

Monitoring Module ZTT PMU-01

Product Manual

Version: V1.1

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Chapter 1 Overview

This chapter introduces the appearance and main functions of the SMU monitoring module.

1.1 Appearance

The appearance of the monitoring module is shown in Figure 1-1

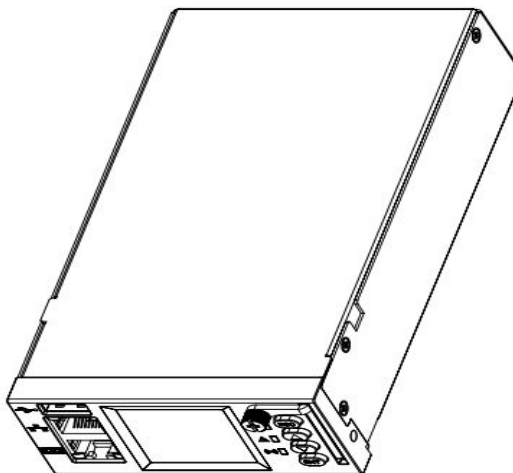


Figure 1-1 Appearance of the Monitoring Module

1.2 Main functions

1.2.1 communication with the host computer

The monitoring module provides RS485/Ethernet interfaces and 6 groups of alarm dry contact to communicate with the host computer. At the same time, it supports the direct access mode of web pages.

Dry contact output mode

The monitoring module provides six groups of alarm dry contact output, and each group is divided into normally open/normally closed contacts. Before the alarm event occurs, each dry contact is configured in advance, and different dry contacts are respectively corresponding to a certain alarm type or a group of alarm type groups formed by logical relationship. In this way, once this alarm event or a set of alarm events meeting the logical relationship occurs, the dry contact will act and send an alarm to the outside world.

If the user has other intelligent monitoring, the alarm dry contact can be connected to the interface of its intelligent monitoring equipment, and the dry contact network can be conveniently established to complete the level isolation transmission of fault signals.

1.2.2 Telemetry, remote signaling, remote control

In RS485 or Ethernet communication mode, the backstage host can realize telemetry, remote signaling, remote control functions for the power supply system through the monitoring module.

Telemetry function: the backstage host can obtain the real-time analog quantity of the system through the monitoring module.

Remote signaling function: the background host can obtain the real-time switching value of the system through the monitoring module.

Remote control function: the backstage host can realize five functions: module on/off, system EC/FC conversion, system control mode switching, alarm silencing, and battery test start/stop.

1.2.3 Set the alarm type of dry contacts

1. By setting the "associated relay" parameter of the alarm type, a certain alarm type can be associated with a dry contact.

Once this alarm event occurs, the corresponding dry contact will act and send an alarm to the outside world. When leaving the factory, all six pairs of alarm output dry contacts have default alarm types.

2. The monitoring module has the function of programmable logic controller (PLC), and the alarm types corresponding to the six dry contacts of the monitoring module can be flexibly set by the computer. The PLC setting of each dry contact includes three input alarms and two relationship markers, that is, the serial numbers of the three alarm types and their logical relationships need to be set, and the logical relationships include AND, OR and NOT.

The PLC function can be set to be off. If the PLC function and the associated relay setting mode are effective at the same time, when the alarm type occurs under either setting mode, the corresponding dry contacts will act and send an alarm to the outside world.

Chapter 2 Wiring

This chapter describes the wiring instructions of the monitoring module.

2.1 Connecting signal line terminals

The distribution of each signal line terminal is shown in Figure 2-1.

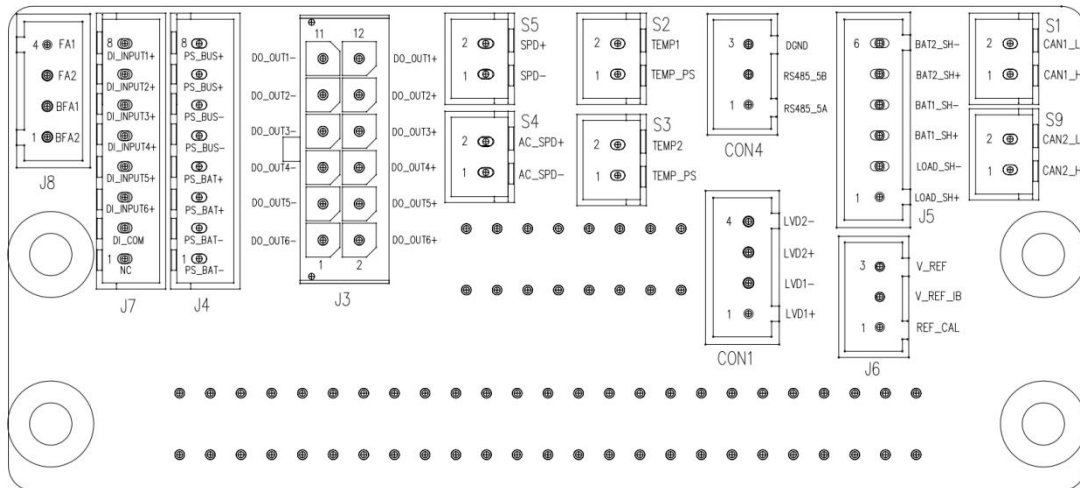


Figure 2-1 Schematic diagram of PCB terminal of monitoring module

See Table 2-1 for the terminal definition and wiring description of monitoring module. Users can connect signal lines according to Table 2-2.

Table 2-2 Terminal definition and wiring description of monitoring module

Terminal No. J8		
PIN	Definition	Function
1	BFA2	Fuse voltage of battery pack 2
2	BFA1	Fuse voltage of battery pack 1
3	FA2	Fuse voltage of load 2
4	FA1	Fuse voltage of load 1
Terminal No. J7		
PIN	Definition	Function
1	NC	
2	DI_COM	Digital input common port
3	DI_INPUT6+	Digital input 6
4	DI_INPUT5+	Digital input 5
5	DI_INPUT4+	Digital input 4
6	DI_INPUT3+	Digital input 3
7	DI_INPUT2+	Digital input 2

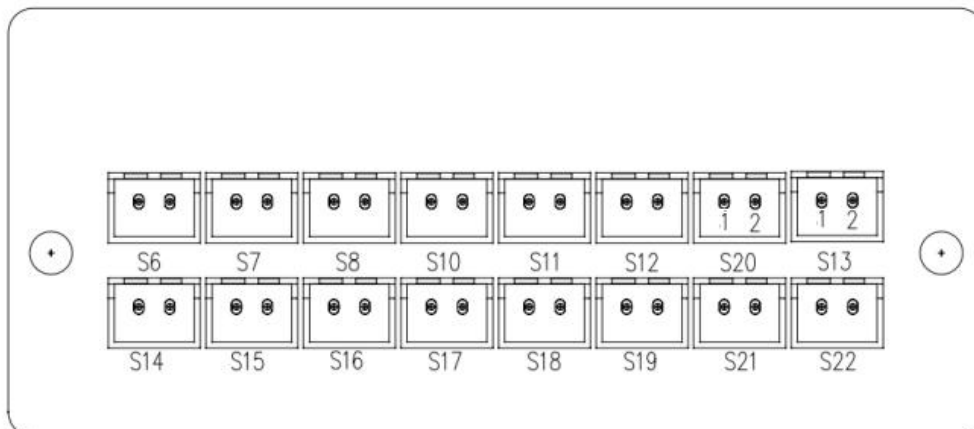
8	DI_INPUT1+	Digital input 1
Terminal No. J4		
PIN	Definition	Function
1	PS_BAT-	Battery bus negative
2	PS_BAT-	Battery bus negative
3	PS_BAT+	Battery bus positive
4	PS_BAT+	Battery bus positive
5	PS_BUS-	Bus negative
6	PS_BUS-	Bus negative
7	PS_BUS+	Bus positive
8	PS_BUS+	Bus positive
Terminal No. J3		
PIN	Definition	Function
1.2	DO_OUT6- DO_OUT6+	custom
3.4	DO_OUT5- DO_OUT5+	custom
5.6	DO_OUT4- DO_OUT4+	custom
7.8	DO_OUT3- DO_OUT3+	custom
9.10	DO_OUT2- DO_OUT2+	custom
11.12	DO_OUT1- DO_OUT1+	custom
Terminal No. S5		
PIN	Definition	Function
1	SPD-	DC negative
2	SPD+	DC positive
Terminal No. S4		
PIN	Definition	Function
1	AC_SPD-	AC input negative
2	AC_SPD+	AC input positive
Terminal No. S2		
PIN	Definition	Function
1	TEMP_PS	Temperature sampling power supply
2	TEMP1	Temperature signal 1
Terminal No. S3		
PIN	Definition	Function
1	TEMP_PS	Temperature sampling power supply
2	TEMP2	Temperature signal 2
Terminal No. CON4		
PIN	Definition	Function
1	RS485_5A	RS485_5A
2	RS485_5B	RS485_5B
3	DGND	485_GND
Terminal No. CON1		

PIN	Definition	Function
1	LVD1+	LVD1+
2	LVD1-	LVD1-
3	LVD2+	LVD2+
4	LVD2-	LVD2-
Terminal No. J5		
PIN	Definition	Function
1	LOAD_SH+	Load current sampling positive
2	LOAD_SH-	Load current sampling negative
3	BAT1_SH+	Battery pack 1 current sampling positive
4	BAT1_SH-	Battery pack 1 current sampling negative
5	BAT2_SH+	Battery pack 2 current sampling positive
6	BAT2_SH-	Battery pack 2 current sampling negative
Terminal No. J6		
PIN	Definition	Function
1	REF_CAL	Reference source correction
2	V_REF_IB	Current reference
3	V_REF	Voltage reference
Terminal No. S1		
PIN	Definition	Function
1	CAN1_H	CAN1_H
2	CAN1_L	CAN1_L
Terminal No. S9		
PIN	Definition	Function
1	CAN2_H	CAN2_H
2	CAN2_L	CAN2_L

2.2 Connecting dry contact

The monitoring module can provide users with 12 alarm dry contacts, namely S6 ~ S22 terminals, as shown in Figure 2-2.

Figure 2-2 Schematic diagram of dry contact terminal



See Table 2-3 for the function description of dry contact.

