P Series Battery

User manual

Version: 3.0

Please comply with all warnings and operating instructions in this manual strictly. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.

Safety Precaution

1. When Using battery

⚠ **Danger of High Voltage :**
The high voltage power supply offer the equipment power, wet object contact high voltage power supply directly or indirectly , can cause fatal danger.

⚠ **Using a special tool :**
Working in high voltage and ac power, be sure to use a special tool instead of individual tools.

⚠ **Static - free :**
Static electricity would damage veneer on the electrostatic sensitive components, before touching the plug - in, circuit board or chips, be sure to use correct electrostatic prevention measures.

⚠ **Disconnect the power supply in operation:**
When operate the power supply, you must first cut off power supply, power operation is prohibited.

⚠ **Dc short circuit dangerous :**
Power system provides dc regulated power supply. Dc short circuit could cause fatal damage to the e quipment.

2. While Charging

⚠ CAUTION
The temperature range over which the battery can be charged is 0°C to 45°C. Charging the battery at temperatures outside of this range may cause the battery to become hot or to break. Charging the battery outside of this temperature range may also harm the performance of the battery or reduce the battery's life expectancy.

3. When Discharging the Battery

⚠ DANGER
Do not discharge the battery using any device except for the specified device. When the battery is used in devices aside from the specified device it may damage the performance of the battery or reduce its life expectancy, and if the device causes an abnormal current to flow, it may cause the battery to become hot and cause serious injury.

⚠ CAUTION
The temperature range over which the battery can be discharged is -20°C to 60°C. Use of the battery outside of this temperature range may damage the performance of the battery or may reduce its life expectancy.

Communication	It has RS232 and RS485 standard communication interface, it can real-time monitoring the capacity of battery bank, the voltage, current, environment temperature, and charging/discharging current.
Alarm	It has over-temperature, over charge, under-voltage, over-current, short circuit alarm function.

4. Basic Block Diagram

- There are Battery cells and BMS board inside, before connecting the terminal, please read the diagram, and make sure the output is no short or other abnormal connection.

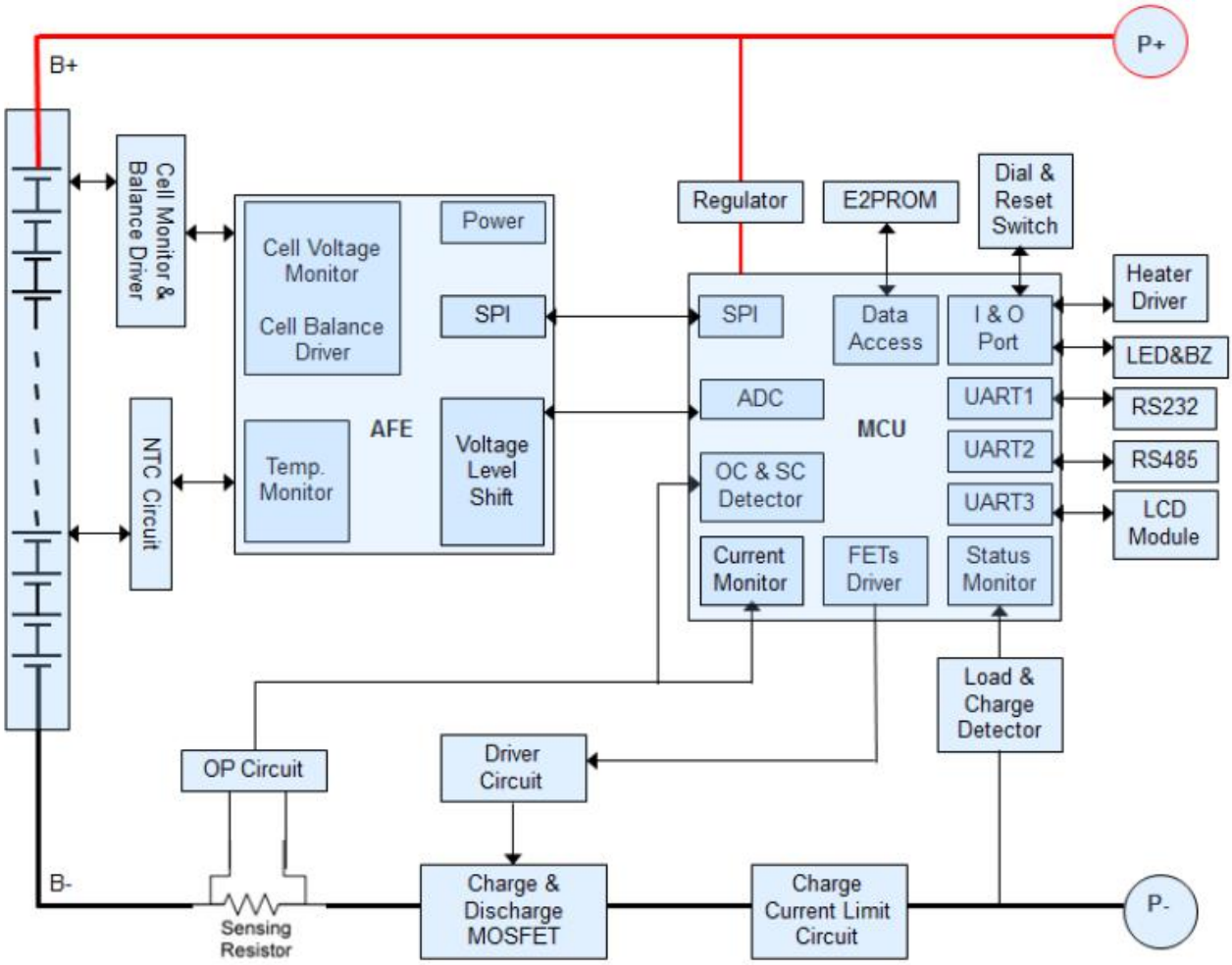


Fig1 Battery Block Diagram

5. Installation and Operation

5-1. Unpacking and Inspection

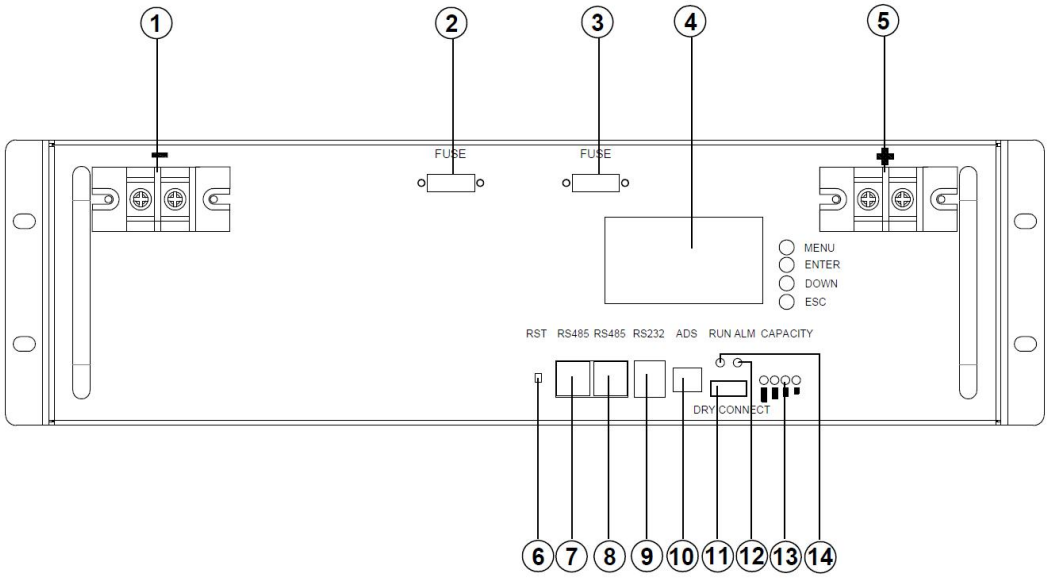
Unpack the package and check the package contents. The shipping package contains:

- One Battery
- Two mounting bracket
- A small bag of screws and nuts

NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged during transportation. Do not turn on the unit and notify the carrier and dealer immediately if there is any damage or lacking of some parts. Please keep the original package in a safe place for future use.

