MEGMEET®

MC2600 Controller

User Manual

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Revision History

Version	Date	Description	Changed by
V2.00	January 09, 2020	1. First draft 2. The matched software version is 2.000105.	Aaron An
V2.01	January 15, 2020	1. Add load 3 fuse & load 4 fuse alarm 2. Update default parameters to be consistent with the software. 3. Update the LCD menu tree to be consistent with the software 4. The matched software version is 2.000105.	Weiqiang wu
V2.02	March 20, 2020	1. Temperature sensor 3 can be configured to battery temperature or ambient temperature. 2. Add battery discharge test during tariff peak periods. 3. Update for 4 load recovery lvd voltage can be set respectively 4. Update the LVD mode according to voltage, time and battery capacity. 5. The matched software version is 2.37.	Weiqiang wu/ Aaron An
V2.03	April 29, 2020	1. The matched software version is 2.37 and 2.38.	Weiqiang wu
V2.04	August 25, 2020	1. DG parameter setting description adds Low Fuel Stop DG, Diesel Limit Power and Diesel Max Power. 2. Rectifier parameter setting description adds Default Volt and Mppt Scan 3. Update parameter setting screen 4. The matched software version is 2.40.	Weiqiang wu
V2.05	February 25, 2021	1. The default number of solar modules is changed from 0 to 4. 2. The default number of rectifier modules is changed from 7 to 8. 3. The rectifier module and solar module alarm name is modified. 4. PV input fail alarm level is set to minor alarm. 5. Remove the "Batt Type" option. 6. The default setting for ECO was changed to Disable. 7. The default setting for ECO cycle age was changed to Enable. 8. The default setting for Batt.Fuse. Num to 2. 9. The default setting for battery discharge alarm level to major alarm. 10. Optimize ECO management strategy, give priority to ac three phase balance when modules on or off. ECO cycle age is enable.	CanLin Peng
V2.10	April 2, 2022	1. Add a list of system alarms, as shown in Table 1-3 2. Add a list of system alarm handling measures, as shown in Table 3-1 3. Detailed description of battery management functions, see chapter 1.4.5 4. Detailed description of ECO management functions, see chapter 1.4.6 5. Unify the signal name,see chapter 2.2	Charley Pan

Content

Chapter 1 MC2600 Monitoring System

This chapter introduces MC2600 monitoring system, including the sections of overview, system composition, system configuration and system functions.

1.1 Overview

MC2600 is the new generation DC power controller developed by MEGMEET. It offers many features and functions, and a more robust, user-friendly, and easy-to-use interface. A power monitoring system is formed by this monitoring module together with Megmeet's rectifier modules, solar modules and distribution plug-in frame (or distribution cabinet), realizing interactive operations in human-machine interfaces, monitoring of system operating state, intelligent battery management, and automatic energy-saving management. MC2600 controller provides several communication interfaces, such as CAN, RS485, Ethernet and dry contacts. The RS485 and Ethernet ports provide flexible extension function and parameters setting, firmware and data logs downloading/uploading, remote monitor system accessing, and it can realize remote monitoring. MC2600 can be used as either separate system or hybrid power system of rectifier modules and solar modules.

Table 1- 1 Name and Model

Name	Model	Remarks
Controller	MC2600	/

1.2 System Composition

MC2600 controller together with rectifier modules, solar modules, diesel generators, distribution plug-in frame (or distribution cabinet) and other devices, forms a communication power monitoring system. Fig1- 1 shows the system monitoring solution.

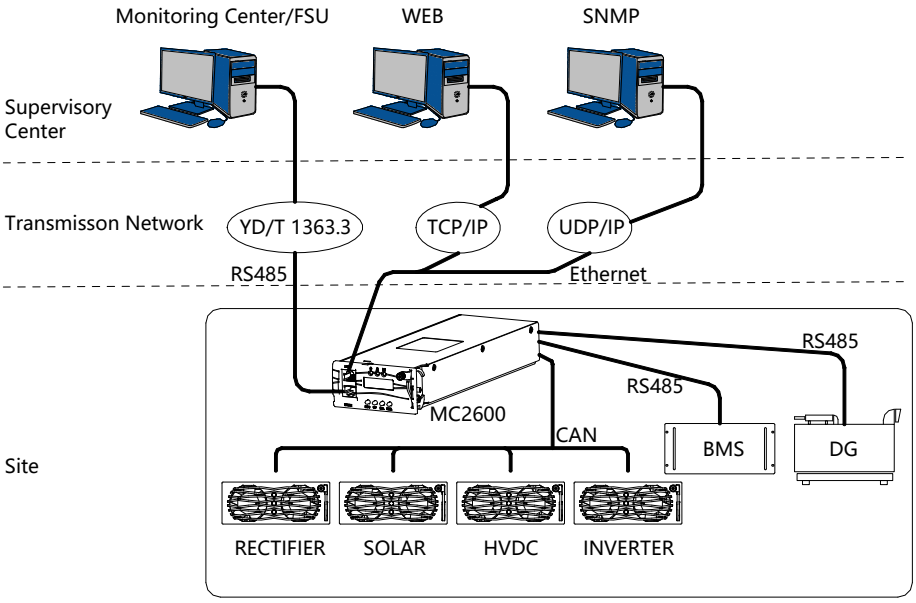


Fig1- 1 MC2600 monitoring system solution

1.3 System Configuration

Table 1- 2 Power system configuration

Name	Model	Quantity	Remark
Controller	MC2600	1pcs	
Rectifier or MPPT module	MR483000HG MS483000HG2	Max. 20pcs	
Distribution plug-in frame (or distribution cabinet)	-	1pcs	

1.4 System Functions

1.4.1 Measurement Functions

1) Analog value measurement

DC Voltage, Load current, Battery current, Battery mid-point voltage, Battery temperature, Ambient temperature and humidity, Load fuse, Battery fuse, AC voltage, AC frequency.

2) Digital value measurement

The controller has 8 available digital inputs. The digital input should be dry contact signal and there is no polarity between two contacts, interchangeable. Each digital input can be defined as NO or NC.

1.4.2 Display and Indicating Functions

The controller is equipped with a 128×32 LCD unit, three LED lights and four buttons; simple and efficient, the user interface can display operating parameters, operating status, alarm status, setup parameters, system configuration data and control parameters of the power system.

1.4.3 Control Functions

The controller can send corresponding action commands to the monitored object according to the system operating status; such commands mainly include control of rectifier module or solar module on/off switching and battery equalizing/floating charge switching, change of current limiting point of rectifier module or solar module, and adjustment of voltage of rectifier module or solar module, load disconnect, battery protection.

The controller supports both automatic and manual control modes. In automatic mode, all functions of battery management can be fulfilled automatically; In manual mode, only the functions of battery equalizing charge time protection and capacity calculation can be realized, and other functions of battery management need to be completed manually. The switching between automatic and manual control modes can be achieved through button setting or send command.

1.4.4 Alarm Functions

The controller can make sound-light alarms against system faults based on the data acquired, produce corresponding actions and report to the client computer. There are three levels of alarms: MAJOR alarm, MINOR alarm and NO alarm. Users are allowed to set the level of each alarm according to the actual situation and also set the corresponding relay output, or NO relay output for each alarm type.

Users have access to history alarm logs and current alarm logs. The history alarm logs include alarm type, start time, and end time, while the current alarm logs only cover alarm type and start time; the logs are displayed in chronological order of start time. At most 1000pcs of history alarm logs can be saved cyclically. Table 3-3 lists the alarms generated for the MC2600.

Table 1- 3 Alarm list

No.	Alarm name	Creation conditions	Clearing Conditions
1	DC Under Volt	DC voltage less than "DC Under Volt"	DC voltage greater than "DC Under Volt "+0.25
2	DC Over Volt	DC voltage greater than "DC Over Volt "	DC voltage less than "DC Over Volt "-0.25
3	Batt 1 Temp Low	"Temp Sensor 1 " is set to "Batt", and battery temperature 1 to less than "Batt 1 Temp Low".	"Temp Sensor 1" is set to "No" or battery temperature 1 is greater than "Batt 1 Temp Low" +3
4	Batt 1 Temp High	"Temp Sensor 1 " is set to "Batt", and battery temperature 1 to greater than "Batt 1 Temp High".	"Temp Sensor 1" is set to "No" or battery temperature 1 is less than “Batt 1 Temp High”-3
5	Batt 1 Temp High+	"Temp Sensor 1 " is set to "Batt", and battery temperature 1 to greater than "Batt 1 Temp High+".	"Temp Sensor 1" is set to "No" or battery temperature 1 is less than “Batt 1 Temp High+”-3
6	Batt 2 Temp Low	"Temp Sensor 2 " is set to "Batt", and battery temperature 2 to less than "Batt 2 Temp Low".	"Temp Sensor 2" is set to "No" or battery temperature 2 is greater than "Batt 2 Temp Low" +3

7	Batt 2 Temp High	"Temp Sensor 2 " is set to "Batt", and battery temperature 2 to greater than "Batt 2 Temp High".	"Temp Sensor 2" is set to "No" or battery temperature 2 is less than “Batt 2 Temp High”-3
8	Batt 2 Temp High+	"Temp Sensor 2 " is set to "Batt", and battery temperature 2 to greater than "Batt 2 Temp High+".	"Temp Sensor 2" is set to "No" or battery temperature 2 is less than “Batt 2 Temp High+”-3
9	Sen. 3 Temp Low	"Temp Sensor 3" is set to "Batt" or "Env", and the temperature of Sensor 3 is less than "Sen.3 Temp Low".	“Temp Sensor 3” is set to “No”, or the temperature of Sensor 3 is greater than "Sen.3 Temp Low" +3
10	Sen. 3 Temp High	"Temp Sensor 3" is set to "Batt" or "Env", and the temperature of Sensor 3 is greater than "Sen. 3 Temp High".	“Temp Sensor 3” is set to “No”, or the temperature of Sensor 3 is less than "Sen.3 Temp High" -3
11	Sen. 3 Temp High+	"Temp Sensor 3" is set to "Batt" or "Env", and the temperature of Sensor 3 is greater than "Sen. 3 Temp High+".	“Temp Sensor 3” is set to “No”, or the temperature of Sensor 3 is less than "Sen.3 Temp High+" -3
12	Sen. 4 Temp Low	"Temp Sensor 4" is set to "Batt" or "Env", and the temperature of Sensor 4 is less than "Sen.4 Temp Low".	“Temp Sensor 4” is set to “No”, or the temperature of Sensor 4 is greater than "Sen.4 Temp Low" +3
13	Sen. 4 Temp High	"Temp Sensor 4" is set to "Batt" or "Env", and the temperature of Sensor 4 is greater than "Sen. 4 Temp High".	“Temp Sensor 4” is set to “No”, or the temperature of Sensor 4 is less than "Sen.4 Temp High" -3
14	Sen. 4 Temp High+	"Temp Sensor 4" is set to "Batt" or "Env", and the temperature of Sensor 4 is greater than "Sen. 4 Temp High+".	“Temp Sensor 4” is set to “No”, or the temperature of Sensor 4 is less than "Sen.4 Temp High+" -3
15	Env Hum.Low	Humidity is less than "Env.Humidity L"	Humidity is greater than "Env.Humidity L"+2
16	Env Hum. High	Humidity is greater than "Env.Humidity H"	Humidity is less than "Env.Humidity H”-2
17	AC-L1 Ph. Fail	When the controller is powered on, one of the following conditions is met: 1. No rectifier module is Installed on phase L1 2. All rectifier modules on phase L1 communicate fail 3. The input voltage of phase L1 is less than Phase Loss Volt	At least one rectifier is Installed on L1 phase communicates normally and L1 phase input voltage is greater than "Phase Loss Volt" + 10
18	AC-L1 Under Volt	The system is powered by mains and L1 phase input voltage is less than "AC Under Volt"	At least one rectifier is Installed L1 phase communicates normally and L1 phase input voltage is greater than "AC Under Volt" + 10
19	AC-L1 Over Volt	The system is powered by mains and L1 phase input voltage is greater than "AC Over Volt"	At least one rectifier is Installed L1 phase communicates normally and L1 phase input voltage is less than "AC Over Volt" -10
20	AC-L2 Ph. Fail	When the controller is powered on, one of the following conditions is met: 1. No rectifier module is Installed on phase L2 2. All rectifier modules on phase L2 communicate fail 3. The input voltage of phase L2 is less than Phase Loss Volt	At least one rectifier is Installed on L2 phase communicates normally and L2 phase input voltage is greater than "Phase Loss Volt" + 10

21	AC-L2 Under Volt	The system is powered by mains and L2 phase input voltage is less than "AC Under Volt"	At least one rectifier is Installed L2 phase communicates normally and L2 phase input voltage is greater than "AC Under Volt" + 10
22	AC-L2 Over Volt	The system is powered by mains and L2 phase input voltage is greater than "AC Over Volt"	At least one rectifier is Installed L2 phase communicates normally and L2 phase input voltage is less than "AC Over Volt" -10
23	AC-L3 Ph. Fail	When the controller is powered on, one of the following conditions is met: 1. No rectifier module is Installed on phase L3 2. All rectifier modules on phase L3 communicate fail 3. The input voltage of phase L3 is less than Phase Loss Volt	At least one rectifier is Installed L3 phase communicates normally and L3 phase input voltage is greater than "Phase Loss Volt" + 10
24	AC-L3 Under Volt	The system is powered by mains and L3 phase input voltage is less than "AC Under Volt"	At least one rectifier is Installed L3 phase communicates normally and L3 phase input voltage is greater than "AC Under Volt" + 10
25	AC-L3 Over Volt	The system is powered by mains and L3 phase input voltage is greater than "AC Over Volt"	At least one rectifier is Installed L3 phase communicates normally and L3 phase input voltage is less than "AC Over Volt" -10
26	Mains Failure	Meet one of the following conditions: 1, For single-phase system, L1 phase voltage is less than 60.For three-phase system, L1,L2 and L3 phase voltage are all less than 60; 2. The system does not install any rectifier module 3.All rectifier modules communicate fail	At least one rectifier module communicates normally and AC input voltage is greater than 75.(For single-phase system,L1 input voltage is greater than 75.For three-phase system,L1, L2 and L3 voltage are all greater than 75.)
27	Solar Input Fail	The system is powered by solar and meets one of the following conditions: 1, solar input voltage is less than 50V 2. No MPPT module is installed 3. All MPPT modules communicate fail	At least one MPPT module communicates normally and solar input voltage is greater than 65.
28	Solar Input Vol Low	The system is powered by solar and at least one MPPT module communicates normally and solar Input voltage is less than "Solar Input Und Vol"	At least one MPPT module communicates normally and solar input voltage is greater than "Solar Input Und Vol"+10
29	Solar Input Vol High	The system is powered by solar and at least one MPPT module communicates normally and solar Input voltage is greater than "Solar Input Over Vol"	At least one MPPT module communicates normally and solar input voltage is less than "Solar Input Over Vol"+10
30	Curr Imbalance	The difference between the maximum and minimum output current of the rectifier module exceeds 12% of the rated current for 120 seconds	The difference between the maximum and minimum output current of the rectifier module is less than 8% of the rated current

31	Multi Module Fault	The number of overtemperature, module failure, fan failure, overvoltage protection, current imbalance, or communication fail rectifier modules is greater than 1	The number of overtemperature, module failure, fan failure, overvoltage protection, current imbalance, or communication fail rectifier modules is less than 2
32	Module xx Comm Fail	Failed to receive data packets from the rectifier module for 10 consecutive times	Received the rectifier packet correctly
33	Module xx Input Fail	The rectifier module meets any one of the following conditions: 1. The input voltage is less than 80vac; 2. The input voltage is greater than 303vac The solar module meets any one of the following conditions: 1. The input voltage is less than 110V; 2. The input voltage is greater than 430v; 3. Reverse polarity of input wiring	The rectifier module meets the following conditions: The input voltage is greater than 90vac and less than 290vac; The solar module meets the following conditions: The input voltage is greater than 160V and less than 415V, and the input wiring polarity is correct;
34	Module xx Temp High	The module air inlet temperature is greater than 75 ℃	The module air inlet temperature is less than 65 ℃
35	Module xx HW Fault	Meet any one of the following conditions: 1. Module hardware failure; 2. The output voltage is greater than 60.5v; 3. The input voltage of rectifier module is greater than 303v or the input voltage of solar module is greater than 430v	All of the following conditions are met: 1. The module hardware is normal; 2. The output voltage is less than 60.5v; 3. The input voltage of rectifier module is less than 290v or the input voltage of photovoltaic module is less than 415V
36	Module xx Protection	Meet any one of the following conditions: 1. Fan failure 2. The air inlet temperature is greater than 75 ℃ 3. Ambient temperature sensor failure	All of the following conditions are met: 1. The fan is normal; 2. The air inlet temperature is less than 65 ℃; 3. The ambient temperature sensor is normal.
37	Module xx Fan Fault	Module fan failure	Module fan is normal.
38	Modu xx Out Over Vol	The output voltage of the module is greater than 60.5v	The output voltage of the module is less than 60.5v
39	Climate Alarm	Determine by the DI status	Determine by the DI status
40	Door Alarm		
41	DI 3 Alarm		
42	DI 4 Alarm		
43	DI 5 Alarm		
44	DI 6 Alarm		
45	DI 7 Alarm		
48	DI 8 Alarm		
49	SPD Alarm		
50	Load 1 Fuse Alarm	The voltage of the collection point is greater than 400mV	The collection point voltage is less than 100mV
51	Load 2 Fuse Alarm		
52	Load 3 Fuse Alarm		
53	Load 4 Fuse		

	Alarm		
54	Batt 1 Fuse Alarm		
55	Batt 2 Fuse Alarm		
56	Boost Charge	The battery is in boost charge state	The battery is not in boost charge state
57	Battery Test	The battery is in stable test state	The battery is not in stable test state
58	Batt Discharge	The battery is discharging	The battery is not discharging
59	Batt Short Test Fail	This alarm is generated when the current difference between batteries is greater than "Batt Curr Imbalance" or the difference between the DC voltage and "End Test Voltage" is less than 0.5V during a short test.	It will be automatically cleared after 5 minutes
60	Batt Test Fail	This alarm is generated when the difference between the DC voltage and "End Test Voltage" is less than 0.5V during a stable test.	It will be automatically cleared after 5 minutes
61	LLVD1	meet any of the following conditions: 1, LVDx is enabled and DC voltage is less than LVDx voltage and the battery is not in test state and the battery is discharging 2, LVDx is enabled and LVD Mode is "Time Mode" and the duration of Mains fail and PV input fail is longer than LLVDx Time 3, LVDx is enabled and LVD Mode is "Cap Mode" and the battery is discharging and SOC is less than LLVDx Capacity	meet any of the following conditions: 1. LLVDx is disabled 2, DC voltage is greater LLVDx Recovery Volt and (AC input is normal or PV input is normal) 3. LLVDx is disconnected due to AC input failure. Ac input is now normal .
62	LLVD2		
63	LLVD3		
64	LLVD4		
65	BLVD	meet any of the following conditions: 1. BLVD is enabled and DC voltage is less than BLVD voltage and the battery is not in test state and the battery is discharging 2. BLVD is enabled and LVD Mode is "Time Mode" and the duration of Mains fail and PV input fail is longer than "BLVD Time" 3. BLVD is enabled and LVD Mode is "Cap Mode" and the battery is discharging and SOC is less than BLVD Capacity 4. "Over Temp BLVD En" is enabled and the battery temperature is greater than "Batt x Temp High+" 5. "Under Temp BLVD En" is enabled and the battery temperature is less than "Batt x Temp Low"	meet any of the following conditions: 1. BLVD is disconnected due to low DC voltage and BLVD is disabled 2. BLVD is disconnected due to low DC voltage and BLVD is enabled and DC voltage is greater than BLVD volt and (AC input is normal or PV input is normal) 3. BLVD is disconnected due to high temperature and "Over Temp BLVD En" is disabled 4. BLVD is disconnected due to high temperature and the battery temperature is less than "Batt x Temp High+" -3 5. BLVD is disconnected due to low temperature and "Under Temp BLVD En" is disabled 6. BLVD is disconnected due to low temperature and the battery temperature is greater than "Batt x Temp Low" +3
66	Batt x Volt Imba	Based on the midpoint voltage, if the voltage difference between the upper and lower exceeds 1.5V, this alarm is generated	Based on the midpoint voltage, if the voltage difference between the upper and lower is less than 0.5, the alarm is cleared

67	Batt x Charge Over	The battery charging Current is greater than (Charge Current Limit+0.2)*Batt Capacity	The battery charging Current is less than (Charge Current Limit+0.18)*Batt Capacity
68	ECO	The system is in ECO mode	The system is not in ECO mode
69	ECO Pause	The system automatically exits the ECO state if any of the following conditions occurs: 1. Both Mains and PV input failure 2. DC under voltage 3. Batteries are in testing 4. Batteries are discharging 5. Battery fuses failure 6. BLVD disconnect 7. Any rectifier module alarms (e.g., communication interruption) Note: When the system exit ECO due to the preceding reasons and any rectifier is turned off, the number of ECO exceptions increases by 1. If the number of ECO exceptions reaches 10 within 1 hour, ECO Pause alarm occur.	The alarm is cleared after 12 hours.
70	Manual Mode	The system is in manual control mode	The system is in automatic control mode
71	BMS xx Comm Fail	Failed to receive data packets from the BMS for 10 consecutive times	Received the BMS packet correctly
72	BMS xx Warning	Please refer to the battery user manual	Please refer to the battery user manual
73	BMS xx Protect	Please refer to the battery user manual	Please refer to the battery user manual
74	BMS xx Fault	Please refer to the battery user manual	Please refer to the battery user manual
75	Minor Alarm	Active alarms contain minor alarms	Active alarms do not contain minor alarms
76	Major Alarm	Active alarms contain major alarms	Active alarms do not contain major alarms
77	Temp Sensor 1 Fault	"Temp Sensor 1" is set to "Batt" and the temperature 1 is greater than 90° C or less than -50° C	"Temp Sensor 1" is set to "No" or the temperature 1 is less than 80° C and greater than -40° C
78	Temp Sensor 2 Fault	"Temp Sensor 2" is set to "Batt" and the temperature 2 is greater than 90° C or less than -50° C	"Temp Sensor 2" is set to "No" or the temperature 2 is less than 80° C and greater than -40° C
79	Temp Sensor 3 Fault	"Temp Sensor 3" is set to "Batt" or "Env" and the temperature 3 is greater than 90° C or less than -50° C	"Temp Sensor 3" is set to "No" or the temperature 3 is less than 80° C and greater than -40° C
80	Temp Sensor 4 Fault	"Temp Sensor 4" is set to "Batt" or "Env" and the temperature 4 is greater than 90° C or less than -50° C	"Temp Sensor 4" is set to "No" or the temperature 4 is less than 80° C and greater than -40° C
81	Heavy Load	The power system Load Ratio exceeds " Heavy Load Ratio"	The power system Load Ratio less than " Heavy Load Ratio"-5%
82	AC Breaker Open	Judge according to circuit breaker status detection	Judge according to circuit breaker status detection

83	Fuel Level Low	The fuel level is less than the low fuel alarm threshold	The fuel level is greater than the low fuel alarm threshold+10%
84	Module Address Err	The module cannot detect the hardware address or the module address conflicts or the address is out of the limited range	Modules have unique HW address in normal range

1.4.5 Battery Management Functions

The MC2600 manages battery by a state machine with 5 states, including Float Charge, Boost Charge, Stable Test, Short Test,Peak Discharge. Meanwhile, MC2600 supports the functions of Temperature Compensation,Battery Charge Current Limitation ,Battery capacity prediction and Battery Protection.

1.4.5.1 Charge and Discharge Management

As shown in Fig1- 2,Fig1- 3,Fig1- 4,Fig1- 5 and Fig1- 6,the controller is designed with the perfect automatic battery management function, efficiently prolonging the battery service life.