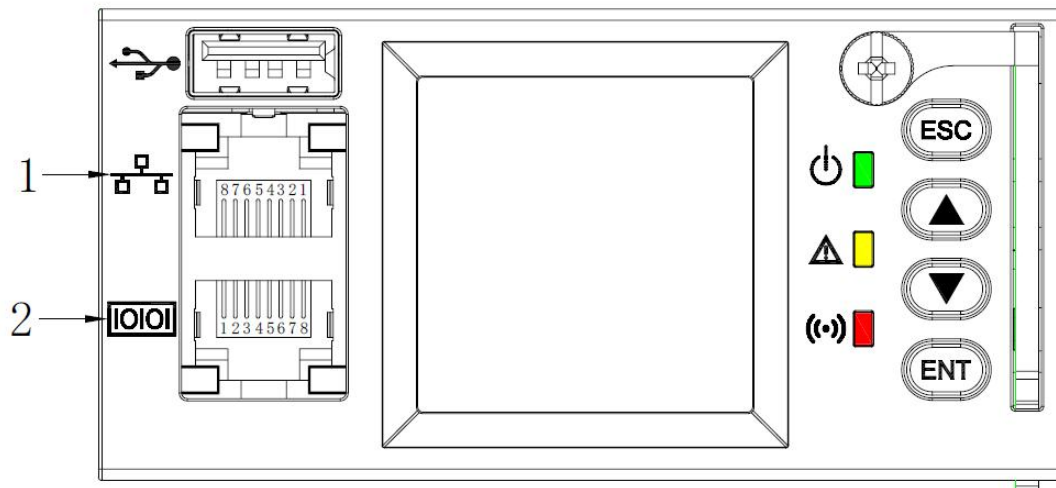
Table 2-3 Dry contact functions

S6	Input alarm dry contact 1	
S7	Input alarm dry contact 2	
S8	Input alarm dry contact 3	
S10	Input alarm dry contact 4	
S11	Input alarm dry contact 5	
S12	Input alarm dry contact 6	
S20	485 communication port	Pin 1 is RS485_5B and Pin 2 is RS485_5A.
S13	485 communication port	Pin 1 is RS485_5B and Pin 2 is RS485_5A.
S14	Output alarm dry contact 1	
S15	Output alarm dry contact 2	
S16	Output alarm dry contact 3	
S17	Output alarm dry contact 4	
S18	Output alarm dry contact 5	
S19	Output alarm dry contact 6	
S21	Battery temperature sampling port	
S22	Ambient temperature sampling port	

Note: The above is the factory default value of the monitoring module, and the dry contact setting can be changed through the monitoring module.

2.3 Ethernet and 485 communication interface

The monitoring module panel can provide users with an Ethernet interface and two 485 communication interfaces, as shown in Figure 2-3.



The wiring method is as follows:

Table 2-4 Connection Sequence of Ethernet Port

1. Ethernet port								
No.	1	2	3	4	5	6	7	8
Definition	TX+	TX-	RX+	/	/	RX-	/	/

Table 2-5 Connection Sequence of 485 Communication Port

2. RS485 communication port								
No.	1	2	3	4	5	6	7	8
Definition	RS485_4B	RS485_4A	DGND	DGND	DGND	DGND	RS485_1B	RS485_1A

Chapter 3 Instructions For Use

This chapter will briefly explain the functions of the panel indicator light and operation keys of the monitoring module. The contents of main display screens, access ways, system control, information query and parameter setting are introduced in detail.

After the monitoring module is powered on, the module is initialized internally. The default language is English, and the user can do nothing. After the initialization is completed, the first screen of the system information screen is displayed.

3.1 Operation panel

There is a backlight LCD screen, function operation keys, indicator lights and positioning pins on the front panel of the monitoring module, as shown in Figure 3-1.

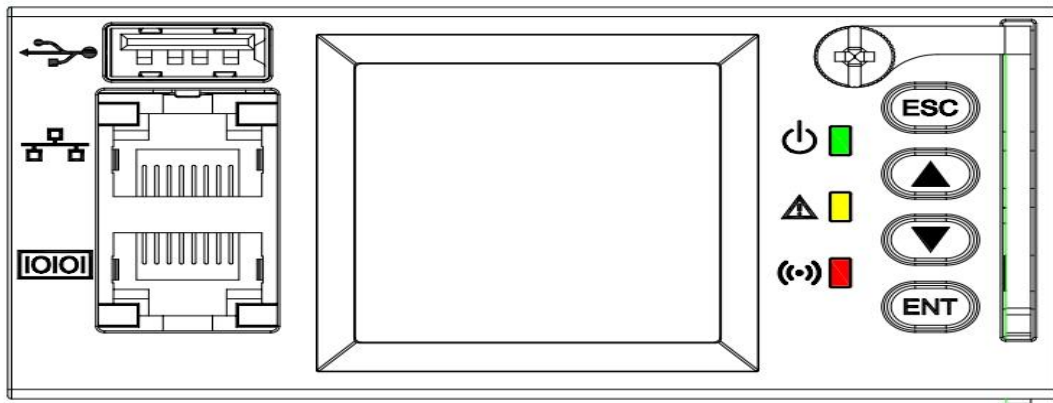


Figure 3-1 Front panel of monitoring module

See Table 3-1 for the description of the indicator light on the front panel of the monitoring module.

Table 3-1 Indicator light of monitoring module

Indicating sign	Colour	Normal conditions	Abnormal conditions	Abnormal causes
Operation indicator light	Green	On	Off	Without working power supply
Alarm indicator light	Yellow	Off	On	There is a general alarm.
Emergency alarm indicator light	Red	Off	On	There is a serious alarm in the power system.

The monitoring module adopts 128×64 LCD display unit with four function operation keys, and the interface has Chinese/English selection (8×7 Chinese characters can be displayed), so the user interface is simple and effective. The monitoring module panel is easy to be removed and replaced.

Note: All parameter settings in monitoring are set with decimal places, single digits and ten digits as follows.

When setting parameters, press the Enter key to initially hover the cursor over the decimal places. Press the Enter

key twice continuously and quickly to set the parameters in one place, and then press it twice continuously to set the parameters in a higher place.

Table 3-2 Description of operation keys of monitoring module

Key identification	Key name	Functions
ESC	Return key	Return to the previous menu
ENT	Enter	"Next Menu" or "Confirm" operation. When modifying or inputting parameters, press ENT key to enter the editing state. After any setting is modified, you need to press the "ENT" key to confirm it before it takes effect.
▲	Page up	Press the page up or down key to browse another page of the horizontal menu interface; when the value of the interface option is a character string, press the page up or down key to change its selected value. On the first screen of the system information screen, press the page up key to enter the current alarm interface, and press the page up key to enter the history alarm interface.
▼	Page down	

3.2 Introduction to display screens

The following display screens will be mentioned many times in this chapter, and this section will describe their display contents and access ways respectively.

3.2.1 System information screen

After the monitoring module is powered on, the default language is Chinese, and the user can do nothing. Then the module is initialized internally. After the initialization is completed, the first screen of the system information screen will be displayed.

The system information screen displays the main information of the system. The first screen of the system information screen is as shown in Figure 3-2.

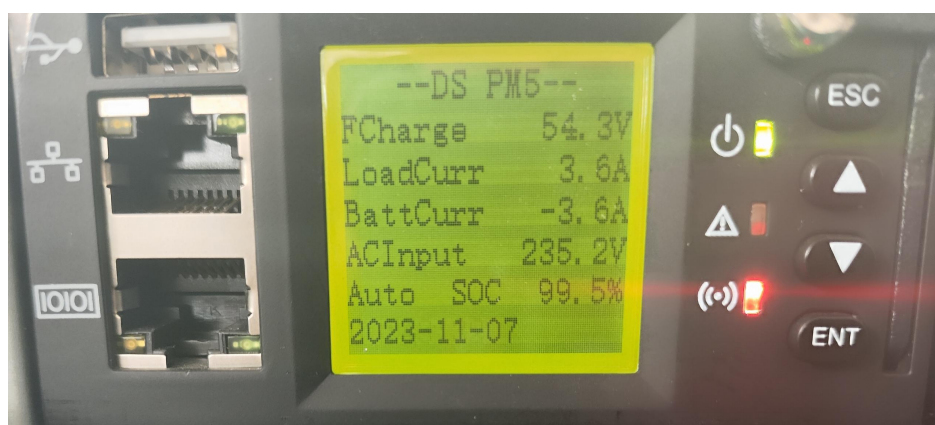


Figure 3-2 The first screen of system information screen

1. The first screen of the system information screen will be displayed after the monitoring module is powered on and initialized.
2. Under the main menu display screen, press the Return key to return to the first screen of the system information screen

step by step.

3. The English version of the first screen of the system information screen shows the following contents:

(1)FCharge displays the floating charge voltage.

(2)LoadCurr displays the load current.

(3)BattCurr indicates the battery charging current if it is positive, and it indicates the battery discharging current if it is negative.

(4)ACinput displays the AC input voltage.

(5)Manual indicates that the current mode is manual mode, and if it is Auto, it indicates that the current mode is automatic mode.

(6)ECO displays the current battery remaining capacity, which is displayed as a percentage.

(7) The current date and time are displayed at 02: 23: 37, and the date and time are displayed alternately every 2 seconds.

3.2.2 Main menu screen

The main menu is the highest menu of the monitoring module, and all system settings, controls, rectifier module information/DC module information and alarm information are inquired through the submenus under the main menu. The main menu is shown in the figure below.



Figure 3-3 Main menu screen

1. Press the Enter key in the first screen of the system information screen to enter the main menu screen.
2. Press the Return key in any submenu screen of the main menu to return to the main menu screen step by step.

3.2.3 Operation information screen

The operation information screen is a first-level sub-menu screen under the main menu, and there are several sub-menu screens below it. It mainly displays the current alarm, historical alarm information and rectifier module

information/DC module information. The operation information screen is shown in the figure below.

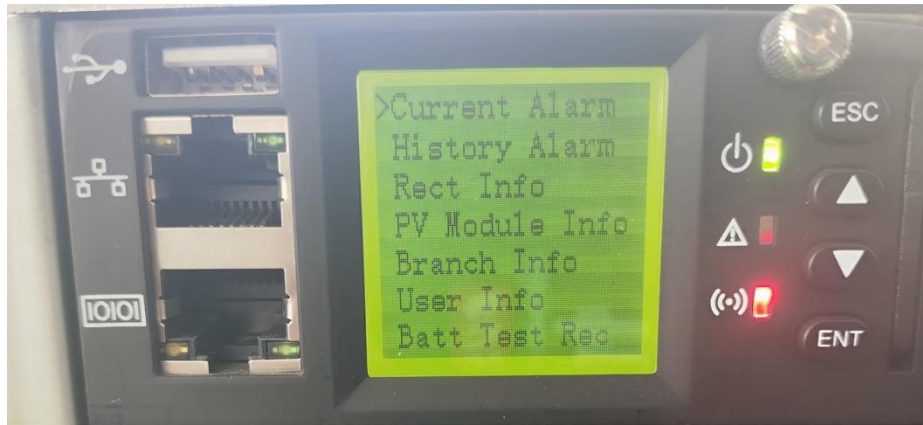


Figure 3-4 Operation information screen

1. Press the up and down keys in the main menu screen to select the "Operation Information" submenu, and press the Enter key to confirm to enter the operation information screen.
2. Press the Return key in any sub-menu screen of the operation information menu to return to the operation information screen step by step.

3.2.4 Parameter setting screen

The operation information screen is a first-level sub-menu screen under the main menu, and there are several sub-menu screens below it. It mainly displays the current alarm, historical alarm information, rectifier module information and DC module information of the system. The operation information screen is shown in the figure below.



Figure 3-5 Parameter setting screen

1. Press the up and down keys in the main menu screen to select the "parameter setting" submenu, and press the Enter key to confirm, which will enter the parameter setting screen.
2. Press the Return key in any sub-menu screen of the parameter setting menu to return to the parameter setting screen step by step.

3.2.5 Control output screen

The control output screen is the first-level submenu screen under the main menu. It is mainly used for the operator to control the system in real time. The control output screen is shown in the figure below.