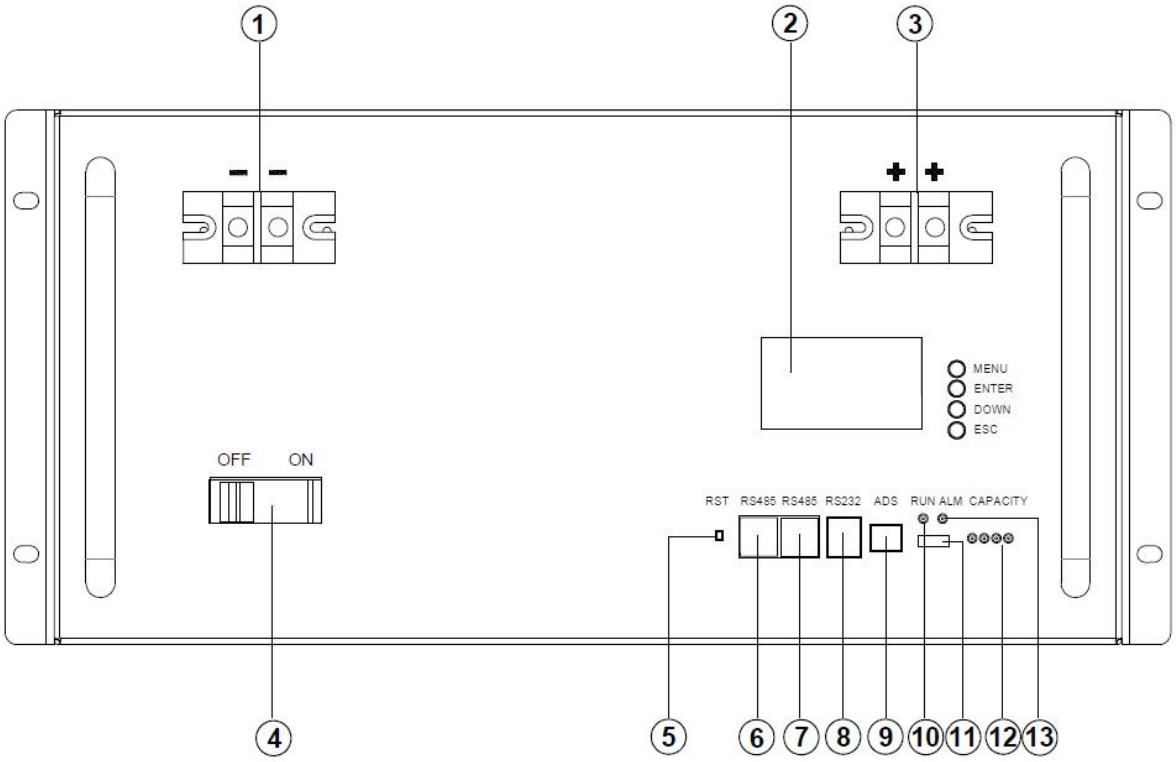
5-2. Panel View

5-2-1 48V50AH battery



No.	Description	Functional Description
1	Battery -	Negative terminal
2	FUSE	Input/Output protection
3	FUSE	Input/Output protection
4	LCD	Display screen
5	Battery +	Positive terminal
6	Reset key	On/OFF button
7	RS-485connection port-B RS485	RS485 communication interface
8	RS-485connection port-B RS485	RS485 communication interface
9	RS-232 connection port RS232	RS232 communication interface
10	Display connection address	ADS Dialer
11	Dry contact	2 roads dry contact
12	Display state information	ALM alarm indicator light blinking
13	Display the battery's capacity	Electricity volume indicator
14	Red- trouble-light on	Run indicator light OFF

5-2-2 48V100AH battery



No.	Description	Functional Description
1	Battery -	Negative terminal
2	LCD	Display screen
3	Battery +	Positive terminal
4	MCB	Output ON/OFF
5	Reset key	On/OFF button
6	RS-485connection port-B RS485	RS485 communication interface
7	RS-485connection port-B RS485	RS485 communication interface
8	RS-232 connection port RS232	RS232 communication interface
9	Display connection address	ADS Dialer
10	Red- trouble-light on	Run indicator light OFF
11	Dry contact	2 roads dry contact
12	Display the battery's capacity	Electricity volume indicator
13	Display state information	ALM alarm indicator light blinking

5-3. Single battery Installation

Installation and wiring must be performed in accordance with the local electric laws/regulations and execute the following instructions by professional personnel.

1) Make sure the mains wire and breakers in the building are in compliance with the standard of rated capacity of battery to avoid the hazards of electric shock or fire.

NOTE: Do not use the wall receptacle as the input power source for the battery, as its rated current is less than the battery's maximum input current. Otherwise the receptacle may be burned and destroyed.

2) Switch off the mains switch in the building before installation.

3) Turn off all the connected devices before connecting to the battery.

4) Prepare wires based on the following table:

Model	Cables(AWG)	Cables(mm2)
<50Ah	8	6
50Ah	6	16
100Ah	4	25

Table 1 Output Cables

NOTE 1: It is recommended to use suitable wire in above table or thicker for safety and efficiency.

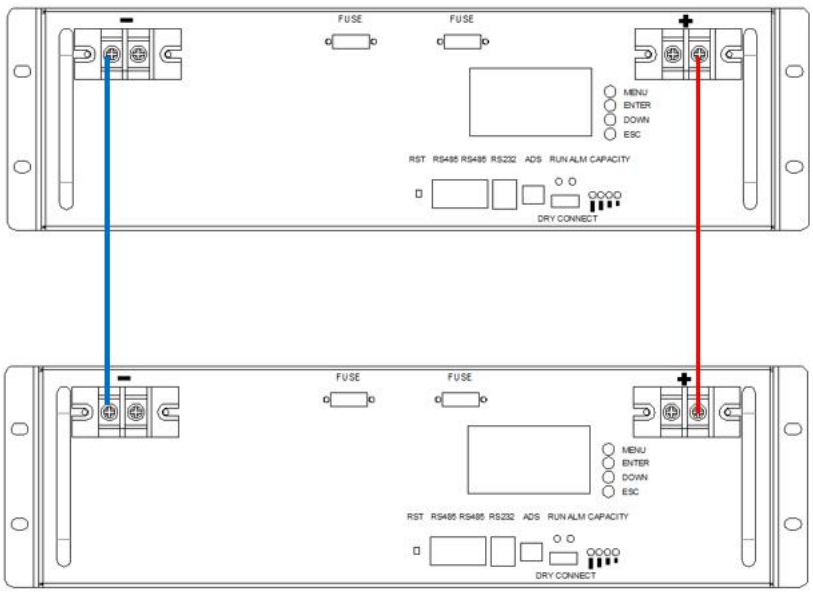
5) Put the terminal block cover back to the front panel of the battery.

NOTE: Set the battery pack breaker in "OFF" position and then install the battery pack.

6-4. Software Installation

For optional computer system protection, install battery monitoring software to fully configure battery shutdown and other setting value.

5-5. Installation of Battery in Parallel



6-6 Installation Precautions

(1) Prior to installation, unpacking to check the quantity of the parts and battery appearance.

(2) Install the hanger and handle and measure the battery voltage with a multimeter. The general factory voltage of the battery is 51.5V-53.5V.

(3) Prior to wiring, check the anode and cathode of the battery and the anode and cathode terminals shall not be connected reversely.

(4) During battery connection, please wear the protective gloves. When using such metal tools as torque wrench, please perform insulating packaging for them and two end of the metal tools such as torque wrench shall not contact the positive and negative terminals of the battery at the same time to avoid battery short-circuit.

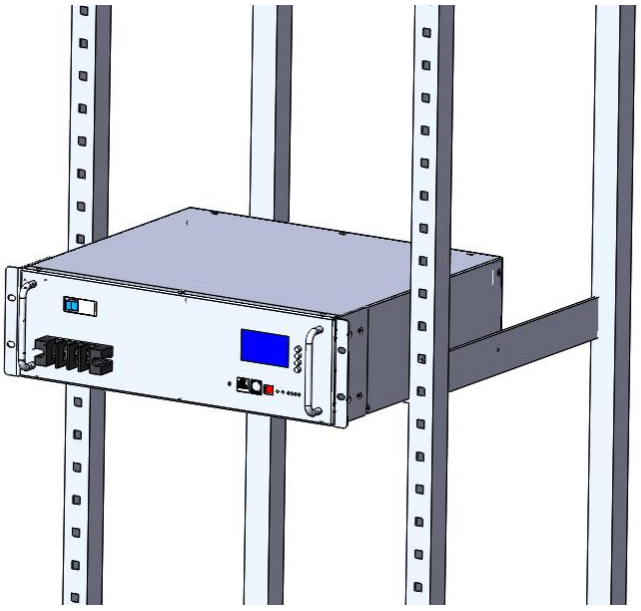
(5) Before the battery is connected with the externally connected equipment, make the equipment in a disconnected state, check whether the connecting polarity of the battery and total voltage are correct, connect the battery anode with the equipment anode and battery cathode with the equipment cathode and fix the connecting line.

(6) During handling and placement, the battery must be handled gently. No dropping or impacting. The battery shall not be thrown or beaten to avoid damaging the battery or resulting in potential safety hazard.

(7) Do not touch the surface of the battery box with the sharp part of the tool to scratch or damage the battery box.

