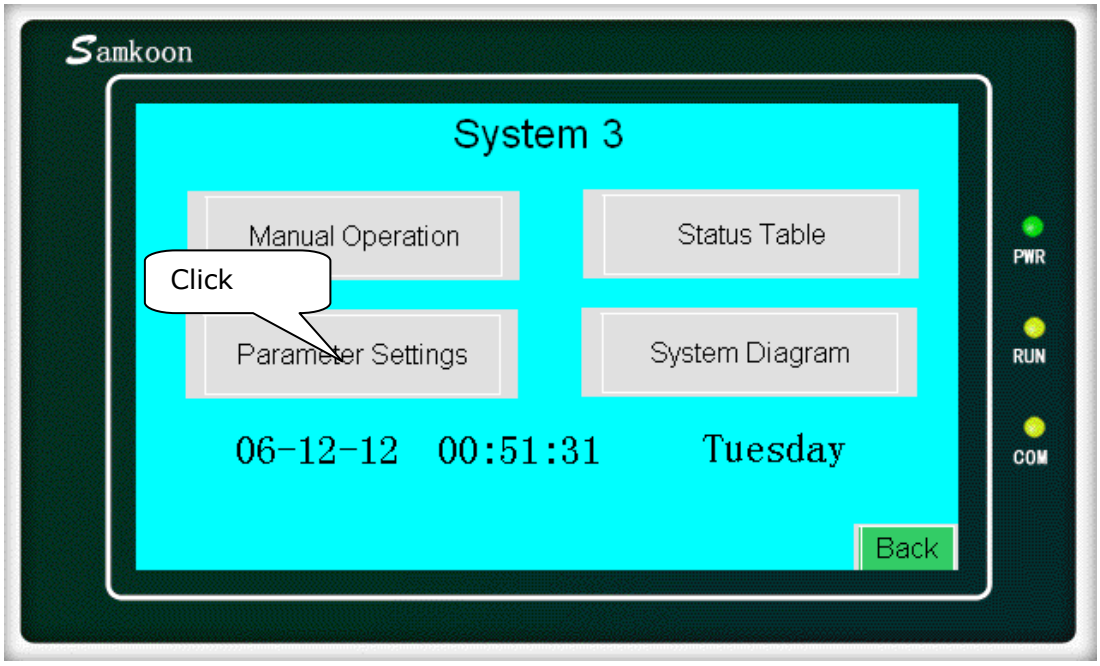


Click "Status Table" button to show as below:

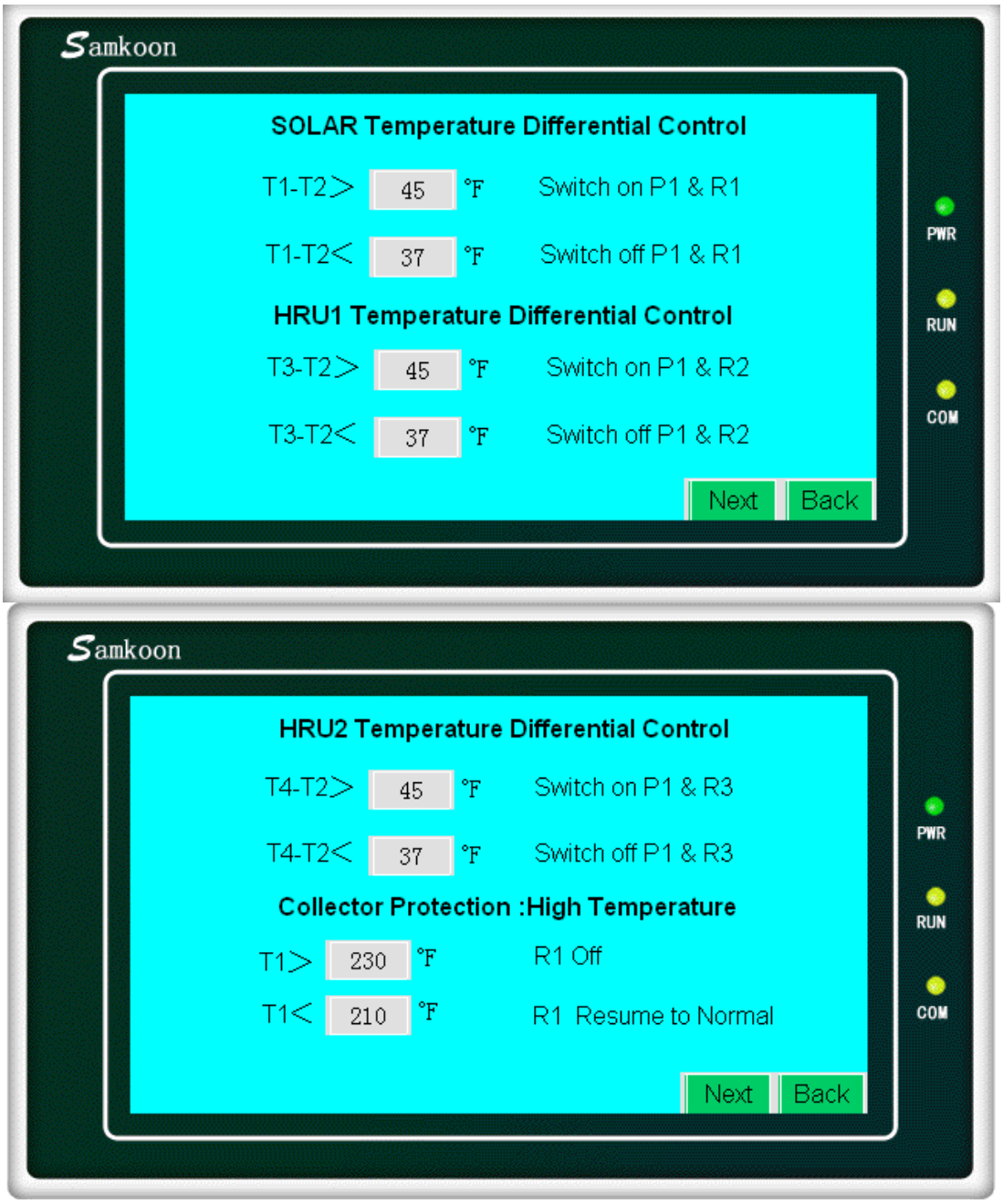


The actual system temperature, valve, pump status, and the accumulative heat gain will be displayed.