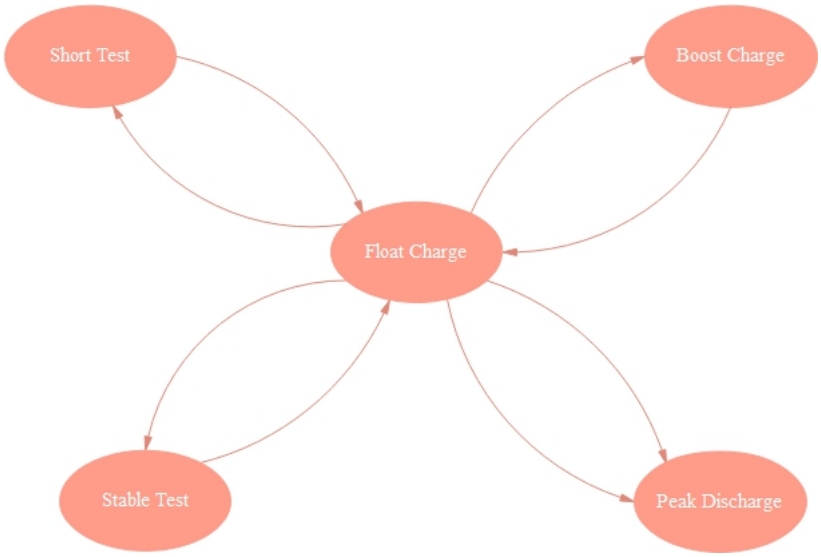


Fig1- 2 Battery State Machine

1） Float Charge and Boost Charge switching

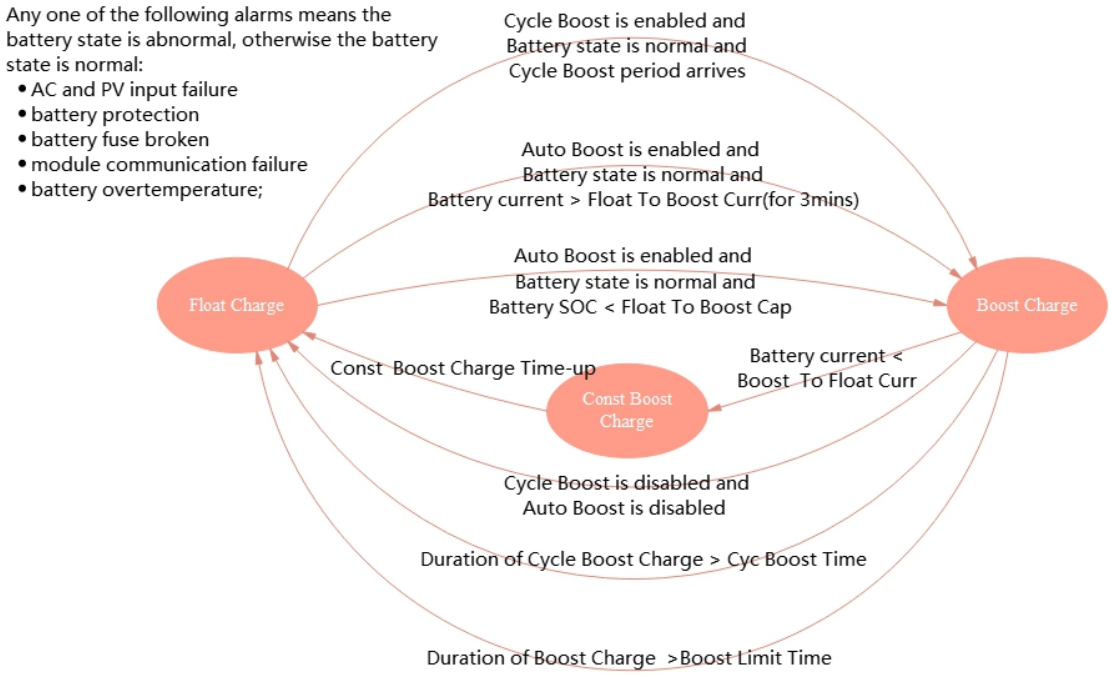


Fig1- 3 Float Charge and Boost Charge State switching

2） Float Charge and Short Test switching

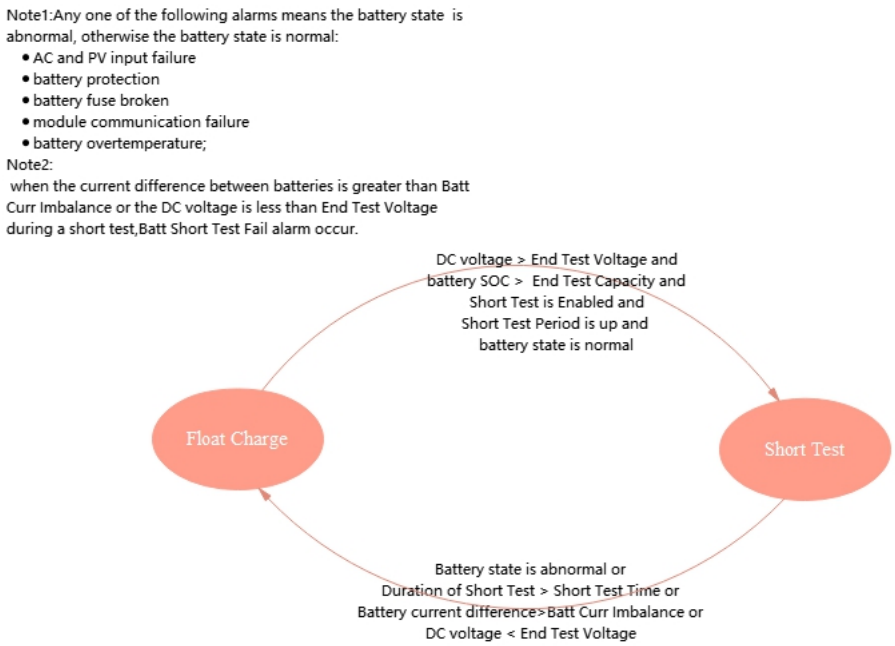


Fig1- 4 Float Charge and Short Test State switching

3） Float Charge and Stable Test switching

Note1:Any one of the following alarms means the battery state is abnormal, otherwise the battery state is normal:

- AC and PV input failure
- battery protection
- battery fuse broken
- module communication failure
- battery overtemperature;

Note2:
when the DC voltage is less than End Test Voltage during a Stable test,Batt Test Fail alarm occur.

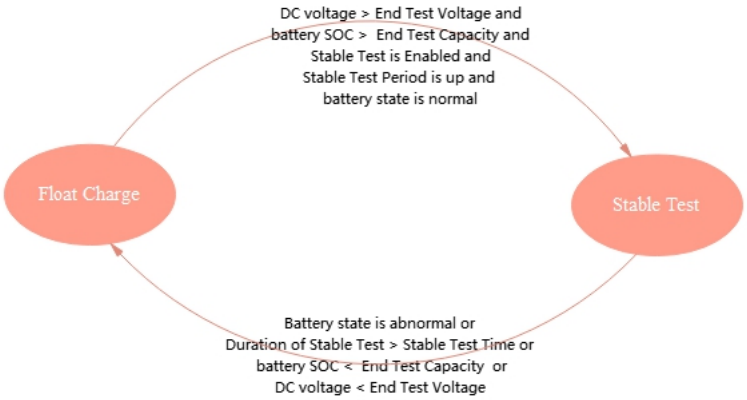


Fig1- 5 Float Charge and Stable Test State switching

4） Float Charge and Peak Discharge switching

Note:Any one of the following alarms means the battery state is abnormal, otherwise the battery state is normal:

- AC and PV input failure
- battery protection
- battery fuse broken
- module communication failure
- battery overtemperature;

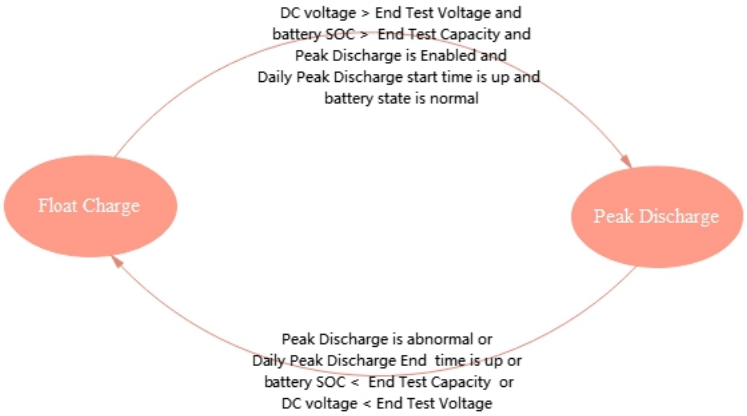


Fig1- 6 Float Charge and Peak Discharge State switching

5） Float Charge

After the battery is fully charged, the battery is charged with a small current , which is called float charging, also known as trickle charging. This small current is generally not artificially set, but after the voltage is set to the float voltage (Default value is 53.5V), the battery is fully charged and can accept When the current is very small, a floating current is automatically formed.

There are three purposes of floating charge:

a) Keep the voltage of the battery in the range of floating charging voltage. At this time, the grid of the battery (that is, the conductive skeleton of the plate) corrodes at the slowest state, which can prolong the battery life.

b) Supplement the capacity loss caused by the self-discharge of the battery and keep the power sufficient.

c) Inhibit sulfation caused by re-crystallization of active substances.

There is no limit to the floating charging time of the battery. As long as the voltage is within the floating charging voltage range, lead-acid batteries are not afraid of floating charging.

6） Short Test

In the short test state, the module output voltage is controlled as "End Test Voltage" (default 45.2V)-1V, the battery is discharged, and it is used to test whether the battery discharge current is balanced and the battery performance is good or bad.The alarm Batt Short Test Fail will be generated when the current difference between batteries is greater than "Batt Curr Imbalance" or the DC voltage is less than "End Test Voltage" during a short test.

Note:

LLVDx and BLVD will not be disconnected during short test.

7） Stable Test

In the Stable Test state, the module output voltage is controlled as "Float Voltage" (default 54.5V). By adjusting the current limiting point of the module, the battery discharge current is maintained near the "Stable Test Current" (default 0.2C10). If the load is less than the set value, the discharge current is approximately equal to the load current. The Stable Test is mainly used to test the battery performance.The alarm Batt Test Fail will be generated when the DC voltage is less than "End Test Voltage" during a stable test.

Note:

LLVDx and BLVD will not be disconnected during Stable test.

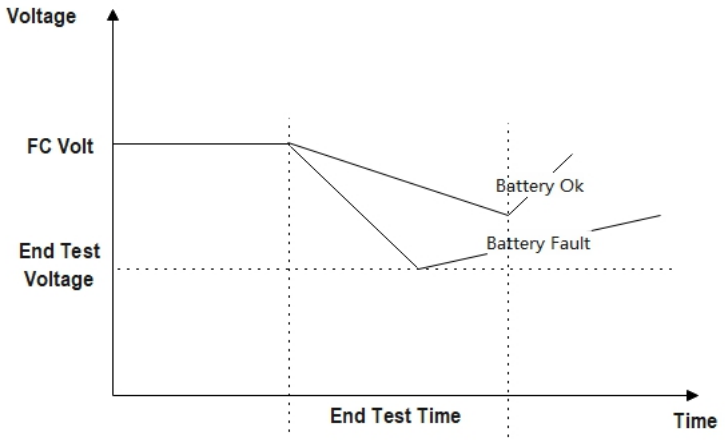


Fig1- 7 Schematic diagram of battery test process

8） Boost Charge

During the use of the battery, the battery point voltage is unbalanced due to individual differences and temperature differences of the battery. In order to ensure that the voltage and specific gravity of all the batteries in the battery pack are uniform, we use the constant voltage and current limiting charging method. This constant voltage and current limiting charging method is boost charge.

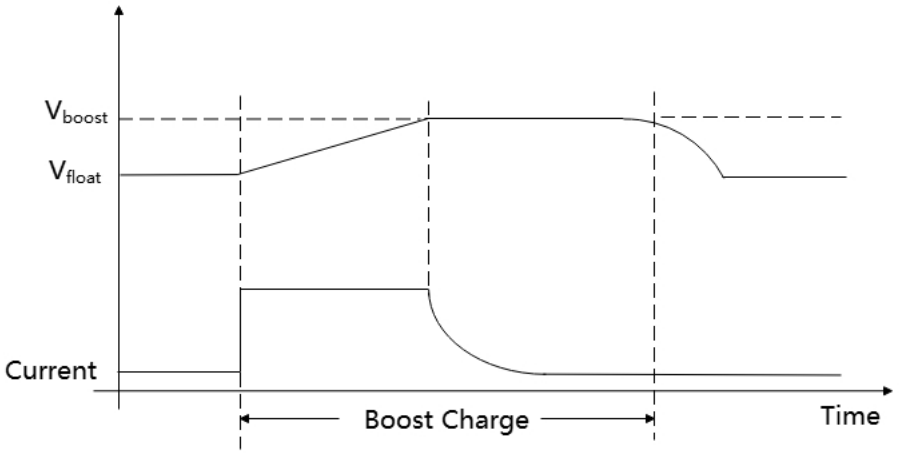


Fig1- 8 Schematic diagram of the boost charge process

9） Peak Discharge

During the peak power consumption period, the module output voltage is adjusted to the "End Test Voltage" (default 45.2V), the battery is discharged, and when the DC voltage is less than the "End Test Voltage", system exits the peak discharge state.During the valley period of power consumption, recharge the battery. So as to realize the function of peak shaving and valley filling.

1.4.5.2 Temperature Compensation

In Float Charge state, the charge voltage needs to be adjusted by the temperature of the battery to ensure the battery life cycle. The voltage difference(Delta Volt) depends on Temperature Compensation Coefficient and Center Temperature, but not more than 2V，and the final output voltage does not exceed Boost Voltage.

Output Volt = FC Volt + (Temp - Center Temp) * Temp Comp Coef

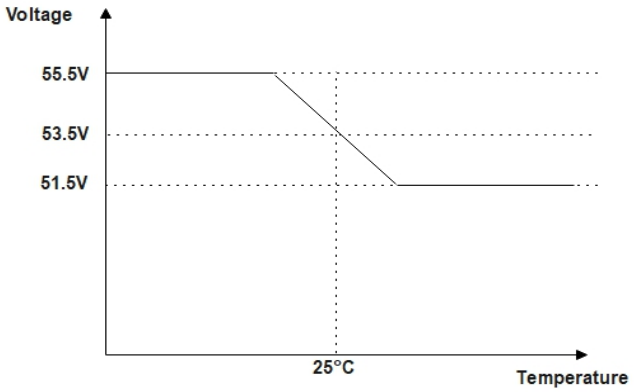


Fig1- 9 Schematic diagram of battery temperature compensation

1.4.5.3 Battery Current Limitation

To avoid damaging battery, the charge current should be limited a pre-defined current value. This current value equals to Charge Current Limit * Battery Rated Capacity.

Battery current limit function is valid for float charge and boost charge state.

1.4.5.4 Battery Protection Functions

As shown in Fig1- 10 and Fig1- 11,The controller can disconnect the load or battery in case of under voltage, in order to prevent the batteries from deep discharge.MC2600 supports 4 load VLD: LLVD1, LLVD2, LLVD3, LLVD4.The controller can disconnect the battery in case of over temperature or low temperature, in order to prevent the batteries from damage.

When the temperature of any batteries is greater than Batt x Temp High(Default: 55℃), the DC output Voltage is limited to 52V. When the temperature of any batteries is greater than over temperature alarm value(Default: 60℃),the battery contactor would be disconnected. This function can be enabled or disabled by LCD or Web client.

When the temperature of any batteries is less than low temperature alarm value(Default: -33℃), battery contactor would be disconnected. This function can be enabled or disabled by LCD or Web client.

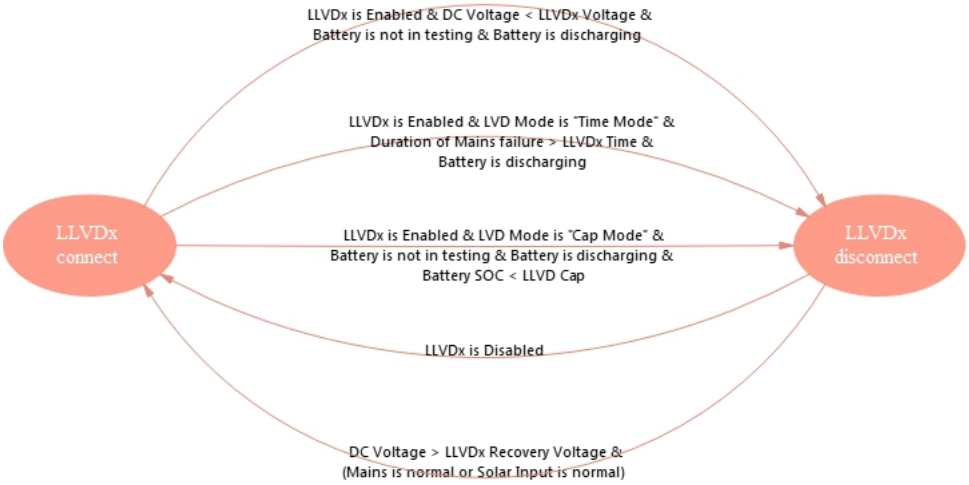


Fig1- 10 LLVD State switching

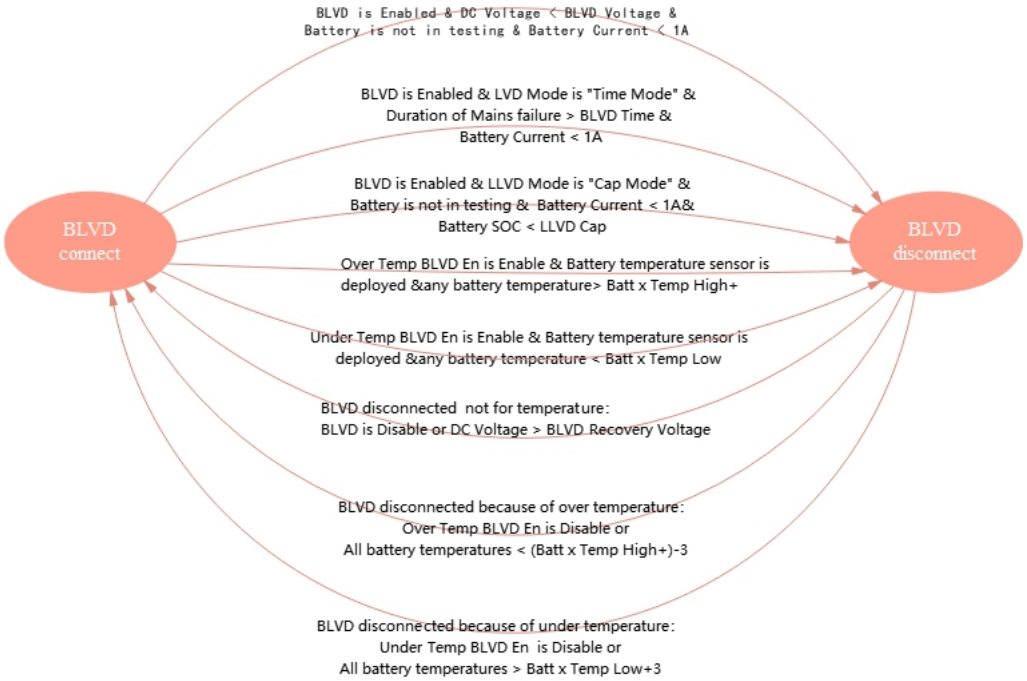


Fig1- 11 BLVD State switching

1.4.6 ECO Management Functions

The rectifier efficiency is usually lower in a light load state than a heavy load state. When the load rate is about 60%, the rectifier shall reach its best efficiency. To save energy, MC2600 switches on / off the rectifier to ensure that the switch-on rectifiers in a DC power at a higher efficiency point. This is the ECO function.

To prevent condensation from damaging the switch-off rectifiers, every few days, MC2600 switches on all rectifiers to dry for a while.

1） ECO State Machine Management

The ECO State Machine is shown in Fig1- 12.

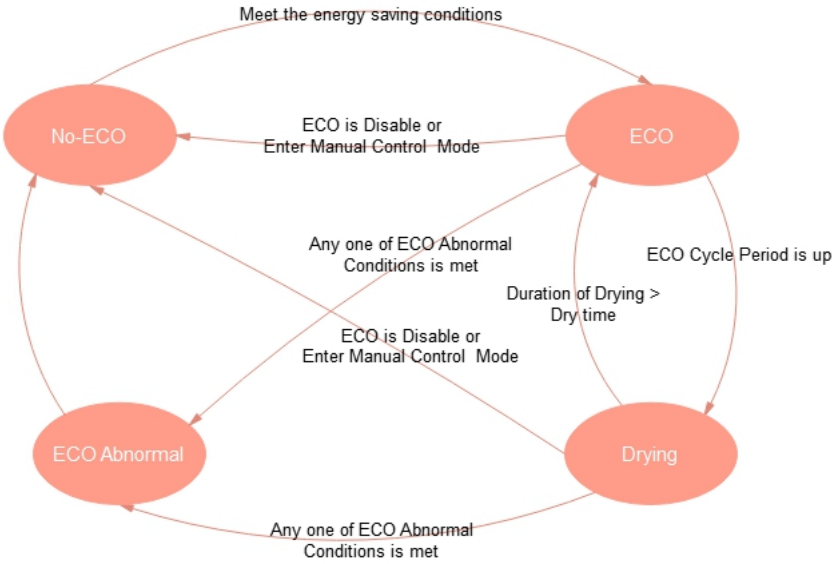


Fig1- 12 ECO State Machine

ECO Abnormal Conditions:

a) Both Mains and PV input failure
b) DC under voltage
c) Batteries are in testing
d) Batteries are discharging
e) Battery fuses failure
f) BLVD disconnect
g) Any rectifier module alarms (e.g., communication interruption)

Note:

When the system exit ECO due to the preceding reasons and any rectifier is turned off, the number of ECO exceptions increases by 1. If the number of ECO exceptions reaches 10 within 1 hour, ECO Pause alarm occur and the ECO function will be disabled. After 12 hours, the ECO function will automatically become enabled.

2） Switch on/off Rectifiers

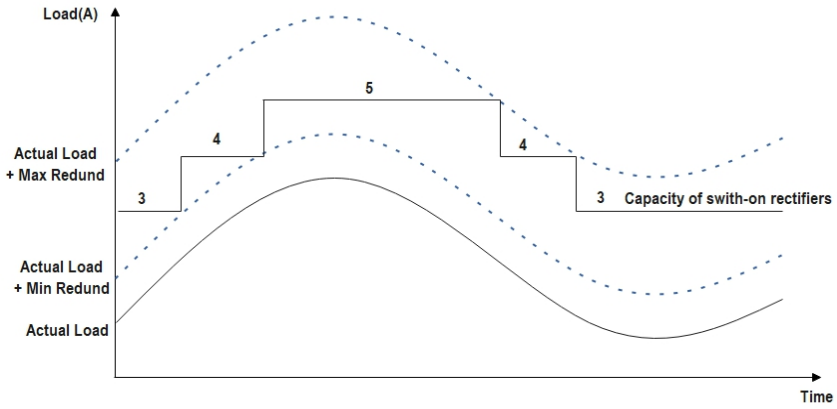


Fig1- 13 Schematic diagram of switch on/off Rectifiers algorithm

MC2600 calculates **Max / Min Redundancy** by **Best Load Rate**, then switches on a rectifier if the Capacity of Switch-on rectifiers is under Actual Load + Min Redundancy, and switches off a rectifier if the Capacity of Switch-on rectifiers is over Actual Load + Max Redundancy.

3） Drying Rectifiers

From MC2600 power-on, or from the end of last drying, if time exceeds the ECO Cycle Period, MC2600 will switch on all rectifiers for Drying. The drying duration will be Dry time.

1.4.7 Communication Functions

The controller can communicate with the computer and southbound devices; the communication with the computer supports RS485 or Ethernet, realizing flexible networking and remote monitoring by using standard YD/T1363.3 protocol. The Ethernet supports web browsing and setup parameters function, SNMP network management function and remote upgrade firmware function. The controller can communicate with southbound devices by RS485 or CAN Bus.

1.4.8 Dry Contact Output Functions

The controller has 8 dry contact outputs which can be set to correlate with different alarm signals. In case of a system alarm, the monitoring unit outputs the alarm signal through the set dry contact. Each dry contact has two connections (NO and NC) for user.

1.4.9 Data Records and Statistics

The controller can periodically record the key data information about the power system. For example, the controller records the system output voltage and the total load current every 5 minutes. Data records period can be set, and the part record content can also be set based on site requirements. At most 1000pcs of history data logs can be saved. The controller can also record the latest 50pcs battery test logs.

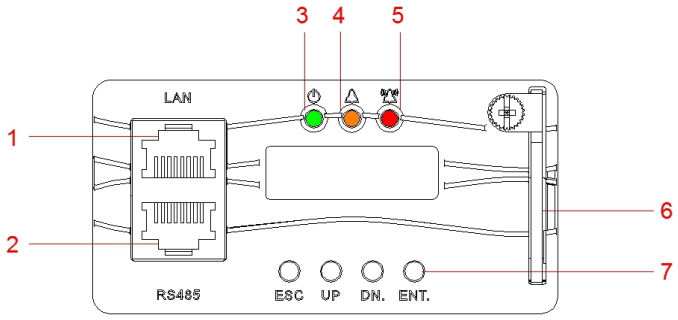
1.4.10 Hybrid Power Management Functions

The controller supports numerous energy input sources, such as diesel generators, solar panels, mains and so on. This hybrid power solution allows you to optimize the operation of the site, to achieve maximum efficiency at all times.

Chapter 2 Introduction of MC2600

This chapter gives a brief introduction to the functions of front panel indicators and operation buttons of the monitoring module, and introduces in detail the contents on main display screens, access approaches, how to conduct system control, information inquiry and parameter setting.

2.1 Description of operation panel



(1) LAN
(2) RS485
(3) Run indicator
(4) Minor alarms
(5) Major alarm
(6) Handle
(7) Press button

128×32 dot matrix LCD is adopted, on which Chinese or English characters can be displayed; Chinese or English can be selected as the interface language. Table 2-1 Gives the definition of each indicator:

Table 2-1 Description of indicators

Indicator	Color	State	Description
Run Indicator	Green	On	Normal work.
		Off	No power supply to the controller.
		Flashing	Work in software upgrade mode.
Minor alarm	Yellow	On	There is a minor alarm.
		Off	No minor alarms
Major alarm	Red	On	There is a major alarm.
		Off	No major alarm.

Table 2-2 Gives the definition of each function button:

Table 2-2 Description of function buttons

Button	Function	
ESC	Return to the upper level menu	
ENT	Go to next menu or confirm the operation. When any setting is changed, the ENT button should be pressed before the new setting becomes effective.	
UP	The cursor can be moved among menu items by pressing the UP or DN. button; to set a parameter option, the UP or DN. button can be pressed to change the option value.	When a parameter option value is a string of characters that need to be set separately, the UP or DN. button can be pressed to change the option value of each character; after selecting the value, press the ENT button, and the cursor will move to the next character automatically.
DN.		

Note: Press "ENT and UP" or "ENT and DN." simultaneously, can adjust the LCD display brightness.

The definition of RS485 communication port was showed in Table 2-3:

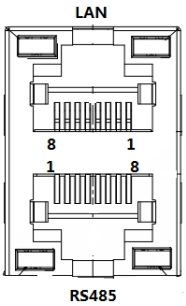


Table 2-3 Description of RS485 communication interface

Pin No.	1	2	3	4	5	6	7	8
Signal name	RS485+	-	RS485-	-	-	-	-	-

LAN Ethernet port interface definition is shown in Table 2-4.

Table 2-4 LAN Ethernet communication interface

Pin No.	1	2	3	4		5	6	7	8
Signal name	TX+	TX-	RX+	-		-	RX-	-	-

2.2 Main LCD Screens

In this chapter, several display screens are frequently mentioned; this section introduces the display content on and the approach to entering each screen.

2.2.1 System Information Screen

When the monitoring module is powered on, information display screen appears as Fig 2-1 shows.