(8) Do not disassemble the battery box without authorization.

(9) Do not put any article made of the metal conductive material together with the battery or assemble it into the battery box.



(10) Install it according to the selected installation mode:

Installation of standard cabinet (rack): Install the matching hanger for the battery pack and fix them in the standard cabinet and the tray protection is added for the battery box.

Installation of wall-mounted box: Prior to installation, please ensure that the wall complies with the wall-mounted requirements; according to the location in the design plan, install the special wall-mounted box of the lithium battery; the battery pack is fixed in the wall-mounted box in a hanger manner.

Installation of integrated indoor and outdoor cabinets (boxes): Install them according to the installation specification for the customized integrated cabinet (box).

5-7 Operation Instruction for Installation

1) Prior to installation, please check whether the battery is normal.

Press the reset key RST on the front panel for 3S for startup. During startup, 4 capacity indicator lights on the front panel, ALM alarm indicator light (red) and RUN running indicator light light up. Check whether all indicator lights light up normally; then the ALM alarm indicator light goes out, the RUN running indicator light lights up and the capacity indicator light lights up according to the capacity.

If the ALM alarm indicator light flashes after startup, it means that the battery has an alarm. The newly installed battery seldom has alarm. The common alarm is the battery undervoltage alarm (which is resulted from non-use of the battery for a long time). Such case may be removed after the battery is charged for 30min; if the alarm may not be removed, please press the reset key RST for 10S, until all LEDs light up for reset, execute the battery reset operation and confirm whether the alarm is removed. If the alarm is removed, the battery may be used normally. Otherwise the battery shall be reworked.

2) For the battery which is normal after detection, please press the reset key RST for 3S to execute the battery ON/OFF operation.

Instructions of manual operation of the reset key RST	Startup	In the OFF state of BMS, press the key for 3S for startup;
	Shutdown	In the non-standby state of BMS, press the key for 3S for shutdown;
	Reset	In the non-standby state of BMS, press the key for 10S, until all LEDs light up for reset.

Instructions: "Shutdown" and "standby" and "startup" and "activation" in Chinese have the same meaning.

3) Installation of the lithium battery, wiring and startup.

Make the battery pack in a standby state, install it in the battery cabinet one by one, the anode and cathode of the battery pack are connected respectively, which are connected to the switching mode power supply or UPS (Please note that the switching mode power supply and UPS shall be disconnected from the

AC). Press the reset key RST of one of battery packs for 3S for startup. Such startup battery may activate other batteries which are connected in parallel (or press the reset key RST of each battery pack for 3S successively) and the whole battery pack with high capacity enters the working state. Later, apply AC to the power supply equipment such as switching mode power supply and UPS to make the whole standby system run.

The specification of the connecting line is selected according to the load current, with the common specifications of the connecting line as follows:

1) When the battery pack with the capacity of 200Ah or below is connected in parallel, it is suggested to select 16mm2 copper wire.

2) When the battery pack with the capacity of 200Ah~300Ah is connected in parallel, it is suggested to select 16mm2 or 25mm2 copper wire.

3) When the battery pack with the capacity of 300Ah or above is connected in parallel, it is suggested to select 25mm2 copper wire.

Note: We do not equip with the battery connecting line by default, which shall be selected according to the total capacity of the battery pack.

Lithium battery	Copper core cable	Copper pigtail	Remarks
48V50Ah	$16mm^2/25mm^2$	16-8/25-8	M8 copper pigtail is used for 48V50Ah sing pack of battery binding post
48V100Ah	$16mm^2/25mm^2$	16-10/25-10	48V100Ah M10 copper pigtail is used for 48V100Ah sing pack of battery binding post

Introduction to operation steps in detail according to the capacity required:

- **Battery pack in parallel with the capacity of 400Ah or above (the wiring diagram is shown in Figure 1):**

Step 1: Make the battery pack in the standby state and install it in the battery cabinet successively.

Step 2: Disassemble the insulating cover of the battery pack one by one, connect the anode of each battery pack to the anode busbar with the same length and screw.

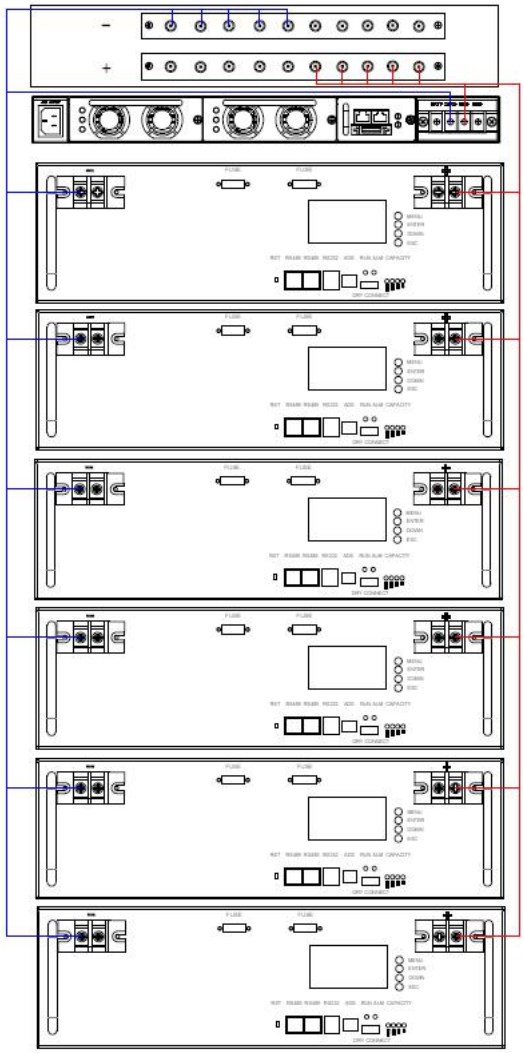
Step 3: According to step 2, connect the cathode of the battery pack. Last, cover the terminal with the insulating cover.

Step 4: Set the dial-up addresses of all battery modules from top to bottom one by one, which are 1000, 0100, 1100 , 0010 …… 0111 , 1111(the dial-up addresses are set according to the number of battery modules actually used) respectively; (this step may be skipped if there is no need to access to the remote monitoring platform).

Step 5: Perform the cascade connection to RS485 communication interface of the battery module with the RS485 connecting line; lead to the collector of the monitoring platform from the RS232 interface of the battery module with the address of 1000 with the RS232 connecting line; (this step may be skipped if there is no need to access to the remote monitoring platform).

Step 6: Connect the busbar to the battery charger(battery charger can be a SMPS or UPS).

Step 7: Press the RST key of each battery pack for Reset and the whole battery pack with high capacity enters the working state.



Wiring Diagram of Battery Pack in Parallel with Capacity of 300Ah or above

- **Battery pack with the capacity of 300Ah or below in parallel:**

Step 1: Make the battery pack in the standby state and install it in the battery cabinet successively.

Step 2: Disassemble the insulating cover of the battery pack one by one, connect the anode of each battery pack to the anode of adjacent battery with the same length and screw.

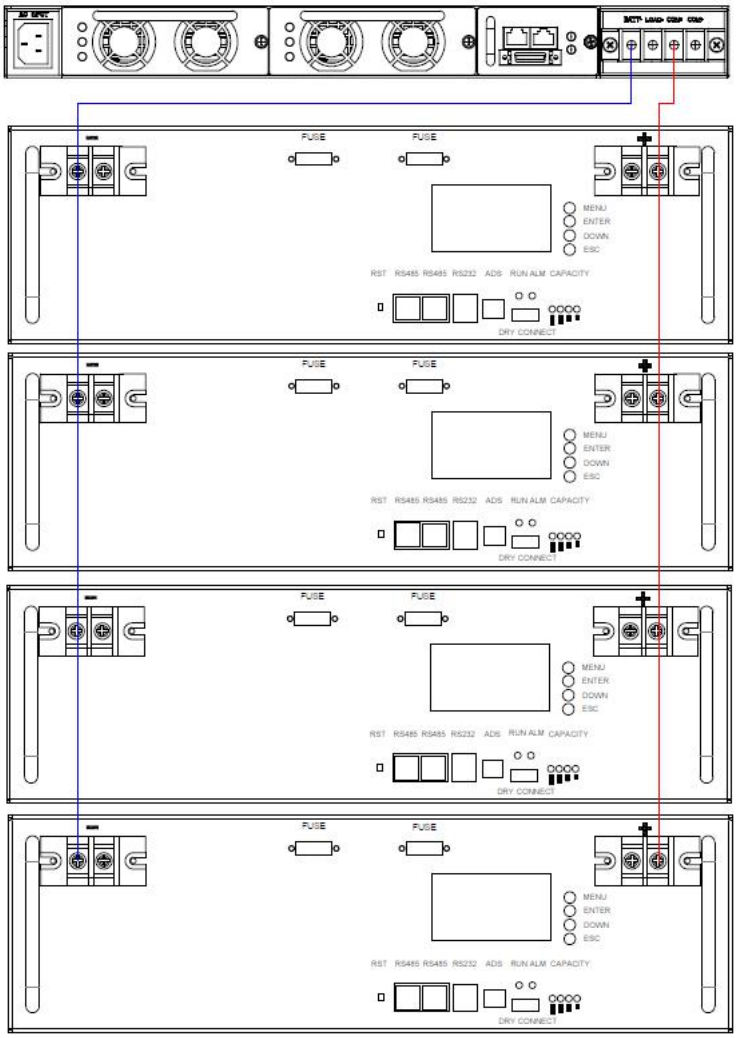
Step 3: According to step 2, connect the cathode of the battery pack. Last, cover the terminal with the insulating cover.