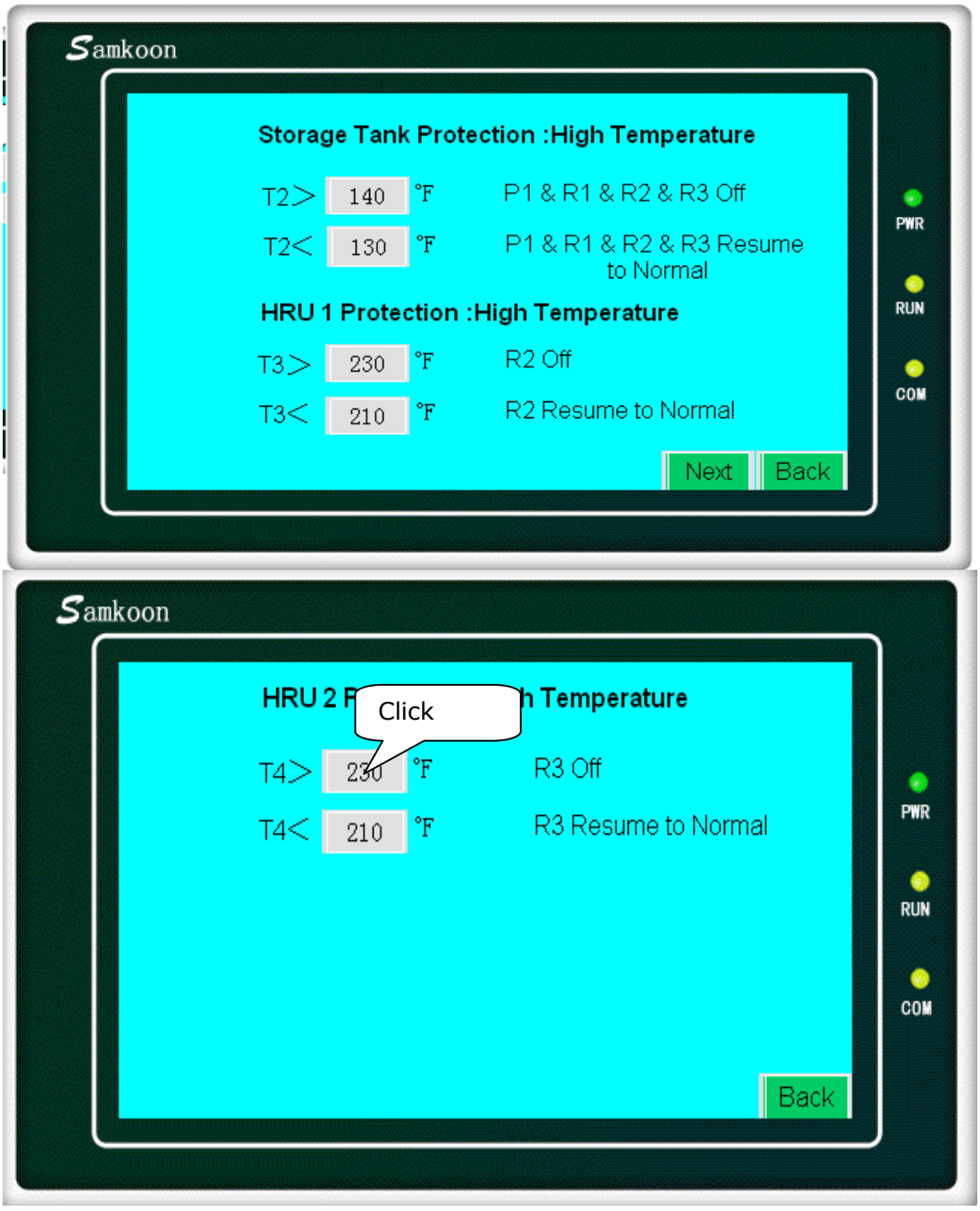
Note: When the lamp is a green color, the valve or pump is on;
When the Lamp is a red color, the valve or pump is off.

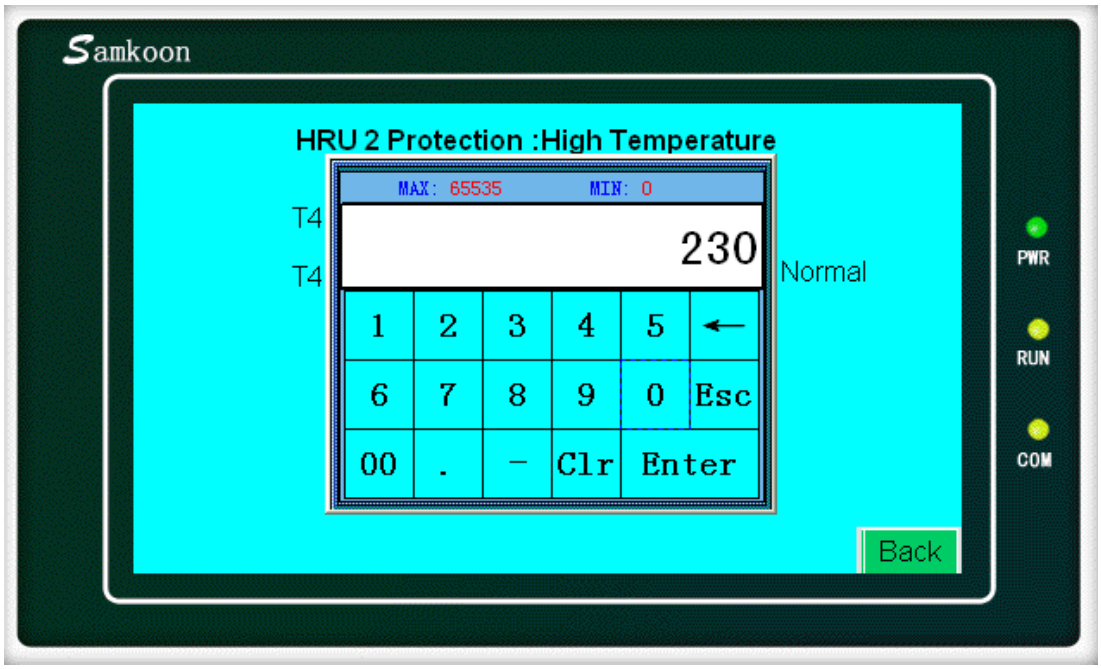


Click the "Parameter Settings" button to show the status:

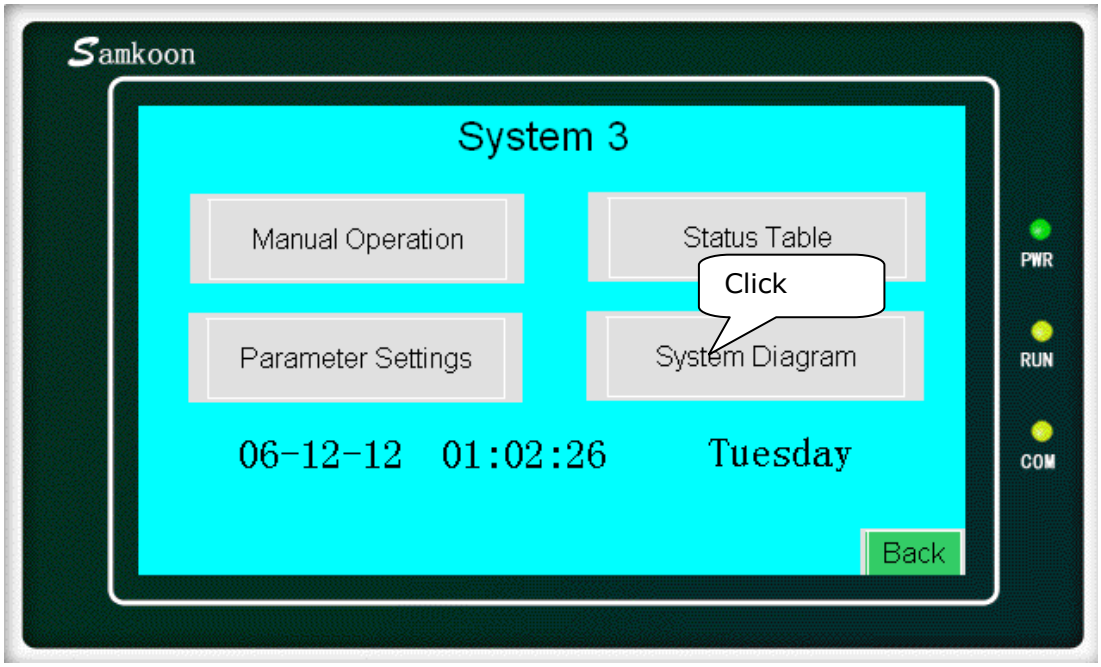


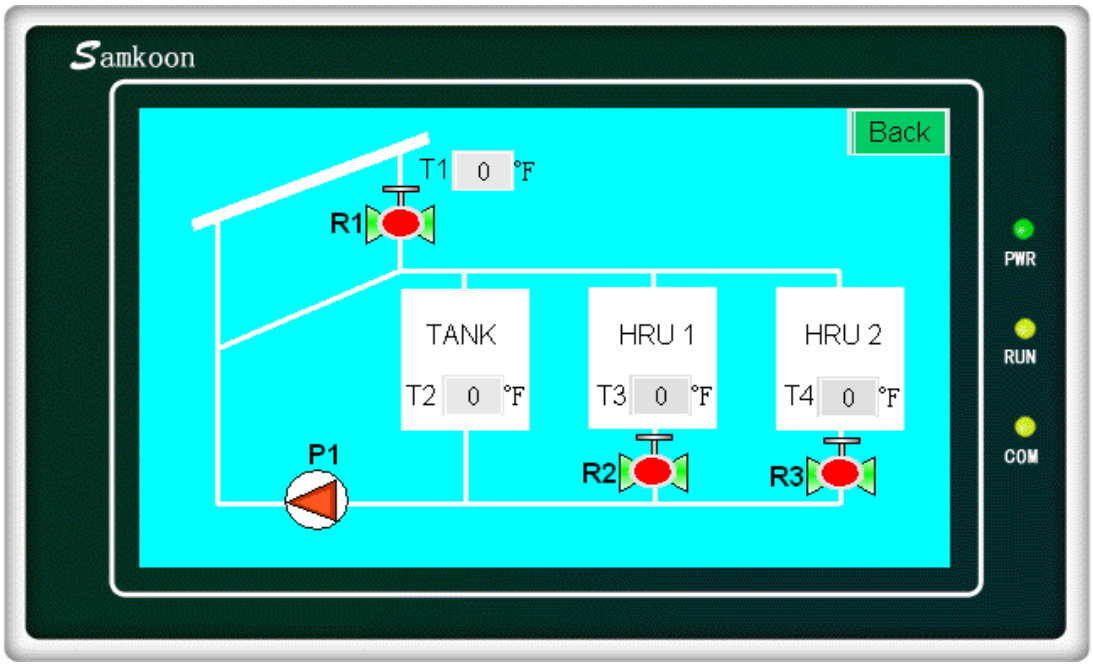
The default value of the parameter setting is displayed here. To change the setting, click the cell to input the desired value. To cancel one function, such as "Collector Protection: High Temperature", T1>230F change into T1>999F; To resume this function, input the desired value.


Samkoon
Storage Tank Protection :High Temperature
T2> 140 °F P1 & R1 & R2 & R3 Off
T2< 130 °F P1 & R1 & R2 & R3 Resume to Normal
HRU 1 Protection :High Temperature
T3> 230 °F R2 Off
T3< 210 °F R2 Resume to Normal
Next
Back
PWR
RUN
COM
Samkoon
Click
T4> 230 °F R3 Off
T4< 210 °F R3 Resume to Normal
Back
PWR
RUN
COM



Input the value and click "Enter"





7. System 4 Function Survey

Inputs: 5 Temperature Sensors T1, T2, T3, T4, T5

Outputs: 4 Relays @ 24VAC 200W, 60HZ (relays for solenoid valves) R1, R2, R3, R4 (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ (relays for pump) P1 (L,N terminal)

1 Relay @ 24VAC 200W, 60HZ undesignated

Temperature Differential Control:

SOLAR T1-T2>45℉ (Adjustable)，Switch On R1 & P1；T1-T2<37℉ (Adjustable)，Switch Off R1 & P1;

HRU 1 T3-T2>45℉(Adjustable)，Switch On R1 & R2 & P1；T3-T2<37℉ (Adjustable)，Switch Off R1 & R2 & P1;

HRU 2 T4-T2>45℉(Adjustable)，Switch On R1 & R3 & P1；T4-T2<37℉ (Adjustable)，Switch Off R1 & R3 & P1;

HRU 3 T5-T2>45℉(Adjustable)，Switch On R1 & R4 & P1；T5-T2<37℉ (Adjustable)，Switch Off R1 & R4 & P1;

Switch Off P1 when R1, R2, R3 and R4 are all switched Off.

Collector Protection:High-Temp.:T1≥230℉, R1 Off;if T1≤210℉, P1 & R1 resume to Normal

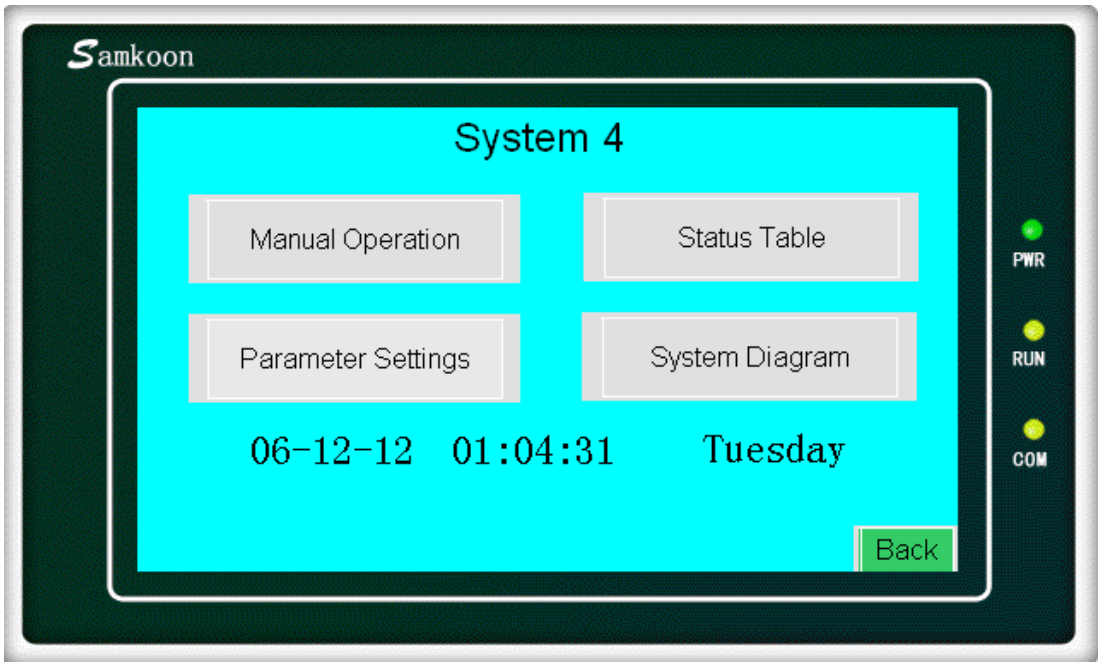
HRU 1 Protection: High-Temp.: T3≥230℉, R2 Off; if T3≤210℉, P1 & R2 resume to Normal