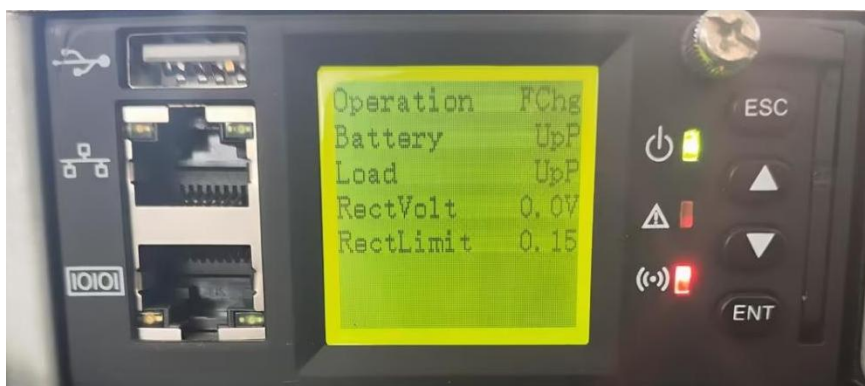


Figure 3-6 Control output screen

1. Press the up and down keys in the main menu screen to select the "Control Output" submenu, and press the Enter key to confirm.

3.3 Checking the main information of the system

DC, system status, battery status and energy management information

In any screen of the system information screen, press the Return key continuously until you return to the first screen of the system information screen. DC voltage and current, system status, battery status and energy management information are all on the first screen of the system information screen, as shown in the following figure.

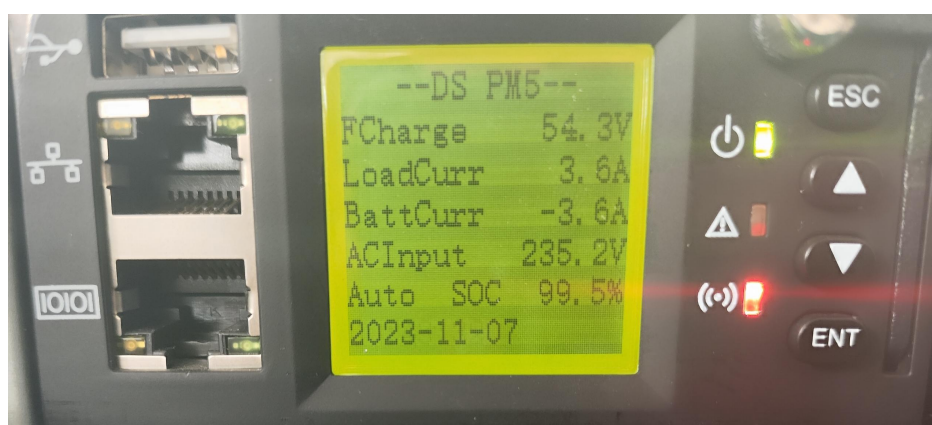


Figure 3-7 The first screen of system information screen

The date and time are displayed alternately every 2 seconds. Energy management modes include Auto and Manual. ECO shows battery remaining.

Capacity, the remaining battery capacity is displayed as a percentage.

Current alarm information

Press the key on the first screen of the system information screen to view the current alarm information, as shown in the figure below.

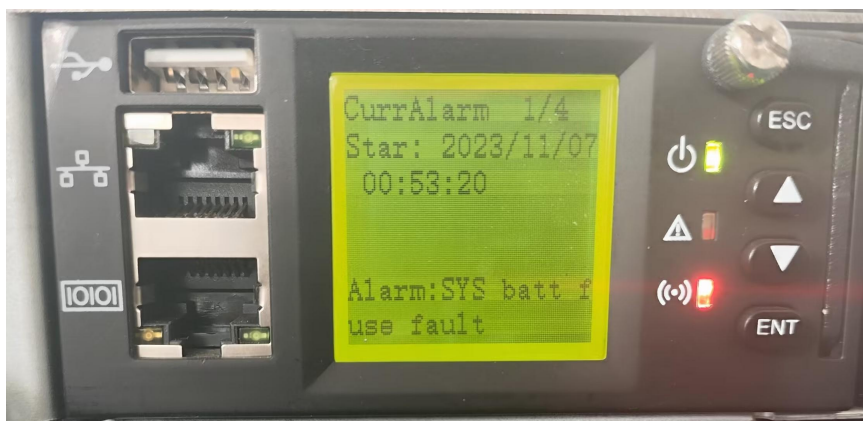


Figure 3-8 Alarm information screen

Historical alarm information

Press the key on the first screen of the system information screen to view the historical alarm information, as shown in the figure below.



Press the key in the historical alarm information screen to view all historical alarm information.

System temperature information

In the monitoring main screen, if the temperature sensor is connected, the temperature information as shown in the following figure will be displayed, and if the temperature sensor is not connected, the temperature will not be displayed.



Figure 3-9 Temperature information display

If the temperature sensor is not connected or the measurement is wrong, the temperature will not be displayed. The temperature display is displayed at intervals of 2S along with the system time.

3.4 Checking the information of rectifier/DC module

 Note: If the monitoring module does not detect the rectifier/DC module, the information of the rectifier/DC module cannot be consulted.

The information of rectifier/DC module includes serial number of rectifier/DC module, output voltage, output current, current limit point, AC input voltage, temperature, PFC working voltage, etc. of each rectifier/DC module.

In the operation information screen shown in Figure 3-4, press the up and down keys to select the "Module Information" submenu, and press the Enter key to enter the information screen of rectifier/DC module, as shown in the following figure.

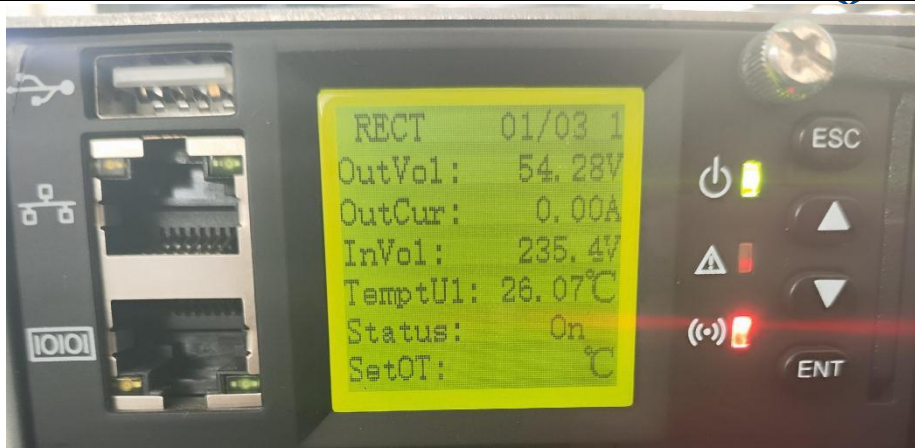


Figure 3-10 Rectifier module information screen

All information of each rectifier/DC module is displayed in two screens. Press the up and down keys to change the screen. Press the Enter key to check the information of other rectifier/DC modules.

The monitoring module displays the inserted module information, and if the module has no communication from beginning to end, the monitoring does not display the module information.

3.5 Checking the alarm information

Users can check the current alarm records and historical alarm records on the display screen of the monitoring module, and the following methods are introduced respectively.

3.5.1 Checking the current alarm

If a new alarm appears in the system, you can refer to the detailed information of all current alarms in the system in the following steps.

In the operation information screen shown in Figure 3-4, press the up and down keys to select the "Current Alarm" submenu, and press the Enter key to enter the current alarm information screen.

1. If there is no alarm at present, you cannot enter the alarm prompt. If there was an alarm before, after entering the

current alarm information screen, the alarm will disappear and "There is no alarm in the system at present" will be displayed.

2. When there is an alarm in the system, it will be displayed as shown in the figure below.



Figure 3-11 Current alarm information screen

The above figure includes the alarm sequence number/alarm total number, alarm name and occurrence time. The alarm sequence is sorted according to the occurrence time, and the last alarm is displayed in the first article. Press the up and down keys to browse all the current alarm information.

Table 3-3 The current alarm that may appear in the monitoring module

No.	Alarm type	Alarm name	Alarm description
1	Module alarm	Module AC power failure	
2		Module over-temperature	
3		Module failure	
4		Module protection	
5		Module fan failure	
6		Module power limit	
7		Module communication outage	
8		Multi-module alarm	
9		Module loss	
10		Load uneven	
1	AC alarm	SPD failure	Digital 1 alarm
2		Digital alarm	
3		AC overvoltage	
4		AC undervoltage	
5		AC phase loss	
6		AC blackout	
1	DC alarm	DC overvoltage	
2		DC undervoltage	
3		DC voltage drop	
4		Battery over-temperature	
5		High battery temperature	
6		Low battery temperature	
7		High ambient temperature	
8		Low ambient temperature	
9		Temperature sensor 1 disconnection	
10		Temperature sensor 2 disconnection	
11		Temperature sensor 1 fault	
12		Temperature sensor 2 fault	

No.	Alarm type	Alarm name	Alarm description	
13		Load power-off		
14		Battery protection		
15		Load branch 1 disconnected		
16		Load branch 2 disconnected		
17		Load branch 3 disconnected		
18		Load branch 4 disconnected		
19		Load branch 5 disconnected		
20		Load branch 6 disconnected		
21		Load branch 7 disconnected		
22		Load branch 8 disconnected		
23		Load branch 9 disconnected		
24		Load auxiliary branch disconnected		
25		Battery branch 1 disconnected		
26		Battery branch 2 disconnected		
27		Battery branch 3 disconnected		
28		Battery branch 4 disconnected		
29		Battery 1 overcurrent		
30			Low battery voltage alarm	
31			High battery voltage alarm	
1		Battery management status alarm	Battery non-FC state	
2	Battery discharge			
3	System current imbalance			
4	Abnormal battery test			
5	Abnormal quick test			
6	Energy-saving state operation			
7	Energy-saving fault			
8	Low battery voltage Alarm			
9	High battery voltage Alarm			
1	Monitoring self-checking alarm	Monitoring module failure		
2		Manual module management		
3		Abnormal output voltage		
4		System maintenance time out		
5		Alarm blocking		

3.5.2 Checking historical alarms

1. In the operation information screen shown in Figure 3-4, press the up and down keys to select the "Historical Alarm" submenu, and press the Enter key to enter the historical alarm information screen.
 - 1) If there is no historical alarm in the system, you cannot enter the lower menu.
 - 2) When there is an alarm in the system, it will be displayed as shown in the figure below.




Figure 3-12 Historical alarm information screen

As shown in Figure 3-12, the first line shows the alarm sequence number/total number of alarms, followed by the alarm occurrence time and end time, and the bottom is specific alarm types.

1. Press the up and down keys to browse the rest of the historical alarms.
2. Press the Return key repeatedly in any historical alarm information screen to return to the main menu step by step until the first screen of the system information screen.

Note: Up to 10,000 historical operation records can be queried on the web page.

3.6 Control system

 Note:Be careful that a battery power-off operation may cause a load power-off accident.

1. Change the "management mode" from "automatic" to "manual" in the battery basic parameter setting screen shown in Figure 3-17, and press the Enter key to confirm.
2. Press the up and down keys in the main menu screen and select the "Control Output" option to enter the control output screen.



Figure 3-13 Control output screen

3. Press the up and down keys to select the control to be carried out, and then press the Enter key to confirm. If control is allowed, press the Enter key to set the current parameters. After the parameter setting is completed, press the Enter

key again to take effect. Press the Return key to exit without saving the currently set parameters. Each control content is introduced below.