Step 4: Set the dial-up addresses of all battery modules from top to bottom one by one, which are 1000, 0100, 1100 , 0010 …… 0111 , 1111 (the dial-up addresses are set according to the number of battery modules actually used) respectively; (this step may be skipped if there is no need to access to the remote monitoring platform).

Step 5: Perform the cascade connection to RS485 communication interface of the battery module with the RS485 connecting line; lead to the collector of the monitoring platform from the RS232 interface of the battery module with the address of 1000 with the RS232 connecting line; (this step may be skipped if there is no need to access to the remote monitoring platform).

Step 6: Connect the battery to the battery charger(battery charger can be a SMPS or UPS).

Step 7: Press the RST key of each battery pack for Reset and the whole battery pack with high capacity enters the working state.

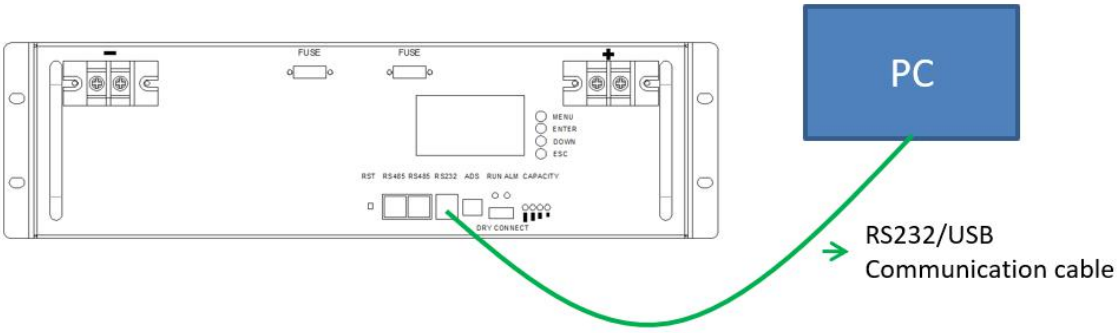


Wiring Diagram of Battery Pack in Parallel with Capacity of 200Ah or below

6-8. Circuit breaker of battery circuit is set to OFF, connect it to switch power supply, and output voltage of switch power supply is set to 53.2-54V, current set to 0.2C; after all settings done, switch the circuit breaker ON.

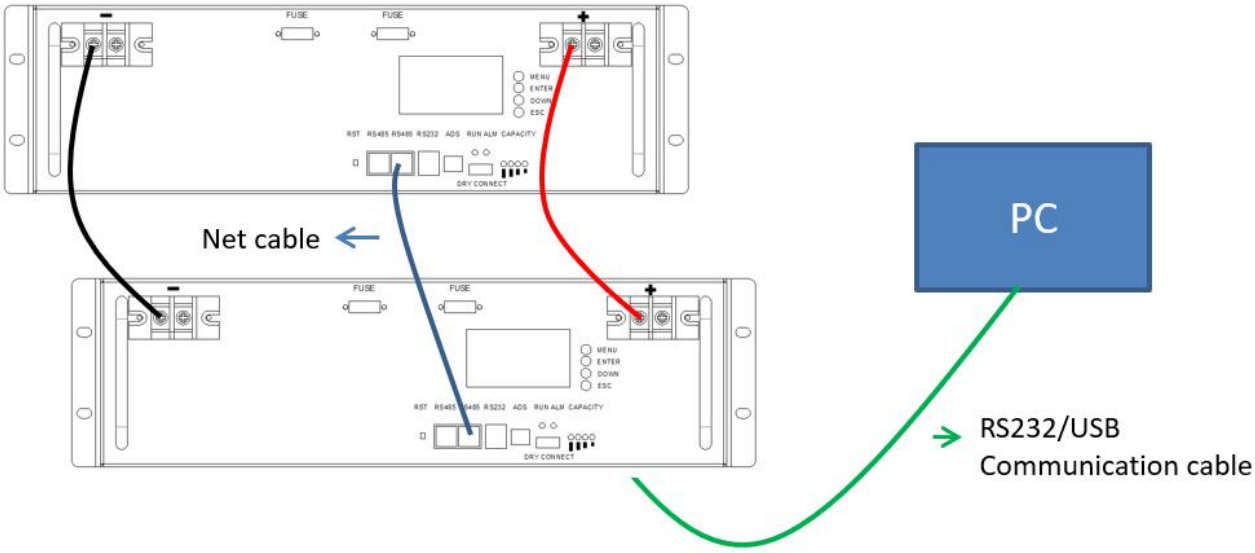
6-9. Connection mode for parallel communication

6-9-1 Single battery communication



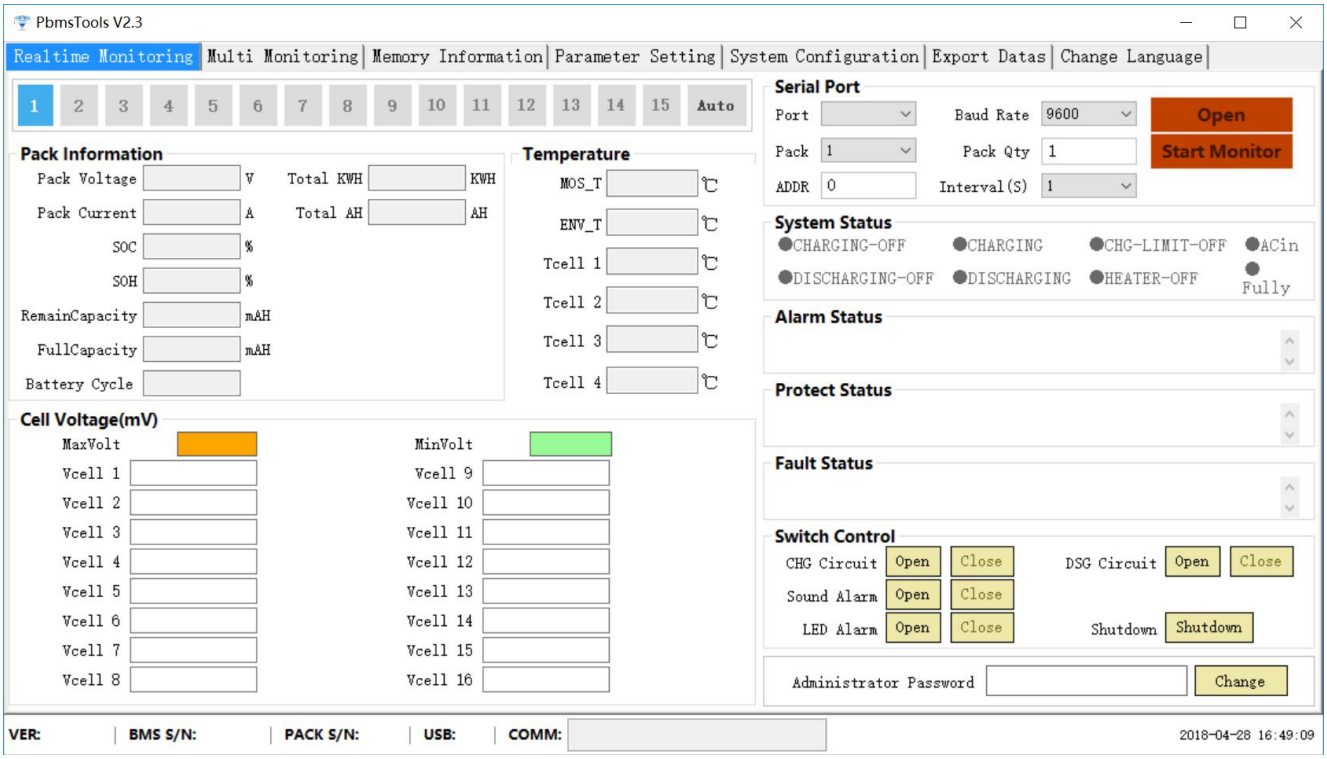
6-9-2 Connection mode for parallel communication