HRU 2 Protection: High-Temp.: T4≥230℉, R3 Off; if T4≤210℉, P1 & R3 resume to Normal

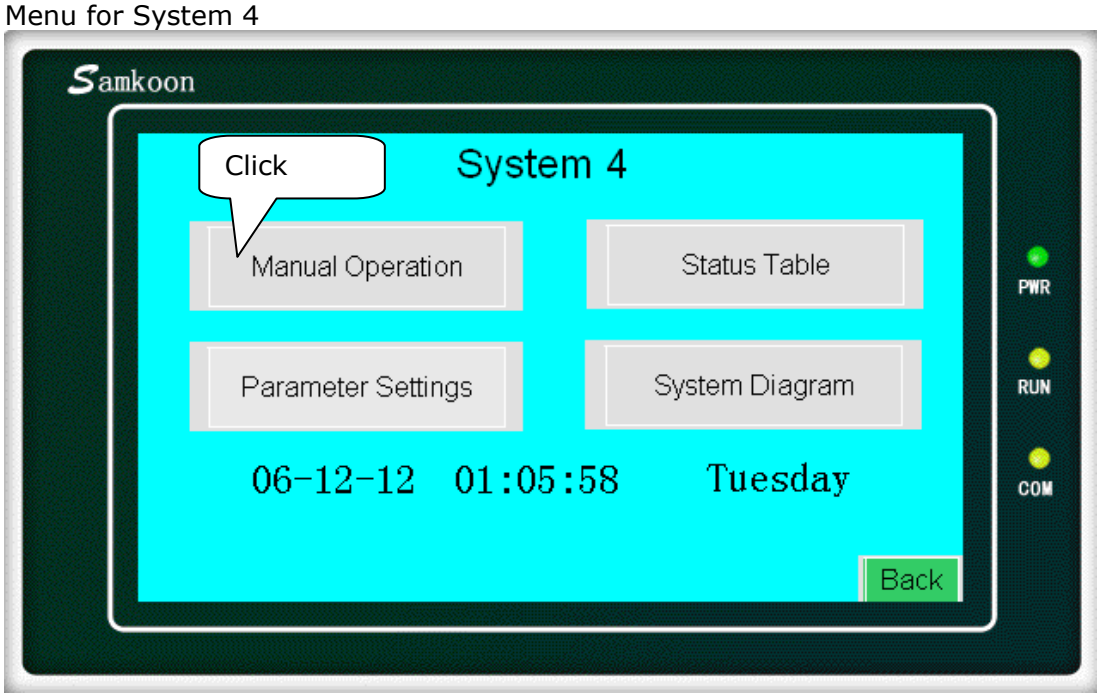
HRU 3 Protection: High-Temp.: T5≥230℉, R4 =Off; if T5≤210℉, P1 & R4 resume to Normal

Switch Off P1 when R1, R2, R3 and R4 are all switched Off

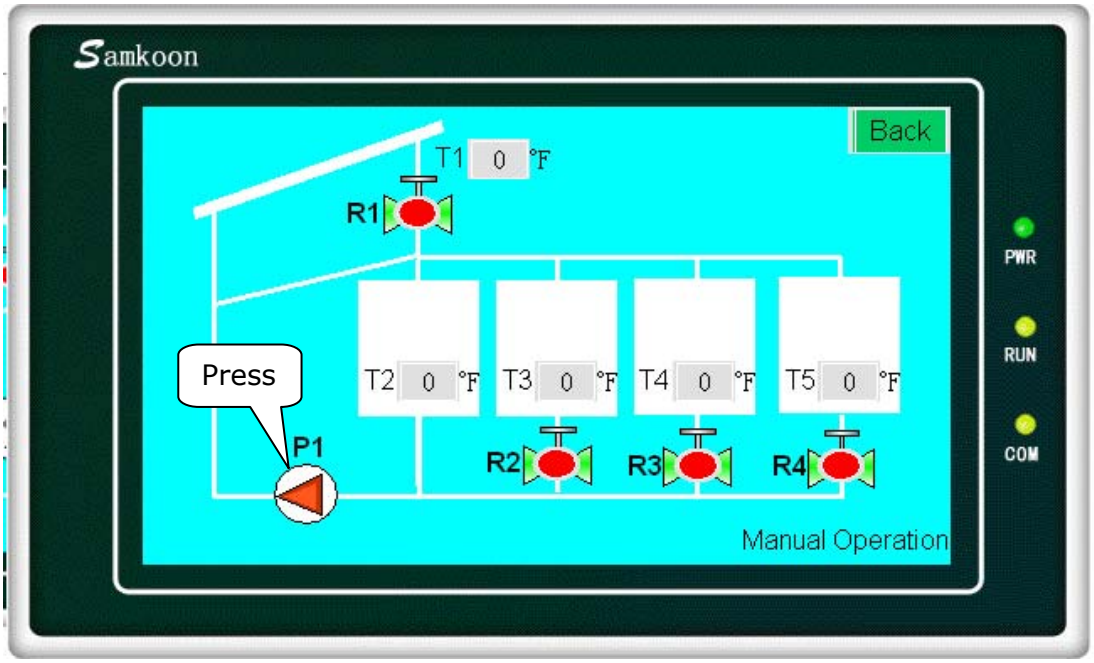
Storage Tank Protection: High-Temp. T2≥**140**℉, R1, R2, R3, R4 and P1 Off; if T2≤130℉, R1, R2, R3, R4 and P1 resume to Normal