- 1) Start-up: including uniform charging, floating charging and testing. When this item is selected, pressing the up and down keys will cycle through the three options. When there is an AC power failure alarm or the bus voltage is too low, the system does not execute the command of equalizing charge and battery test.
- 2) Battery: including battery power-on and power-off. The current system does not support battery power-on and power-off operation for the time being.
- 3) Load: including power-on and power-off of the load. The current system does not support load power-on and power-off operation for the time being.
- 4) Module voltage regulation: the control range is 42V ~ 58V. If the set voltage exceeds the module voltage control range, the system will not execute the module voltage regulation command.
- 5) Module current limiting: the control range is 0.1 ~ 1.21.

module voltage regulation operation method is as follows:

- 1) First, ensure that the battery management mode is manual (the module voltage can be adjusted only in manual mode).
 - 2) Press the Enter key in the control output screen to bring up the cursor, and then press the up and down keys to adjust the cursor to the column of module voltage.
 - 3) Press the Enter key to enter the module voltage setting (the current cursor hovers over the decimal place of the module voltage, and the single-digit and ten-digit voltages can be set by pressing the Enter key twice continuously and quickly), and then press the Enter key to save the current setting after the setting is completed.
4. Change the "management mode" from "manual" to "automatic" in the battery basic parameter setting screen shown in Figure 3-17. After the change is completed, press the return key to return to the system information screen step by step.

3.7 Setting parameters

Power system parameters are divided into seven categories, including alarm parameters, AC parameters, DC parameters, battery parameters, system parameters, communication parameters and quick setting. In actual use, users need to set the battery capacity according to the actual situation of the battery configured in the system, and it is recommended to keep the factory settings for other parameters. The following respectively introduces the setting methods of various parameters.

User password: 200000

3.7.1 Setting alarm parameters

In the parameter setting screen, press the up and down keys to select the "Alarm Parameter" option, and press the Enter key to enter the alarm parameter setting screen, as shown in the following figure.



Figure 3-14 Alarm parameter setting screen

Alarm parameters are divided into three sub-menus, the contents of which are introduced below.

Setting the alarm level

In the alarm parameter setting screen, press the up and down keys to select the "alarm level" option, and press the Enter key to enter the alarm level setting screen, as shown in the following figure.

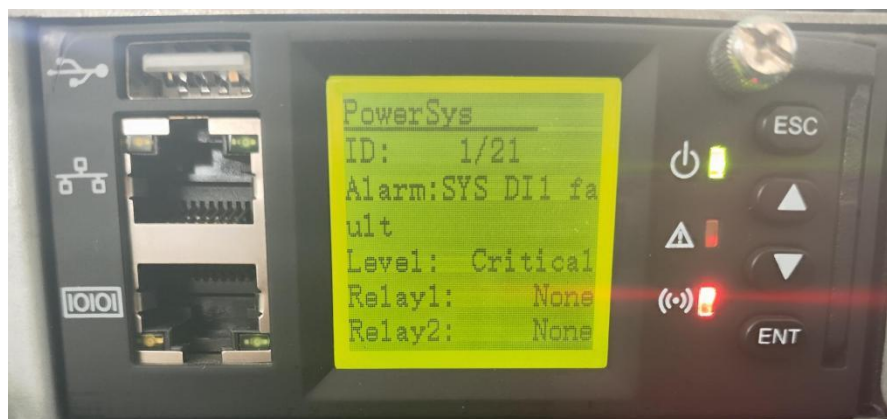


Figure 3-15 Alarm level setting screen

After entering the alarm level setting screen, press the key to select the system type that needs to set the alarm level, which includes battery system, battery management, rectifier module, etc.

After entering the corresponding system, press the key until the cursor is selected to Level, then press the key to select the alarm item that needs to be set at present, and press the Enter key to select the alarm level, which is divided into three items, namely None (no alarm), Warning (general alarm) and Critical (serious alarm). After setting, the system will automatically save the setting parameters.

The monitoring module divides the alarm types into three levels: serious alarm, general alarm and no alarm.

Serious alarm: After this type of alarm occurs, it will seriously affect the performance of the power system. No matter when it occurs, users are required to take immediate measures to deal with it.

General alarm: after this type of alarm occurs, the power supply system can temporarily maintain normal DC output. If it occurs during the duty time, measures should be taken immediately to deal with it. If it does not occur during the duty time, it should be dealt with at the beginning of the duty time. The power supply system only lights the alarm indicator.

No alarm: After this kind of alarm occurs, no sound and light indication will be generated.

The alarms in the monitoring module and their default settings are shown in the table below.

Table 3-4 Alarm name and default setting of monitoring module

No.	Alarm name	Alarm description	Alarm level	Associated relay	Correlation parameter
1	SPD failure	There is failure in SPD circuit.	Emergency	N/A	
2	Custom switch value	The alarm name is defined by the user himself, with a maximum of 10 characters. In this system, there are 8 branches to customize the alarm. Among them, the first self-defined switch value has been set to "SPD failure", and the other 7 branches can be set by users.	None	N/A	
3	AC overvoltage	The AC input voltage is greater than the AC overvoltage alarm value.	Emergency	N/A	Overvoltage alarm
4	AC undervoltage	The AC input voltage is less than the AC undervoltage alarm value.	Emergency	N/A	Undervoltage alarm
5	AC blackout	The AC input voltage of all rectifier modules is less than 80V.	Critical	1	
6	DC overvoltage	The DC output voltage is greater than the DC overvoltage alarm value.	Emergency	2	Overvoltage alarm
7	DC undervoltage	The DC output voltage is less than the DC undervoltage alarm value.	Emergency	2	Undervoltage alarm
8	DC voltage drop	The DC output voltage is less than the low-voltage alarm value.	Warning	N/A	Low pressure alarm
9	Battery over-temperature	The battery temperature is greater than the over-temperature alarm value.	Critical	N/A	Over-temperature alarm point
10	High battery temperature	The battery temperature is greater than the high temperature alarm value.	Warning	N/A	High temperature alarm point
11	Low battery temperature	The battery temperature is less than the low temperature alarm value.	Warning	N/A	Low temperature alarm point
12	High ambient temperature	The ambient temperature is higher than the set alarm point.	Warning	N/A	High temperature alarm point
13	Low ambient temperature	The ambient temperature is lower than the alarm point.	Warning	N/A	Low temperature alarm point
14	Temperature sensor 1 disconnection	A temperature sensor 1 is provided, but no sensor is connected.	Emergency	N/A	
15	Temperature sensor 2 disconnection	A temperature sensor 2 is provided, but no sensor is connected.	Emergency	N/A	
16	Temperature sensor 1 fault	The temperature sensor 1 measured an unreasonable temperature.	Emergency	N/A	
17	Temperature sensor 2 fault	The temperature sensor 2 measures an unreasonable temperature.	Emergency	N/A	
18	Load power-off	Load disengagement or manual control of load power-off.	Emergency	5	Load power-off permission
19	Battery protection	Battery detachment or manual control of battery protection	Emergency	4	Battery protection permission
20	Load branch 1 ~ 9 disconnection	Overload, short circuit, manual cut-off or alarm circuit failure	Emergency	N/A	

No.	Alarm name	Alarm description	Alarm level	Associated relay	Correlation parameter
21	Load auxiliary branch circuit disconnection	Last branch failure	Emergency	N/A	
22	Battery branch 1 ~ 4 disconnection	Overload, short circuit, manual cut-off or alarm circuit failure	Emergency	N/A	
23	Battery 1 overcurrent	The charge current of that battery pack 1 is greater than the set value of the charge overcurrent point.	Waring	N/A	Overcurrent point
24	Battery 2 overcurrent	The charge current of that battery pack 2 is greater than the set value of the charge overcurrent point.	Waring	N/A	Overcurrent point
25	Module AC power failure	All AC voltages are below the undervoltage point.	Critical	3	
26	Module over-temperature	The temperature in the rectifier module is higher than 90 degrees.	Waring	3	
27	Module failure	Overvoltage of rectifier module is higher than the upper limit voltage of module.	Emergency	3	
28	Module protection	Rectifier module protection without output	Waring	3	
29	Module fan failure	Fan failure in rectifier module	Critical	3	
30	Module power limit	The rectifier module limits the output power.	Waring	3	
31	Module communication outage	Communication between rectifier module and monitoring module is interrupted.	Critical	3	
32	Module HVSD alarm	Module high voltage shutdown		3	
33	Multi-module alarm	More than two rectifier module alarm	Emergency	N/A	
34	Monitoring module failure	Monitoring module hardware self-test error	None	N/A	
35	Manual module management	The management mode in the monitoring module is set to "manual"	None	N/A	
36	Battery non-FC state	The battery is not in a FC state.	None	N/A	
37	Battery discharge	The battery is discharging.	None	N/A	
38	System current imbalance	In a load diverter system, the difference between the collected load current plus the battery current and the module output current is great.	None	3	
39	Abnormal battery test	Battery discharge is shorter than expected.	Waring	N/A	
40	Abnormal quick test	During the quick test time, the discharge capacity of the battery is greater than the set value.	Waring	N/A	
41	Abnormal output voltage	The control output voltage is different from the bus voltage, and the data communicated with the module is also different, and the error is greater than 1V.	Waring	N/A	
42	System maintenance time out	Exceeding the maintenance time set by system operation.	Waring	N/A	
43	Module loss	Monitoring has detected that the number of modules running on power is slightly smaller than the number of modules running last time.	Emergency	N/A	
44	Energy-saving state operation	The system is running in an energy-saving state.	None	N/A	

3.7.2 Setting battery parameters

Battery parameter is an important parameter, so it must be set correctly, which is related to the service life of the battery.

In the parameter setting screen shown in Figure 3-5, press the up and down keys to select the "Battery Parameter" option, and press the Enter key to enter the battery parameter setting screen, as shown in the figure below.

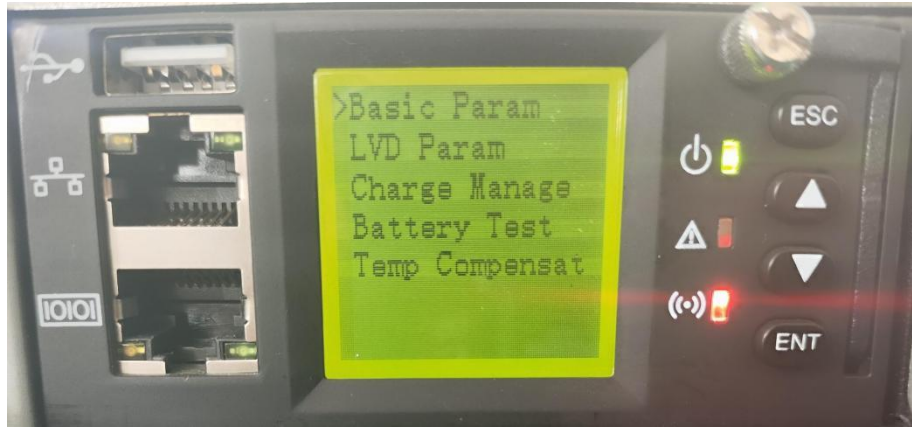


Figure 3-16 Battery parameter setting screen

Battery parameters include basic parameters, power-down protection, charging management, battery testing and temperature compensation parameters, and the setting methods are described below.