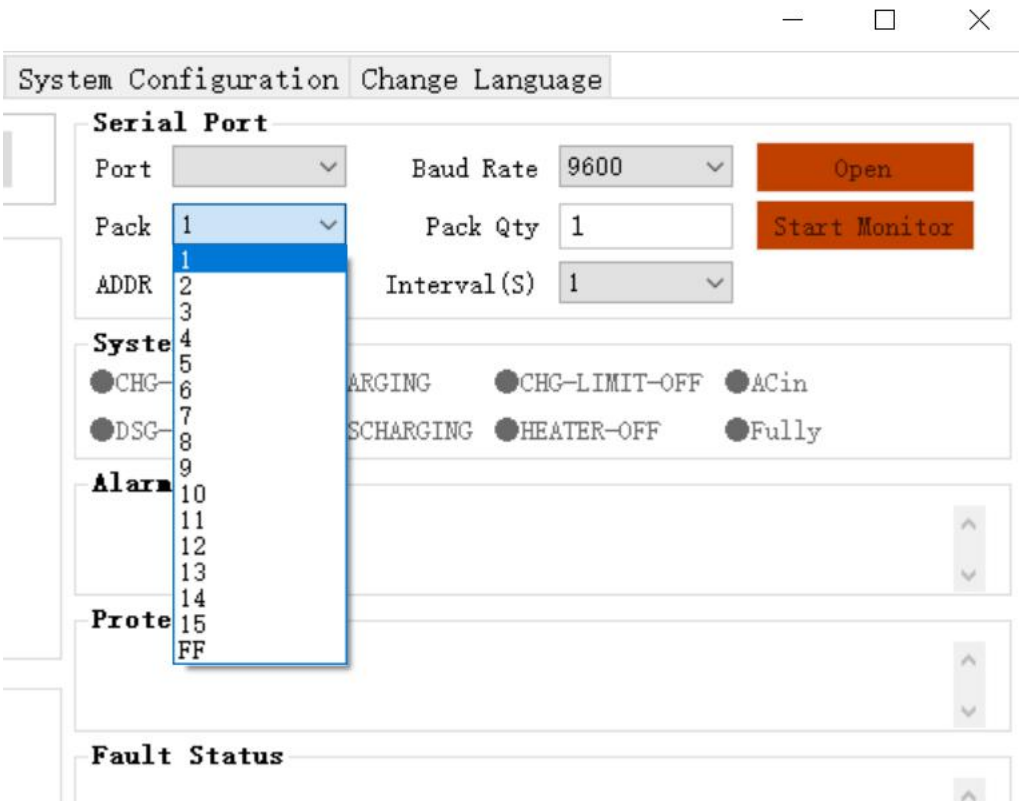
While in parallel communication, dial-up addresses of battery module are 1，2,3,4……14,15,of which 1 stands for host computer, to which other batteries' data is uploaded; host computer conducts unified uploading, and host computer with dial-up code of 1 is required to connect with upper computer; FF polling mode used as consulting mode.



RS232 Parallel Communication

5-10. Monitor Software interface





6-11 Upper machine instructions

A、Software source file：

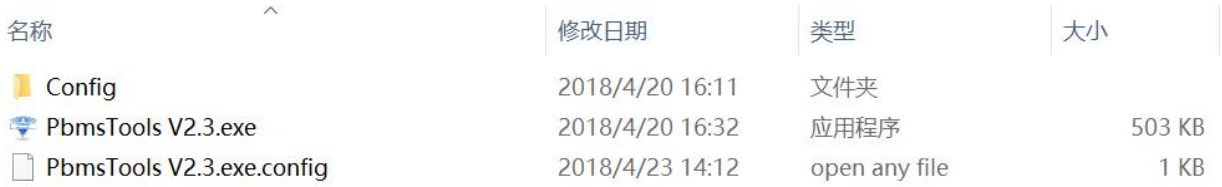
Name of software source file：PbmsTools V2.04.exe、PbmsTools V2.04.exe.config、DevComponents.DotNetBar2.dll、NPOI.dll、Language.xls、ParamSetting.xml six documents in total.

B、Software running environment：

The software running on the PC and its compatible computer, using WINDOWS operation system.

C、Software using steps：

（1）Double click BmsTools.exe icon can show the main interface of the software（As shown in figure A）.



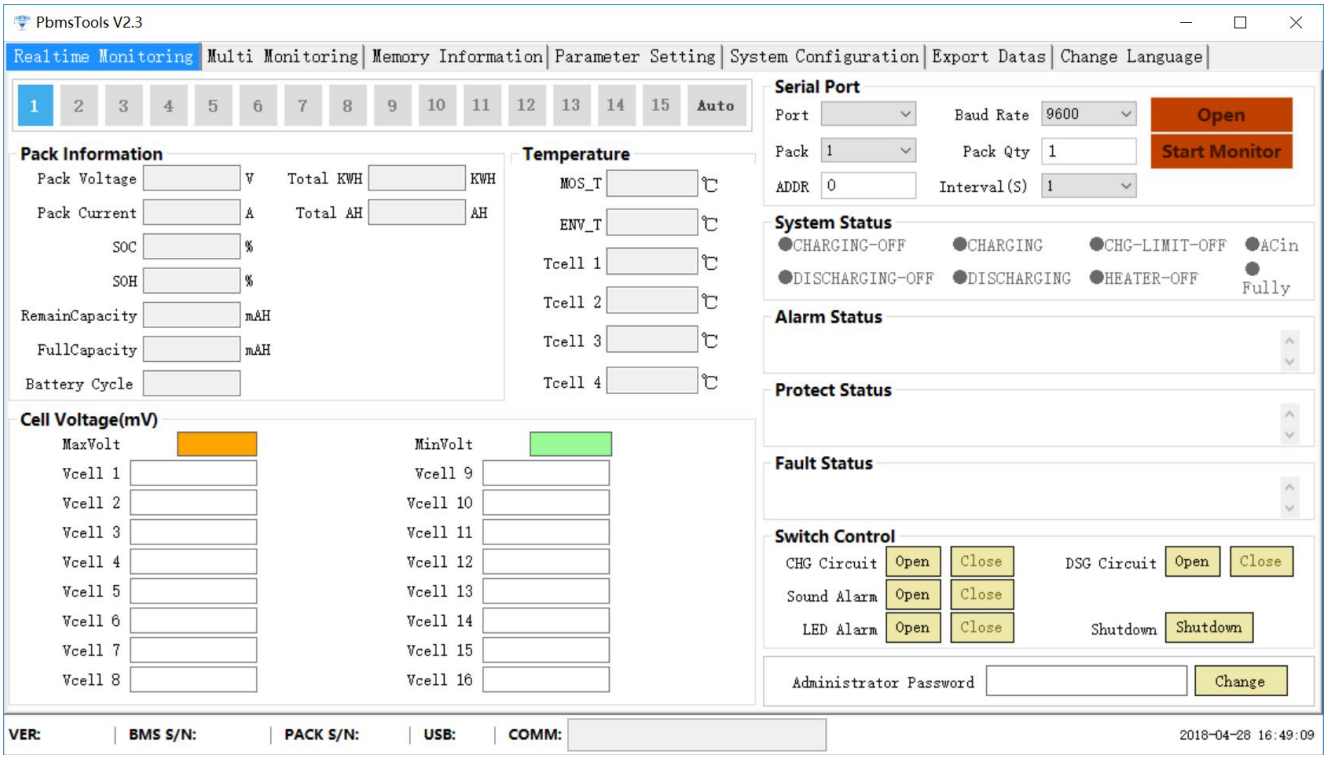


Figure A：Real-time Monitoring

（2）Open the main interface（As shown in figure A），the software automatically search serial port，and automatically open，real-time read battery voltage, power, temperature, and protection of the state of battery parameters.

Operating authority is divided into general rights and administrator privileges.

Pack Info: shows the basic parameter information of each battery pack.

Pack Voltage: the real-time voltage of battery pack *(Measure and monitor the voltage of battery pack: Error ≤ 0.5 %)*

Pack Current: the real-time charge/discharge current of battery pack. *(Measure and monitor the current of battery pack: Error:≤ 2% @ 0.5C charge/discharge rate)*

SOC: State of Charge; It is the equivalent of a fuel gauge for the battery pack. The units of SOC are percentage points (0% = empty; 100% = full). (Measure and monitor the SOC : Accuracy: ≤ 5%)

SOH: Health of battery , is the ratio of battery current full capacity corresponding to the rated capacity。

(Measure and monitor the SOH : Accuracy: ≤ 5%)

Remain-Capacity: the remaining capacity of the battery pack.

Full-Capacity: the capacity of battery pack when it's fully charged.(48V50AH battery is ≥50AH, and 48V100AH battery is ≥100AH)

Battery Cycle: the cycles of full charge-full discharge.