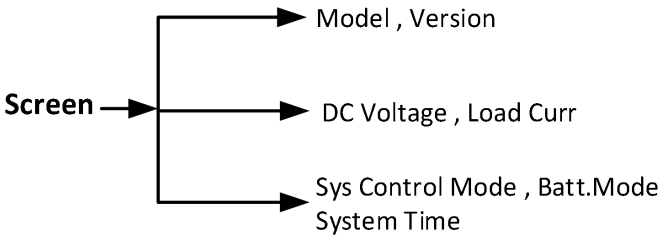


Fig 2-1 Information display screen

The system information screen shows the main information, including system voltage, Load current, system control mode, battery charging state and date. System control mode including of Auto and Manual, Battery charging state including of float charge, boost charge, temperature compensation and test, etc.

1. The first screen DC Voltage and load current will be displayed after monitor module power-on.

DC Voltage: 54.5V

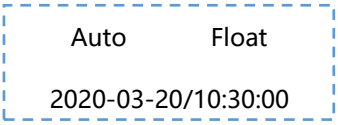
Load Curr: 10A

2. At the Main Menu screen, press ‘ESC’ button to return to the first system information screen.
3. If no operation is conducted on the monitoring module button for 2 minutes, the LCD will return to the first system information screen.
4. Press ‘ESC’ button on the first screen, the model and software version will be displayed.

Model: MC2600

SW Ver: X.XX

5. Press ‘DN.’ button on the first screen, system time setting screen will be displayed, set the time by ‘UP’ and ‘DN.’ button.



2.2.2 Main Menu Screen

The main menu is the top menu of the monitoring module. All settings, controls and status of rectifier module information and alarm information are achieved through the submenus of the main menu. Press the ESC button on any submenu of the main menu to return to the main menu screen level by level. Fig. 2-2 shows the main menu.

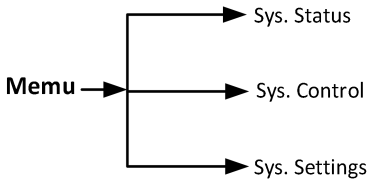


Fig. 2-2 Main menu screen

2.2.3 Information Inquiry Screen

Information inquiry screen is submenu of main menu. Information inquiry screen refers to Fig 2-3.

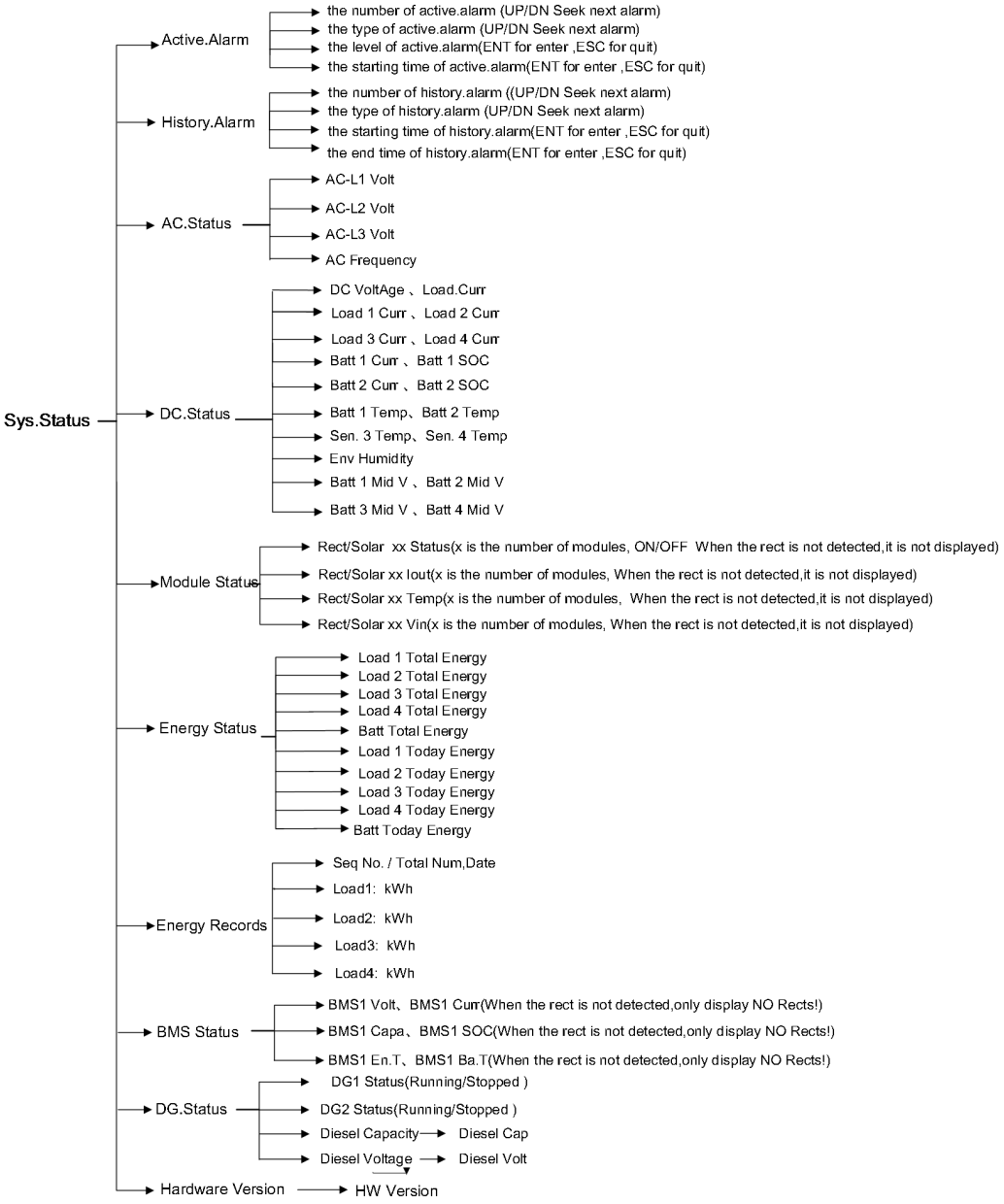


Fig 2-3 Information inquiry screen

1. Press ‘UP’ and ‘DN.’ button to select ‘Information inquiry’, press ‘ENT’ button to confirm, then goes into Information inquiry screen.
2. All displayed data in ‘Information Inquiry screen’ submenu just can be read but can’t be edited.
3. Press ‘ESC’ button on Information inquiry submenu, then goes back to Information inquiry screen step by step.
4. When user check current alarm or history alarm, the alarm name will be displayed directly after entering submenu. Press ‘ENT’ button to enter and ‘ESC’ button to back if user want check alarm time. Press ‘UP’ or ‘DN’ button to check next alarm.

2.2.4 Setting Screen

The setting screen is a Level 1 submenu screen of the main menu. There are also several submenu screens for setting all parameters of the power system. The setting screen refers to Fig. 2-4.

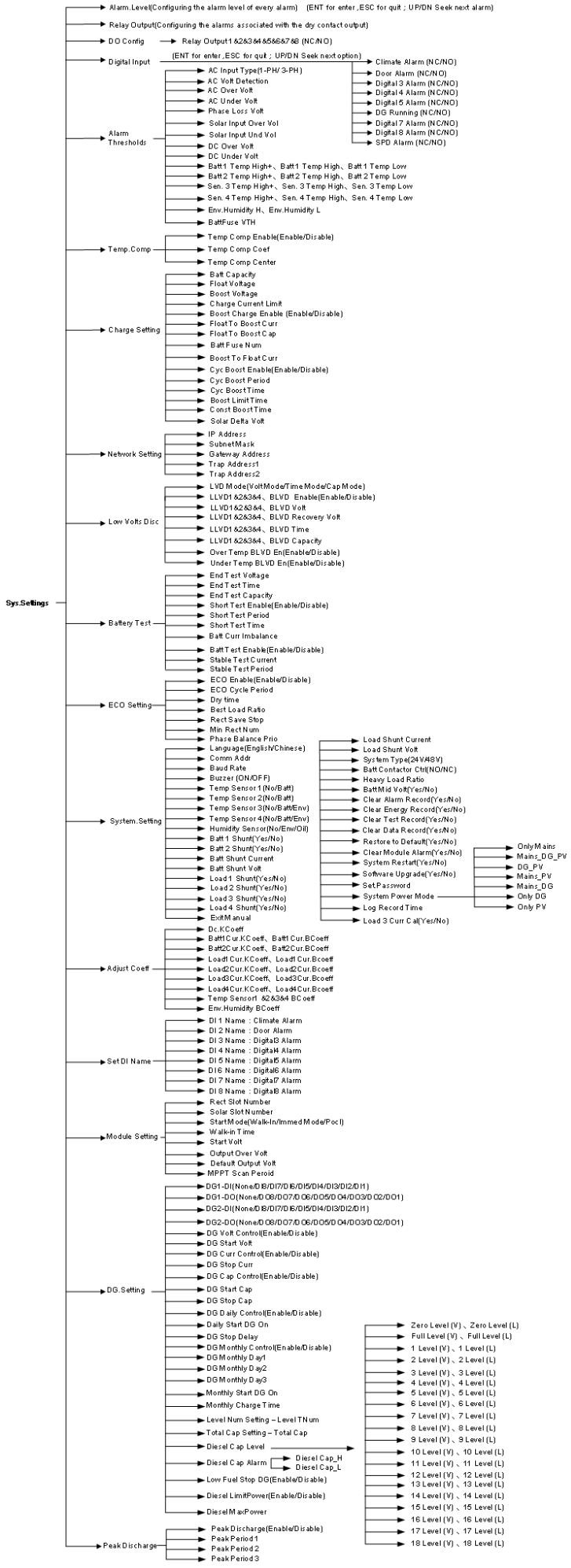


Fig 2-4 Parameter setting screen

Notice: Press ‘ENT’ button to enter ‘Settings’, press ‘UP’ and ‘DN’ button to choose the submenu, and then press ‘ENT’ button to enter it .You can press ‘ENT’ button to modify it and press ‘UP’ or “DN’ to next option. After you choose your option, you need to press ‘ENT’ button to make the set success. If you don't need to set the current alarm setting option, you can press ‘DN’ to select next alarm setting. When you are finished, press ‘ESC’ to return to the previous menu.

2.2.4.1 Alarm Level

Alarm setting screen is a submenu of parameter setting menu, mainly use for setting alarms level of the system. Move the cursor to the option need be changed by press ‘UP’ and ‘DN.’ button, then press ‘ENT button into modification mode, choose the related content by press ‘UP’ and ‘DN.’ button. Press ‘ENT’ button to confirm at last.

Monitoring module divided alarms type into three levels: Major alarm, Minor alarm, no alarm.

Major alarm: This alarm affects power system working performance severely. Whenever it appears, user must take method to deal with it. Red alarm LED lighting with voice alarm.

Minor alarm: Power system can maintain normal DC output temporally when this alarm appears. When it happens during duty time, method must be taken to deal with it. If not, deal with it when workers on duty. Yellow alarm LED lighting when alarm appears.

The default alarm settings refer to Table 2-5.

2.2.4.2 Relay Output Configuration

Relay Output configuration screen is level 1 submenu of setting menu, mainly use for setting correlated connection of each alarms and dry contacts. The Relay Output configuration settings refer to Table 2-5

Table 2-5 Alarms name and default setting

No	Alarm name	Alarm description	Alarm Level	Related relay
1	DC Under Volt	DC output voltage is less than the setting parameter ”DC Under Volt”l.	Major	None
2	DC Over Volt	DC output voltage is greater than the setting parameter “DC Over Volt”	Major	None
3	Batt 1 Temp Low	Battery 1 temperature is less than the setting parameter “Batt 1 Temp Low”(Default: -33℃), battery contactor can be disconnected. This function can be enabled or disabled by LCD or client. Default setting: Disable.	Minor	None
4	Batt 1 Temp High	Battery 1 temperature is greater than the setting parameter “Batt 1 Temp High”(Default: 55℃), the DC output voltage go down to 52V.	Minor	None
5	Batt 1 Temp High+	Battery 1 temperature is greater than the setting parameter “Batt 1 Temp High+”(Default: 60℃), battery contactor can be disconnected. This function can be enabled or disabled by LCD or client. Default setting: Enable.	Major	None
6	Batt 2 Temp Low	Battery 2 temperature is less than the setting parameter “Batt 2 Temp Low”(Default: -33℃), battery contactor can be disconnected. This function can be enabled or disabled by LCD or client. Default setting: Disable.	Minor	None
7	Batt 2 Temp High	Battery 2 temperature is greater than the setting parameter “Batt 2 Temp High”(Default: 55℃), the DC output voltage go down to 52V.	Minor	None
8	Batt 2 Temp High+	Battery 2 temperature is greater than the setting parameter “Batt 2 Temp High+”(Default: 60℃), battery contactor can be disconnected. This function can be enabled or disabled by LCD or client. Default setting: Enable.	Major	None
9	Sen. 3 Temp Low	Temperature 3 is less than parameter “Sen. 3 Temp Low”(Default: -33℃)	Minor	None
10	Sen. 3 Temp High	Temperature 3 is greater than parameter “Sen. 3 Temp High”(Default: 55℃).	Minor	None
11	Sen. 3 Temp High+	Temperature 3 is greater than parameter “Sen. 3 Temp High+”(Default: 60℃).	Major	None
12	Sen. 4 Temp Low	Temperature 4 is less than parameter “Sen. 4 Temp Low”(Default: -33℃)	Minor	None
13	Sen. 4 Temp High	Temperature 4 is greater than parameter “Sen. 4 Temp High”(Default: 55℃).	Minor	None
14	Sen. 4 Temp High+	Temperature 4 is greater than parameter “Sen. 4 Temp High+”(Default: 60℃).	Minor	None
15	Env Hum.Low	Environmental Humidity is less than the parameter	Minor	None

		“Env.Humidity L”(Default: 5%RH).		
16	Env Hum.High	Environmental Humidity is greater than the parameter “Env.Humidity H”(Default: 95%RH).	Minor	None
17	AC-Lx Ph. Fail	System AC Lx phase lost	Minor	None
18	AC-Lx Under Volt	System AC Lx phase voltage is too low.	Minor	None
19	AC-Lx Over Volt	System AC Lx phase voltage is too high.	Minor	None
20	Module xx Comm Fail	Module xx communication failure.	Minor	None
21	Module xx Input Fail	Module xx Input mains failure.	Minor	None
22	Module xx Temp High	Module xx over temperature protection.	Minor	None
23	Module xx HW Fault	Module xx failure.	Minor	None
24	Module xx Protection	Module xx protect.	Minor	None
25	Module xx Fan Fault	Module xx fan failure.	Minor	None
26	Module xx Derated	Module xx current limiting.	None	None
27	Module xx Off	Module xx off.	None	None
28	Modu xx Out Over Vol	Module xx over voltage protection.	Minor	None
29	Rect xx Curr. Uneven	Module xx output current Imbalance.	Minor	None
30	Climate Alarm	Digital input 1 Alarm, Default settings: Climate Alarm.	Minor	1
31	Door Alarm	Digital input 2 Alarm, Default settings: Door Alarm.	Minor	2
32	DI3 Alarm	Digital input 3 Alarm, User programmable.	Minor	None
33	DI4 Alarm	Digital input 4 Alarm, User programmable.	Minor	None
34	DI5 Alarm	Digital input 5 Alarm, User programmable.	Minor	None
35	DI6 Alarm	Digital input 6 Alarm, User programmable.	Minor	None
36	DI7 Alarm	Digital input 7 Alarm, User programmable.	Minor	None
37	DI8 Alarm	Digital input 8 Alarm, User programmable.	Minor	None
38	SPD Alarm	SPD fault alarm	Major	None
39	Load 1 Fuse Alarm	Load fuse/CB 1 disconnect alarm;	Major	3
40	Load 2 Fuse Alarm	Load fuse/CB 2 disconnect alarm	Major	3
41	Load 3 Fuse Alarm	Load fuse/CB 3 disconnect alarm;	None	None
42	Load 4 Fuse Alarm	Load fuse/CB 4 disconnect alarm	None	None
43	Batt 1 Fuse Alarm	Battery fuse/CB 1 disconnect alarm	Major	None
44	Batt 2 Fuse Alarm	Battery fuse/CB 2 disconnect alarm	Major	None
45	Mains Failure	The AC input Voltage is less than 60 VAC	Major	4
46	Boost Charge	Battery boost charge alarm	None	None
47	Battery Test	Battery test alarm	None	None
48	Batt Discharge	Battery discharge alarm	Major	None
49	Batt Short Test Fail	This alarm will occur when the current difference between batteries is greater than the setting parameter “Batt Curr Imbalance” or the difference between the DC voltage and the setting parameter “End Test Voltage” is less than 0.5V during a short test.	Minor	None
50	Batt Test Fail	This alarm will occur when the DC voltage is less than the setting parameter “End Test Voltage” during a stable test.	Minor	None
51	LLVD1~ LLVD4	Load low voltage disconnect contactor 1~4 is open due to low DC voltage. (LLVD1~ LLVD4)	Major	None
52	BLVD	Battery low voltage disconnect contactor is open due to low DC voltage. (BLVD)	Major	None
53	ECO	System be in energy-saving status	Minor	None
54	ECO Pause	System Energy-saving fault	Minor	None
55	Curr Imbalance	Rectifier output current imbalance in the system	Minor	None
56	Manual Mode	System control method was set as’ Manual’	Minor	None
57	BMS xx Comm Fail	The BMS xx lithium battery communication failure.	Minor	None
58	BMS xx Warning	The BMS xx lithium battery warning.	Minor	None
59	BMS xx Protect	The BMS xx lithium battery protect alarm.	Minor	None
60	BMS xx Fault	The BMS xx lithium battery fault alarm.	Minor	None
61	Minor Alarm	Controller all minor alarm	None	None
62	Major Alarm	Controller all major alarm	None	None
63	Multi Module Fault	More than 2 modules fail, there will be multiple module alarms.	Major	None

64	Temp Sensor 1 Fault	Temperature sensor 1 disconnect or fault, the system voltage go down to 52V.	Major	None
65	Temp Sensor 2 Fault	Temperature sensor 2 disconnect or fault, the system voltage go down to 52V.	Major	None
66	Temp Sensor 3 Fault	Temperature sensor 3 disconnect or fault.	Major	None
67	Temp Sensor 4 Fault	Temperature sensor 4 disconnect or fault.	Major	None
68	Heavy Load	Load current is greater than the setting parameter ”Heavy Load Ratio”.	None	None
69	Solar Input Fail	System Solar Input fail	Minor	None
70	Solar Input Vol Low	System Solar Input voltage is too low.	Minor	None
71	Solar Input Vol High	System Solar Input voltage is too high.	Minor	None
72	Batt x Volt Imba	The battery mid-voltage Imbalance alarm.	Minor	None
73	Batt x Charge Over	The battery overcharge alarm.	None	None
74	Fuel Level Low	Diesel generator low fuel level alarm	None	None
75	Module Address Err	Module address error, such as address conflict, out of address range, etc.	Minor	None

2.2.4.3 DO Configuration

DO Configuration is submenu of parameter setting menu, which is mainly used for the operator to configure the output normal state of 8 relays in the system.

Table 2-6 DO Configuration parameter setting

Parameter name	Setting range	Default value	Setting description
DO 1	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 2	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 3	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 4	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 5	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 6	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 7	NC/NO	NC	Closed when normal, opened when associated alarm occurs.
DO 8	NC/NO	NC	Closed when normal, opened when associated alarm occurs.

2.2.4.4 Digital Input

Digital input is submenu of parameter setting menu, which is mainly used for the operator to configure the input normal state of 9 digital switches in the system.

Table 2-7 Digital Input parameter setting

Parameter name	Setting range	Default value	Setting description
Climate Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
Door Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
DI 3 Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
DI 4 Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
DI 5 Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
DI 6 Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
DI 7 Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
DI 8 Alarm	NC/NO	NO	It is normal when opened; and the alarm occurs when closed.
SPD Alarm	NC/NO	NC	It is normal when closed; and the alarm occurs when opened.

2.2.4.5 Alarm Thresholds

Alarm threshold is submenu of parameter setting menu, mainly used by operator for setting each alarm in system. Press the UP or DN button to select the parameter to be set, and press the ENT button to confirm the selection, then, press the UP or DN button again to select the parameter value, and press the ENT button to confirm and save the value. Alarm threshold parameter settings refer to Table 2-8.

Table 2-8 Alarm threshold parameter setting

Parameter name	Setting range	Default value	Setting description

Parameter name	Setting range	Default value	Setting description
AC Input Type	1-PH/3-PH	3-PH	Set according to system actual configuration, choose single phrase or three phrase
AC Volt Detection	Yes/No	No	According to the actual system Settings, whether there is AC sampling function.
AC Over Volt	AC Under Volt～500	280V	AC input voltage is greater than this setting value, AC over voltage alarm appears.
AC Under Volt	Phase Loss Volt～AC Over Volt	180V	AC input voltage is less than this setting value, AC Under Volt alarm appears.
Phase Loss Volt	50V～AC Under Volt(≤80V)	80V	AC input phase voltage less than this setting value. AC phase fail alarm appears.
Solar Input Over Vol	Solar Input Und Vol～600	440V	Solar input DC voltage greater than this setting value.Solar Input Vol High alarm appears.
Solar Input Und Vol	80～Solar Input Over Vol	110V	Solar input DC voltage less than this setting value. Solar Input Und Vol alarm appears.
DC Over Volt	DC Under Volt～60	58.5V	System DC voltage is greater than this setting value, DC Over Volt alarm appears.
DC Under Volt	LLVD 1 Volt～DC Over Volt	47.0V	System DC voltage is less than this setting value, DC Under Volt alarm appears.
Batt 1 Temp High+	Batt 1 Temp High ～100℃	60℃	When battery 1 temperature greater than this setting value, Batt 1 Temp High+ alarm appears. In addition, battery contactor can be disconnected if this function is enabled by LCD or client.
Batt 1 Temp High	10℃～Batt 1 Temp High+	55℃	When battery 1 temperature greater than this setting value, Batt 1 Temp High alarm appears. In addition, the DC voltage go down to 52V.
Batt 1 Temp Low	-40℃～10℃	-33℃	When battery 1 temperature less than this setting value, battery 1 low temperature alarm appears. In addition, battery contactor can be disconnected if this function is enabled by LCD or client.
Batt 2 Temp High+	Batt 2 Temp High ～100℃	60℃	When battery 2 temperature greater than this setting value, Batt 2 Temp High+ alarm appears. I In addition, battery contactor can be disconnected if this function is enabled by LCD or client.
Batt 2 Temp High	10℃～Batt 2 Temp High+	55℃	When battery 2 temperature greater than this setting value, Batt 2 Temp High alarm appears. In addition, the DC voltage go down to 52V.
Batt 2 Temp Low	-40℃～10℃	-33℃	When battery 2 temperature less than this setting value, Batt 2 Temp Low alarm appears. In addition, battery contactor can be disconnected if this function is enabled by LCD or client.
Sen. 3 Temp High+	Sen. 3 Temp High ～100℃	60℃	When the sensor 3 temperature is greater than this setting value, Sen. 3 Temp High+ alarm appears.
Sen. 3 Temp High	10℃～Sen. 3 Temp High+	55℃	When the sensor 3 temperature is greater than this setting value, Sen. 3 Temp High alarm appears.
Sen. 3 Temp Low	-40℃～10℃	-33℃	When the sensor 3 temperature is less than this setting value, Sen. 3 Temp Low alarm appears.
Sen. 4 Temp High+	Sen. 4 Temp High ～100℃	60℃	If sensor 4 is set to battery 4 temperature, when battery 4 temperature greater than setting value, battery 4 over temperature alarm appears. In addition, battery contactor can be disconnected if this function is enabled by LCD or client. In addition, sensor 4 can also be set to ambient temperature by the user. When ambient temperature greater than setting value, Temp. 4 High+ alarm appears.
Sen. 4 Temp High	10℃～Sen. 4 Temp High+	55℃	When the sensor 4 temperature is greater than this setting value, Sen. 4 Temp High+ alarm appears.
Sen. 4 Temp Low	-40℃～10℃	-33℃	When the sensor 4 temperature is greater than this setting value, Sen. 4 Temp High alarm appears.
Env.Humidity H	50%RH～100%RH	95%RH	When environment humidity greater than setting value, Env. Hum. High alarm appears.
Env.Humidity L	0%RH～50%RH	5%RH	When environment humidity less than this setting value, Env Hum.Low alarm appears.

Parameter name	Setting range	Default value	Setting description
BattFuse VTH	0.1~0.5	0.4	Because electric parameter of battery switch or fuse is different, adjust battery fuse alarm to avoid no-alarm or wrong alarm.(this parameter need no change normally)

2.2.4.6 Temperature Compensation

Temperature compensation screen is submenu of parameter setting, mainly used for operator to set temperature compensation parameter of battery management.

Press the UP or DN button to select the parameter to be set, and press the ENT button to confirm the selection, then, press the UP or DN button again to select the parameter value, and press the ENT button to confirm and save the value.

Alarm threshold parameter setting description please refer to Table 2-9

Table 2-9 Temperature compensation parameter setting

Parameter name	Setting range	Default value	Setting description
Temp Comp Enable	Enable/Disable	Enable	Enable: Open temperature compensation function Disable: Close temperature compensation function **Notice:** 1. The temperature compensation function fail when all battery sensor is set as 'no'; 2. The temperature compensation function is invalid when battery type is set to lithium battery mode.
Temp Comp Coef	0~500mV/℃	96mV/℃	Float charge voltage decrease value = (Battery temperature measuring value- Temp Comp Center) × Temp Comp Coef When rectifier communication fail or DC over/under voltage, temperature compensation function will be invalid. When any battery temperature sensor is fault or disconnect, temperature compensation function will be invalid. When there are multiple temperature sensors, select the lowest temperature for temperature compensation
Temp Comp Center	10~40℃	25℃	Battery temperature compensation reference center point.

2.2.4.7 Charge Setting

Press the UP or DN button to select the parameter to be set, and press the ENT button to confirm the selection; then, press the UP or DN button again to select the parameter value, and press the ENT button to confirm and save the value.The charging management parameter value description is listed in Table 2-10.