Setting basic parameters

1. Press the up and down keys in the battery parameter setting screen to select the "Basic Parameters" option, and press the Enter key to display the battery basic parameter setting screen, as shown in the following figure.



Figure 3-17 Battery basic parameter setting screen

2. Press the Enter key to bring up the cursor, press the up and down keys to select the parameter item to be set, press the Enter key to confirm the setting item, and press the OK key to save after setting. The setting range and default values of basic battery parameters are shown in the table below.

Table 3-15 Setting range and default value of basic battery parameters

Parameter name	Setting range	Default	Setup description
Management style	Automatic and manual	Automatic	Automatic: The monitoring module manages the system. Manual: Users can control the system manually.
Nominal capacity	0Ah~999Ah	200Ah	The sum of the battery capacities connected to each diverter. Users should set according to the actual battery configuration.

Parameter name	Setting range	Default	Setup description
Diverter 1	Yes, no	Yes	The parameters of the diverter and the temperature sensor can be set.
Diverter 2	Yes, no	No	
Temperature sensor 1	No, battery, environment	No	
Temperature sensor 2	No, battery, environment	No	

Setting power-down protection parameters

Press the up and down keys in the battery parameter setting screen to select the "power-down protection" option, and press the Enter key to display the power-down protection setting screen. The setting screen is shown in the following figure:

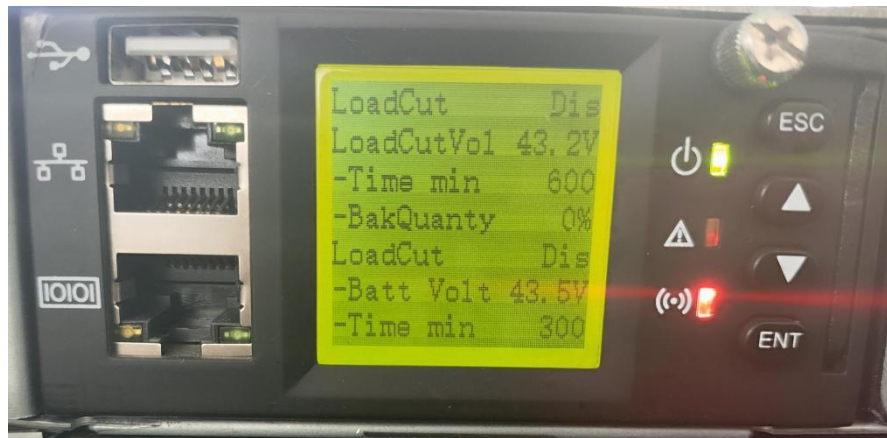


Figure 3-18 Power-down protection setting screen

Press the Enter key to bring up the cursor, press the up and down keys to select the parameter item to be set, press the Enter key to confirm the setting item, and press the OK key to save after setting.

Under-load power supply refers to the AC power failure of the power supply system. Under the condition of battery power supply, the power supply system automatically cuts off the secondary load to extend the power supply time of the important load.

Battery protection refers to the AC power failure of the power supply system. Under the condition of battery power supply, the power supply system automatically cuts off the battery to avoid the battery life being affected by over-discharge.

See the table below for the setting range, default value and setting description of power-down protection parameters.

Table 3-6 Setting range, default value and setting description of power-down protection parameters

Parameter name	Setting range	Default	Setup description
Load power-down permission	Yes or no	Yes	Yes: Use the power-down function of the load. No: Do not use the load power-down function.
Battery protection permission		Yes	Yes: Use battery protection function. No: Do not use battery protection function.

Parameter name	Setting range	Default	Setup description
LLVD Voltage	40V~60V	44.0V	When the battery voltage is taken as the standard, when the voltage drops to the set point, the load is powered down.
BLVD Voltage		42V	Based on the battery voltage, when the voltage drops to the set point, the battery is protected.

Setting charging management parameters

Press the up and down keys in the battery parameter setting screen to select the "charging management" option. Press the Enter key to display the charging management setting screen, which is displayed in two screens, as shown in the following figure.

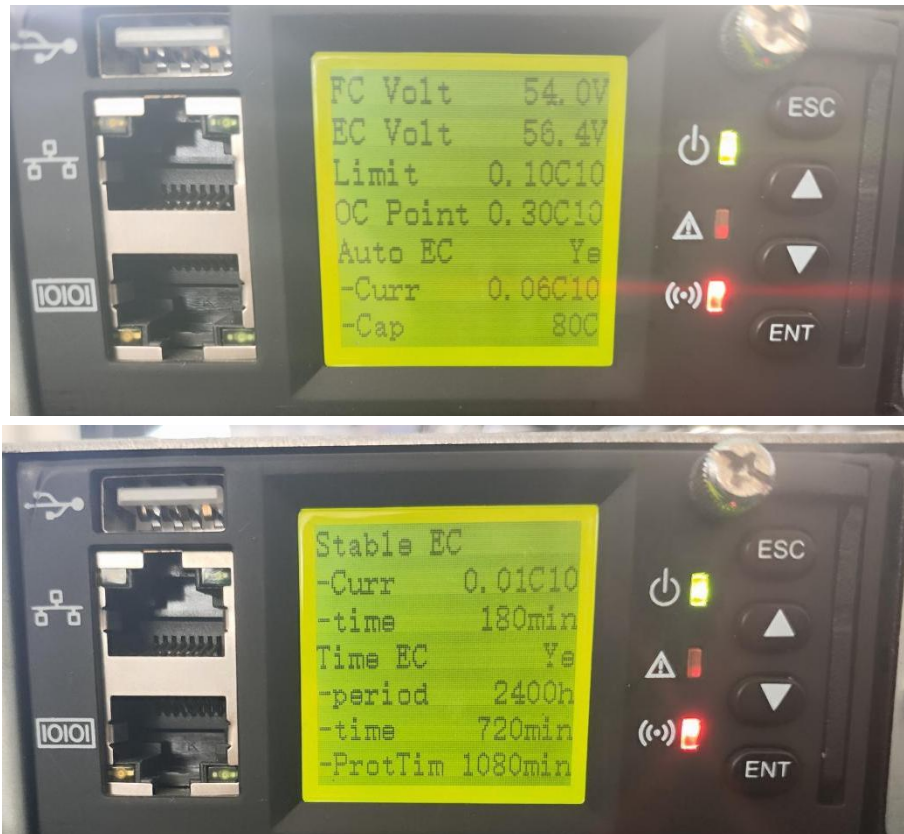


Figure 3-19 Charging management setting screen

Press the Enter key to bring up the cursor, press the up and down keys to select the parameter item to be set, press the Enter key to confirm the setting item, and press the OK key to save after setting.

See for setting range, default value and setting description of charging management parameters in Table 3 -7.

Table 3 -7 Setting range, default value and setting description of charging management parameters

Parameter name	Setting range	Default	Setup description
Floating charge voltage	42V~58V	53.5V	Output voltage of the rectifier module in FC state
Equalizing charge voltage		56.4V	Output voltage of the rectifier module in EC state must be greater than FC voltage.
Boost charge			Turn off the charging current limiting function of battery through the lithium battery BMS software, and then increase the current limiting point (less than 1.0C10), the charging current will increase, thereby achieving fast charging.
Current limiting point	0.1C10~0.25C10	0.1C10	Maximum value of battery charging current. C10 is the nominal capacity of the battery, which is generally set at 10% ~ 20% of the capacity of a single battery.

Parameter name	Setting range	Default	Setup description
Overcurrent point	0.3C10~ 1.0C10	0.3C10	If the charging current is greater than the set value of "overcurrent point", the monitoring module will generate an overcurrent alarm for battery charging.
Automatic EC	Yes or no	Yes	Yes: Use this function. No: Do not use this function.
Automatic EC-current	0.050C10~ 0.080C10	0.06C10	If the automatic EC function is used, when the battery capacity drops to the set value of "EC capacity" or when the charging current reaches the set value of "EC current", the monitoring module controls the system to switch to EC, and the charging voltage of the battery is the set value of "EC voltage".
Automatic EC-capacity	10%~99%	80%	
Constant current EC-current	0.002C10~ 0.02C10	0.01C10	When the system is in the state of EC, if the charging current is less than the set value of "constant current EC current", the system will automatically turn to the state of FC after a period of time set by "constant current EC time".
Constant current EC-time	30 to 1440 minutes	180 minutes	
Timing EC	Yes or no	Yes	Yes: Use this function. No: Do not use this function.
Timing EC-period	48 to 8760 hours	2400 hours	"Timing EC period" refers to the interval between two timing EC periods. The charging voltage of the battery is the set value of "EC voltage", and the charging time is the set value of "timing EC time"
Timing EC-time	30 to 2880 minutes	720 minutes	
EC protection time	60 to 2880 minutes	1080 minutes	In the process of EC, when the EC time reaches the set value of "EC protection time", the monitoring module will forcibly change the power supply system to FC to ensure system safety.

See the schematic diagram of the conversion relationship between EC and FC in Figure 3 -20.

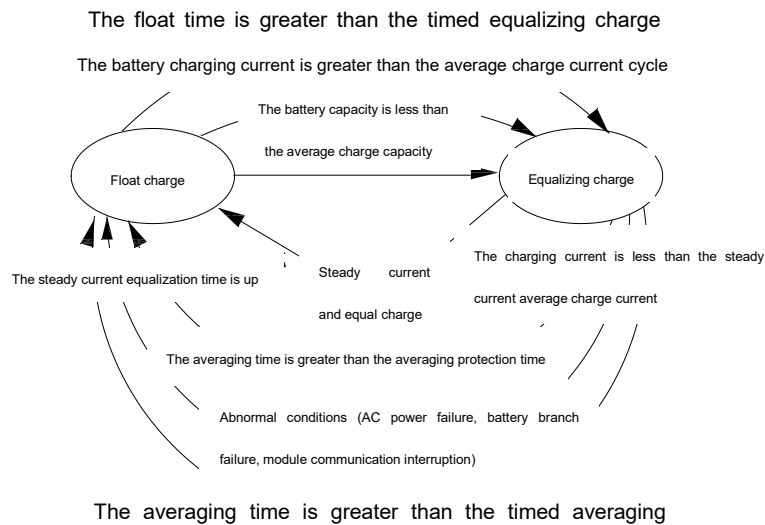


Figure 3 -20 Schematic diagram of the conversion relationship between EC and FC

Setting battery test parameters

1. Press the up and down keys in the battery parameter setting screen to select the "battery test" option, and press the Enter key to display the battery test parameter screen. The setting screen is divided into six screens, as shown in the figure below (two screens are selected in the figure below).



Figure 3 -21 Battery test parameter setting screen

2. Press the up and down keys to select one of the screens or the parameter items to be set, press the Enter key to confirm the setting items, and press the OK key to save after setting.

The monitoring module provides battery testing function, and can record 10 groups of battery testing data, which can only be accessed through background maintenance software. After starting the battery test, firstly, the output voltage of the rectifier module is adjusted to the set value of "test termination voltage", and the battery begins to discharge. When the battery voltage reaches the set value of "test termination voltage" or the discharge time reaches the parameter of "test termination time" or the battery capacity reaches the set value of "test termination capacity", the monitoring module terminates the battery test, the output voltage of the rectifier module returns to the normal floating charge voltage, the power supply system charges the battery, and the system switches to automatic battery management.