Total KWH: Battery discharge energy in whole battery life *(Error: ≤5%)*

Total AH: Battery discharge capacity in whole battery life *(Error: ≤5%)*

Temperature: the real-time temperature of battery cells, MOSFET and Environment of battery pack

Cell-T: the real-time temperature of battery cell. Inside the battery pack can totally install 4 temperature detectors, typically detecting the temperature at 4 positions.(*Measure and monitor the temperature of cells, BMS and ambient temperature: Error: ≤ 3 degC)*

MOSFET-T: the real-time temperature of MOSFET. (*Measure and monitor the temperature of cells, BMS and ambient temperature: Error: ≤ 3 degC)*

Environ-T: the real-time ambient temperature inside the battery pack(*Measure and monitor the temperature of cells, BMS and ambient temperature: Error: ≤ 3 degC)*

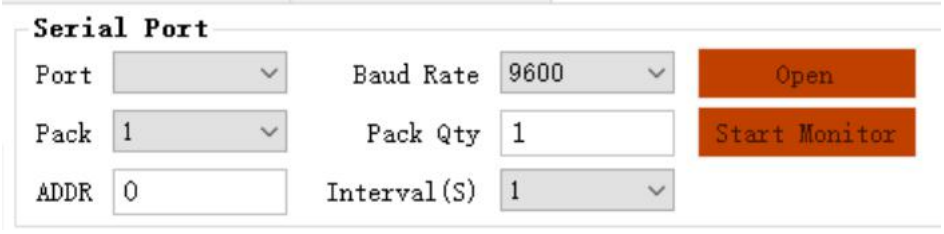
Cell Voltage(mV): the real-time voltage of each series battery cell.

MaxVoltCell: the maximum real-time cell voltage in all series cells.

MinVoltCell: the minimum real-time cell voltage in all series cells.

Vcell: the real-time voltage of each series battery cell(*Measure and monitor the voltage of each cell : Error≤ 0.5 %)*

Remark: *The deviation of voltage between maximum and minimum cell compare when battery pack is fully :Error≤0.25V*



Serial Port:

Can connect 15 packs at the same time

FF: Choose this mode when batteries in parallel communication

Port: The serial port NO. which battery chosen to communication

Pack Qty: the quantity of battery packs in parallel (15 batteries can work in parallel)

ADR: Address dial code (0# just for single battery communication,1#-15# for 15 batteries communication in parallel)

Open: Means can choose to open or close the port

Enable: Can choose to communication or not

System Status: the real-time status of BMS system.

ChgMos: the real-time status of charging MOSFET

DsgMos: the real-time status of discharging MOSFET

EffectiveCharge: Means battery is charging when it is green

EffectiveDischar: Means battery is discharging when it is green

ChgCurrentLimit: Means charging current limited is ON

HeatingFilm: The status of heater, is a reserved function

ACin: Means detect the external power supply connection

Fully: Means battery is full charge

Alarm Status: the status of alarm.

COV: battery cell overvoltage alarm

CUV: battery cell undervoltage alarm

Env-OT: Ambient over-temperature alarm

POV: Battery pack overvoltage alarm

PUV: battery pack undervoltage alarm

Env-UT: Ambient under-temperature alarm

Chg-OC: charging over current alarm

Dsg-OC: discharging over current alarm

Mos-OT: MOSFET over-temperature alarm

Cell-OT: battery cell over-temperature alarm

Cell-UT: battery cell under-temperature alarm

Protect Status: the status of battery protection.

COVP: battery cell overvoltage protection.

CUVP: battery cell undervoltage protection

Chg-OTP: charging over-temperature protection

Dsg-OTP: discharging over-temperature protection

POVP: battery pack overvoltage protection.

PUVP: battery pack undervoltage protection

Chg-UTP: charging under-temperature protection

Dsg-UTP: discharging under-temperature protection

Chg-OCP: charging over current protection.

Dsg-OCP: discharging over current protection.

Mos-OTP: MOSFET over-temperature protection

Env-OTP: Ambient over-temperature protection?

SCP: Short circuit protection

Inversed Charger: Positive/negative of charger is inversed

Charger OVP: overvoltage protection of charger

Env-UTP: Ambient under-temperature protection

Fault Status: the status of fault

ChgMOS Fault: Charging MOSFET fault

DsgMOS Fault: Discharging MOSFET fault

NTC fault: the NTC is faulty

CCBoard Fault: Current limited plate fault

Sampling Fault: Sampling fault alarm

Heater Fault: Heater of BMS fault alarm, is a reserved alarm function

Cell Fault: the battery cell is faulty

Switch Control: can control the switches on BMS

Chg Circuit: can open or close the charging circuit

Dsg Circuit: can open or close the discharging circuit(NC)

Sound Alarm: can enable or disable the sound alarm

ChgCurrentLimit: can enable or disable the charging current limit(48V50AH is 10A current limit & 48V100AH is 20A current limit)

LED alarm: can enable or disable the LED alarm

Software Sleep: can turn on or shut down the software sleep mode

Administrator Password: for setting the battery protection parameters; set by manufacturer. It can be changed by administrator privileges.

（3）In the display record TAB(As shown in figure B), there are two checkboxs, display and automatic storage.

Check the display option, can real-time display the various parameters of the battery.

Check the automatic storage option, can automatically storage the parameters of the battery in the excel table. The file in the software under the current file path of the data folder, storage file name named after pack number and time.比 For example packNo1_20150306145010.xls.

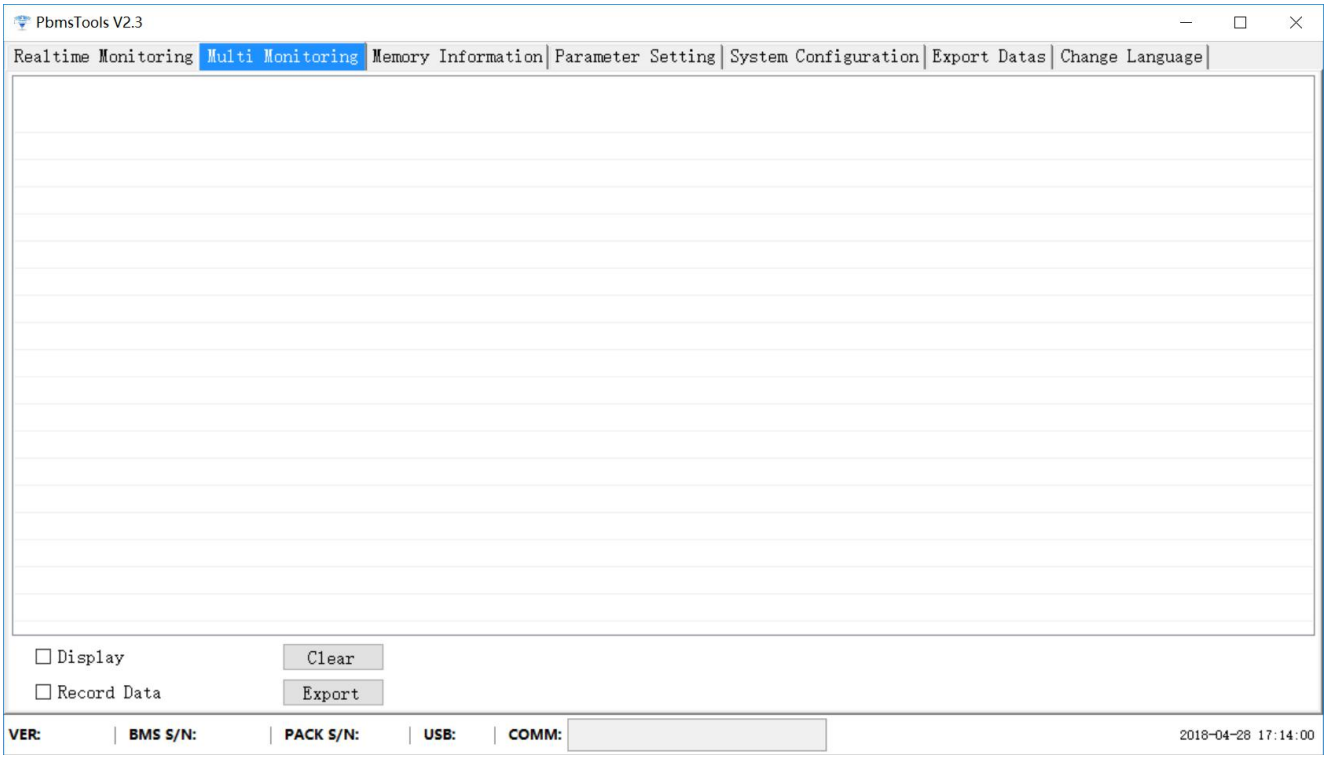


Figure B：Display record

（4）In storage record TAB(As shown in figure C)，can read the battery protective plate storage of records, the records content including record the protection and alarm and restore the category and time of occurrence，records includes fault categories and fault occurs monomer voltage, total voltage, charge/discharge capacity, charge/discharge current, temperature, etc. In addition to normal record protection and alarm and recovery information, but by setting, record battery parameters within a certain period of time.：Monomer voltage，total voltage, charge/discharge capacity, charge/discharge current, temperature, etc.