Table 2-10 Battery charging parameter setting

Parameter name	Setting range	Default value	Setting description
Batt Capacity	12～5000	100	Bat Capacity is known as the nominal capacity of the battery. You should set this parameter according to the actual battery configuration. If you have multiple batteries in parallel, It should be set to the sum of the battery rated capacity of the installation.
Float Voltage	42～Boost Charge Volt	54.5	In the FC state, all rectifiers output voltage according to the set float voltage. The float voltage must be less than boost voltage.
Boost Voltage	Float Charge Volt～58.5	56	In the BC state, all rectifiers output voltage according to the set boost voltage. The boost voltage must be greater than the float voltage.
Charge Current Limit	0.1～1C10	0.1C10	This is the maximum charging current that should be allowed into the battery at any time, as regards to the nominal capacity of the battery. For example, a value of $0.2C_{10}$ means that the charging current is limited to 20% of the battery's nominal capacity. Notice: C_{10} means the nominal capacity of the battery.
Boost Charge Enable	Enable/Disable	Enable	Enable: meet boost condition, transfer to boost charge automatically.

Parameter name	Setting range	Default value	Setting description
			Disable: transfer to boost charge isn't allowed. **Notice:** The boost function is invalid when battery type is set to lithium battery mode.
Float To Boost Curr	0.040～0.080C10	0.06	The monitoring module will control the system enter the BC state when the battery capacity decreases to the value of To Boost Capacity, or when the charge current reaches the To Boost Current. The charge voltage will be the Boost
Float To Boost Cap	10～99	80	
Batt Fuse Num	1~2	2	Set the number of battery fuses in the system.
Boost To Float Curr	0.002～0.02	0.01	'Boost To Float Current' is also known as constant boost current. When the system is on boost charge status, if charge current is less than 'Boost To Float Current' setting values，system will enters constant boost charge status. When the system is on constant boost charge status, if charge timer is more than 'Const Boost Time' setting values, system enters the float charge status.
Const Boost Time	5～1440	180	
Cyc Boost Enable	Enable/Disable	Enable	Enable: Use this function Disable: Don't use this function **Notice:** The boost function is invalid when battery type is set to lithium battery mode.
Cyc Boost Period	48～8760	2400	To set cyclic boost charging. 'Per.Boost Interval' means interval time between twice timing boost charge. Battery charging voltage is ' Boost charge voltage' Setting value. Charge time is 'Per.Boost Duration' setting value.
Cyc Boost Time	30～2880	240	
Boost Limit Time	60～2880	1080	During boost charge, monitor module will force system turns to float charge to secure system when boost charge time reaches to the value of 'Boost charge protection time'
Solar Delta Volt	0～2.0	1.0	Set the threshold of voltage difference between solar module and rectifier module. Make the solar module work at priority. (suitable for mixed system of rectifier module and solar module)

The Boot Charge/Float Charge switchover diagram is shown in Fig. 2-5

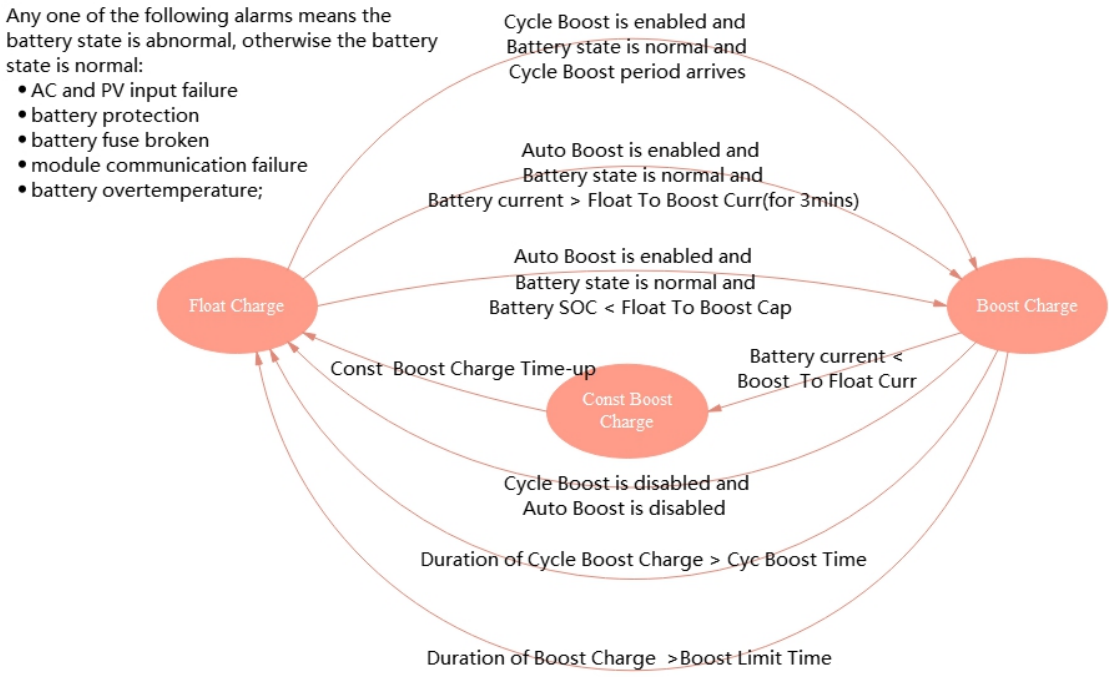


Fig 2-5 The Boot Charge/Float Charge switchover diagram

2.2.4.8 Load LVD and Battery LVD

Load LVD and Battery LVD is submenu of parameter setting menu, mainly used for battery disconnect protection and load disconnect protection of battery management.

Press 'UP' or 'DN.' button to select parameter which need be set, press 'ENT' button to confirm. Then press 'UP' and

‘DN.’ button to select parameter again, press ‘ENT’ button to confirm and save at last.

Load disconnect means AC power-off, battery supply power and system cut-off minor important load automatically to prolonged power provided time of major important load

Battery protection means AC power-off, battery provide power, system cut-off battery automatically to avoid the situation that battery life be shorten caused by secondary cell discharge too much.

Set alarm threshold parameter description table shown in Table 2-11.

Table 2-11 LVD parameter setting

Parameter name	Setting range	Default value	Setting description
LVD Mode	Volt Mode, Time Mode Cap Mode	Volt Mode	Volt Mode: LVD according to voltage. Time Mode: LVD according to voltage and Mains failure time at the same time, which will come earlier. Cap Mode: LVD according to voltage and battery capacity at the same time, which will come earlier. Note:In either mode, LLVD will be disconnected when the DC voltage is less than the LLVD voltage.
LLVD1	Enable, Disable	Enable	Enable: Can use load 1~4 disconnect function Disable: Can’t use load 1~4 disconnect function
LLVD2	Enable, Disable	Enable	
LLVD3	Enable, Disable	Disable	
LLVD4	Enable, Disable	Disable	
BLVD	Enable, Disable	Enable	Enable: Can use battery LVD function Disable: Can’t use battery LVD function
LLVD1 Voltage	BLVD Volt～DC Under Volt	45.0V	When the DC voltage is less than this setting voltage, load 1 contactor will be disconnected.
LLVD2 Voltage	BLVD Volt～DC Under Volt	44.0V	When the DC voltage is less than this setting voltage, load 2 contactor will be disconnected.
LLVD3 Voltage	BLVD Volt～DC Under Volt	44.0V	When the DC voltage is less than this setting voltage, load 3 contactor will be disconnected.
LLVD4 Voltage	BLVD Volt～DC Under Volt	44.0V	Whenthe DC voltage is less than this setting voltage, load 4 contactor will be disconnected.
BLVD Voltage	35～Min(LLVD 1 Volt,LLVD 2 Volt,LLVD 3 Volt,LLVD 4 Volt)	43.5V	When the DC voltage is less than this setting voltage, BLVD appears.,The battery contactor will be disconnected.
LLVD 1 Recovery Volt	LLVD 1 Volt~DC Over Volt（<=58.5）	50V	When the DC voltage is greater than this setting voltage, load 1 contactor will be connected.
LLVD 2 Recovery Volt	LLVD 2 Volt~DC Over Volt（<=58.5）	50V	When the DC voltage is greater than this setting voltage, load 2 contactor will be connected.
LLVD 3 Recovery Volt	LLVD 3 Volt~DC Over Volt（<=58.5）	50V	When the DC voltage is greater than this setting voltage, load 3 contactor will be connected.
LLVD 4 Recovery Volt	LLVD 4 Volt~DC Over Volt（<=58.5）	50V	When system voltage is greater than this setting voltage, load 4 contactor will be connected.
BLVD Recovery Volt	BLVD Volt~DC Over Volt（<=56）	50V	When the DC voltage is greater than this setting voltage, battery contactor can be connected.
LLVD 1 Time	5min~BLVD Time	360min	When the duration time of Mains and Solar Input failure exceeds this setting time, load 1 contactor will be disconnected.
LLVD 2 Time	5min~BLVD Time	360min	When the duration time of Mains and Solar Input failure exceeds this setting time, load 2 contactor will be disconnected.
LLVD 3 Time	5min~BLVD Time	360min	When the duration time of Mains and Solar Input failure exceeds this setting time, load 3 contactor will be disconnected.
LLVD 4 Time	5min~BLVD Time	360min	When the duration time of Mains and Solar Input failure exceeds this setting time, load 4 contactor will be disconnected.
BLVD Time	LLVD 1 Time~3600min	480min	When the duration time of Mains and Solar Input failure exceeds this setting time, battery contactor will be disconnected.
LLVD 1 Capacity	BLVD Capacity~99%	15%	When the remaining battery capacity is less than this

Parameter name	Setting range	Default value	Setting description
			setting value, load 1 contactor will be disconnected.
LLVD 2 Capacity	BLVD Capacity~99%	15%	When the remaining battery capacity is less than this setting value, load 2 contactor will be disconnected.
LLVD 3 Capacity	BLVD Capacity~99%	15%	When the remaining battery capacity is less than this setting value, load 3 contactor will be disconnected.
LLVD 4 Capacity	BLVD Capacity~99%	15%	When the remaining battery capacity is less than this setting value, load 4 contactor will be disconnected.
BLVD Capacity	0%~LLVD 1 Capacity	5%	When the remaining battery capacity is less than this setting value, battery contactor will be disconnected.
Over Temp BLVD En	Enable, Disable	Enable	When any battery temperature is greater than Batt x Temp High+ (Default: 60℃), battery contactor will be disconnected. This function can be enabled or disabled by LCD or client.
Under Temp BLVD En	Enable, Disable	Disable	When any battery temperature is less than Batt x Temp Low (Default: -33℃), battery contactor will be disconnected. This function can be enabled or disabled by LCD or client.

2.2.4.9 Battery Test

The battery test process allows for the battery to be discharged on-line using the system load. There are three types of battery test:

- Manual start and stop stable test or short test.
- Automatic stable test, if enabled.
- Automatic short test, if enabled.

Battery test screen is submenu of parameter setting screen, mainly used for operator to set battery test of system battery management.

Press ‘UP’ or ‘DN.’ button to select parameter which need be set, press ‘ENT’ button to confirm. Then press ‘UP’ or ‘DN’ button to select parameter again, press ’ENT’ button to confirm and save at last.

Parameter setting range, default value and setting description of battery refer to Table 2-12.

Table 2-12 Battery testing parameter setting

Parameter name	Setting range	Default value	Setting description
End Test Voltage	BLVD Volt～57.9V	45.2V	In the process of battery test, if meet one of the following three conditions, exit the battery test and turn to float charge : Battery voltage reaches to ‘End Test Voltage’ Battery discharge time reaches to ‘ End Test Time Battery residual capacity reaches to ‘End Test Cap’ Note: During a Stable Test, if the DC voltage is less than ‘End Test Voltage’, the Stable Test abort and Batt Test Fail alarm occur. During a Short Test, if the DC voltage is less than ‘End Test Voltage’, the Short Test abort and Batt Short Test Fail alarm occur.
End Test Time	5～1440min	300min	
End Test Capacity	1%～95%	70%	
Short Test Enable	Enable, Disable	Disable	Enable: Can use short test function Disable: Can’t use short test function
Short Test Period	24～8760H	720H	A short test is a short duration battery discharge test. Short Test Period is the interval, in hours, between the short test cycles. Short Test Time is the duration, in minutes, of each short battery test. When start the short test, the rectifier modules will be turned down to a voltage just below ‘End Test Voltage’, then battery began to discharge. In the short test time, if the Batt Short Test Fail alarm appears, battery short test is fail. If the Batt Short Test Fail alarm does not appear, battery short test is pass.
Short Test Time	1～60min	5min	

Parameter name	Setting range	Default value	Setting description
Batt Curr Imbalance	1~60A	5A	If the discharge current difference between battery strings is greater than this value, the battery short test abort and Batt Short Test Fail alarm occur.
Batt Test Enable	Enable, Disable	Disable	Enable: Can use Stable Test function Disable: Can't use Stable Test function
Stable Test Current	0.1 C10～0.9 C10	0.2 C10	When start the stable test, the battery discharge current is limited to 'Stable Test Curr', via adjust the current limit value of rectifier modules. Stable test means battery discharge according to constant current. Set current value according to 'Stable Test Curr'. Stable test mode is recommended in only one battery current system if you want to test battery. Stable test current can be set to 1.0C If you want to keep battery discharge current to full capacity. Stable Test Period is known as cyclic stable test period. This is the interval, in hours, between the stable test cycles. In the process of battery stable test, if test time or Ah is obtained batteries are good, the battery test fault alarm does not appear, battery test is pass; If end voltage is reached first batteries are bad, the battery test fault alarm appears, battery test is fail. In other words, when the battery test time has reached 'End Test Time' , or the battery capacity has reached 'End Test Cap', but the battery voltage has not yet reached 'End Test Voltage', the battery test fault alarm does not appear. Battery test is pass. When the battery voltage has reached 'End Test Voltage', but the battery test time has not yet reached 'End Test Time' , and the battery capacity has not reached 'End Test Cap', the battery test fault alarm appears. The battery test fault alarm disappears after 5 minutes, and become a historical alarm. Notice: This type of battery test is designed to give an indication only of battery state of health.
Stable Test Period	24～8760H	4320H	

Test function operating principles shows in bellowing Fig 2-6:

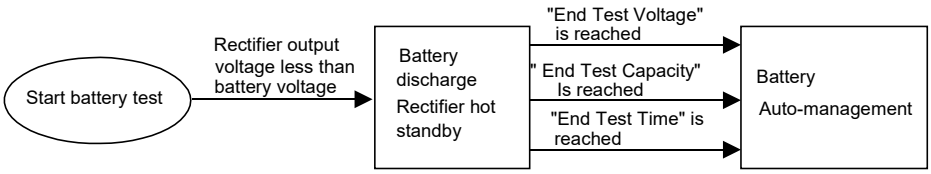


Fig 2-6 Testing function operating principles

During the battery test, if any one of the following conditions is met, exit the battery test and turn to float charge:

- Mains Failure and PV input fail
- BLVD, Battery fuse alarm, Rectifier communication fail,
- Battery temperature low/high/ higher
- Battery discharge time reaches to 'Short Test Time', if short test enabled.
- Battery voltage reaches to 'End Test Voltage'.
- Battery discharge time reaches to ' End Test Time'
- Battery residual capacity reaches to 'End Test Cap'

2.2.4.10 ECO Setting

ECO setting screen is submenu of parameter setting screen, mainly use for setting system ECO parameter to save energy.

1. Operating principles

In the ECO mode, the monitoring module controls some rectifier modules to turn off and makes the rectifier modules powered on bear all loads. Each rectifier module powered on works at the optimal efficiency point whenever possible,

to improve the utilization rate of the rectifier module and reduce energy consumption. For rectifier modules having entered the off state, the monitoring module will power them on after a certain period of time (i.e., the set value of "ECO Cycle Period" shown in Table. 2-13); after these rectifier modules run for some time, the monitoring module will control the rectifier modules having worked for a long period to turn off again. The two states switch in cycles, ensuring that the rectifier modules in the system start working closely. In case of change in battery current or load current in the system, the monitoring module will control some working rectifier modules to turn off according to the actual situation, or control some rectifier modules in off state to turn on and start working.

2．Preconditions

The system can run in the ECO mode only when the system is equipped with battery and the load current has no instant oscillation (i.e., the parameter of "ECO Enable" is set to "Enable".)

3．Advantages

The ECO mode enables rectifier modules to work at the optimal efficiency point, therefore can save power for the system.

If the "Phase Balance Prio" set to enable, It can balance the three-phase AC voltage as much as possible, and balance the working time of rectifier modules in the system and prolong the service life of rectifier modules.

4．Handling of abnormalities

In case of both Mains and PV input failure, all rectifier modules will turn on.

In case of DC Voltage fault (DC under voltage), all rectifier modules will turn on.

In case of the battery is in testing, all rectifier modules will turn on.

In case of the battery is discharging, all rectifier modules will turn on.

In case of the battery fuse failure, all rectifier modules will turn on.

In case of the BLVD is disconnecting, all rectifier modules will turn on.

In case of rectifier module alarms (e.g., communication interruption), all rectifier modules will turn on.

In case of no controller in location interruption between rectifier modules and controller, all rectifier modules will turn on automatically.

ECO parameters setting description refers to Table 2-13.

Table 2-13 ECO parameter setting

Parameter name	Setting range	Default value	Setting description
ECO Enable	Enable/Disable	Disable	Enable: Can use ECO function. Disable: Can't use ECO function **Notice:** Only can be set as 'Enable' if system has battery and no large load current shock appears.
Best Load Ratio	30-Rect Save Stop(<=90)	60%	Best Load Ratio is also known as rectifier best operating-point. At the best operating-point, the rectifier module operates at a relatively high efficiency and is subject to more suitable stresses. For energy saving, the power supply system should try to make the rectifier module load / rated capacity ratio as close as possible to the best operating-point. **Notice: Load / Rated capacity ratio = Rectifier real output current / Rectifier rated current * 100% .**
ECO Cycle Period	1~8760H	168h	Period Time is also known as cycle activation time. In order to synchronize the life of all the rectifier modules, it is necessary to operate the module with a long sleep time at a certain time interval while allowing the module with a long working time to sleep. This time interval is cycle activation time.
Min Rect Num	1~Rect Slot Number	2	The minimum number of rectifier working.
Dry time	5~240min	120min	After exiting the last sleep mode, the work time of rectifiers on the no sleep mode. It is allowed to enter sleep mode again when more than dry time.
Rect Save Stop	Best Load Ratio~100%	90%	Rect Save Stop is also known as system energy-saving point. If load / rated capacity ratio more than system energy-saving point, the power supply system exit energy-saving mode.
Phase	Enable/Disable	Enable	Enable: In ECO mode, AC three-phase voltage balance is

Parameter name	Setting range	Default value	Setting description
Balance Prio			considered first, rectifier efficiency is considered second, and rectifier running time is considered third. Disable: In ECO mode, rectifier efficiency is considered first, and rectifier slot is considered second. Rectifier modules off from a lower slot, and rectifier modules on from a higher slot.

2.2.4.11 System Setting

The system setting screen is submenu screen under the main menu, mainly used for operator to set parameter according to system hardware configuration, then to reduce part of system functions but make sure system can running well at the same time.

System parameter setting description refers to Table 2-14:

Table 2-14 System parameter setting

Parameter name	Setting range	Default value	Setting description
Language	Chinese, English	English	Set according to user need.
Sys.Address	0～255	1	Controller communication address.
BaudRate	2400bps, 4800bps, 9600bps, 19200bps, 38400bps	9600bps	Serial communication baud rate for the RS485 port on front panel. Set according to user need.
Buzzer	ON, OFF	ON	ON: open voice alarm function OFF: close voice alarm function
Batt.Sensor1.T	Batt, No	Batt	Batt: Enable sensor 1 for battery temperature. No: Disable sensor 1 for battery temperature. Set according to user need. Temperature compensation function can be used for VRLA battery if the power system has battery temperature sensor 1.
Batt.Sensor2.T	Batt, No	No	Batt: Enable sensor 2 for battery temperature. No: Disable sensor 2 for battery temperature. Set according to user need. Temperature compensation function can be used for VRLA battery if the power system has battery temperature sensor 2.
Temp.Sensor.3	Batt, Env, No	No	Batt: Enable sensor 3 for battery temperature. Env: Enable sensor 3 for ambient temperature. No: Disable sensor 3. Set according to user need. It can be configured for battery temperature or ambient temperature.
Temp.Sensor.4	Batt, Env, No	No	Batt: Enable sensor 4 for battery temperature. Env: Enable sensor 4 for ambient temperature. No: Disable sensor 4. Set according to user need. It can be configured for battery temperature or ambient temperature.
Env.Hum.Sensor	Yes, No	No	Set according to user need.
Batt.1 Shunt	Yes, No	Yes	Set according to actual power system. Battery shunt should be set as ‘No’ if system doesn’t sample via shunt.
Batt.2 Shunt	Yes, No	No	
Batt.Shunt Coefficient -Current	1～2000A	400A	Set according to actual power system.
Batt.Shunt Coefficient -Voltage	1～500mV	25mV	
Load 1 Shunt	Yes, No	Yes	Set according to actual power system. If all load shunt is set to ‘No’, the total load current is equal to the sum of module currents minus the sum of battery currents.
Load 2 Shunt	Yes, No	Yes	
Load 3 Shunt	Yes, No	No	
Load 4 Shunt	Yes, No	No	
Load Shunt Coefficient -Current	1～2000A	200A	Set according to actual power system. **Notice**: These two parameters will be invalid if all load shunt is configured as No.

Parameter name	Setting range	Default value	Setting description
Load Shunt Coefficient -Voltage	1～500mV	25mV	
System Type	24V, 48V	48V	Set according to actual situation.
Batt Contactor	NC, NO	NO	Battery contactor type is normal open.
Load OverCurr	80%~120%	100%	System overload alarm percentage. For example, if load over current alarm value is 80% in 200A system, when load current more than 160A, load over current alarm will appear. If load over current alarm value is 100% in 200A system, when load current more than 200A, load over current alarm will appear.
Exit Manual	None, 30min, 1hour, 2hour, 4hour	30min	Manual to auto mode timer can be configurable. None means that manual mode will not be switched to automatic mode unless there is dc under voltage alarm.
Clear Alarm Record	Yes, No	No	Used for clearing all history alarm record.
Clear Energy Record	Yes, No	No	Used for clearing all used energy record.
Clear Test Record	Yes, No	No	Used for clearing all battery test record.
Clear Data Record	Yes, No	No	Used for clearing all history data record.
Restore to Default	Yes, No	No	Used for resetting system factory default setting.
Clear Module Alarm	Yes, No	No	Used for clearing all modules alarm.
System Restart	Yes, No	No	Used for restarting system controller.
Software Upgrade	Yes, No	No	Used for software updating, unprofessional operator is not allowed to do this.
Set password	No more than 6 digits or characters	2	If you need to set parameters and controls, you must enter a password to have permission. If there is no button operation for more than 2 minutes, you need to re-enter the password.
System Power Mode	Only Mains, Only PV, Only DG, Mains_DG, Mains_PV, DG_PV, Mains_DG_PV	Only Mains	Hybrid power system energy input sources type. Set according to actual power system. **Notice:** Mains means AC input; PV means solar panels; DG means diesel generators.
Log Record Time	1~1440min	5min	History data logs record period Time.
Cal Load 3 Curr	Yes, No	Yes	Calculate the load 3 current.
Batt Mid Volt	Yes, No	No	Battery midpoint voltage detection.

2.2.4.12 Set Digital Input Name

The Set DI Name is submenu screen under the main menu, the DI name can be self-defined by user according to the actual needs. The default alarm name can be viewed as 2.2.4.4 Digital Input.

2.2.4.13 Rectifier Setting

Table 2-15 Rectifier parameter setting

Parameter name	Setting range	Default value	Setting description
Rect Slot Number	0-20	8	The default number of rectifier modules. It is recommended to set the maximum number of module slots in the power system. **Notice:** The sum of rectifier module and solar module cannot be more than 20.
Solar Slot Number	0-20	4	The default number of solar modules. It is recommended to set the maximum number of module slots in the power system. **Notice:** The sum of rectifier module and solar module cannot be more than 20.
Start Mode	Walk-In，Immed Mode，Pocl	Pocl	1. Walk-In: The rectifier or solar output voltage slowly rises to the floating charging voltage. 2. Immed Mode: The rectifier output voltage immediately rises to the

			floating charge voltage. 3. Pocl: The controller controls the output voltage to rise slowly from 42V to the floating charging voltage. This startup mode is recommended.
Walk-in Time	8~200s	12s	Rectifier module output voltage slowly rising time.
Start Volt	42 V ~ Float Volt	42V	The rectifier module startup voltage
Output Over Volt	59.5 ~ 60.5V	60.5V	Set the over voltage protect point of the rectifier module. Be careful, this value is not generally recommended to change.
Default Output Volt	Start Volt ~ Output Over Volt	52V	The rectifier module default output voltage.
MPPT Scan Peroid	0 ~ 1800s	300s	MPPT module scan tracking period.

2.2.4.14 Set Network Address

Table 2-16 Network parameter setting

Parameter name	Default value	Setting description
IP Address	192.168.70.2	Set according to your need.
Netmask Address	255.255.255.0	
Gateway Address	192.168.70.1	
Trap Address1	0.0.0.0	The host address 1 of SNMP active report alarm. Set according to your need.
Trap Address2	0.0.0.0	The host address 2 of SNMP active report alarm. Set according to your need.