Test start time, voltage, end time, voltage and battery remaining capacity will be recorded in the battery test record, which can be obtained from the monitoring module through background maintenance software. **Can save at least 5 charge and discharge test records.** During the battery test, if the system is abnormal, the monitoring module will automatically terminate the battery test. See the setting range, default value and setting description of battery test parameters in Table 3 - 8.

Table 3 - 8 Setting range, default value and setting description of battery test parameters

Parameter name	Setting range	Default	Setup description
----------------	---------------	---------	-------------------

Parameter name	Setting range	Default	Setup description
Termination condition-voltage	43.1V~57.9V	45.2V	When the battery voltage reaches the set value of "test termination voltage" or the discharge time reaches the set value of "test termination time" or the battery capacity reaches the set value of "test termination capacity", the monitoring module terminates the battery test and switches to FC.
Termination condition-time	5 to 1440 minutes	300 minutes	
Termination condition-capacity	0.01C10~0.95C10	0.7C10	
Timing test permission	Yes or no	Yes	Yes: Use the timing test function. No: Do not use the timing test function.
Timing test time	Month, day and time	01-01-00: 00	Under the condition of using the timing test function, the power supply system automatically tests the battery at the "timing test time" setting point.
		04-01-00: 00	
		07-01-00: 00	
		10-01-00: 00	
Quick test permission	Yes or no	Yes	If you use the quick test function or not.
Quick test-alarm point	1A~100A	10A	The quick test is suitable for the comparison of discharge test between two groups of batteries. It is also of reference value to test the quality of a single battery under the condition that it has not been discharged for a long time.
Quick test-period	24 to 8760 hours	720 hours	
Quick test-time	1 to 60 minutes	5 minutes	If the battery has not been discharged continuously for more than the set value of "quick test period", the monitoring module will start the quick test, and the running time will be the set value of "quick test time". For the system with two batteries, at the end of the test, if the difference between the discharge currents of the two batteries is greater than the set value of the "quick test alarm point" of the batteries, a quick test abnormal alarm will be generated.
Constant current test permission	Yes or no	No	Constant current test means that the battery is tested with constant discharge current. The condition of entering the constant current test is that the current load current is greater than the current value set by the constant current test. This kind of battery test is suitable for the case of large load and relatively stable load current, and it is not recommended in the case of small load. The current value is set by the parameter "Constant current test current". Under the condition of allowing constant current test, if the battery meets the test conditions, the constant current test will be carried out.
Constant current test-current	0~9999A	9999A	

See the figure below for the working principle of the test function.

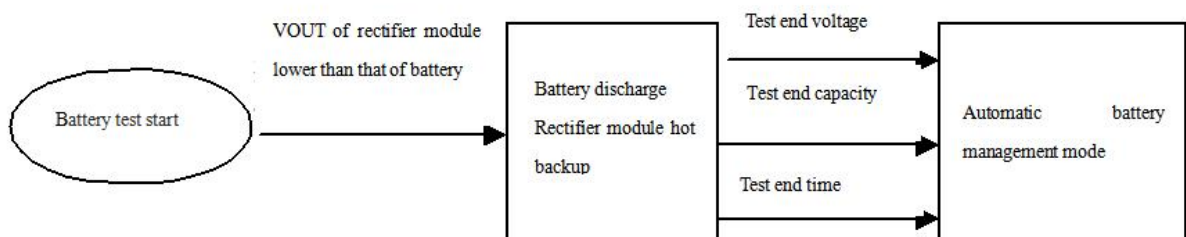


Figure 3 -22 Working schematic diagram of test function

Setting temperature compensation parameters

1. Press the up and down keys in the battery parameter setting screen to select the "Temperature Compensation Parameter" option, and press the Enter key to display the temperature compensation parameter setting screen, as

shown in the following figure.

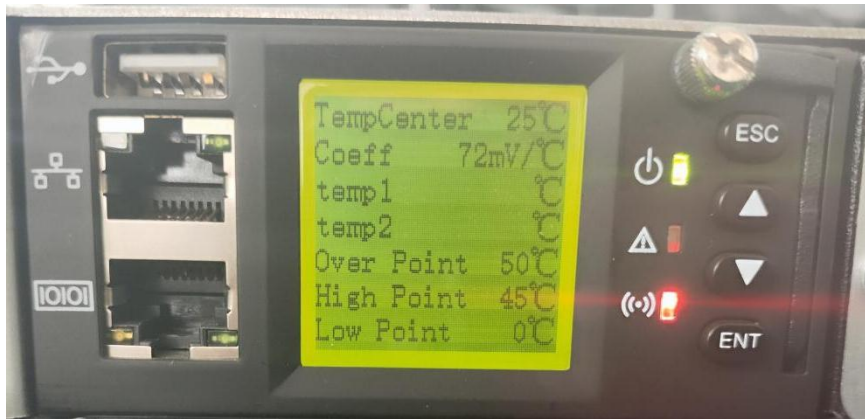


Figure 3 -23 Temperature compensation parameter setting screen

2. Press the Enter key to bring up the cursor, press the up and down keys to select the parameters to be set, press the Enter key to confirm the setting items, and press the OK key to save after setting. See the setting range, default value and setting description of temperature compensation parameters in Table 3 -9.

Table 3 -9 Setting range, default value and setting description of temperature compensation parameters

Parameter name	Setting range	Default	Setup description
Temperature compensation center point	10°C~40°C	25°C	FC voltage drop value = (battery temperature measured value-"temperature compensation center point" set value) × temperature compensation coefficient.
Coefficient	0~500mV/°C	72mV/°C(48V system) 36mV/°C(24V system)	When an alarm such as communication interruption of the rectifier module, DC over-voltage or battery branch disconnection is detected, the monitoring module does not compensate the FC voltage of the battery for temperature.
Battery over-temperature	-40°C~100°C	50°C	When the battery temperature is higher than the set value, the monitoring module generates corresponding alarm. The set value of "high temperature alarm" is required to be less than or equal to the set value of "over-temperature protection"
Battery high temperature	-40°C~100°C	50°C	
Battery low temperature	-40°C~100°C	0°C	When the battery temperature is lower than the set value, the monitoring module generates a low temperature alarm.

3.7.3 Setting DC parameters

Press the up and down keys in the parameter setting screen to select the "DC parameter" option, and press the Enter key to enter the DC parameter setting screen, as shown in the following figure.

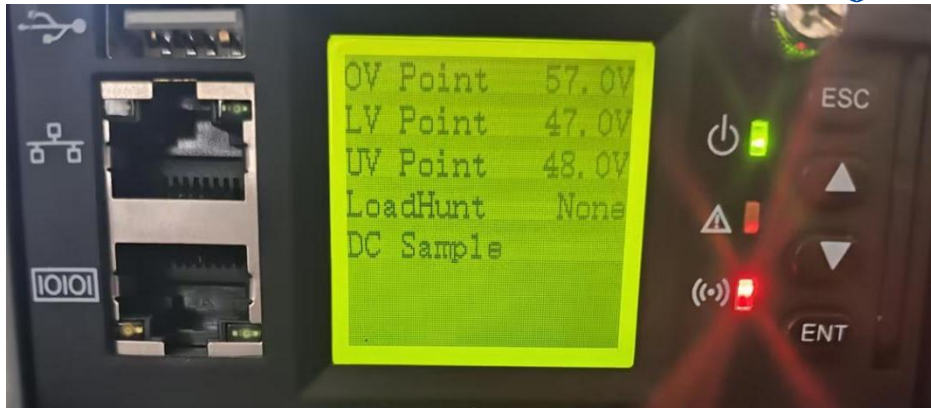


Figure 3 -24 DC parameter setting screen

Press the Enter key to bring up the cursor, press the up and down keys to select the parameters to be set, press the Enter key to confirm the setting items, and press the OK key to save after setting.

The DC parameter setting instructions are as follows:

Parameter name	Setting range	Default	Setup description
Overvoltage alarm	40V~60V	58.5V	When the DC voltage of the system is greater than the set value, the system sends out a DC overvoltage alarm.
Low-voltage alarm		45.0V	When the DC voltage of the system is lower than the set value, the system sends out a DC low-voltage alarm, which must be less than the overvoltage alarm value.
Undervoltage alarm		43.0V	When the DC voltage of the system is lower than the set value, the system sends out a DC undervoltage alarm, which must be less than the low-voltage alarm value.

3.7.4 Setting system parameters

In the parameter setting screen shown in Figure 3-5, press the up and down keys to select the "System Parameters" option, and press the Enter key to enter the basic parameter setting screen.

The setup screen shown in Figure 3-26.



Figure 3-26 User-level parameter setting screen

Press the up and down keys to select the parameter item to be set, and press the Enter key to enter the submenu.

Parameter name	Setting range	Default	Setup description
Language	Chinese, English	Chinese	Change according to your own needs (this item is included in the basic parameter setting)
Timezone	-	8	Set according to the actual situation (this item is included in the basic parameter setting)
Date	2000 ~ 2099	-	If there is leap year processing, it can be set according to the current actual time.

3.8 Quick setting

In the parameter setting screen shown in Figure 3-5, press the up and down keys to select the "quick setting" option, and press the Enter key to enter the quick setting screen.



Figure 3-26 Quick setting screen

The quick setting screen is used to set the module type and battery capacity, as shown in Table 3-11.

Figure 3- 10 Table of quick setting

Parameter name	Setting range	Default	Setup description
Module type	48V/50 48V/75	48V/50	When the monitoring module leaves the factory with the power supply system, the system type of the monitoring module has been set according to the actual situation, and the user does not need to change it separately. When a new monitoring module is replaced, it needs to be set on the new monitoring module according to the actual power system type. Users need to change some parameters according to the battery and other equipment requirements of the system configuration.
Battery capacity	0Ah~ 999Ah	200Ah	The sum of the battery capacities connected to each shunt. Users should set according to the actual battery configuration

Chapter 4 Web Operation

The monitoring module provides Web service, which can access the monitoring through the web page for understanding the real-time operation information of the power system and configuring the parameters.

4.1 Connection preparations

- Use the computer to connect the Ethernet port of the device.
- Check the IP address of the monitoring module (from the LCD screen "Parameter Settings-> Communication Parameters ->IP Address").
- Change the IP address of the computer to be on the same network segment as the IP address of the monitoring module.
- The factory address of the monitoring module is 192.168.2.100.
- Confirm that the yellow lights of the two network ports are on normally, and the green light of the network port on the computer side is on, indicating that the network connection is normal.