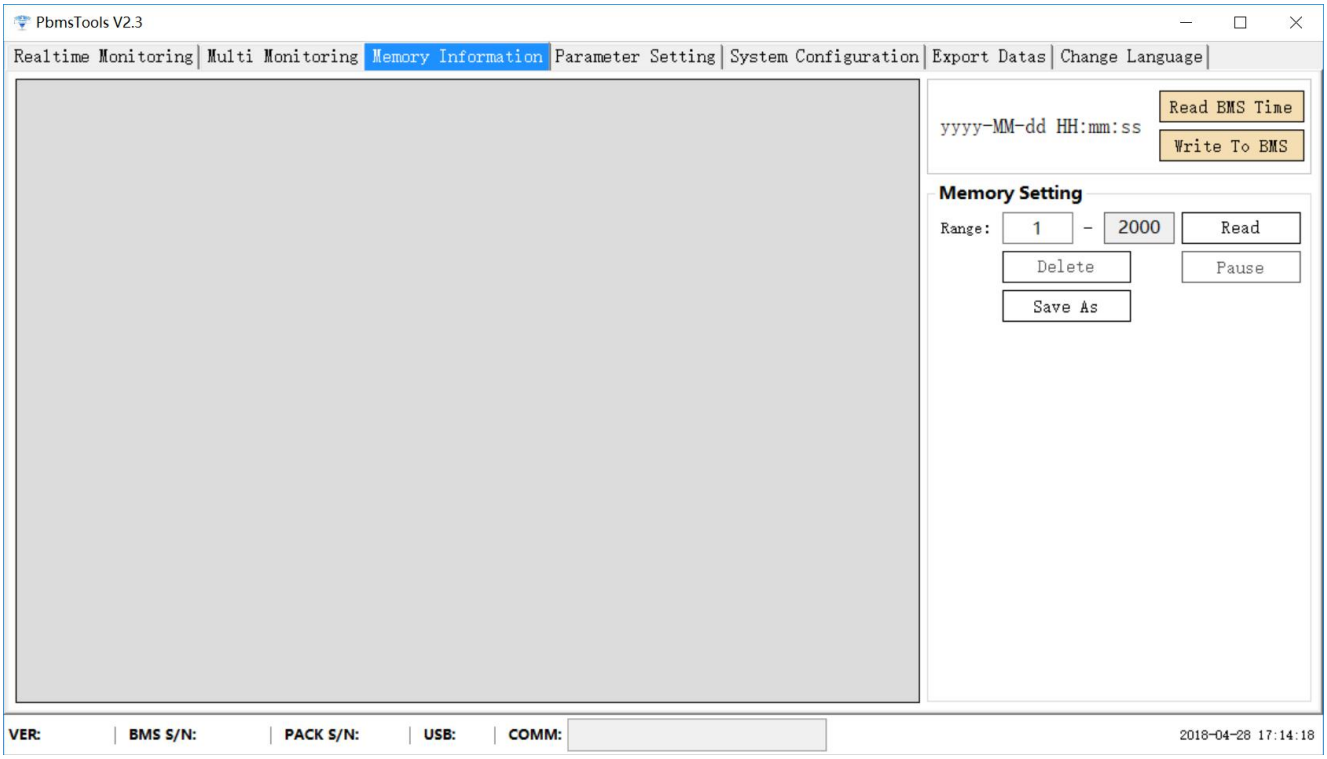


Figure C: Storage record

(5) In the parameter settings TAB(As shown figure D),the TAB for the battery parameters.

Read All : Read all the parameters of the battery

Write All: Write all the parameters of the battery; only by manufacturer or administrator privileges.

Restore default : Restore the default parameters for battery.

Import : The parameters of the import file format for the XML to the current TAB

Export : Export the current battery parameters, for the XML file format.

Cell Over-Charge Voltage Alarm: typical 3.60v/cell, when cell voltage over 3.60v will alarm.
Cell Over-Charge Voltage Protection: typical 3.70v/cell, when cell voltage over 3.70v will protect and stop charging.
Cell Over-Charge Protection Release: typical 3.38v/cell, when cell voltage from 3.70v down to 3.38v, will restore charging.
Cell Over-Charge Protection Delay Time: typical 1000ms.
Pack Over-Charge Voltage Alarm: typical 57.6v, when battery pack voltage over 57.6v will alarm.
Pack Over-Charge Voltage Protection: typical 58.4v, when battery pack voltage over 58.4v will protect and stop charging.
Pack Over-Charge Protection Release: typical 54.0v, when battery pack voltage from 58.4v down to 54.0v, will restore charging.
Pack Over-Charge Protection Delay Time: typical 1000ms.
Cell Under-Discharge Voltage Alarm: typical 2.80v/cell, when cell voltage below 2.80v will alarm.

Cell Under-Discharge Voltage Protection: typical 2.70V/cell, when cell voltage below 2.70V will protect and stop discharging.

Cell Under-Discharge Protection Release: typical 3.00V/cell, when cell voltage from 2.50V up to 3.00v, will restore discharging.

Cell Under-Discharge Protection Delay Time: typical 1000ms.

Pack Under-Discharge Voltage Alarm: typical 43.2V, when battery pack voltage below 43.2V will alarm.

Pack Under-Discharge Voltage Protection: typical 40.0V, when battery pack voltage below 40.0V will protect and stop discharging.

Pack Under-Discharge Protection Release: typical 48.0V, when battery pack voltage from 40.0V up to 48.0v, will restore discharging.

Pack Under-Discharge Protection Delay Time: typical 1000ms.

Chg Over-Current Alarm: will alarm when the charging current is over, according to maximum charging current and manufacturer's recommendation; the alarm current should be higher than max. charging current?

Chg Over-Current Protection: will protect and stop charging when the charging current is over, according to maximum charging current and manufacturer's recommendation; the protection current should be higher than max. charging current.

Chg Over-Current Protection Delay Time: typical 1000ms.

Dsg Over-Current Alarm: will alarm when the discharging current is over, according to maximum discharging current and manufacturer's recommendation; the alarm current should be higher than max. discharging current.

Dsg Over-Current Protection: will protect and stop discharging when the discharging current is over, according to maximum discharging current and manufacturer's recommendation; the protection current should be higher than max. discharging current.

Dsg Over-Current Protection Delay Time: typical 1000ms.

Dsg Over-Current-2 Protection: discharge over-current second protection, will protect and stop discharging when the current is over, according to manufacturer's recommendation; the second protection current is higher than the first protection current.

Dsg Over-Current-2 Protection Delay Time: ≤100ms, typical 50ms

Short circuit Protection Delay Time: typical 300us.

Cell Balance Threshold: the voltage of each cells balanced, typical 3.40V

△Vcell: Cells balanced voltage difference ,typical 30mV.

Cell Sleep Voltage: Each cells sleep voltage, typical 3.10V

Delay Time: Cells sleep delay time, typical 1min.

Fully Charge Voltage: the battery pack voltage when it's fully charged; according to manufacturer's recommendation, typical 54.0V

Fully Charge Cutoff Current: the cut-off current when battery pack is fully charged; according to manufacturer's recommendation, typical 0.01CA

SOC Low Alarm: will alarm when the state of charge is lower than 10%

MOS Over-Temperature Alarm: typical 100℃ , will alarm when the MOSFET temperature reaches 100℃.

MOS Over-Temperature Protection: typical 115℃ , will protect and cut off circuit when the MOSFET temperature reaches 115℃.

MOS Over-Temperature Protection Release: typical 95℃ , will release protection and recovery circuit when the MOSFET temperature downs to 95℃.

Chg Over-Temperature Alarm: according to manufacturer's recommendation, typical 50℃; will alarm when temperature is higher than 50℃ when charging?

Chg Over-Temperature Protection: according to manufacturer's recommendation, typical 55℃; will protect and cut off circuit when temperature is higher than 55℃ when charging

Chg Over-Temperature Protection Release: typical 50℃, will release protection and recovery circuit when charging temperature downs to 50℃.

Dsg Over-Temperature Alarm: according to manufacturer's recommendation, typical 55℃; will alarm when temperature is higher than 55℃ when discharging.

Dsg Over-Temperature Protection: according to manufacturer's recommendation, typical 60℃; will protect and cut off circuit when temperature is higher than 60℃ when discharging.