Menu for System 4

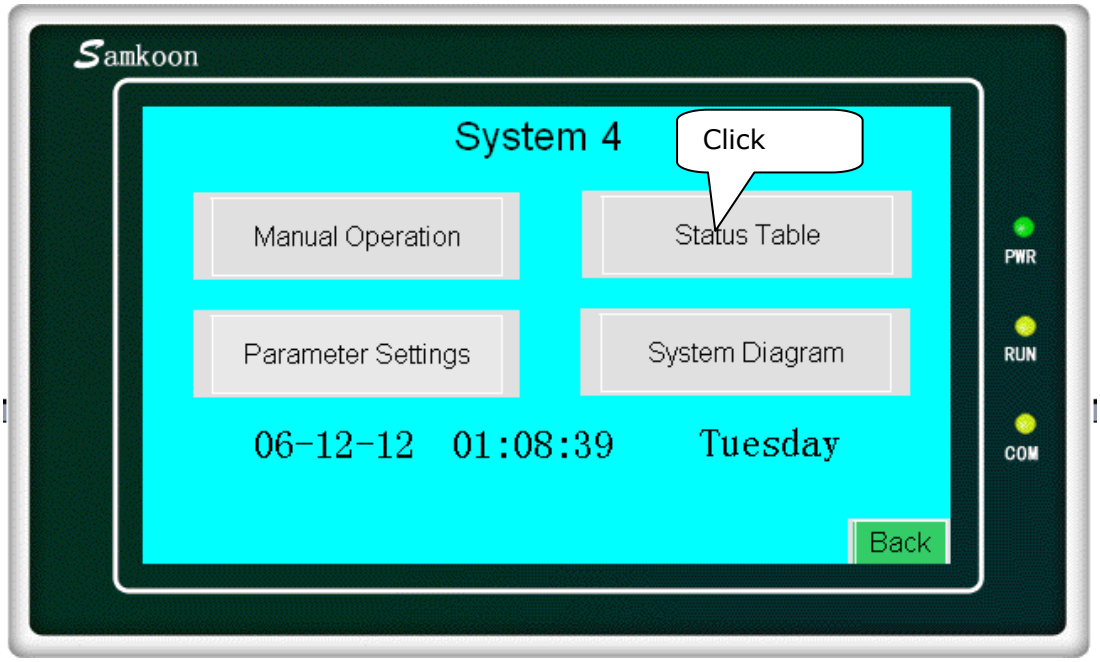


Click the "Manual Operation" button to enter the system operation in manual mode.

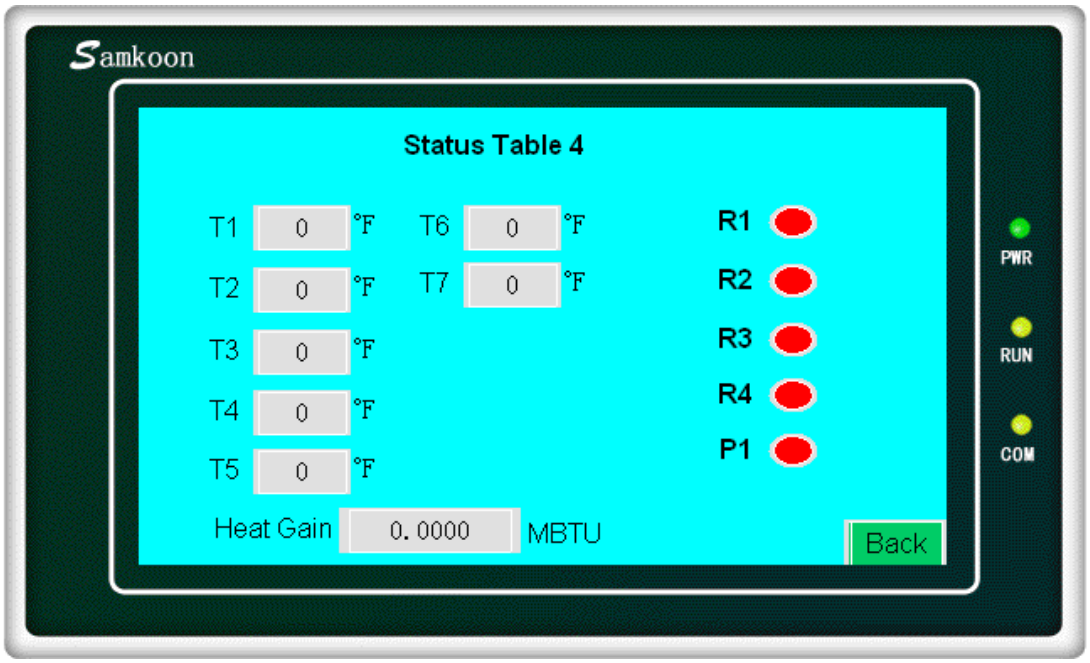


The Controller is now in manual mode once this page is shown. Click the load symbol on the schematic to activate/deactivate pump or valve. When the device is on, the light displays a green color, and then changes to a red color when the device is off.

Upon exit of the Manual Mode the controller will activate the Auto Mode.

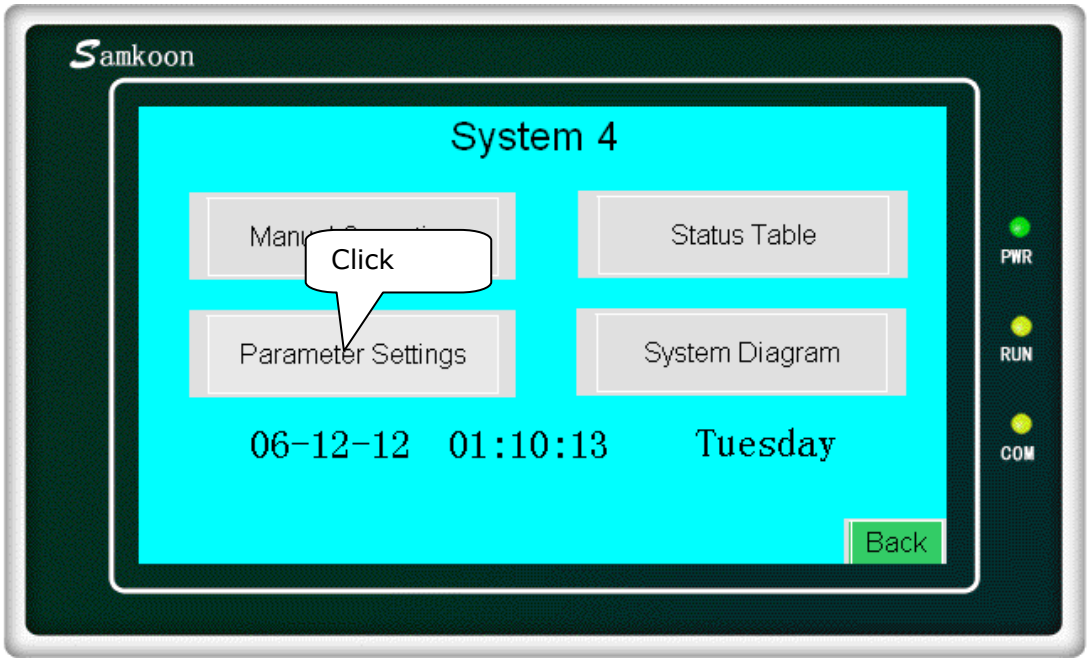


Click "Status Table" button to show as below:

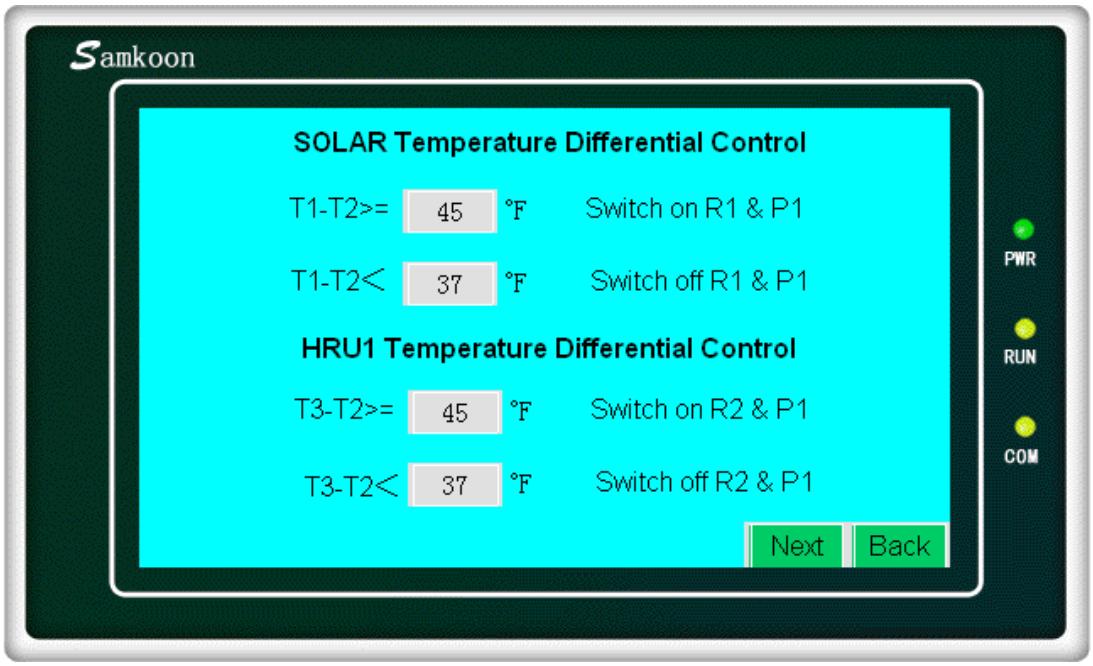


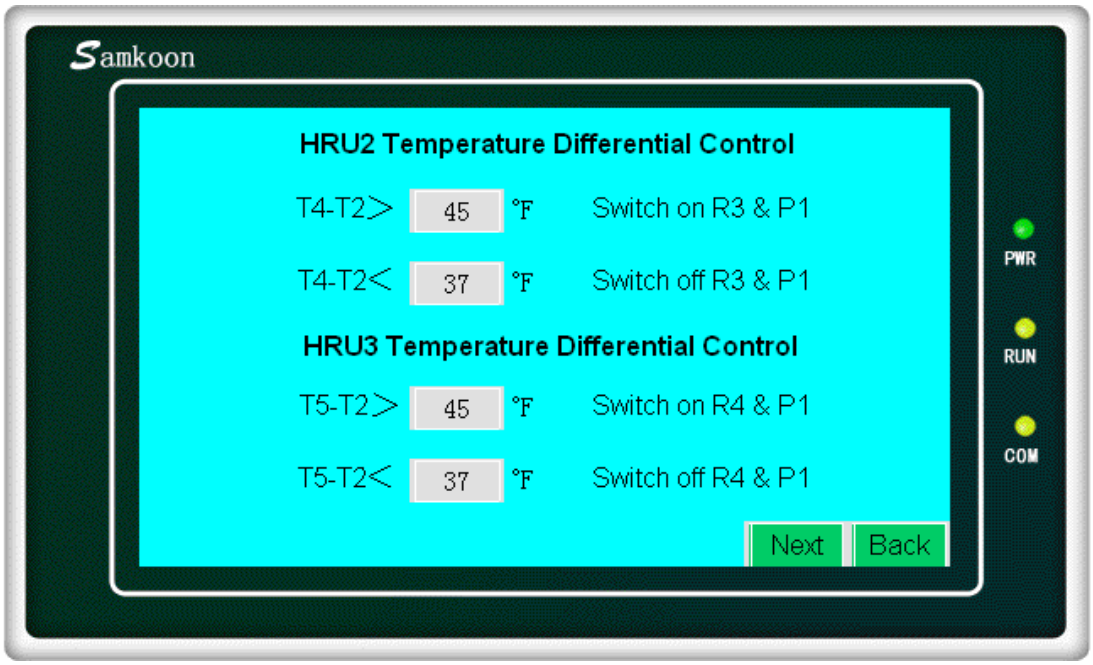
The actual system temperature, valve, pump status, and the accumulative heat gain will be displayed.

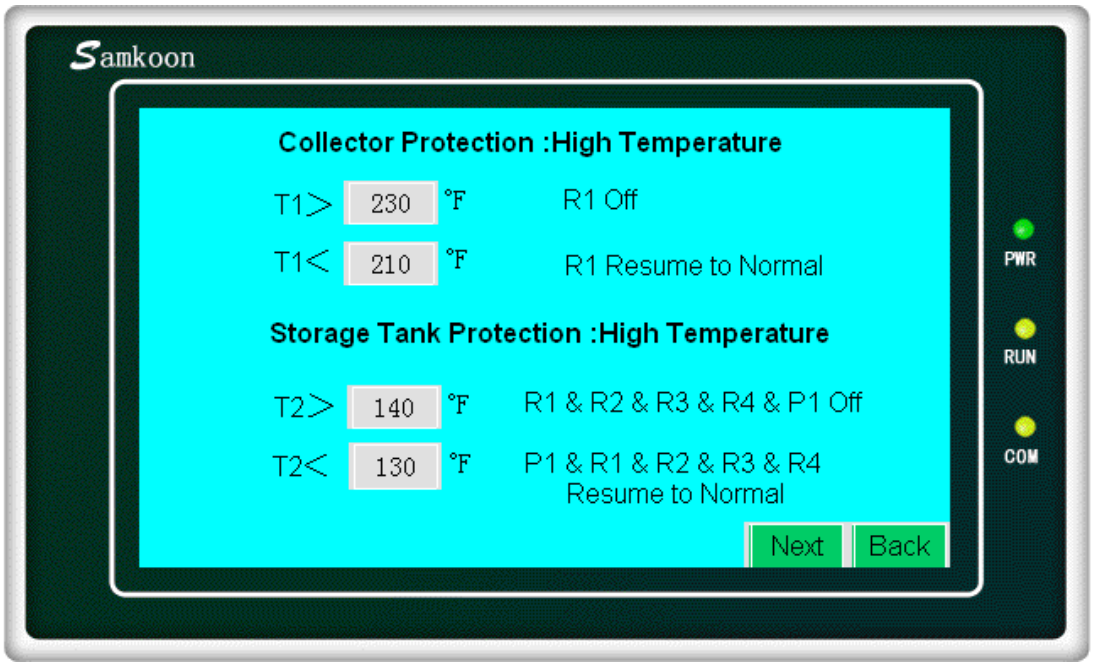
Note: When the lamp is a green color, the valve or pump is on;
When the Lamp is a red color, the valve or pump is off.