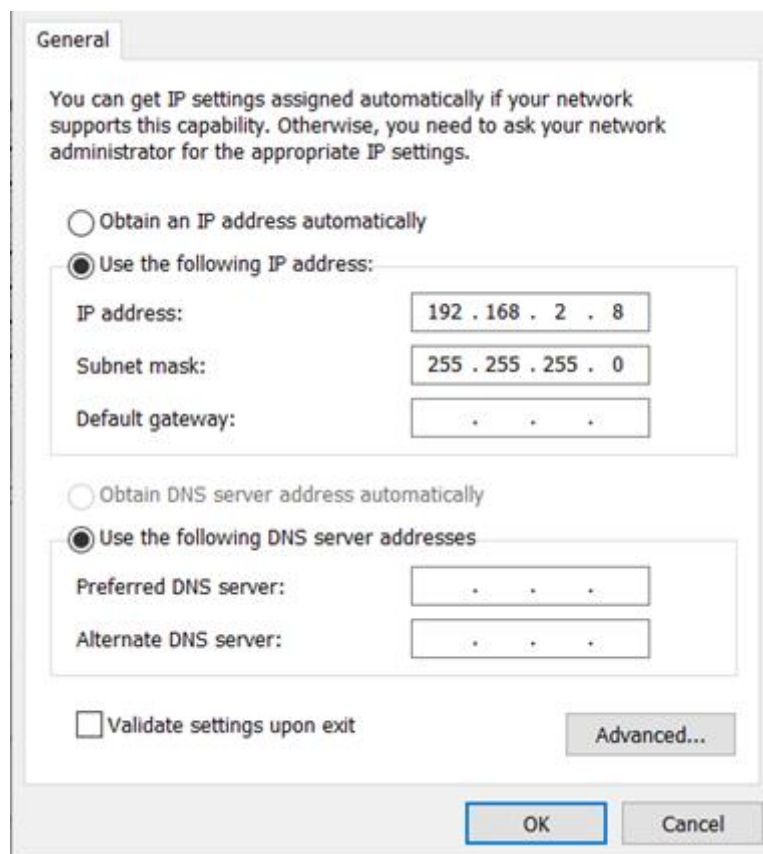


Figure 4-1 PC network settings



Figure 4-2 Monitoring network cable connection

4.2 Status

The status page displays the real-time operation information of the power system.

4.2.1 Operation information

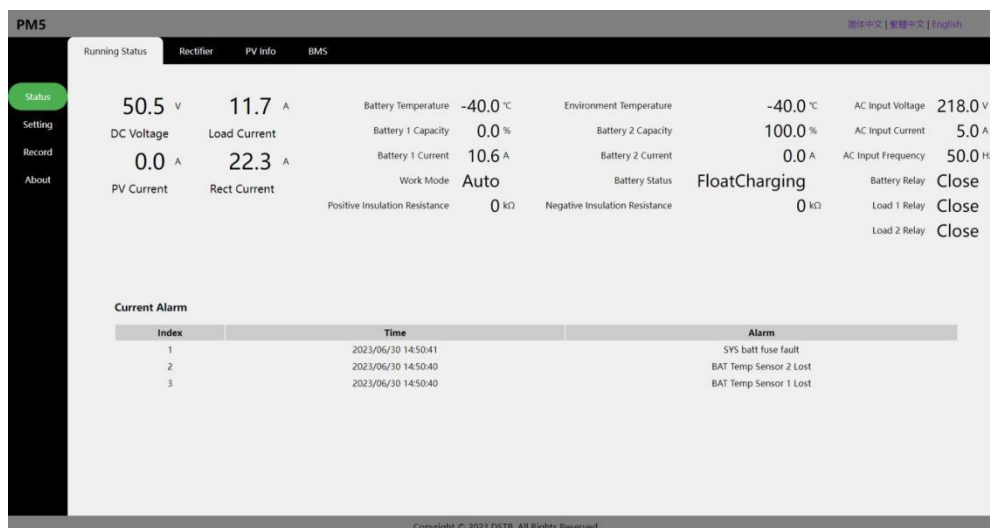


Figure 4-3 Operation information

Upper left display area: bus voltage and load current;

Upper right display area: battery temperature, ambient temperature, 1/2 capacity of battery pack, 1/2 current of battery pack, and battery management working mode;

Lower display area: current alarm;

4.2.2 Rectifier module information

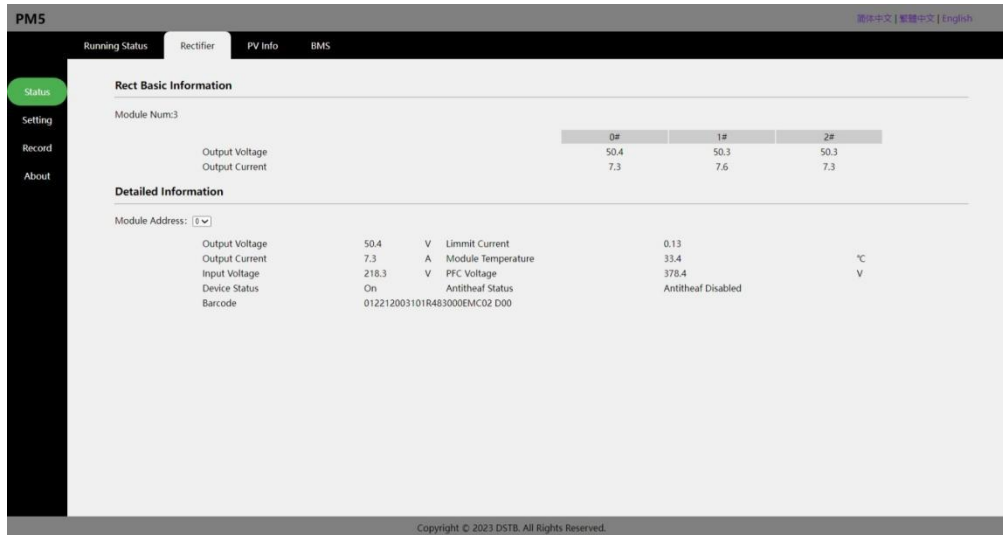


Figure 4-4 Rectifier module information

Rectifier module information is divided into two parts.

- Basic information of rectifier module
- Display the real-time output voltage and output current of all modules;
- Detailed information
- Display detailed operation information of the selected module, including output voltage, output current, current limit point, module temperature, PFC voltage, module status and module hardware bar code;

4.2.3 PV module information

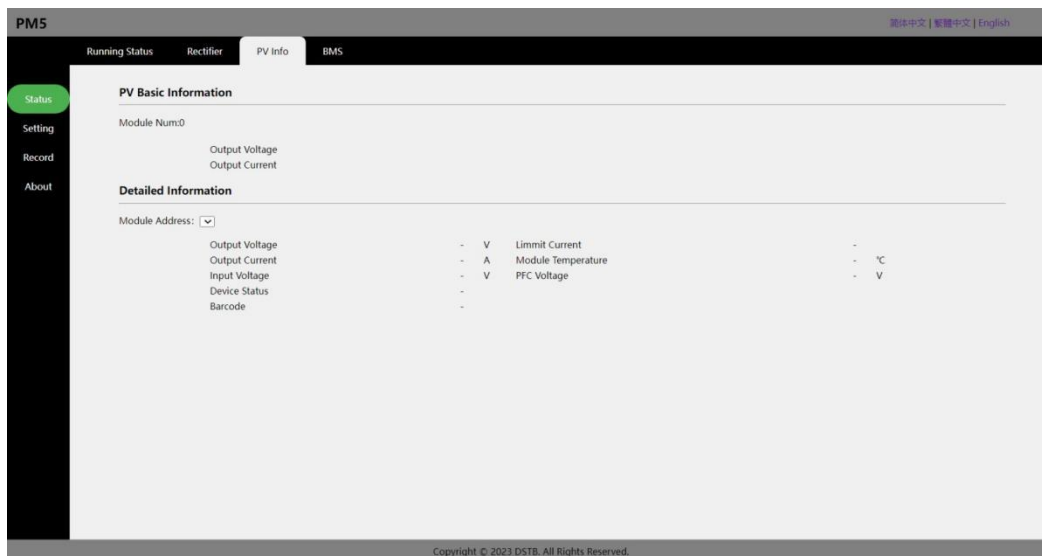


Figure 4-5 PV module information

4.2.4 Historical faults



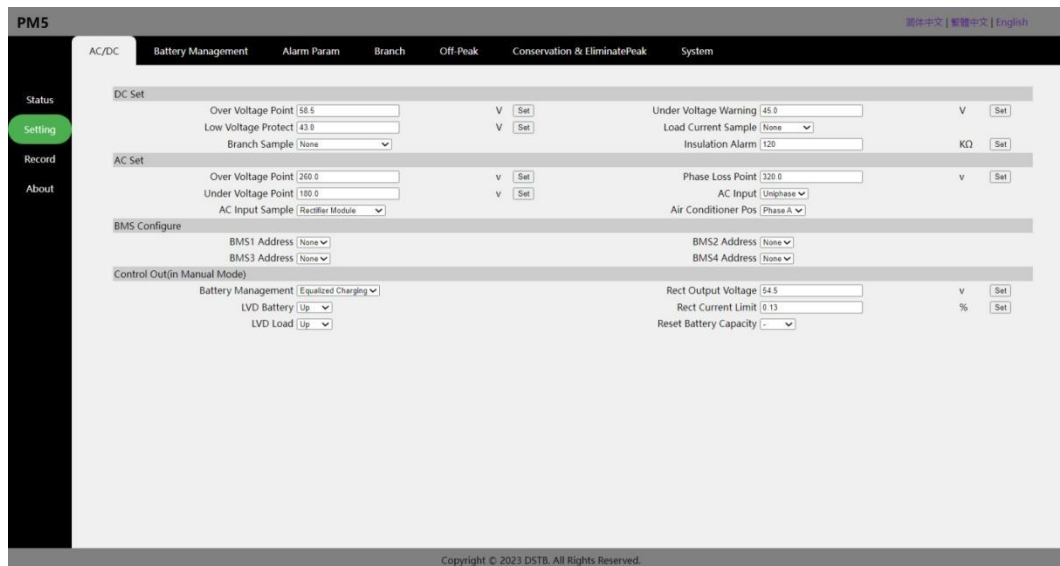
Index	Start	End	Alarm
1	2023/06/29 10:34:11	2023/06/29 10:34:13	SYS bus low voltage
2	2023/06/29 10:34:06	2023/06/29 10:34:10	SYS bus under voltage
3	2023/06/29 10:25:53	2023/06/29 10:26:08	BAT Batt temp too high
4	2023/06/29 10:24:40	2023/06/29 10:25:53	BAT Temp Sensor 1 Lost
5	2023/06/29 10:25:18	2023/06/29 10:25:39	BAT Env temp too high
6	2023/06/29 10:25:04	2023/06/29 10:25:18	BAT Temp Sensor 2 Lost
7	2023/06/29 10:24:48	2023/06/29 10:25:03	BAT Env temp too high
8	2023/06/29 09:13:48	2023/06/29 10:24:48	BAT Temp Sensor 2 Lost
9	2023/06/29 10:24:18	2023/06/29 10:24:25	BAT Temp Sensor 1 Lost
10	2023/06/29 10:24:03	2023/06/29 10:24:18	BAT Batt temp too high

Figure 4-6 Historical faults

Historical faults are listed by page number.