2.2.4.15 Set Diesel Generator

Table 2-17 DG parameter setting

Parameter name	Setting range	Default value	Setting description
Start DG			
DG Volt Control	Enable, Disable	Enable	When set to 'Enable', the system will judge whether start DG according to system output voltage.
DG Start Volt	LLVD1.V ~ Float Volts	47.5V	Start DG when the system output voltage is less than the setting value
DG Cap Control	Enable, Disable	Disable	When set to 'Enable', the system will judge whether start DG according to battery remaining capacity;
DG Start Cap	20% ~ 80%	50%	When the 'DG Cap Control' is set to 'Enable', and the current battery remaining capacity is less than the 'DG Start Cap', the DG will be started
DG Daily Control	Enable, Disable	Disable	When set to 'Enable', the system will judge whether start DG according to the daily starting time.
Daily Start DG On	00:00~23:59	17:00	When the 'DG Daily Control' is set to 'Enable', start DG at 17:00 PM every day.
DG Monthly Control	Enable, Disable	Enable	When set to 'Enable', the system will judge whether start DG according to the monthly starting time.
DG Monthly Day1	1~28	1	When the 'DG Monthly Control' is set to 'Enable', start DG at 21:00 PM on the DG monthly day of every month by default. DG monthly day can be set up to 3 different dates, means starting DG three times a month. DG monthly day can also be the same, means starting DG once a month, users can choose freely.
DG Monthly Day2	1~28	10	
DG Monthly Day3	1~28	20	
Monthly Start DG On	00:00~23:59	21:00	
Stop DG			
DG Stop Cap	85% ~ 100%	95%	When the 'DG Cap Control' is set to 'Enable', and the current battery remaining capacity is greater than the 'DG Stop Cap',

Parameter name	Setting range	Default value	Setting description
			the DG will be stopped.
DG Curr Control	Enable, Disable	Enable	When set to 'Enable', the system will judge whether stop DG according to battery current.
DG Stop Curr	1 ~ 500A	10A	When the 'DG Curr Control' is set to 'Enable', and the battery current is less than the 'DG Stop Curr, the DG will be stopped.
DG Stop Delay	0~1440min	5min	When the 'DG Stop Cap' or 'DG Stop Curr' condition is satisfied, stop DG after the delay time arrives
Monthly Charge Time	1~24H	12H	After monthly start DG, if the 'DG Stop Cap' or 'DG Stop Curr' condition is satisfied, DG will not be stopped until monthly charge time reaches the set value.
DI/DO Config for DG			
DG1-DI	None, DI1~DI8	None	Digital Input x is used to detect the running state of DG.
DG1-DO	None, DO1~DO8	None	Digital output x is used to start or stop DG.
DG2-DI	None, DI1~DI8	None	No digital Input is used to detect the running state of DG.
DG2-DO	None, DO1~DO8	None	No digital output is used to start or stop DG.
Level Num Setting			
Level TNum	0~18	0	Total number of diesel capacity levels
Total Cap Setting			
Total Cap	0~10000L	100L	Total diesel capacity
Diesel Cap Level			
Zero Level(L)	0~10000L	0L	Diesel capacity level zero(L)
Zero Level(V)	0~5V	0V	Diesel capacity level zero(V)
Full Level(L)	0~10000L	100L	Diesel capacity full level(L)
Full Level(V)	0~5V	5V	Diesel capacity full level(V)
x Level(L)	0~10000L	0L	Diesel capacity level 1~18(L)
x Level(V)	0~5V	0V	Diesel capacity level 1~18(V)
Diesel Cap Alarm			
Diesel Cap_H	50~100%	90%	High diesel capacity
Diesel Cap_L	0~50%	10%	Low diesel capacity
Low Fuel Stop DG	Enable, Disable	Disable	When set to "Enable", the system will judge whether to stop DG according to the Fuel level.
Diesel LimitPower	Enable, Disable	Disable	When set to "Enable", the system will turn on the diesel engine power limit function
Diesel MaxPower	500~60000W	21000W	Diesel maximum power

2.2.4.16 Set Peak Discharge

Table 2-18 Peak Discharge parameter setting

Parameter name	Setting range	Default value	Setting description
Peak Discharge	Enable, Disable	Disable	When set to 'Enable', the system will enable peak battery discharge function. The battery will discharge during the peak period of electricity tariff, and the battery will be recharged for energy storage during other periods to achieve the purpose of reducing the electricity cost.
Peak Period1	00:00 - 23:59	08:00 - 11:00	At the daily peak start time of 08:00, the battery starts discharging. At the daily peak end time of 11:00, the battery stops discharging.
Peak Period2	00:00 - 23:59	14:00 - 15:00	At the daily peak start time of 14:00, the battery starts discharging. At the daily peak end time of 15:00, the battery stops discharging.
Peak Period3	00:00 - 23:59	18:00 - 23:00	At the daily peak start time of 18:00, the battery starts discharging.

			At the daily peak end time of 23:00, the battery stops discharging.

Notice:

If the following conditions are met, the battery will start discharging:

- Peak discharge is set to enable, and It is time to the daily peak start time.

If any of the following conditions is met, the battery will stop discharging:

- Peak discharge is set to disable, and It is time to the daily peak end time.
- The battery voltage is less than 'End Test Voltage'. Refer to Table 2-12.
- The remaining battery capacity is less than 'End Test Cap'. Refer to Table 2-12.
- Rectifier or solar module communication fail alarm
- There is a battery fuse alarm
- There is a BLVD alarm
- There is a battery over temperature alarm

2.2.5 System Control Screen

The system control screen is a level 1 submenu screen under the main menu. It is mainly used for the operator to conduct real-time manual control of the system.

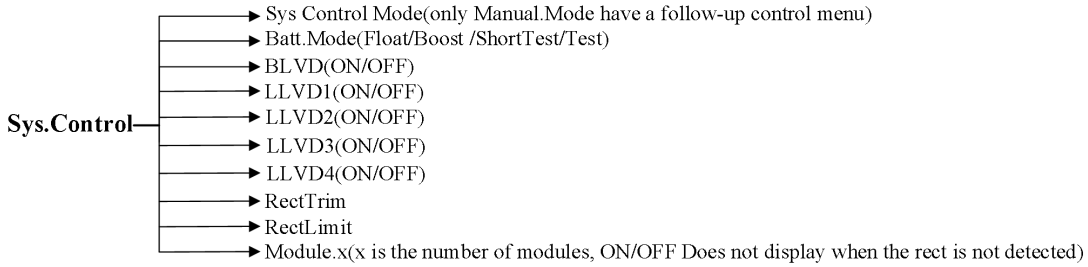


Fig 2-7 System Control Screen

1. Press the UP or DN button to select the "Sys. Control" submenu in the main menu screen; press the ENT button for confirmation, and then enter the password confirmation screen; enter the correct password, and press the ENT button. If the "Sys Control Mode" at this point is set to "Manual", you can press the DN button to enter the system control screen; if the "Sys Control Mode" at this point is set to "Auto", you cannot enter the manual system control screen. In other words, manual system setting is allowed only in "Manual" control mode.
2. 'Module Switch.Status' submenu can't be seen if no communication between controller and module.

Table 2-18 System control parameter setting

Parameter name	Setting range	Default value	Setting description
Sys Control Mode	Manual, Auto	Auto	Used for Auto and Manual mode switch according to operator needs. **Notice:** Manual mode is not allowed if any of the following conditions are met: 1) System output voltage low alarm appears. 2) Mains failure and PV input failure. 3) Exit manual mode time is up, the default setting time is 30min.
Batt. Manage Mode	Float, Boost, ShortTest, Test	Float	Operator can set battery via these four setting ranges. But Boost and battery test aren't be allowed by system if AC power-off or DC voltage is too low. Management method recovery to 'Auto' mode after battery test finished.
BLVD	ON,OFF	ON	OFF: Disconnect battery contactor manually. ON: Connect battery contactor manually.
LLVD1~LLVD4	ON,OFF	ON	OFF: Disconnect load 1~4 contactor manually. ON: Connect load 1~4 contactor manually.
Output Volt Adjust	42V~58.5V	54.5V	Operator can control voltage regulation and current limit manually. **Notice:** Controller will manage battery current limit and voltage regulation continuously to make sure battery current doesn't overshoot if operator doesn't control voltage regulation and current limit manually. If operator takes upper method to control, controller will transfer voltage regulation and current limit to user.
Output Curr Adjust	1%~120%	/	
Module x	ON,OFF	ON	Operator can control on or off of all online rectifiers or solars.

2.3 Client Management

2.3.1 PC client software via RS485

Connecting a communications cable from monitoring center or FSU to the RS485 port on the front panel of MC2600. Refer to Fig 2-8 and Table 2-3.

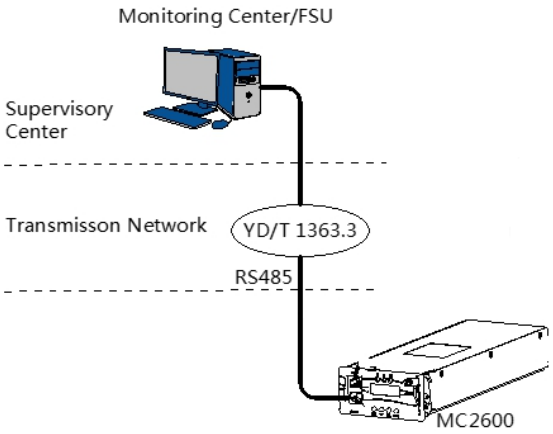


Fig 2-8 Connect a communications cable for RS485

The bellowing function can be used via PC client software:

- Get real-time data or status
- Send control order
- Set parameter
- Display current alarm automatically.
- View historical alarm information
- Configure digital input alarm
- View electricity consumption record of each user
- View the battery test record

MC2600 client software mainly including of system information, active alarm, history alarm, AC/DC parameters, battery management, alarm configuration, other configuration, use record, test record, etc.

2.3.1.1 System information screen

System Information Screen refers to Fig 2-9.

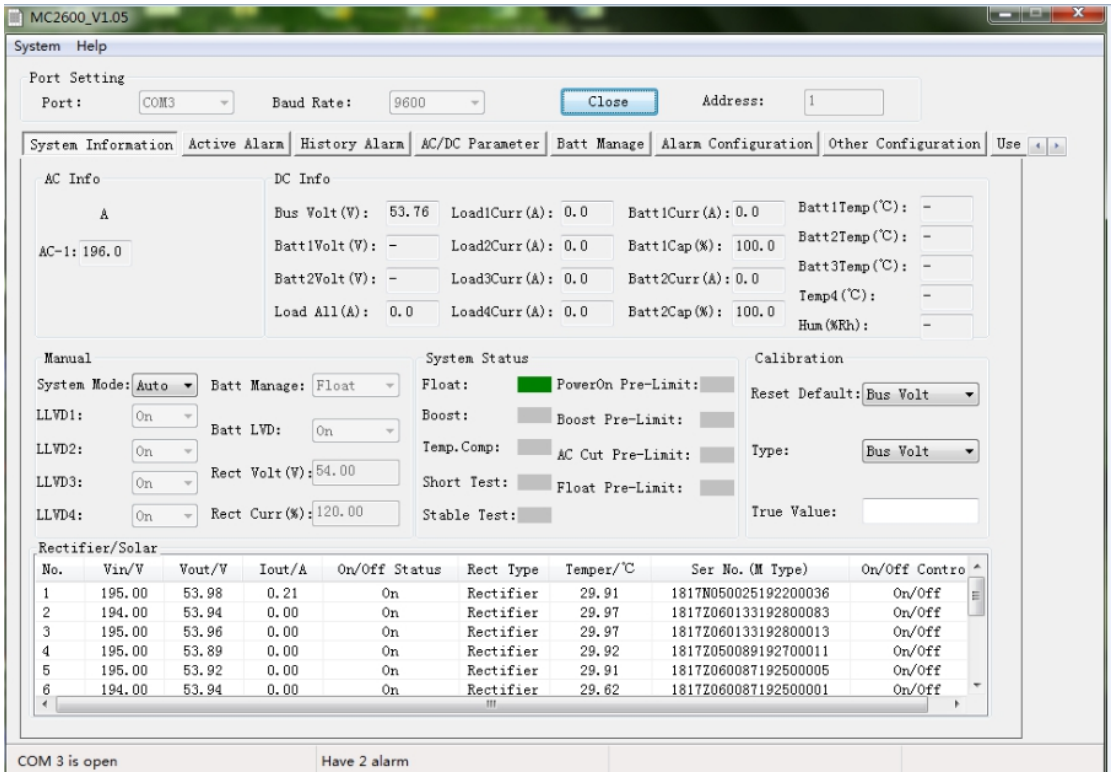


Fig 2-9 System information screen

System information can be divided into 7 areas, as Fig 2-9 shows.

1. Port Setting area is used to set RS485 communication parameter for PC client software.
    a) Port: means current PC COM, Software can scan available COM and displayed it on current box, user choose the right COM is ok.
    b) Baud Rate: Set the communication baud rate, factory default setting 9600bps. This setting must be consistent with the baud rate of the controller, otherwise communication may fail.
    c) Address: Setting PC communication address, factory default setting is 1. The controller address and client software address should be the same. MC2600 monitoring address can only be set by LCD screen.
2. AC Info area is used to display the AC input voltage. The AC input can be set in the "AC / DC Para" screen and changed accordingly.
3. DC Info area is used to display DC information including system voltage, battery midpoint voltage, load current, battery current and remaining capacity, battery temperature, ambient temperature and humidity.
4. Manual area is manual control area. Other control options in this area will be active from grey to bright only when system mode was set to 'Manual'. The specific control method refers to Chapter 2.2.5.
5. System status area is used to display system battery charger or test status.
6. Calibration is used to adjust the calibration parameters.

    Bus voltage, MBatt1 voltage and MBatt2 voltage is a single point calibration method, calibration method is:

    a) First select the "Bus Volt" in the "Reset Default" drop-down box, then the monitoring will reset the system voltage calibration coefficient to default value.

    b) Then re-select the "Bus Volt" in the "Type" drop-down box.

    c) Measure the current system voltage in high-precision multimeter and enter the measured value in the "True value" input box. Then press the buttonboard's Enter button ("Enter").

    d) Look at the bottom status bar of the client software to see if the calibration is successful.

    Battery current, load current, AC-A, B, C voltage is two points calibration method, calibration method is:

    a) First select the "Reset Default" drop-down box corresponding to the analog type to be calibrated.

    b) Then re-select the "Type" drop-down box to be calibrated analog type.

    c) Since these two items are calibrated by two points, two points need to be set. Two points are selected to cover the measurement range as much as possible. Such as the calibration of AC three-phase voltage, it is recommended to choose two points for the 150V and 260V these two points, the battery discharger current is recommended to choose -10A and -30A of these two points.

    d) Use a voltage regulator or digital load to adjust the voltage or current to the first point, then enter the current actual value. At this time, a pop-up prompt will pop up to input the second calibration point.

    e) Adjust the regulator or digital load to the second point, then enter the current actual value again and press "Enter" button to confirm.

    f) Look at the bottom status bar of the client software to see if the calibration is successful.

    Note: When calibrating the battery current, pay attention to whether the current state of the battery is discharging or charging; if it is discharged, the input calibration value should be negative. The battery current calibration is recommended during battery discharge, not during battery charging. Because if the battery is being charged, the battery current may slowly decrease, which may affect the effectiveness of the calibration.
7. Rectifier or Solar area is used to display the rectifier or solar module information in the system. When the system mode is "Manual", click the right mouse button in the list "On/Off" position of this area to control the on or off of this module.

2.3.1.2 Current active alarm screen

Current active alarm screen can shows current alarm in system. No alarm appears when system running normally. Current alarm screen shows in bellowing Fig 2-10.

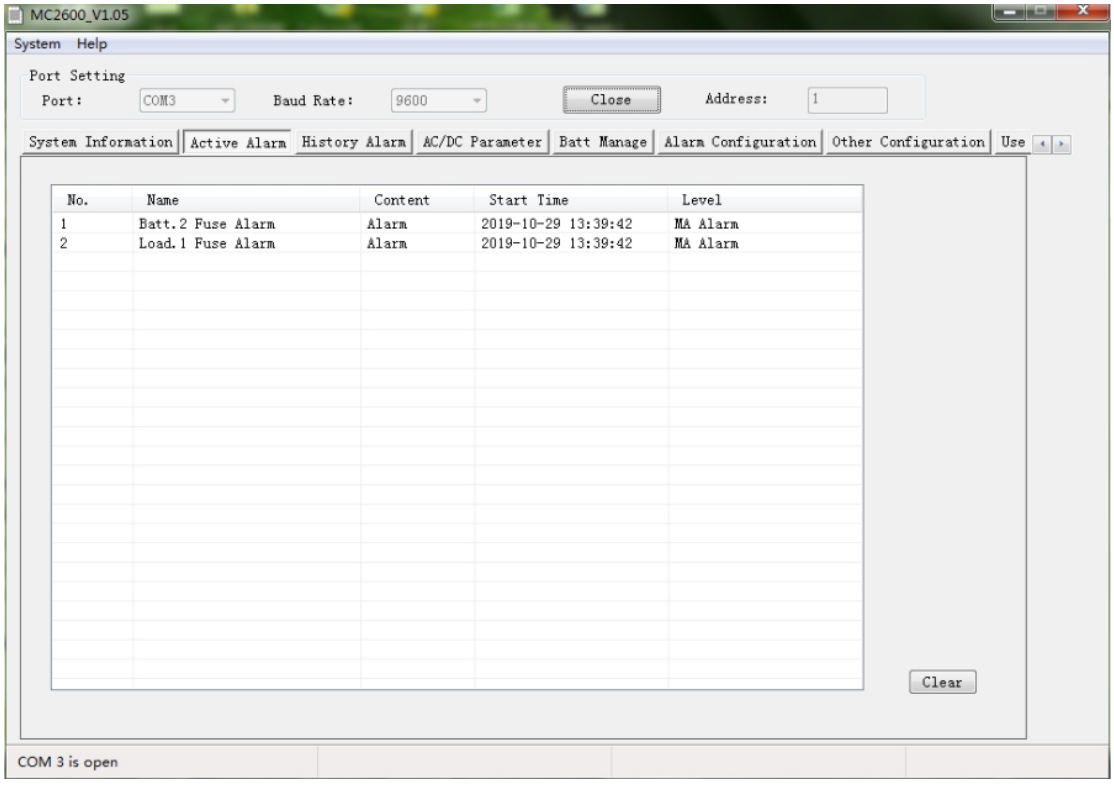


Fig 2-10 Current alarm screen

When it switch to current active alarm screen, alarm information will be updated automatically at active alarm screen, and will displayed chronologically. Current alarm information refers to Fig 2-10.

2.3.1.3 History alarm screen

History alarm screen used for display history alarm. History alarm please refer to Fig 2-11.

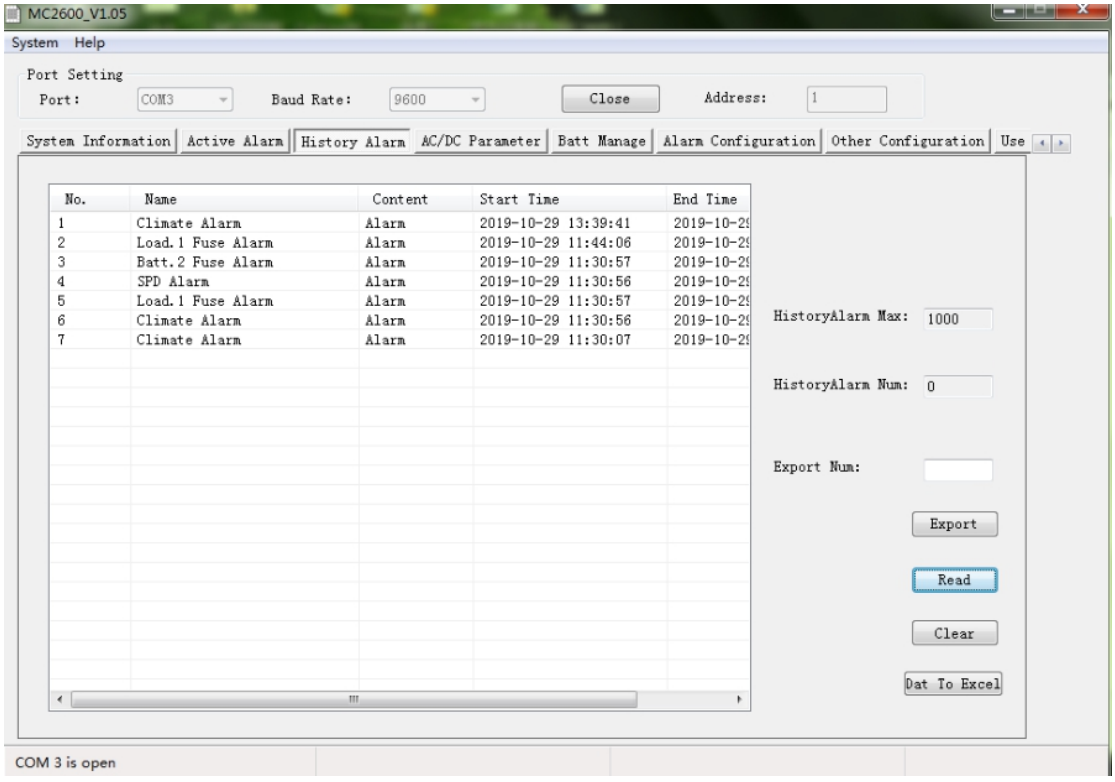


Fig 2-11 History alarm screen

1. Operator can press ‘Read’ button to read history record at history alarm screen. Progress bar can be seen during reading records. MC2600 can store 1000pcs history alarm at most.
2. ‘Clear’ button is used to empty history alarm on the display screen, but will not erase history alarm record.
3. ‘Export’ button is used to upload the history alarm records to EXCEL file by RS485.

4. ‘Export Num’ is used to set export number of history alarm. If no value is entered, all history alarms will be exported by default.
5. ‘Dat To Excel’ button is used to convert Dat file to Excel file for history alarm. The Dat file can be get from WEB GUI.

2.3.1.4 AC/DC parameter screen

AC/DC parameter screen refers to Fig-2-12. AC/DC parameter screen mainly use for setting all AC or DC parameter. All parameter meanings refers to Chapter 2.2.

Press dialog box of setting options before setting parameters, enter the parameter and then press ‘Enter’ Button to confirm. The setting parameter appears at the bottom status bar of setting screen.

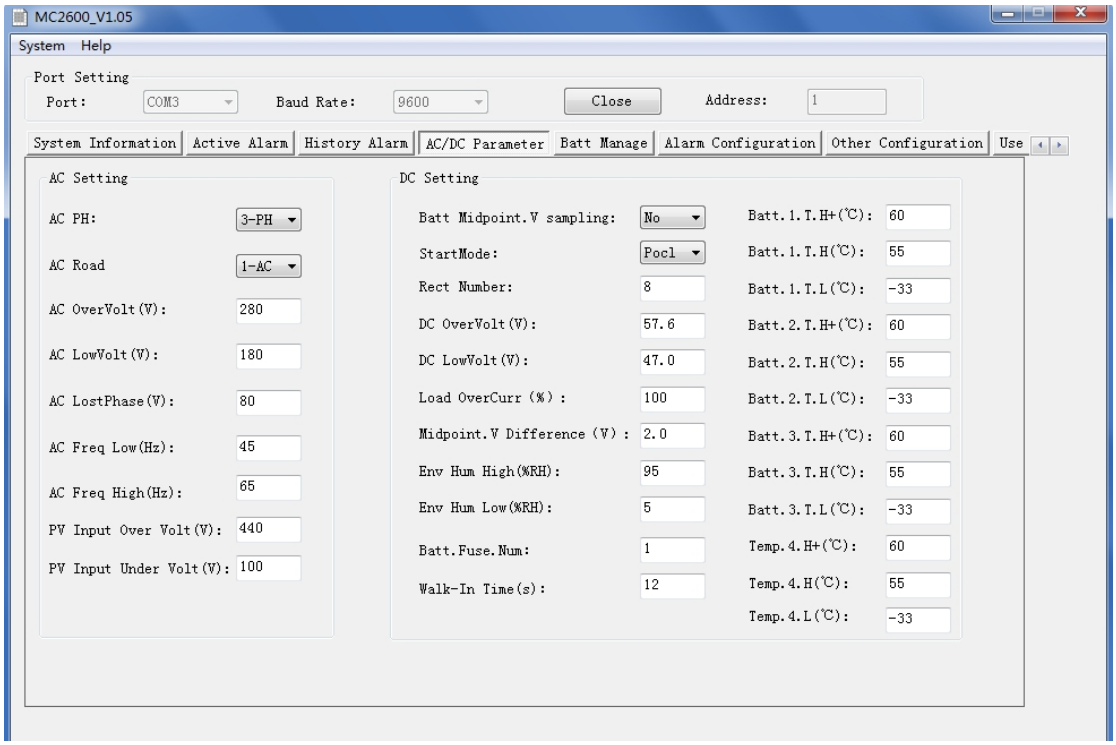


Fig 2-12 AC/DC parameter screen

2.3.1.5 Battery management screen

Battery management screen refers to Fig-2-13. Battery management screen mainly use for setting all battery management parameter. All parameter meanings refers to Chapter 2.2.