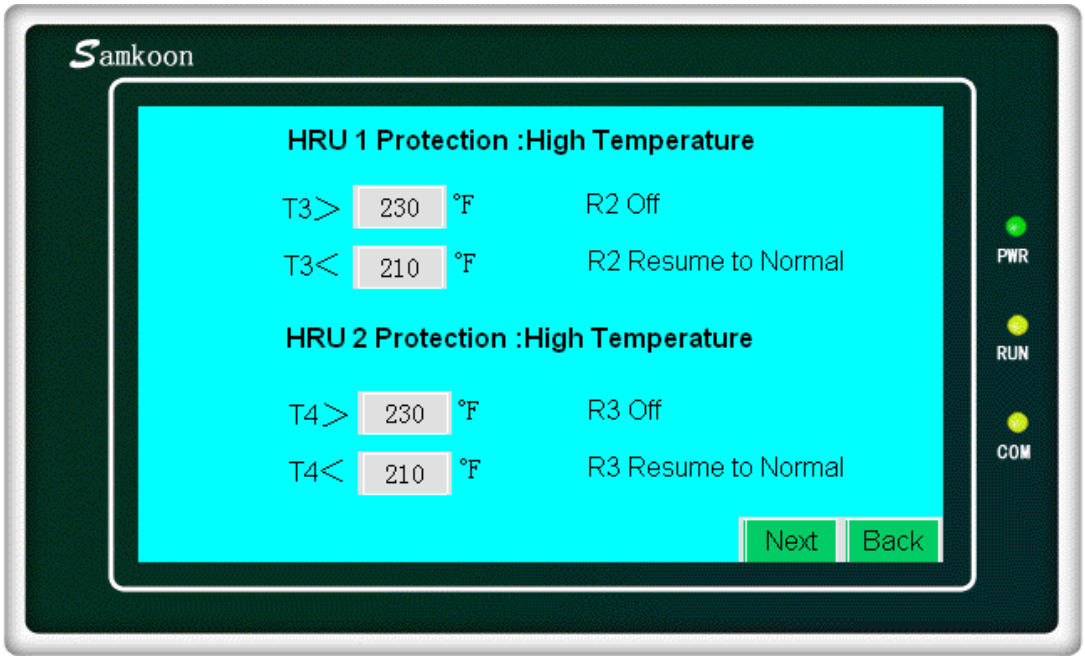
Click the "Parameter Settings" button to show the status:

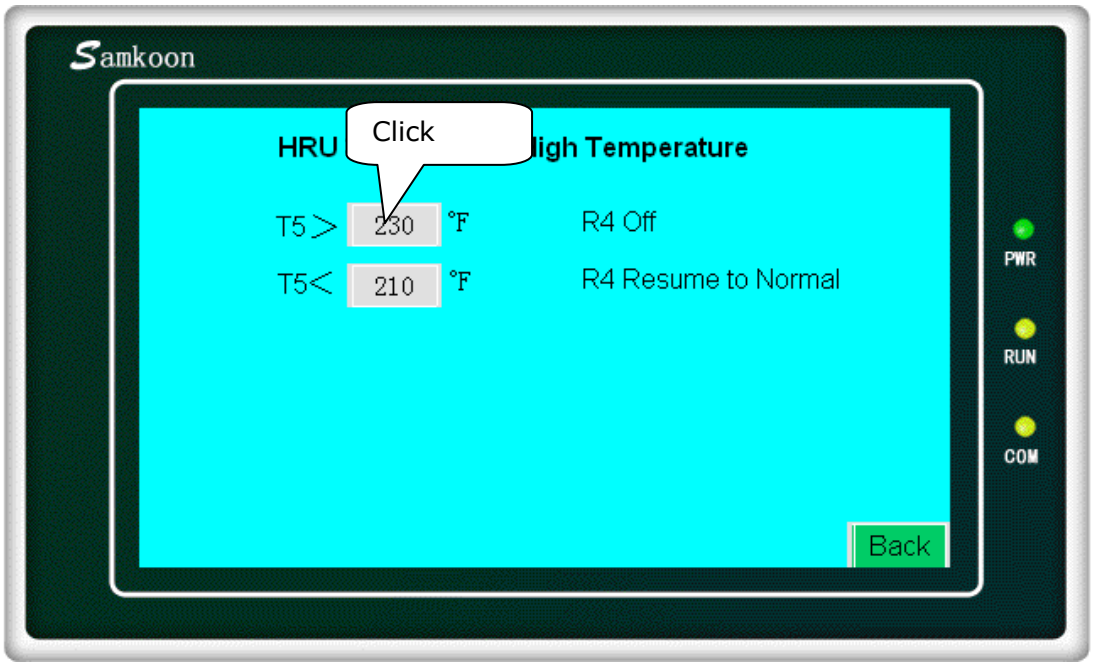

Samkoon
SOLAR Temperature Differential Control
T1-T2>= 45 °F Switch on R1 & P1
T1-T2< 37 °F Switch off R1 & P1
HRU1 Temperature Differential Control
T3-T2>= 45 °F Switch on R2 & P1
T3-T2< 37 °F Switch off R2 & P1
Next
Back
PWR
RUN
COM

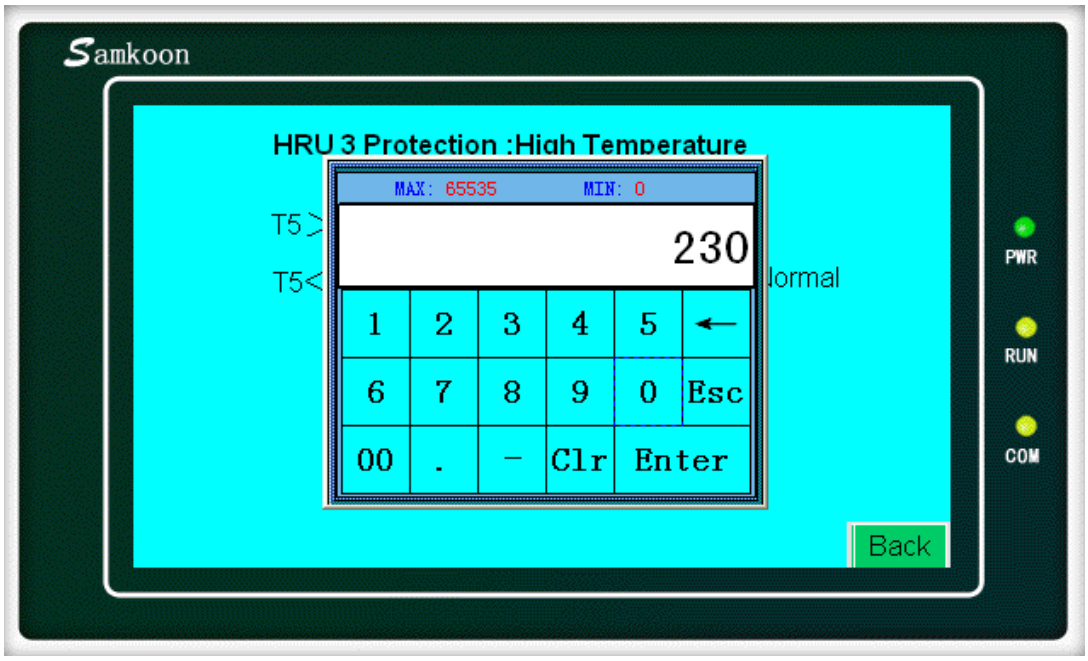

Samkoon
HRU2 Temperature Differential Control
T4-T2> 45 °F Switch on R3 & P1
T4-T2< 37 °F Switch off R3 & P1
HRU3 Temperature Differential Control
T5-T2> 45 °F Switch on R4 & P1
T5-T2< 37 °F Switch off R4 & P1
Next
Back
PWR
RUN
COM