4.3 Settings

4.3.1 AC/DC



The screenshot shows the 'AC/DC' settings page in the PMS interface. It is divided into several sections:

- DC Set:** Includes 'Over Voltage Point' (58.5 V), 'Low Voltage Protect' (43.0 V), 'Branch Sample' (None), 'Under Voltage Warning' (45.0 V), 'Load Current Sample' (None), and 'Insulation Alarm' (120 KΩ).
- AC Set:** Includes 'Over Voltage Point' (260.0 V), 'Under Voltage Point' (180.0 V), 'AC Input Sample' (Rectifier Module), 'Phase Loss Point' (320.0 V), 'AC Input' (Uniphase), and 'Air Conditioner Pos' (Phase A).
- BMS Configure:** Includes 'BMS1 Address', 'BMS3 Address', 'BMS2 Address', and 'BMS4 Address', all currently set to 'None'.
- Control Out(in Manual Mode):** Includes 'Battery Management' (Equalized Charging), 'LVD Battery' (Up), 'LVD Load' (Up), 'Rect Output Voltage' (54.5 V), 'Rect Current Limit' (0.13 %), and 'Reset Battery Capacity' (set to 100%).

Figure 4-7 AC/Rectifier Settings

Set the parameters of AC power distribution and DC power distribution of the system.

Battery capacity reset: the battery capacity can be directly reset to 100%;

4.3.2 Battery management

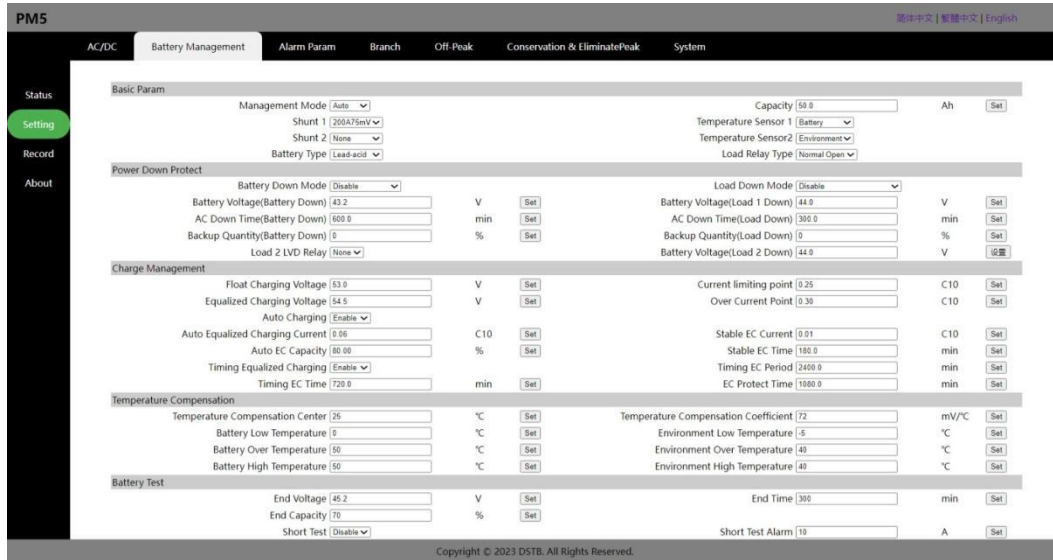


Figure 4-8 Battery management settings

The battery management page is used to configure the operating parameters of the battery pack.

4.3.3 Alarm level

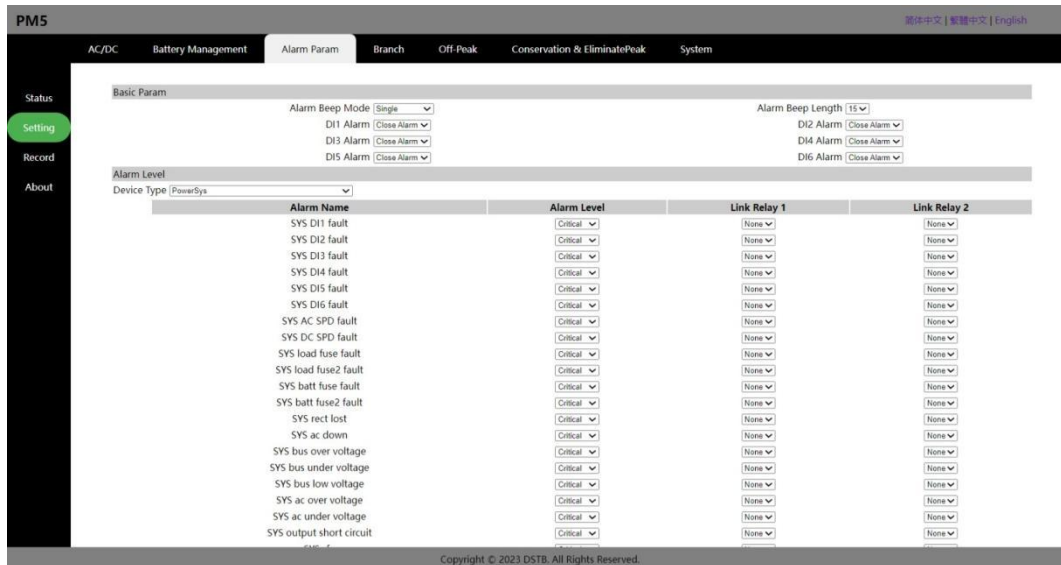


Figure 4-9 Alarm level setting

Set the alarm level for all alarm quantities supported by the system; Alarm levels are divided into system alarm, rectifier module alarm and battery management alarm based on functions.

4.3.4 Energy saving

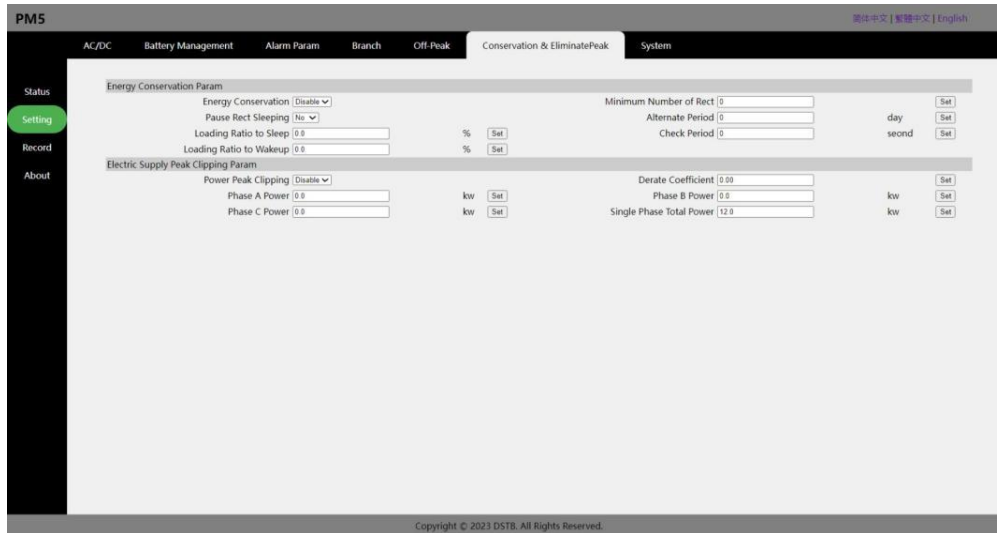


Figure 4-10 Energy-saving setting

According to the peak and valley situation of power consumption in the station area in one day, the alternating operation process of charging and discharging of this power supply system is configured and controlled.

4.3.5 System

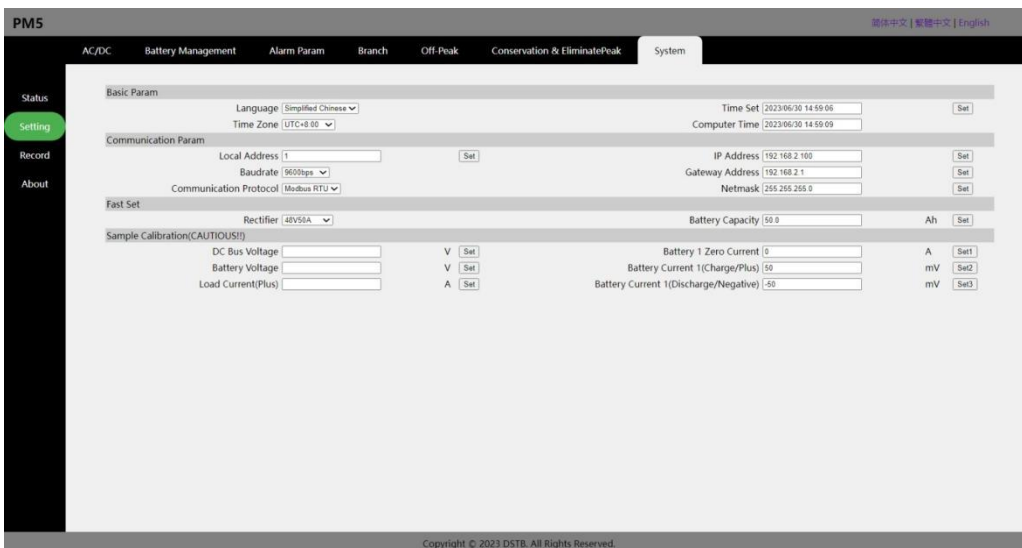


Figure 4-11 System setting

System page for monitoring module related system configuration, including

- Basic parameters: language, timezone, monitoring module system time;
- Communication parameters: including RS485 and Ethernet;
- Quick setting: including module type and system battery capacity;

4.4 About Page

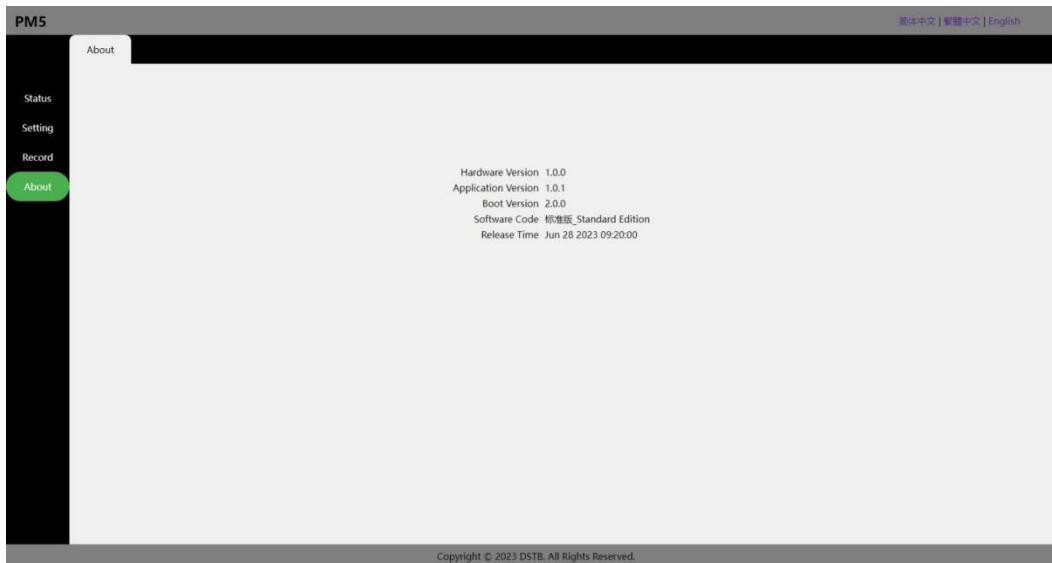


Figure 4-12 About

About page displays the hardware version information, software version information and software release time of the monitoring module.

The version number is divided into three parts, namely, major version number, minor version number and maintenance version number, which are used to identify major changes, general changes, BUG fixes and optimizations respectively.