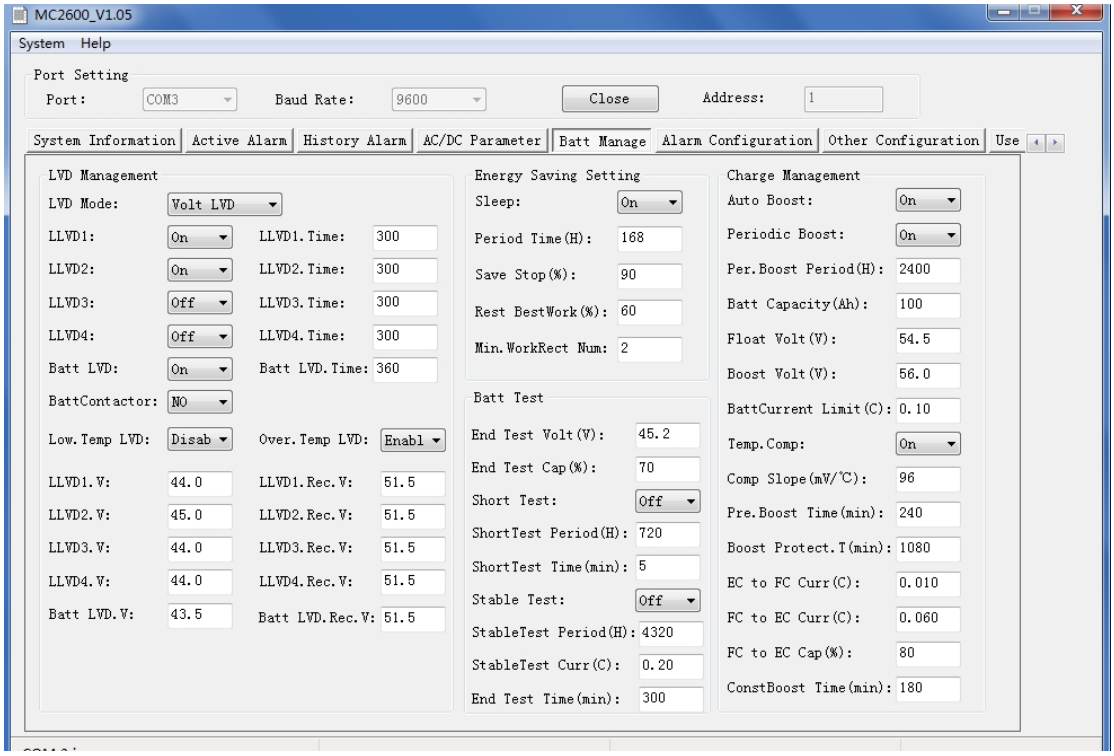


Fig 2-13 Battery management screen

2.3.1.6 Alarm config screen

Alarm config screen is used to set alarm level and related relay output. Alarm setting screen refers to Fig 2-14.

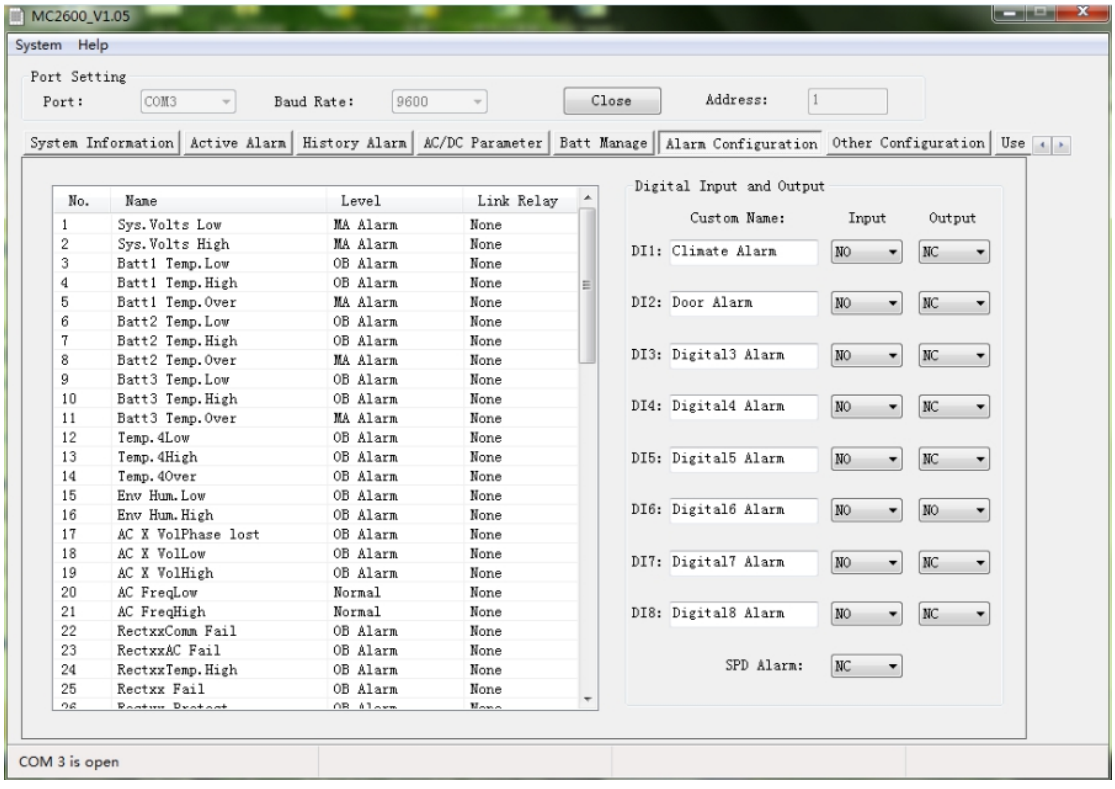


Fig 2-14 Alarm config screen

1. If user need set alarm level or related relay, press right button of mouse to select alarm level or relay option, press left button to choose it. As upper Fig 2-14 shows.
2. 'Dry contact input alarm setting' is adjustable setting mainly use for number input alarm, which can be set as normally open alarm or normally close alarm. And also use for different sensor or system.
3. All the parameter meaning of alarm setting please refer to table 2-5 of Chapter 2.2.4.2

2.3.1.7 Other setting screen

Other setting screen is used to set other system setting. Shows in Fig 2-15

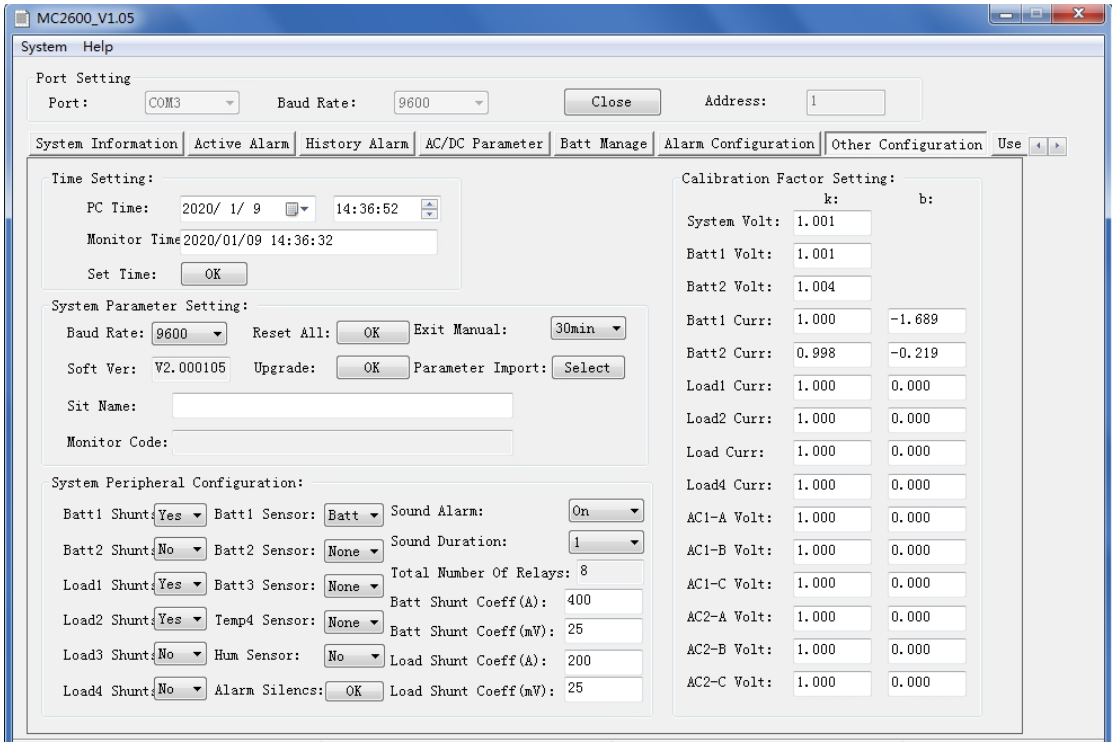


Fig 2-15 Other setting screen

1. ‘Sound Alarm’ is used to set alarm voice. If the alarm voice be started. User can close this voice by setting to Off option.
2. ‘Set Time’ is used to set controller time to PC time
3. ‘Reset All’ is used to restore factory default parameters, except for calibration coefficient parameters.
4. ‘System Peripheral Configuration’ used for setting external instruments of system. Reduce or add system functions by setting parameter and make sure system run normally in the same time. Each parameter meanings please refer to Chapter 2.2.4.11.
5. "Calibration factor settings" used for intuitive understanding of the calibration coefficient is normal. You can also click the left mouse button to set the dialog box, and then enter the data to be set and press "ENTER" to confirm modify the calibration factor. The lower right corner of the screen shows the setting result.

2.3.1.8 Use electricity record screen

According to the local time of monitoring, the system will record the daily load and the cumulative power consumption of each load. This function is only used for multi-channel load current applications. As shown in Figure 2-16.

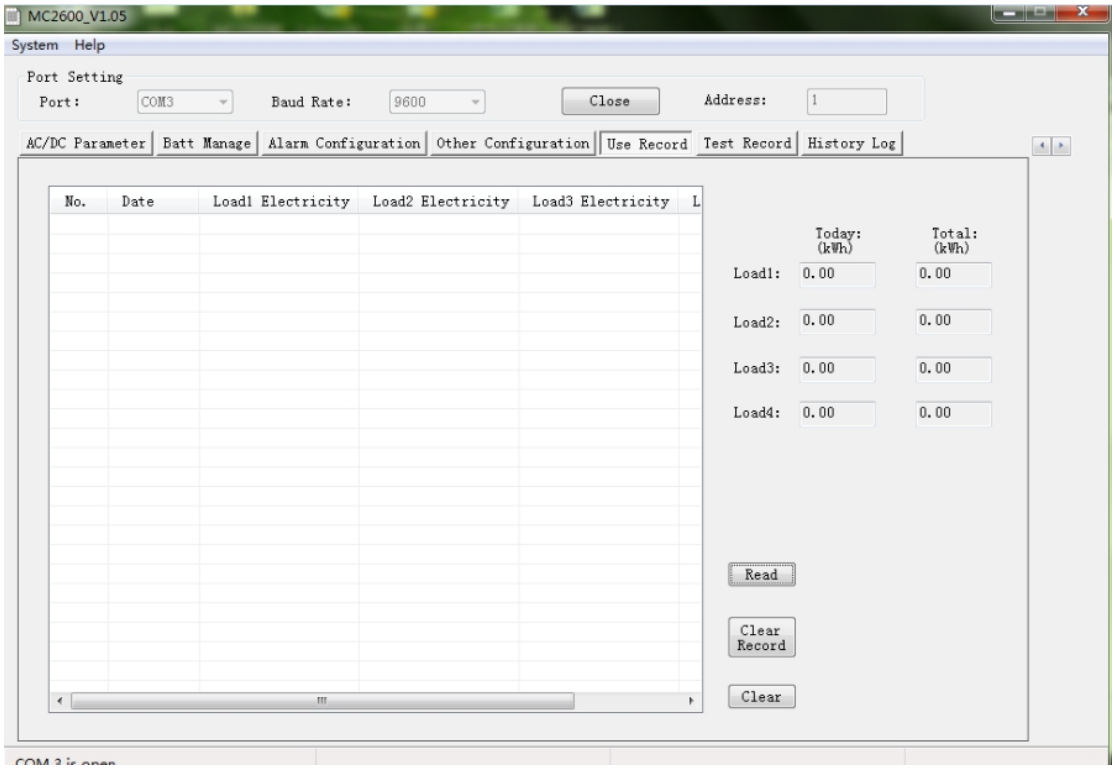


Fig 2-16 Use record screen

1. The operator need to click the "Read" button to read the electricity records, there will be a progress bar at the bottom of the page during reading, the total number of read / electricity records, the monitor can store up to 90 records.

2. Electricity records are arranged in accordance with the chronological order display.

3. "Clear Record" button is used to clear the electricity records, if clicked all the electricity records will be emptied, and began to re-record the load electricity situation.

4. "Clear" button is used to clear the current screen displays the electricity record information, does not empty the monitored electricity records.

2.3.1.9 Test record screen

The battery test record screen shows the latest battery test record of the system. As shown in Figure 2-17.

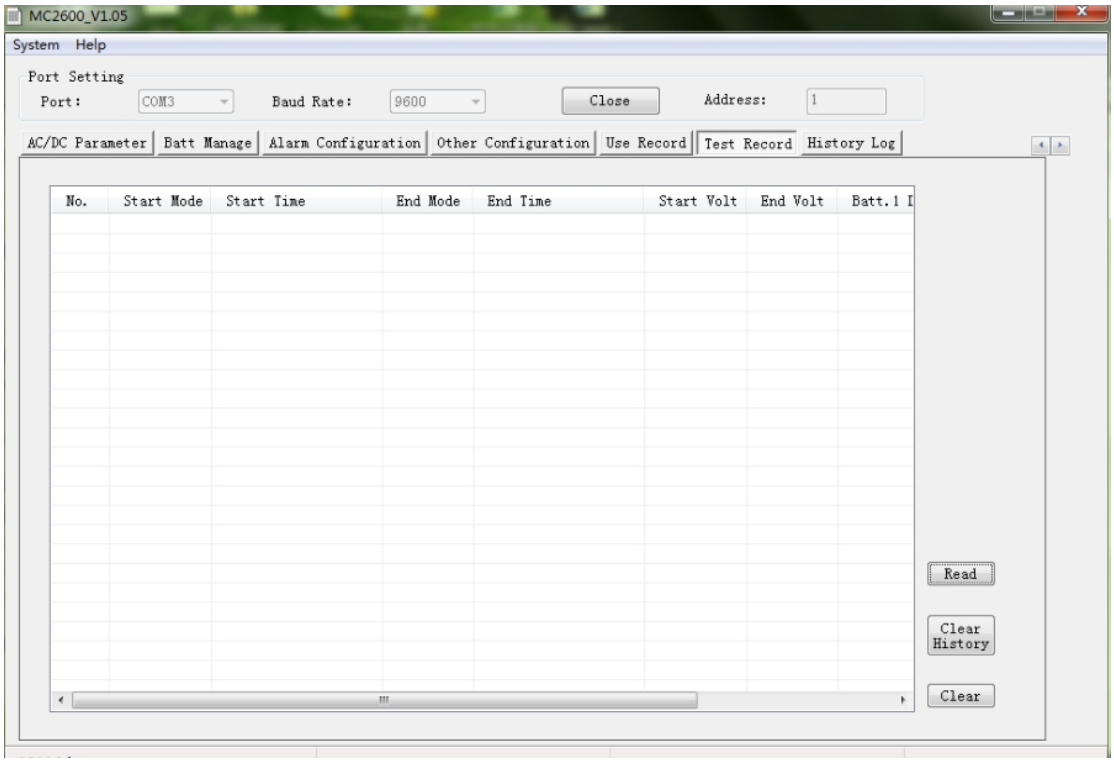


Fig 2-17 Test record screen

1. The operator need to click the "Read" button to read the test records, there will be a progress bar at the bottom of the page during reading, the total number of read / total test records, the monitor can store up to 50 records.

2. The test records are arranged in accordance with the chronological order display.

3. "Clear Record" button is used to clear the test records, if clicked all the test records will be emptied, and begin to record the battery discharge test again.

4. "Clear" button is used to clear the test record information displayed on the current interface. The battery test record will not be cleared.

2.3.2 WEB GUI instructions

Through the web page, users can achieve the following functions:

- View real-time data or status
- Send control commands
- Set parameters
- Pop-up the current alarm information automatically.
- Check history warning information and battery diary.
- Upload or download configuration files, historical alerts and historical events.

2.3.2.1 Browser Suggestion

Recommendation:  Google Chrome, version 70.0.3538.110 or higher.

2.3.2.2 Setting up the computer's network local connection

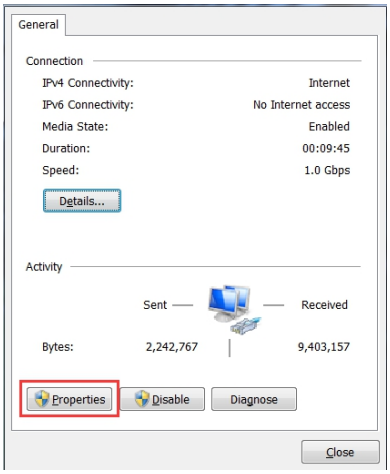
The monitoring module is equipped with a web server with a default IP address 192.168.70.2.

Notice: It is possible to change the web server's IP address in display menu Parameter settings/Comm Settings / IP/Subnet/Gate.

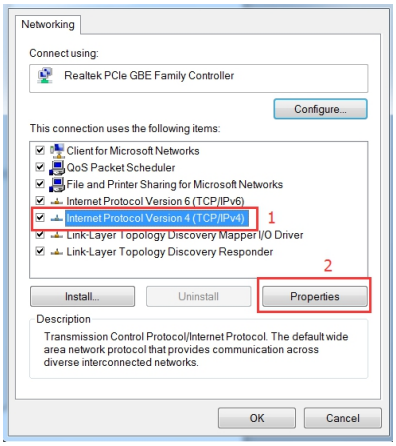
The monitoring module web server can be connected to a PC:

- Directly by using a crossed type network cable
- Through a LAN

1) Open the computer's network local connection and click the "Properties" button:

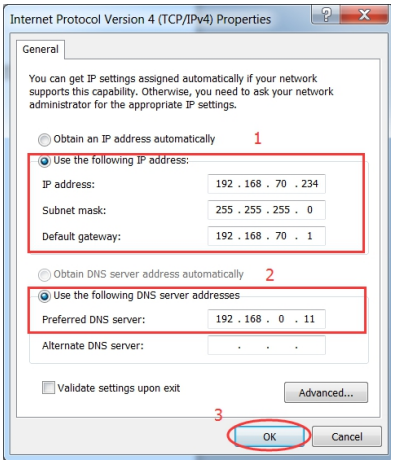


2) Double-click the "TCP/IPv4" option:



3) The IP address is set to 192.168.70.X, where X represents any number from 3 to 254; the subnet mask, default gateway settings are as follows; After setting, click "OK".

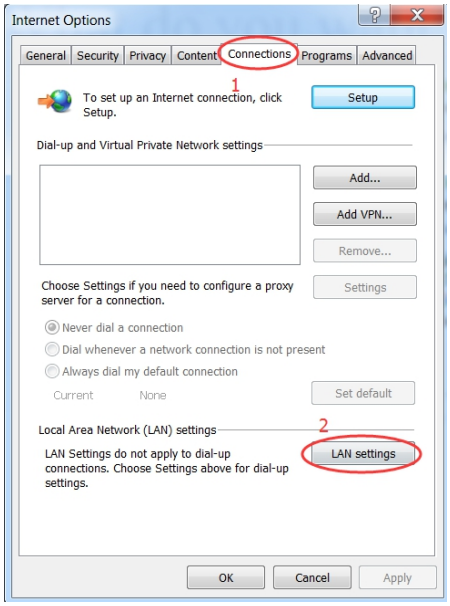
Notice: the DNS server can ignore settings, it is not needed.



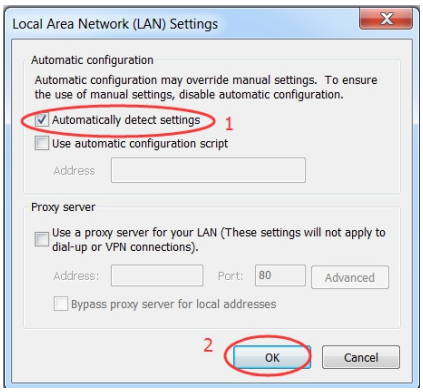
2.3.2.3 Setting Up the “Internet Explorer” Web Browser

1） Launch “Internet Explorer”.

2） Select Internet Options from the Tools menu. The “Internet Options” window opens. In the “Internet Options”window, select the Connections tab.



3） Click on the LAN Settings... button. The following window opens. In the LAN Settings window, uncheck the proxy box and click OK.



2.3.2.4 Login page.

In “Internet Explorer”, enter the default IP address(192.168.70.2) programmed into the controller and press ENTER. The following WEB Interface window opens.

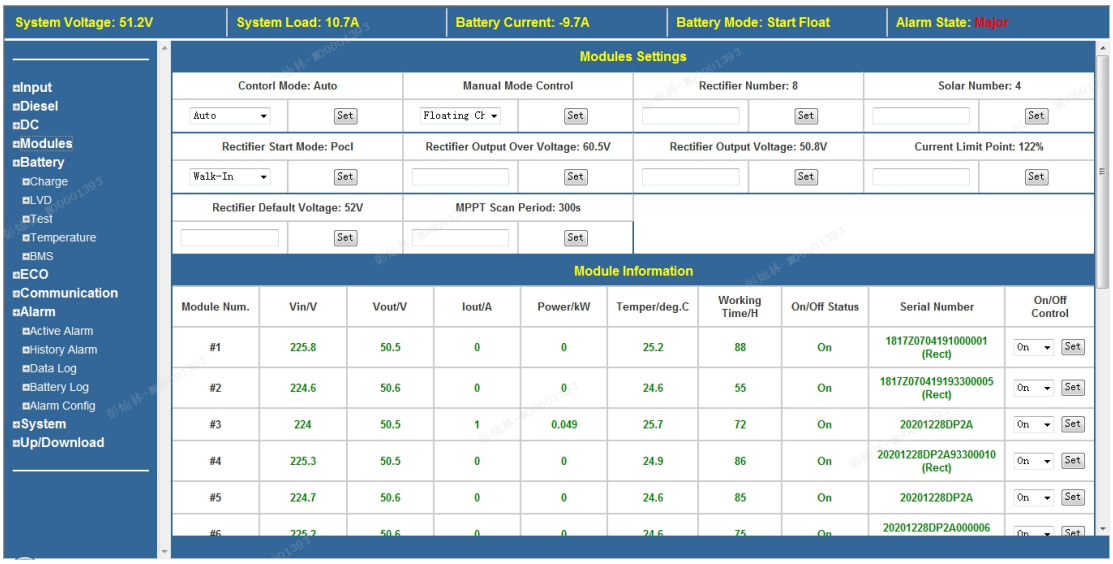
Enter a valid User Name and Password, then click OK. By default, there are two “User Name” and “Password” combinations. One is “admin” and “654321”, the other is “operator” and “1”.

The username of “admin” has the highest authority and the username “operator” has no authority for uploading and downloading configuration files.

2.3.2.5 WEB GUI

This WEB GUI provides a full function to customer. Via a PC connected internet, you can control the power system, view the working status, change the parameters, and download the Alarm history record.

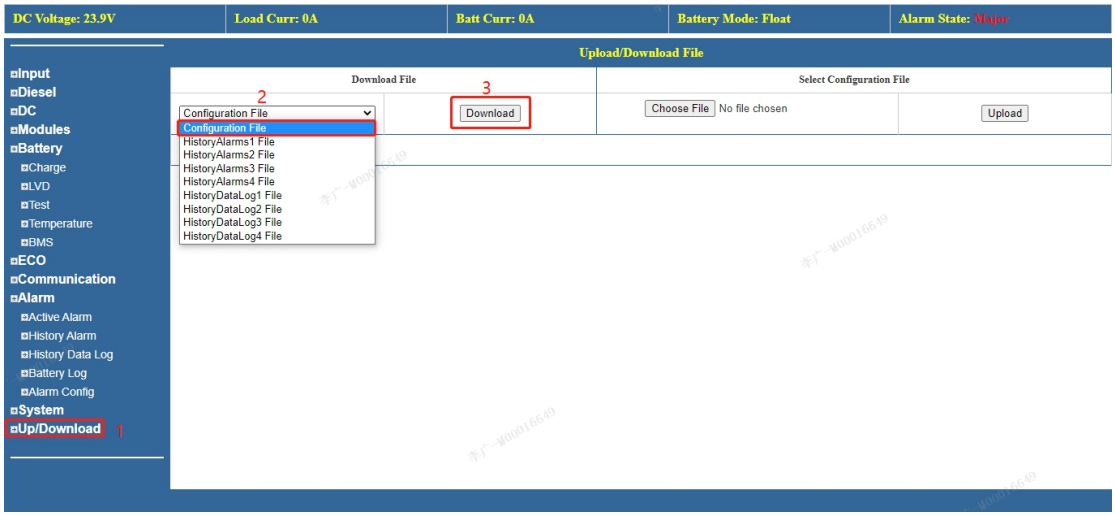
WEB GUI screens display as follows:



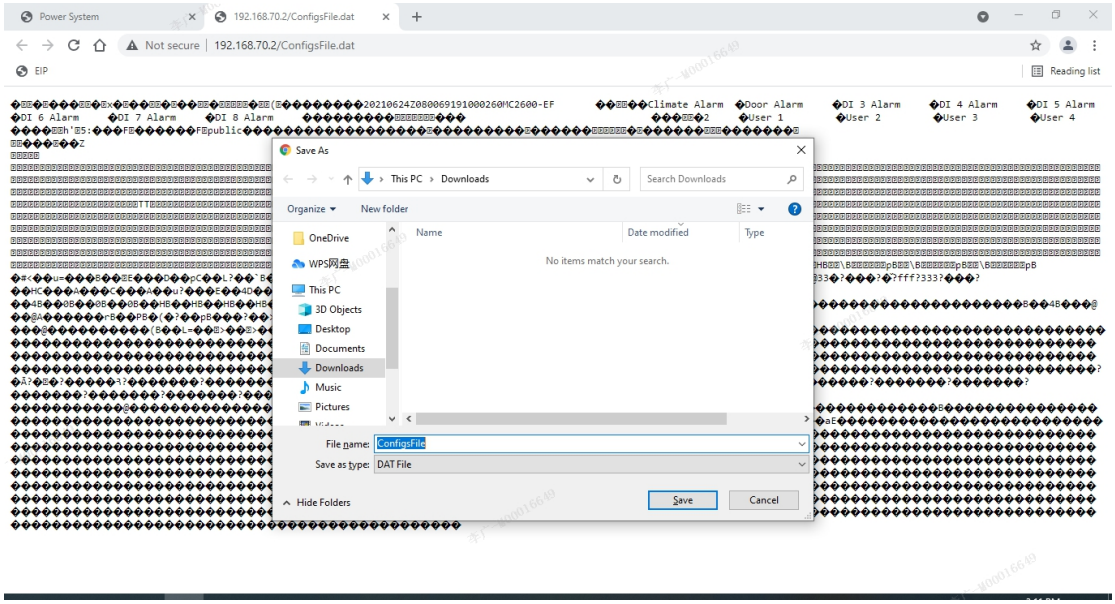
2.3.2.6 Export/Import Configuration File

User can use the configuration file export and import function to copy configuration parameters from one site to other sites.