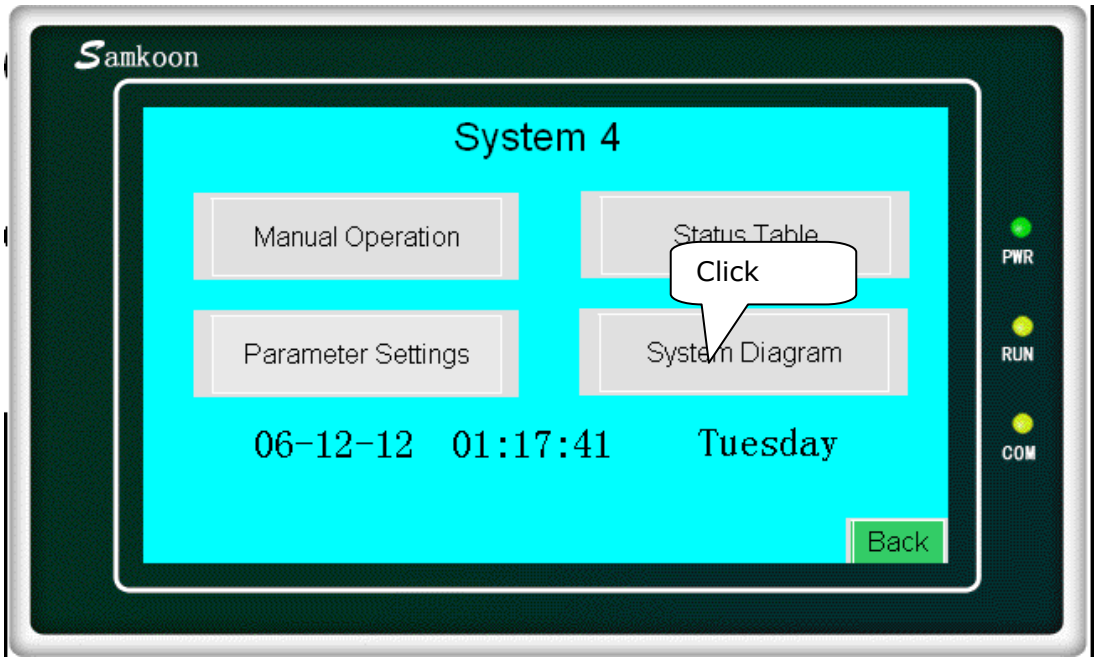
The default value of the parameter setting is displayed here. To change the setting, click the cell to input the desired value. To cancel one function, such as "Collector Protection: High Temperature", T1>230F change into T1>999F; To resume this function, input the desired value.



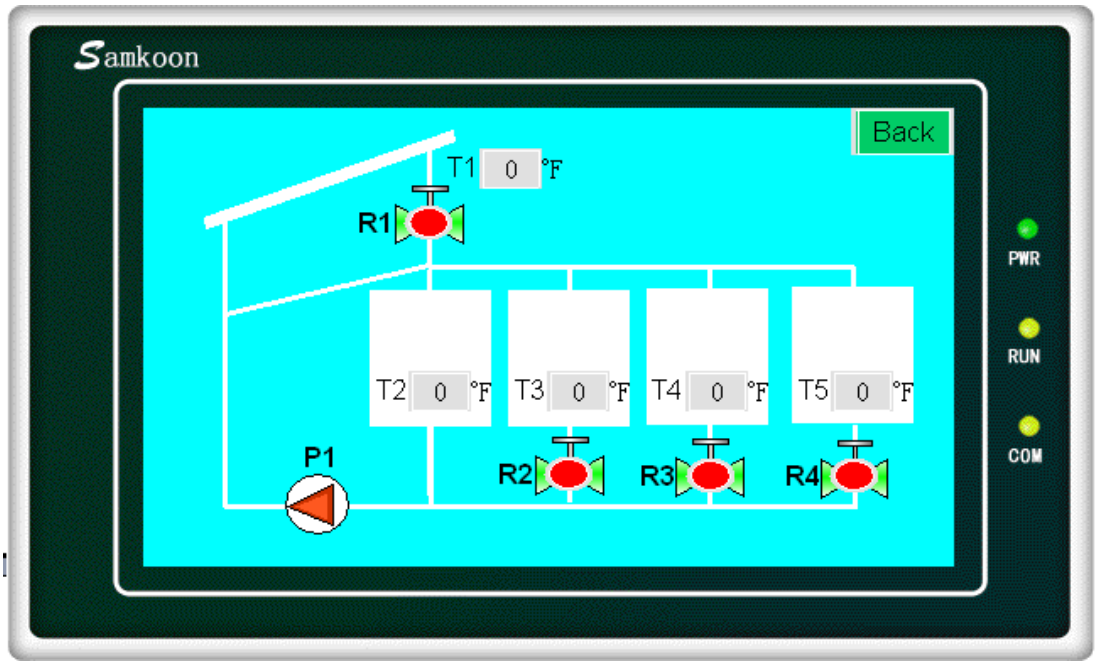


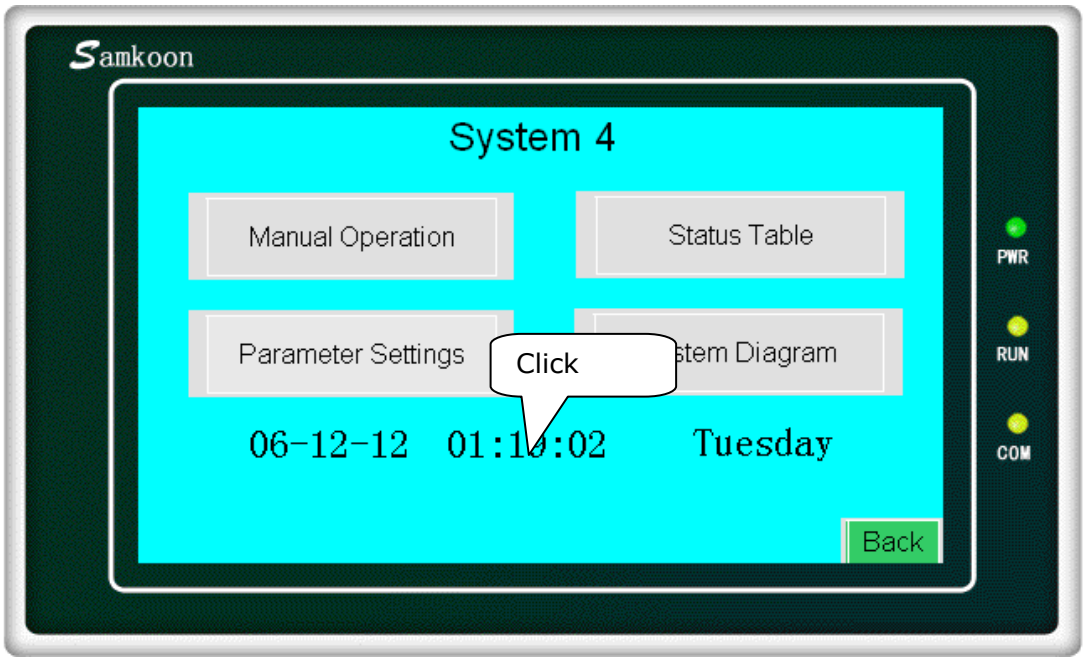


Input the value and click “Enter”



Click "System Diagram" to show the system schematics and real-time operation status.





Click Time to calibrate the Time, Date and Operating Hours