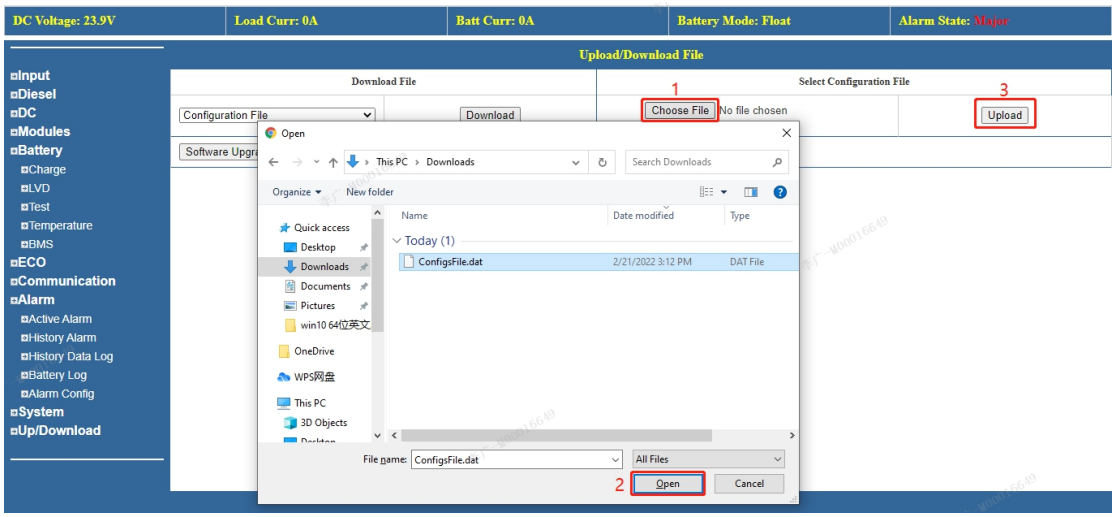
1) First, click "Up/Download", select“Configuration File”, then click "Download";



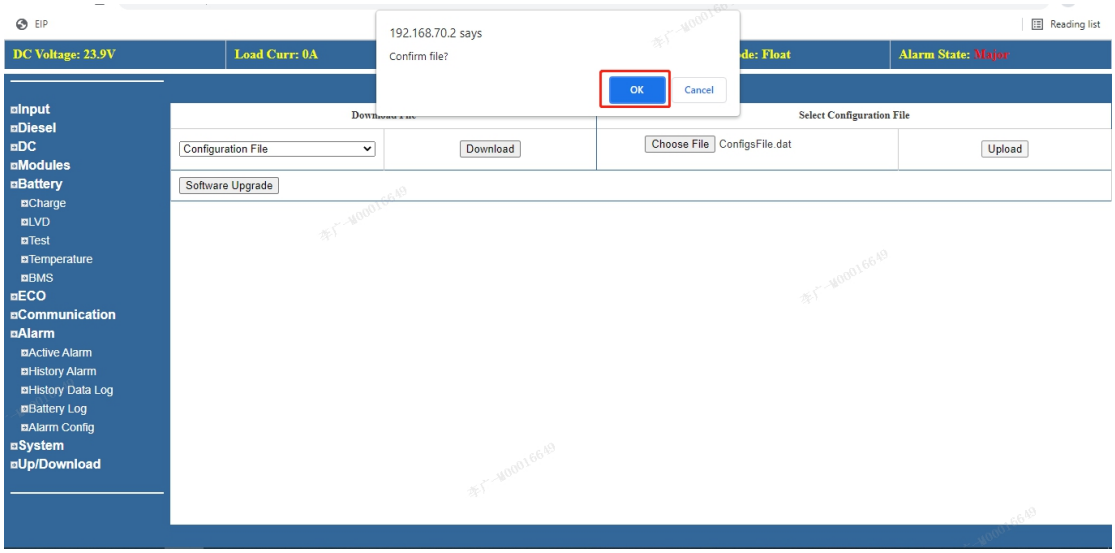
2) In the new page "http://192.168.70.2/ConfigsFile.dat", right click and save as（Notice：Do not change the filename!）;



3) Select the downloaded configuration file "ConfigsFile.dat" and click "Upload";

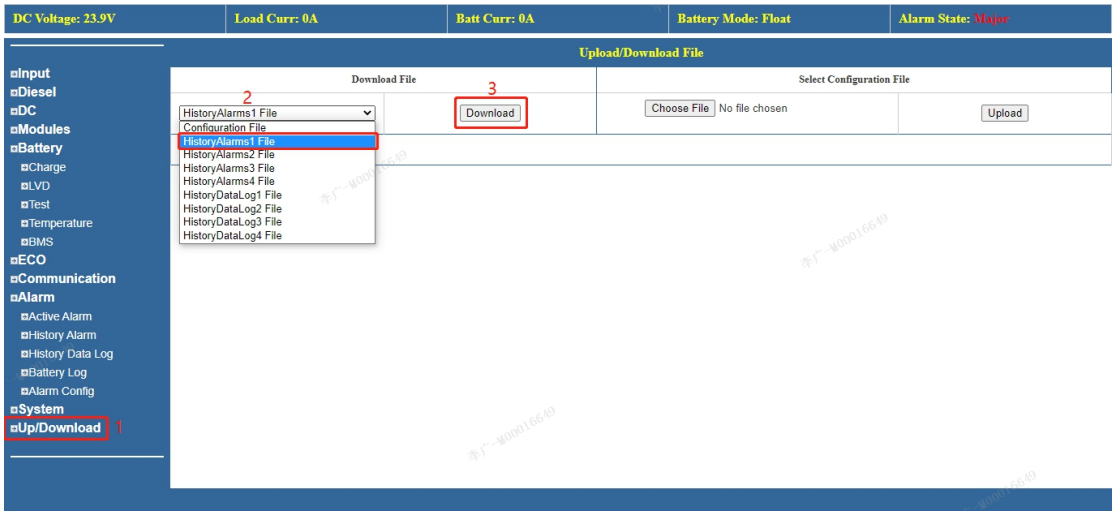


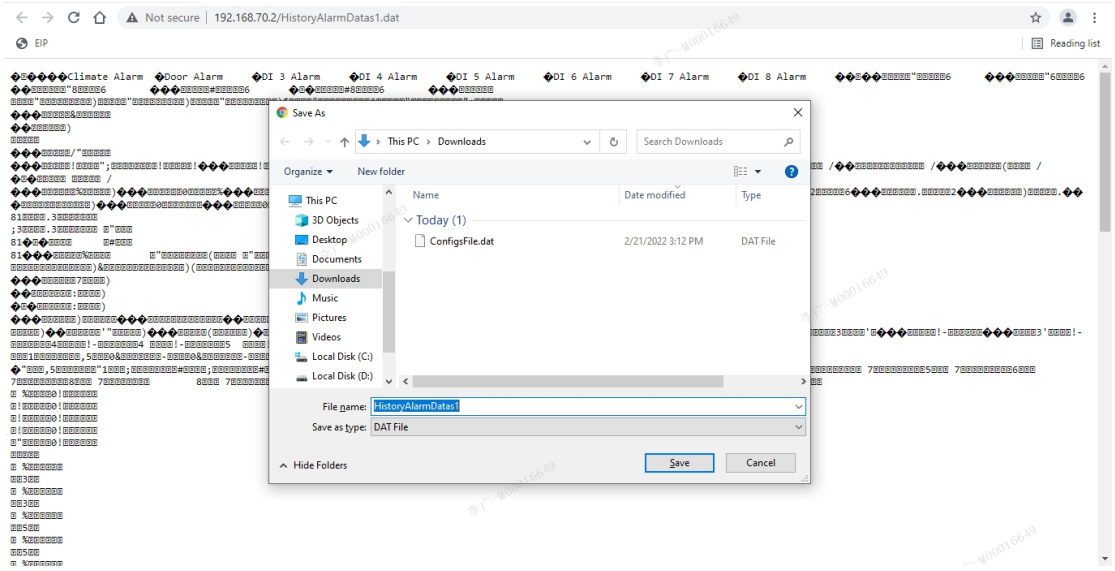
4) When prompted "Download Successful", click "Back to the Homepage".



2.3.2.7 Data download and view

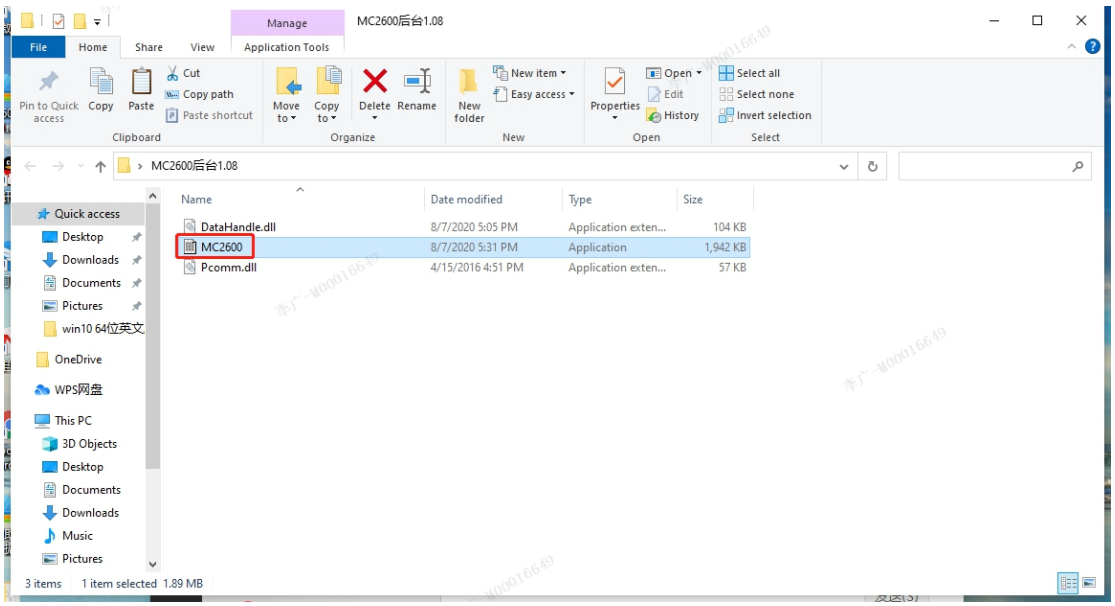
1、First,click "Up/Download",select the file you want to download,for example,select“HistoryAlarms1 File”, then click "Download"； In the new page "http://192.168.70.2/HistoryAlarmDatas1.dat", right click and save as;



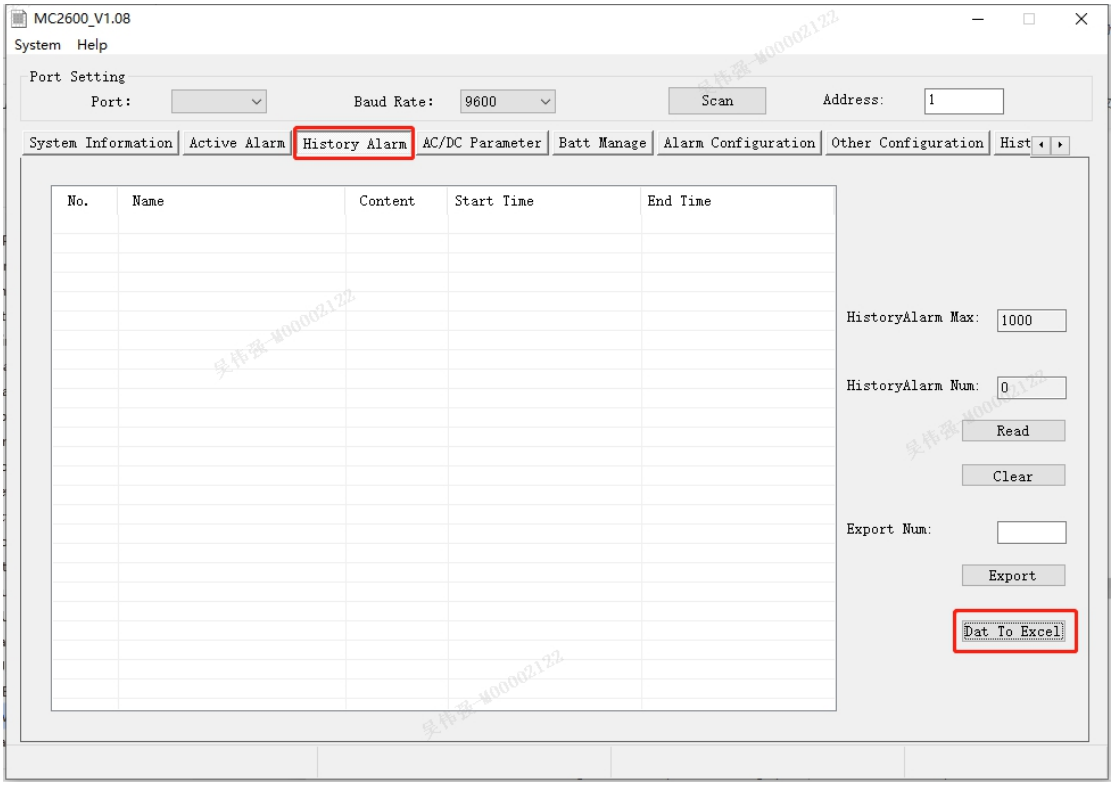


5) History Alarm View

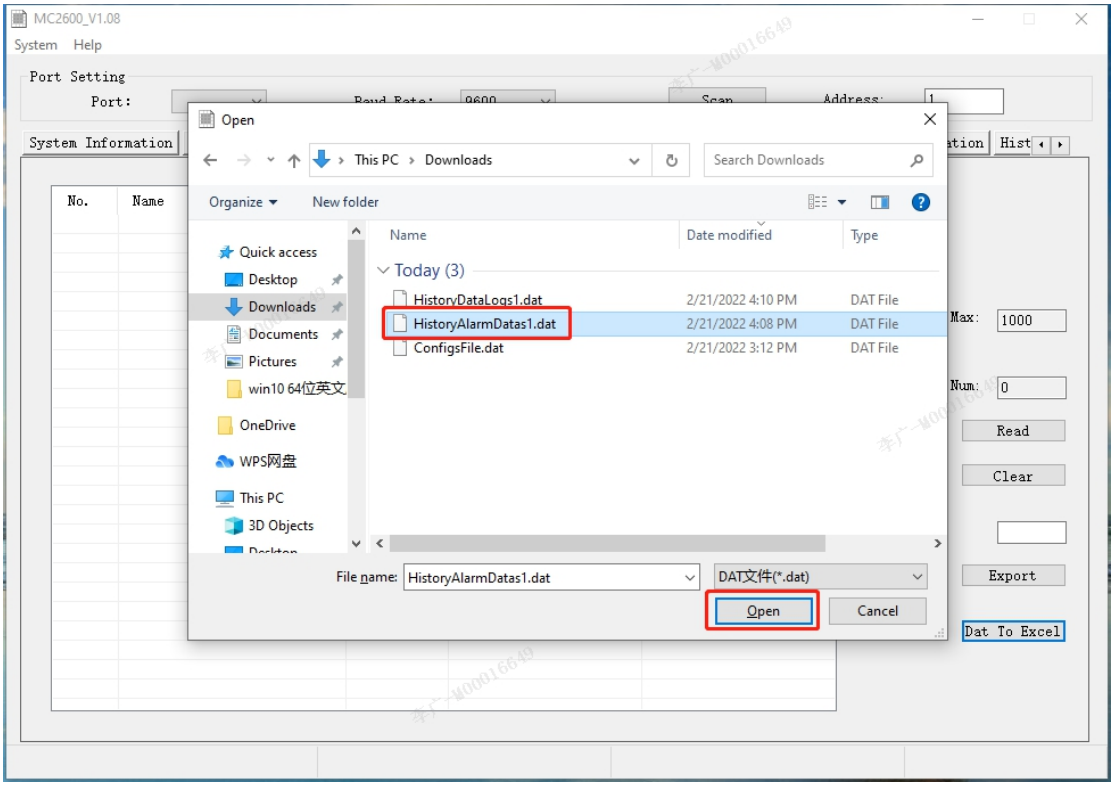
a. Open the background software "MC2600".

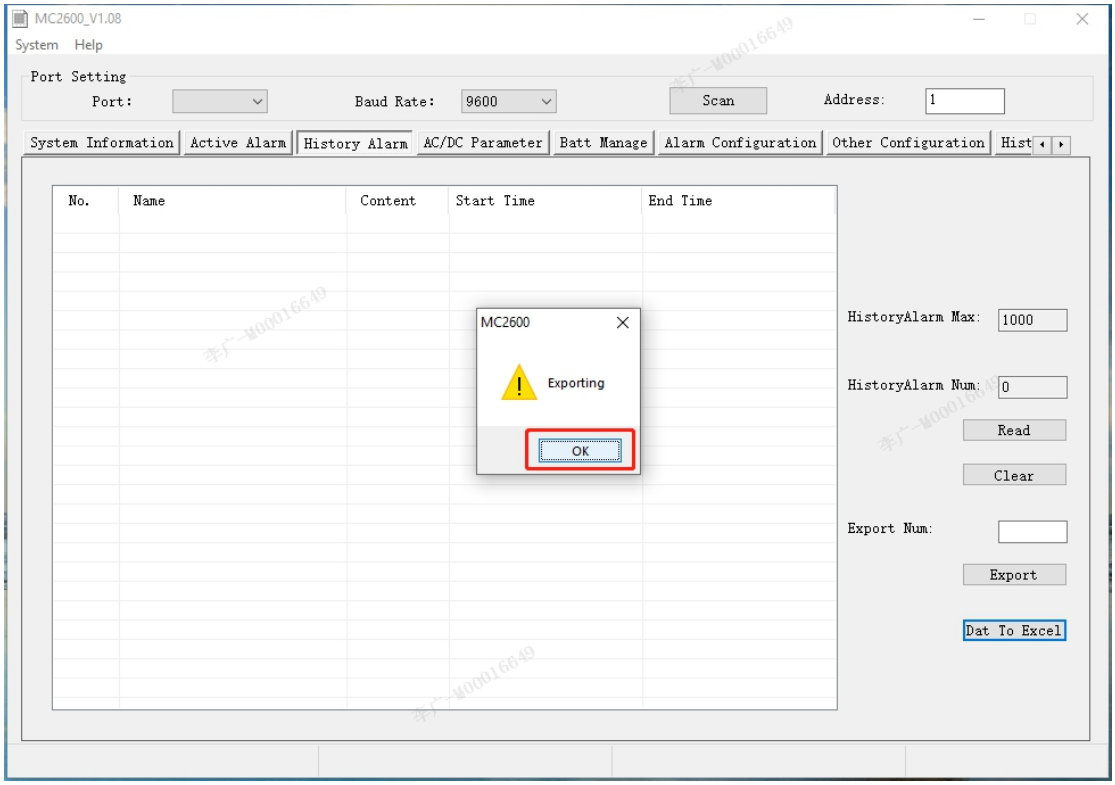


b. Click the tab "History Alarm".



c. Click the button "Dat to Excel" and select the History Alarm file.

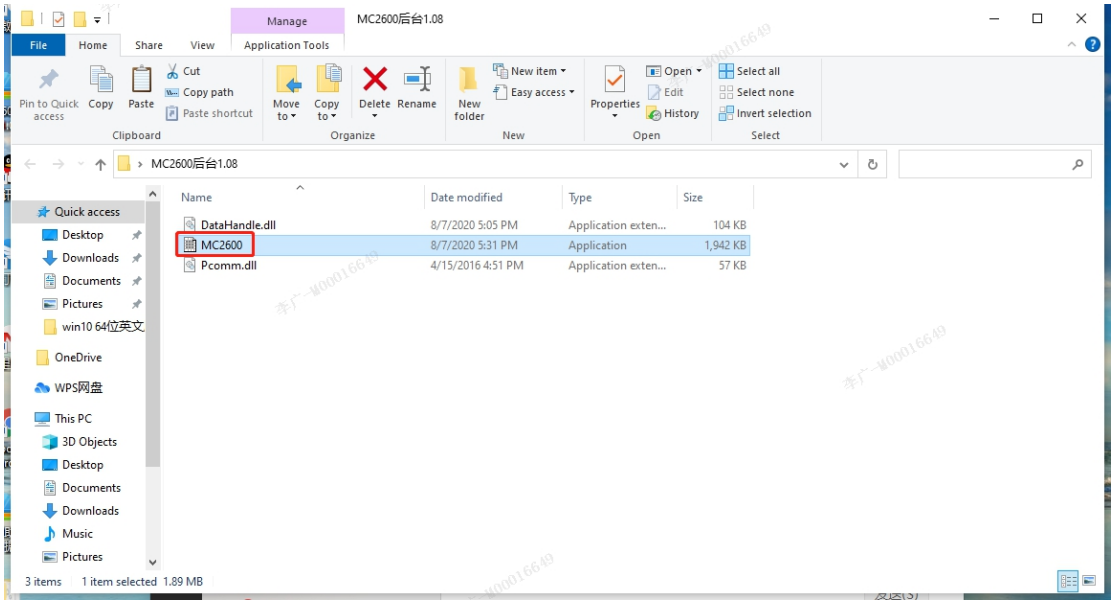




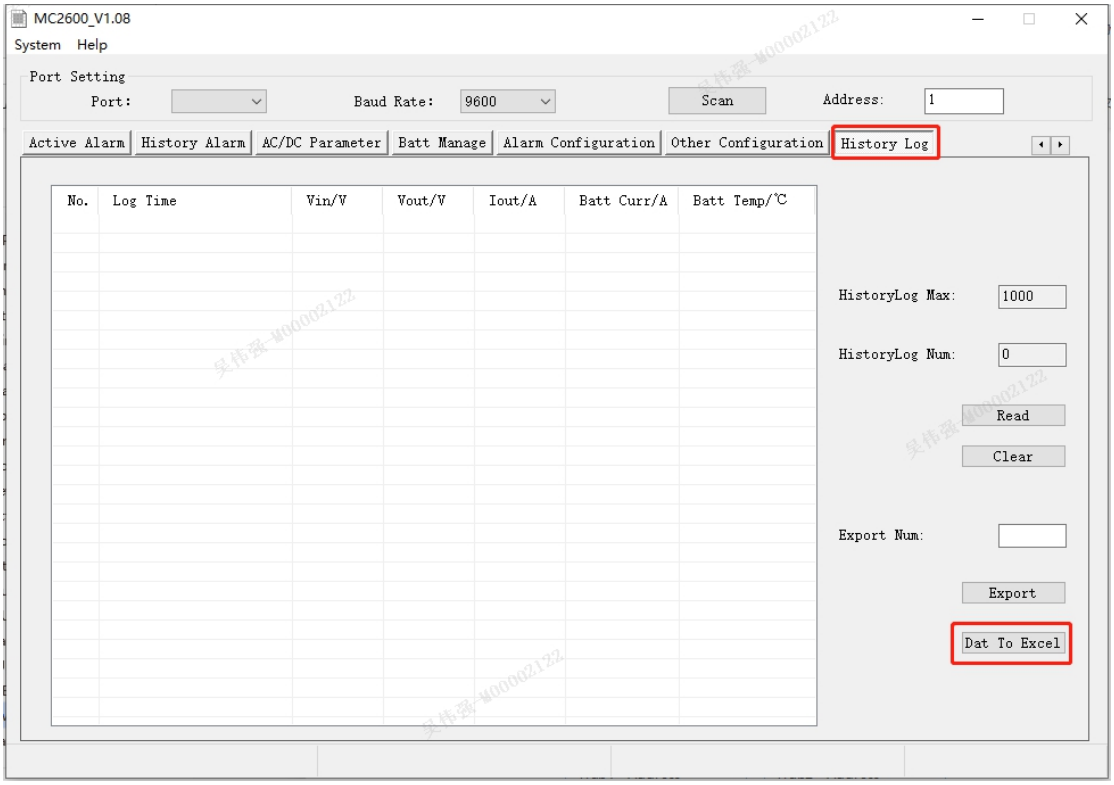
Note:The conversion process will take some time, please wait

6) History Log View

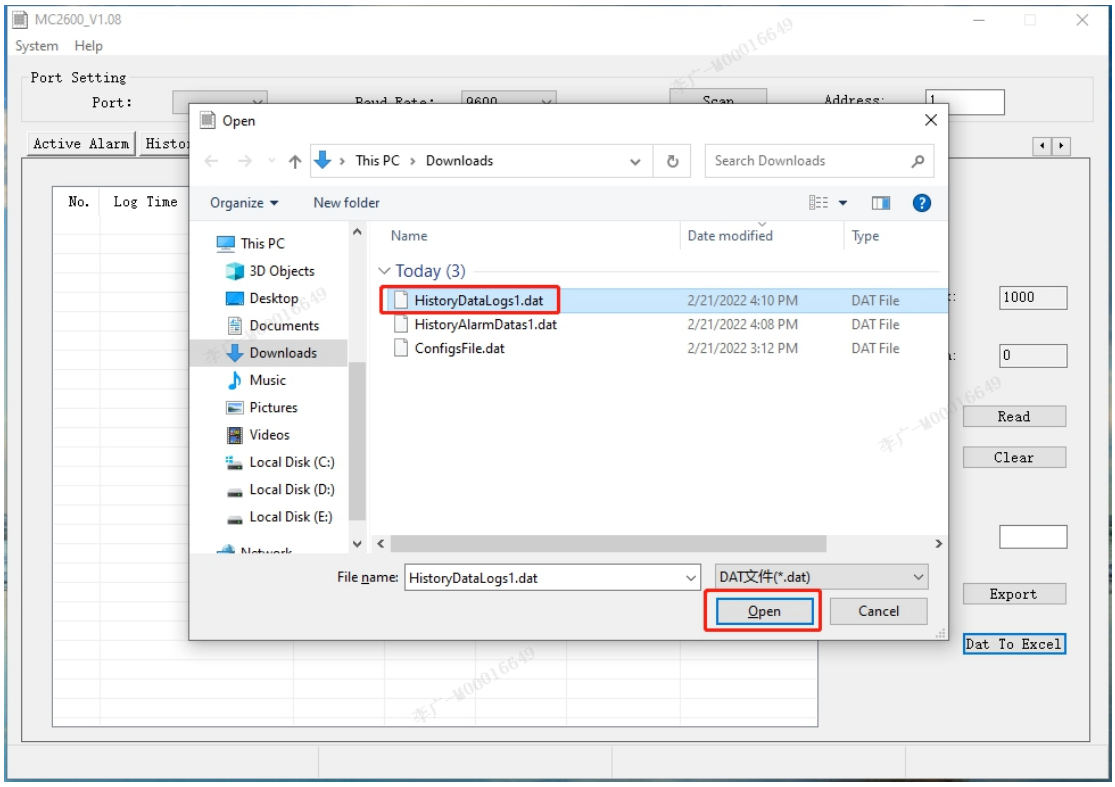
a. Open the background software "MC2600".

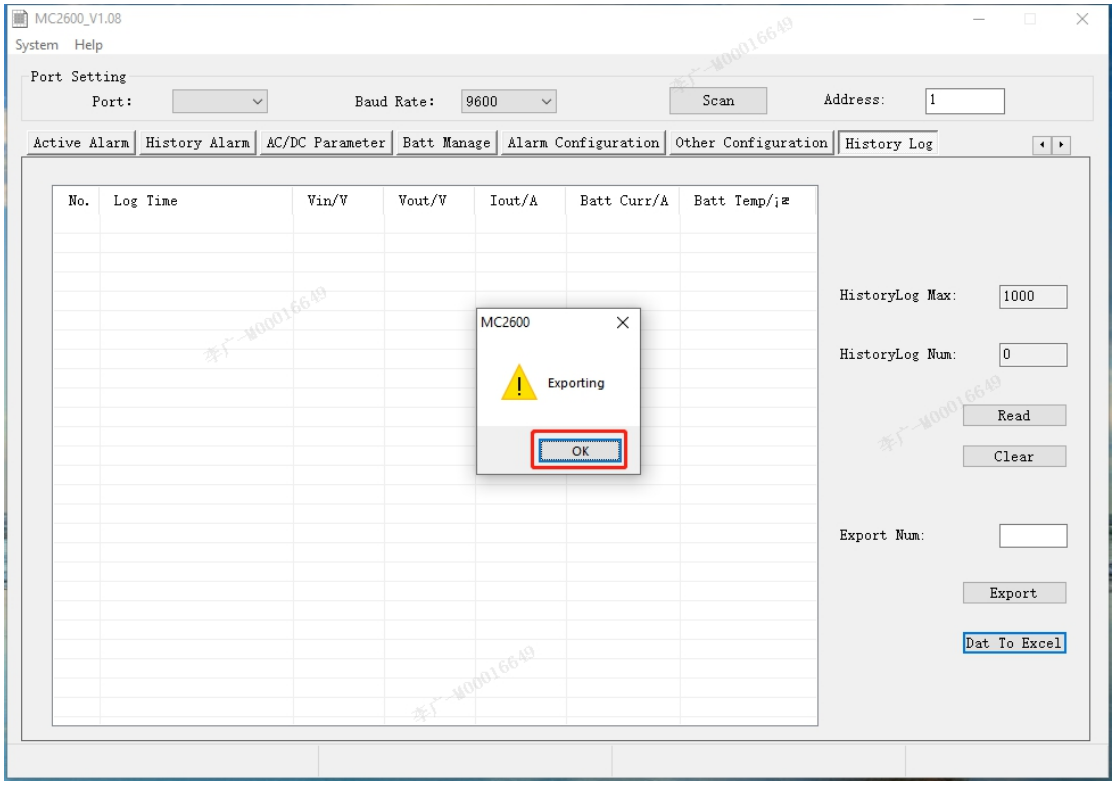


b. Click the tab "History Log".



d. Click the button "Dat to Excel" and select the History Alarm file.





Note:The conversion process will take some time, please wait

2.3.3 SNMP management instructions

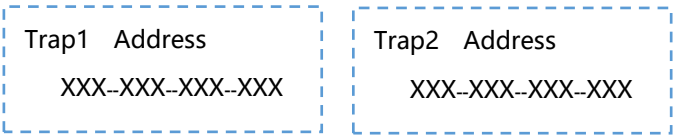
SNMP is a technology used for network management. The technology is based on implementing an information base called MIB (Managed Information Base). This MIB contains parameters that are interesting from a management perspective. All LAN connected equipment that support SNMP shall also support a default MIB called MIB-II.

The SNMP Agent responds to requests received via the SNMP protocol and also actively sends traps to a specified manager when certain MIB values change state. This is used to actively inform a manager when an alarm situation is recognised. The SNMP protocol support SET/GET and TRAP.

SNMP communication can be established via LAN.

2.3.3.1 SNMP Trap address

Make the network settings via the LCD parameter setting options, and set the SNMP Trap address. It can set IP addresses of two computers or servers. After the IP address is set, the monitor can report alarm message to two computers or servers.



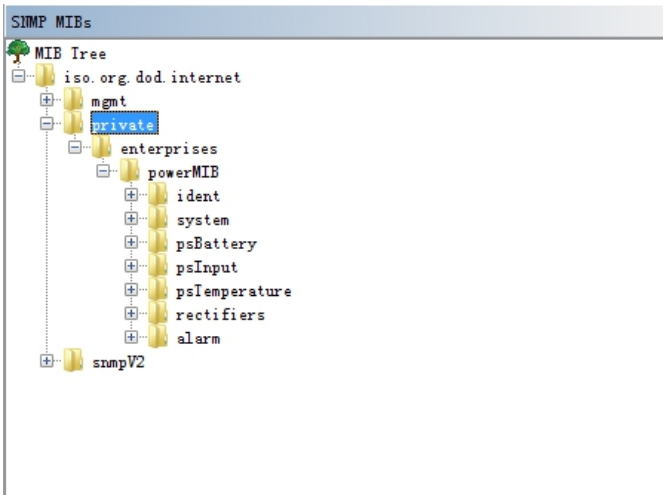
The SNMP Trap address can also be set via the communication screen of WEB page.

The remote computer can also get DC voltage, load current, battery current, the voltage current of each module, system status information by SNMP protocol.

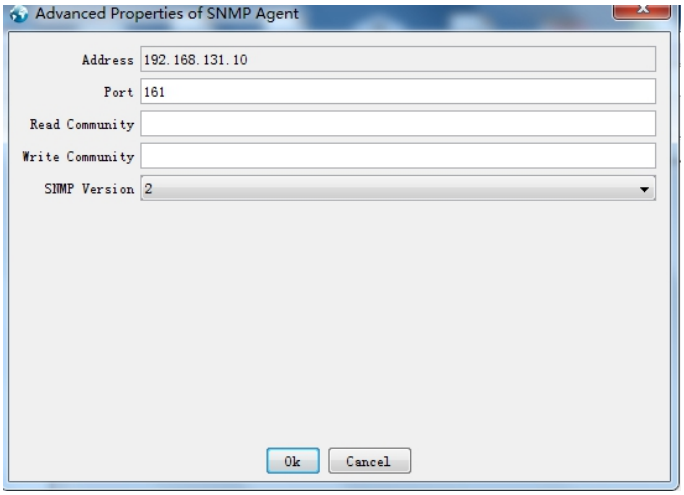
2.3.3.2 Get the SNMP Data by MIB Browser

1. Open iReasoning MIB Browser

2. Get the MIB file.



3. Set the IP address and Port No. Such as IP address: 192.168.131.10; Port No: 161



4. Get the SNMP data.

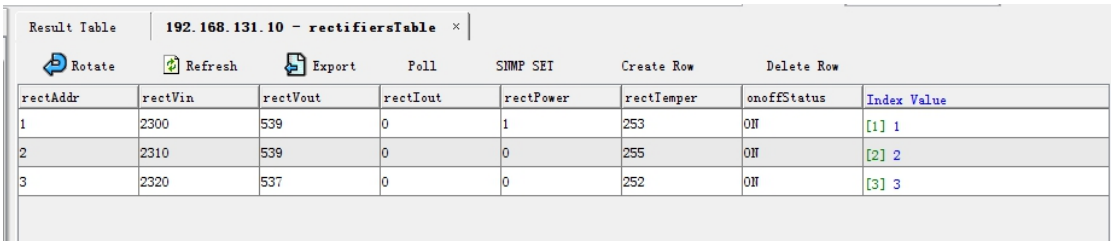


Fig 2-18 Rectifier module data table

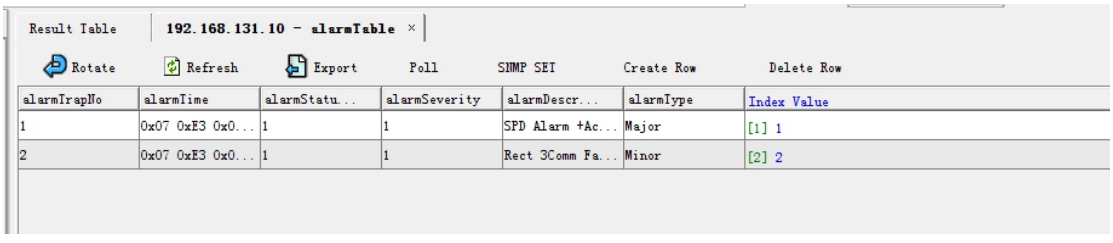


Fig 2-19 Alarm message table

Chapter 3 Alarm handling

Table 3-1 lists the alarms and alarm handling for the MC2600.

Table 3-1 Alarm handling list

No.	Alarm name	handling
1	DC Under Volt	1. Check whether the AC power failure occurs. If the AC power failure occurs, restore the AC power supply. 2. Check whether the "DC Under Volt " is correct(default value is 47V). If not, adjust it based on the actual situation. 3. Check whether the load current of the power supply system exceeds the current capacity of the power supply system. If yes,add more rectifier modules or reduce the load of the power supply system. 4. Check whether the DC voltage is manually lowered. If yes, confirm the cause and restore the voltage to normal after the operation is complete. 5. Check whether the capacity of the power system cannot meet the load requirements because the rectifier module is faulty. If yes, replace the faulty rectifier module.
2	DC Over Volt	1. Check if the "DC Over Volt " is correct(default value is 57.6V). If not, adjust the value based on the actual situation. 2. Check if the output voltage is manually raised. If yes, confirm the cause and restore the voltage to normal after the operation is complete. 3. Remove the rectifier modules one by one and check whether the alarm is cleared. If the alarm persists, re-install the rectifier. If the alarm is cleared, replace the faulty module.
3	Batt 1 Temp Low	1. Check whether the “Batt 1 Temp Low”is correct (default value is -33 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system. This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
4	Batt 1 Temp High	1. Check whether the “Batt 1 Temp High”is correct (default value is 55 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
5	Batt 1 Temp High+	1. Check whether the “Batt 1 Temp High+”is correct (default value is 60 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
6	Batt 2 Temp Low	1. Check whether the “Batt 2 Temp Low”is correct (default value is -33 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.

7	Batt 2 Temp High	1. Check whether the “Batt 2 Temp High”is correct (default value is 55 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
8	Batt 2 Temp High+	1. Check whether the “Batt 2 Temp High+”is correct (default value is 60 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
9	Sen. 3 Temp Low	1. Check whether the “Sen.3 Temp Low”is correct (default value is -33 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system. This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the climate system in the area where the temperature sensor is located is faulty. If yes,repair the climate system. This alarm is automatically cleared when the temperature is restored to the acceptable range. 4. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
10	Sen. 3 Temp High	1. Check whether the “Sen. 3 Temp High”is correct (default value is 55 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the climate system in the area where the temperature sensor is located is faulty. If yes, repair the climate system. This alarm is automatically cleared when the temperature is restored to the acceptable range. 4. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
11	Sen. 3 Temp High+	1. Check whether the “Sen. 3 Temp High+”is correct (default value is 60 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the climate system in the area where the temperature sensor is located is faulty. If yes,repair the climate system. This alarm is automatically cleared when the temperature is restored to the acceptable range. 4. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
12	Sen. 4 Temp Low	1. Check whether the “Sen.4 Temp Low”is correct (default value is -33 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system. This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the climate system in the area where the temperature sensor is located is faulty. If yes, repair the climate system.This alarm is automatically cleared when the temperature is restored to the acceptable range. 4. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.

13	Sen. 4 Temp High	1. Check whether the “Sen. 4 Temp High”is correct (default value is 55 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system. This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the climate system in the area where the temperature sensor is located is faulty. If yes,repair the climate system.This alarm is automatically cleared when the temperature is restored to the acceptable range. 4. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
14	Sen. 4 Temp High+	1. Check whether the “Sen. 4 Temp High+”is correct (default value is 60 ° C) . If not, adjust the value based on the actual situation. 2. Check if climate system of enclosure is good. If climate system faulty, then repair climate system.This alarm is automatically cleared when the battery temperature returns to normal. 3. Check whether the climate system in the area where the temperature sensor is located is faulty. If yes,repair the climate system.This alarm is automatically cleared when the temperature is restored to the acceptable range. 4. Check whether the temperature sensor is faulty. If yes, replace the faulty temperature sensor.
15	Env Hum.Low	There is no impact on the system
16	Env Hum. High	1. Check whether the “Env.Humidity H”is correct (default value is 95%RH) . If not, adjust the value based on the actual situation. 2. Check whether the humidity in the cabinet is normal. If the humidity is abnormal, handle the alarm. 3. Check whether the humidity sensor is faulty. If yes, replace the faulty humidity sensor.
17	AC-L1 Ph. Fail	1. Check whether the AC input cable is loose. If yes, tighten the input cable. 2. Check whether the AC input circuit breaker is switched off. If yes, handle the back-end circuit fault and turn on the circuit breaker. 3. Check whether the AC input voltage of the power system is less than 80V AC. If yes, rectify the power grid fault.
18	AC-L1 Under Volt	1. Check whether the “AC Under Volt”is correct (default value is 180V) . If not, adjust the value based on the actual situation. 2. Check whether the L1 phase input voltage is less than "AC Under Volt". If yes, rectify the L1 phase input fault.
19	AC-L1 Over Volt	1. Check whether the “AC Over Volt”is correct (default value is 280V) . If not, adjust the value based on the actual situation. 2. Check whether the L1 phase input voltage is greater than "AC Over Volt". If yes, rectify the L1 phase input fault.
20	AC-L2 Ph. Fail	1. Check whether the AC input cable is loose. If yes, tighten the input cable. 2. Check whether the AC input circuit breaker is switched off. If yes, handle the back-end circuit fault and turn on the circuit breaker. 3. Check whether the AC input voltage of the power system is less than 80V AC. If yes, rectify the power grid fault.
21	AC-L2 Under Volt	1. Check whether the “AC Under Volt”is correct (default value is 180V) . If not, adjust the value based on the actual situation. 2. Check whether the L2 phase input voltage is less than "AC Under Volt". If yes, rectify the L2 phase input fault.
22	AC-L2 Over Volt	1. Check whether the “AC Over Volt”is correct (default value is 280V) . If not, adjust the value based on the actual situation. 2. Check whether the L2 phase input voltage is greater than "AC Over Volt". If yes, rectify the L2 phase input fault.

23	AC-L3 Ph. Fail	1. Check whether the AC input cable is loose. If yes, tighten the input cable. 2. Check whether the AC input circuit breaker is switched off. If yes, handle the back-end circuit fault and turn on the circuit breaker. 3. Check whether the AC input voltage of the power system is less than 80V AC. If yes, rectify the power grid fault.
24	AC-L3 Under Volt	1. Check whether the “AC Under Volt”is correct (default value is 180V) . If not, adjust the value based on the actual situation. 2. Check whether the L3 phase input voltage is less than "AC Under Volt". If yes, rectify the L3 phase input fault.
25	AC-L3 Over Volt	1. Check whether the “AC Over Volt”is correct (default value is 280V) . If not, adjust the value based on the actual situation. 2. Check whether the L3 phase input voltage is greater than "AC Over Volt". If yes, rectify the L3 phase input fault.
26	Mains Failure	1. Check whether the AC input cable is loose. If yes, tighten the input cable. 2. Check whether the AC input circuit breaker is switched off. If yes, handle the back-end circuit fault and turn on the circuit breaker. 3. Check whether the AC input voltage of the power system is less than 60V AC. If yes, rectify the power grid fault.
27	Solar Input Fail	1. Check whether the photovoltaic input cable is loose. If yes, fix the input cable. 2. Check whether the Photovoltaic components are faulty. If yes, repair or replace them.
28	Solar Input Vol Low	
29	Solar Input Vol High	
30	Curr Imbalance	Check the output current of each rectifier module to find out the one with abnormal current. Remove the rectifier module. Re-install it to the system after all indicators are off. If the fault is disappear, no further operation is required. If the fault persists, replace the uneven rectifier module.
31	Multi Module Fault	1. Remove the rectifier and check whether the connector in the slot is damaged or deformed. If yes, repair or replace the faulty connectors in the enclosure and slot. 2. Reinstall the rectifier. If the alarm persists, the rectifier may be faulty. Replace the faulty rectifier. 3. Restart the controller. If the alarm persists, the controller may be faulty. Replace the faulty controller.
32	Module xx Comm Fail	1. Check whether the rectifier is removed. If yes, re-install the rectifier. 2. If the rectifier is installed, remove and re-install it. 3. If the alarm persists, replace the faulty rectifier.
33	Module xx Input Fail	1. Check whether the AC input cable is loose. If yes, tighten the input cable. 2. Check whether the AC input voltage of the power system is less than 80V AC. If yes, rectify the power grid fault. 3. Check whether the rectifier module is faulty. If yes, replace it. 4. Check whether the photovoltaic input cable is loose. If so, fix the input cable. 5. Check whether the PV module is faulty. If yes, repair or replace it. 6. Check whether the solar module is faulty. If yes, replace it.
34	Module xx Temp High	1. Check whether the temperature of the module air inlet is greater than 75 ° C. If not, replace the faulty module. 2. Check whether the cabinet climate system is faulty. If yes, repair the climate system.
35	Module xx HW Fault	Check whether the fault indicator on the rectifier panel is steady red. If yes, remove the rectifier and re-install it when the indicator is off. If the alarm persists, replace the faulty rectifier.

36	Module xx Protection	1. Check whether the AC or PV input voltage is greater than the maximum operating voltage of the module(Rectifier: 303Vac，Solar module:430Vdc). If yes, rectify the power supply fault and restore the power supply. 2. Check whether the AC or PV input voltage is less than the lowest operating voltage of the module(Rectifier:80Vac，Solar module:110Vdc). If yes, rectify the fault and restore the power supply. 3. Check whether the ambient temperature is greater than 75 ℃. If yes, check and rectify the fault of the climate system.
37	Module xx Fan Fault	1. If conditions are available,replace the fan of the faulty module onsite. 2. If conditions are not available, replace the faulty module onsite.
38	Module xx Derated	NA
39	Modu xx Out Over Vol	1. Check whether "Output Over Volt" is correct (the default value is 60.5V). If not, adjust "Output Over Volt" based on the actual situation. 2. Check whether the output voltage is manually raised. If yes, confirm the cause and restore the voltage to normal after the operation is complete. 3. Remove the rectifier modules one by one and check whether the alarm is cleared. If the alarm persists, re-install the rectifier. If the alarm is cleared, replace the faulty module.
40	Rect xx Curr. Uneven	NA
41	Climate Alarm	1. Check whether climate system alarm cable is loose. If yes, tighten the cables. 2. Check whether hex board or fan or Aircon is faulty. If yes, repair the climate system.
42	Door Alarm	1. Check whether door sensor alarm cable is loose. If yes, tighten the cables. 2. Check whether the sensor is faulty. If yes, replace it. 3. Check whether the cabinet door is open or not.
43	DI 3 Alarm	1. Check whether alarm cable is loose. If yes, tighten the cable. 2. Check whether the related equipment is faulty. If yes, replace it. 3. Check whether related devices are faulty. If yes, rectify the fault.
44	DI 4 Alarm	
45	DI 5 Alarm	
46	DI 6 Alarm	
47	DI 7 Alarm	
48	DI 8 Alarm	
49	SPD Alarm	1. Check whether the SPD alarm cable is loose. If yes, tighten the cables. 2. Check whether the SPD is damaged. If yes, replace it.
50	Load 1 Fuse Alarm	1. Check whether the circuit breaker or fuse is switched off. If yes, switch on the circuit breaker or replace the faulty breaker after the back-end circuit fault is handled. 2. Check whether the circuit breaker or fuse alarm cable is loose. If yes, tighten the alarm cable. 3. Check whether circuit breaker is broken or not. If yes, replace the circuit breaker.
51	Load 2 Fuse Alarm	
52	Load 3 Fuse Alarm	
53	Load 4 Fuse Alarm	
54	Batt 1 Fuse Alarm	
55	Batt 2 Fuse Alarm	
56	Boost Charge	Normal battery management status, no need action to deal with.
57	Battery Test	Normal battery management status, no need action to deal with.
58	Batt Discharge	1. If the AC input is abnormal,restore AC input power. 2. If some rectifiers are broken, then need replace them.

59	Batt Short Test Fail	1. Check whether battery positive and negative cables are loose. If yes, tighten the cables. 2. Check whether the batteries are seriously aged. If yes, replace the batteries.
60	Batt Test Fail	1. Check whether the parameters "End Test Voltage" (default value is 45.2V DC), "End Test Time" (default value is 300min), and "End Test Capacity"(default value is 70%) are correctly set. If they are incorrect, adjust them based on actual situation. 2. Check whether the batteries are seriously aged. If yes, replace the batteries.
61	LLVD1	1. Check whether the AC input is faulty. If the AC input is faulty, restore the AC input power supply. 2. Check whether LLVD x is manually disconnected. If yes, re-connect it manually. 3. Check whether LLVD x Volt is correct (Default LLVD1: 45V; LLVD2~LLDV4:44V) . If yes, adjust it based on the actual situation. 4. Check whether the capacity of the power system cannot meet the load requirements because the rectifier module is faulty. If yes, replace the faulty rectifier module. 5. Check whether the load current exceeds the current capacity of the power system. If yes, install more rectifier modules to increase the capacity of power system.
62	LLVD2	
63	LLVD3	
64	LLVD4	
65	BLVD	1. Check whether the AC input is faulty. If the AC input is faulty, restore the AC input power supply. 2. Check whether BLVD is manually disconnected. If yes, re-connect it manually. 3. Check whether BLVD Volt is correct (default value is 43.5 V DC) . If yes, adjust it based on the actual situation. 4. Check whether the capacity of the power system cannot meet the load requirements because the rectifier module is faulty. If yes, replace the faulty rectifier module. 5. Check whether the load current exceeds the current capacity of the power system. If yes, install more rectifier modules to increase the capacity of power system.
66	Batt x Volt Imba	1. Check whether the midpoint voltage detection line is loose; 2. Check whether the battery is faulty.
67	Batt x Charge Over	1. Check whether the Module XX Comm Fail alarm exists. If yes, remove and reinstall the rectifier. If the alarm persists, replace the faulty module. 2. Remove and reinstall the controller. If the alarm persists, replace the faulty controller.
68	ECO	System in energy saving mode, no need take action to deal with.
69	ECO Pause	1. If the AC input is failure, restore the AC power supply. 2. If the battery is being tested, wait until the test is complete and enter ECO mode again. 3. If any rectifier alarm occur,handle the alarms according to the alarm content. 4. If the battery circuit breaker is switched off, switch it on again. 5. If BLVD is disconnected, handle the fault. 6. If the number of working modules in the system is not greater than "Min Rect Num", increase the number of rectifier modules.
70	Manual Mode	If manual control is no longer required, change the Sys Control Mode to "Auto" or wait 30 minutes for Sys Control Mode switch to "Auto" automatically.
71	BMS xx Comm Fail	1. If the BMS is removed, re-install the it. 2. If the rectifier is installed, remove and re-install it. 3. If the alarm persists, replace the BMS.

72	BMS xx Warning	Handle fault according to the alarm
73	BMS xx Protect	Handle fault according to the alarm
74	BMS xx Fault	Handle fault according to the alarm
75	Minor Alarm	Handle fault according to the alarm
76	Major Alarm	Handle fault according to the alarm
77	Temp Sensor 1 Fault	1. Check whether" Temp Sensor X" is setting correctly. If no, set parameters correctly. 2. If the cables of the temperature sensor are loose, tighten the cables.. 3. If the sensor is faulty, replace the faulty sensor.
78	Temp Sensor 2 Fault	
79	Temp Sensor 3 Fault	
80	Temp Sensor 4 Fault	
81	Heavy Load	1. Check whether"Heavy Load Ratio" is set correctly(default value is 100%). If no, set parameter correctly. 2. Check whether the load current exceeds the current capacity of the power system. If yes,install more rectifiers to increase the capacity of power system.
82	AC Breaker Open	1. Check whether the power grid input voltage is less than 85V. 2. Check whether the system input circuit breaker is switched off. 3. Check whether the rectifier works properly.
83	Fuel Level Low	1. If the fuel level is less than the alarm threshold, add fuel. 2. If the low fuel alarm threshold is incorrectly set,correct it. 3. If the sensor wiring is loose, tighten it. 4. If the sensor is faulty, replace it.
84	Module Address Err	1. Restart the controller 2. Remove the module whose yellow LED is flashing quickly and wait for LEDs Off, then reinstall module completely in place. 3. check the circuit between module output and bus bar, make sure related CB/switch are in close status. 4. Check and make sure the address cables are in good contact 5. Check and make sure the dialing code of the address board is correct

Note:

Before install MPPT modules, need connect the output cables of MPPT shelf to power rack and switch on output breaker of MPPT shelf. otherwise it will cause modules address conflict.