Dsg Over-Temperature Protection Release: typical 55℃, will release protection and recovery circuit when discharging temperature downs to 55℃.

Chg Under-Temperature Alarm: according to manufacturer's recommendation, typical 0℃; will alarm when temperature is lower than 0℃ when charging

Chg Under-Temperature Protection: according to manufacturer's recommendation, typical -5℃; will protect and cut off circuit when temperature is lower than -5℃ when charging.

Chg Under-Temperature Protection Release: typical 0℃, will release protection and recovery circuit when charging temperature up to 0℃.

Dsg Under-Temperature Alarm: according to manufacturer's recommendation, typical -20℃; will alarm when temperature is lower than -20℃ when discharging.

Dsg Under-Temperature Protection: according to manufacturer's recommendation, typical -25℃; will protect and cut off circuit when temperature is lower than -25℃ when discharging.

Dsg Under-Temperature Protection Release: typical -20℃, will release protection and recovery circuit when discharging temperature up to -20℃.

Env Under-Temperature Alarm: typical -20℃; will alarm when ambient temperature is lower than -20℃.

Env Under-Temperature Protection: typical -25℃; will protect and cut off circuit? when ambient temperature is lower than -25℃.

Env Under-Temperature Protection Release: typical -20℃, will release protection and recovery circuit when ambient temperature up to -20℃.

Env Over-Temperature Alarm: typical 65℃; will alarm when ambient temperature is higher than 65℃.

Env Over-Temperature Protection: typical 70℃; will protect and cut off circuit when ambient temperature is higher than 70℃.

Env Over-Temperature Protection Release: typical 65℃, will release protection and recovery circuit when ambient temperature downs to 65℃.

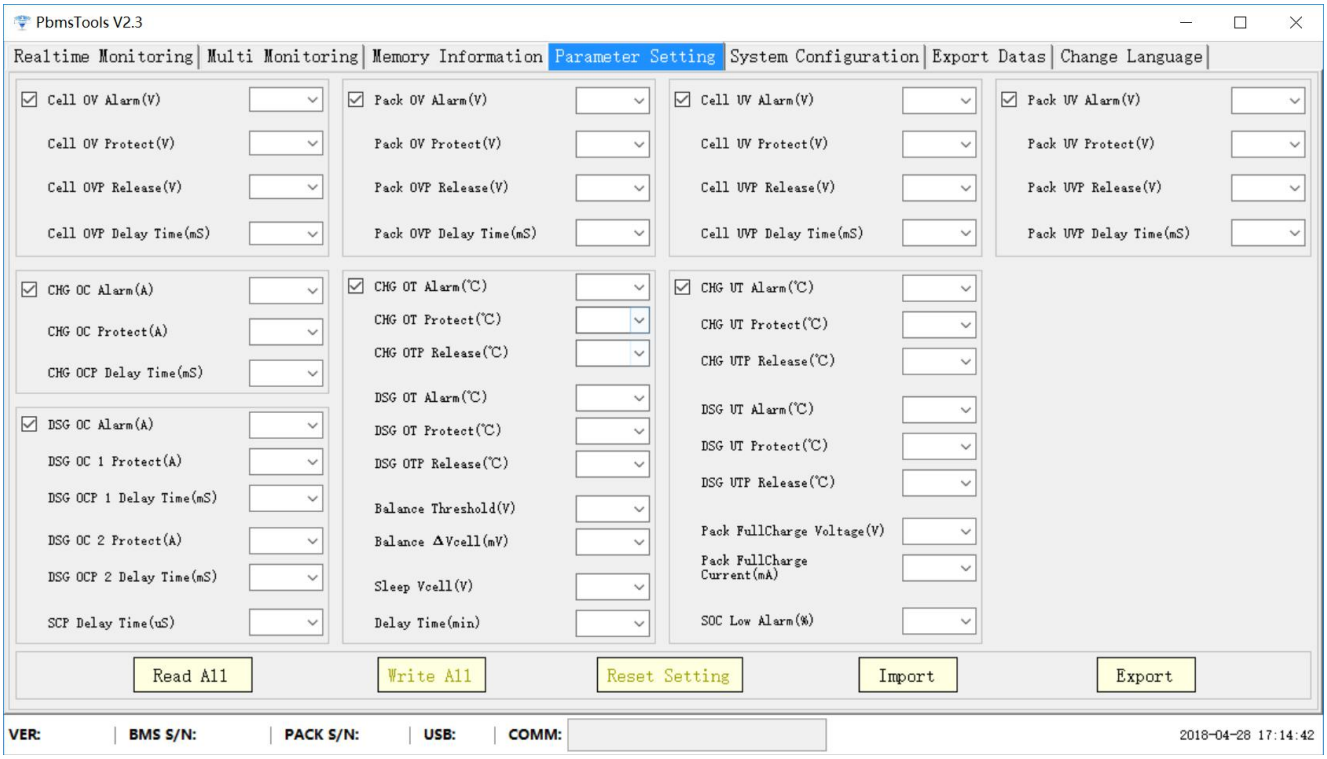


Figure D: Parameter Settings

(6) In the system configuration TAB(As shown in figure E),the TAB for battery calibration, parameters setting, the battery calibration and setting up the battery system parameters need administrator privileges. Setting only by manufacturer.

S/N Bar Code is just useful for manufacturer; it's for quality tracking of BMS board when defective products returned to repair

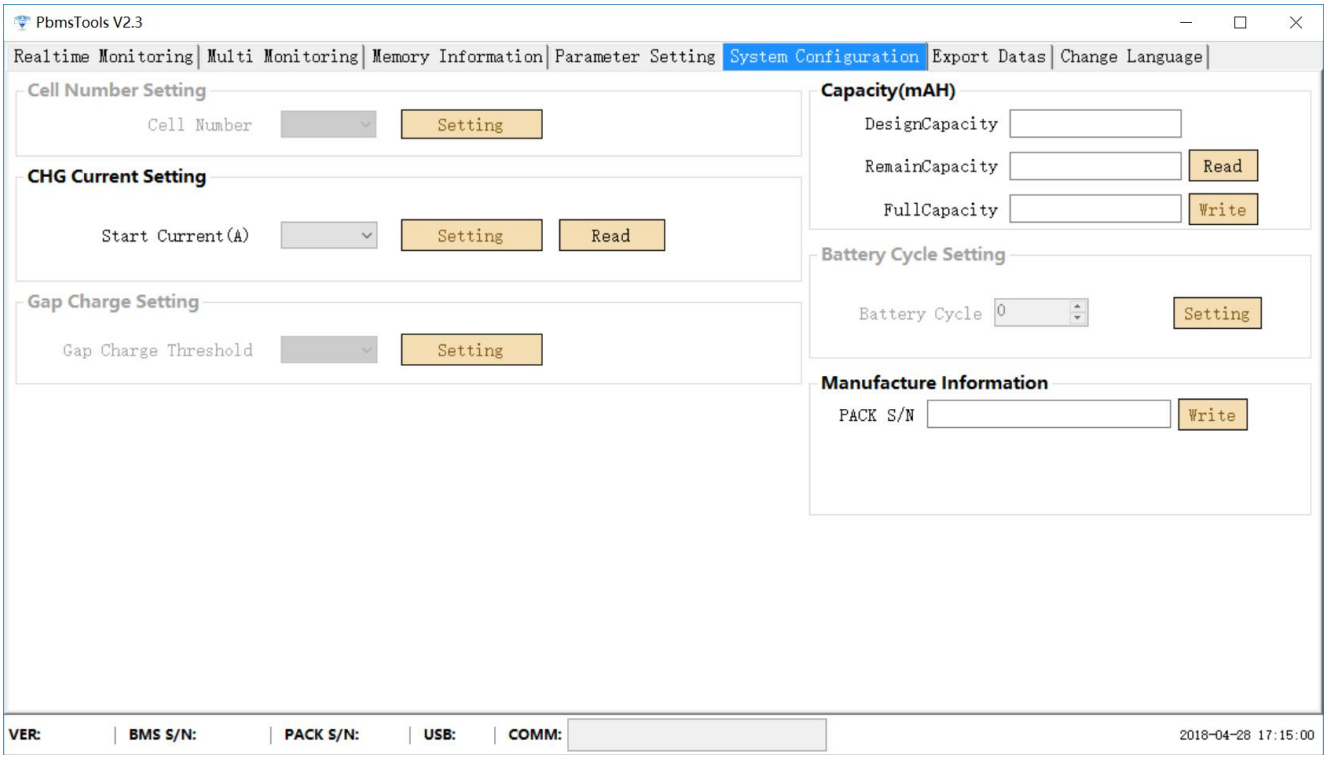


Figure E: System Configuration

(7) In the export data TAB(As shown figure F),can export the battery data to computer or delete the battery store data.

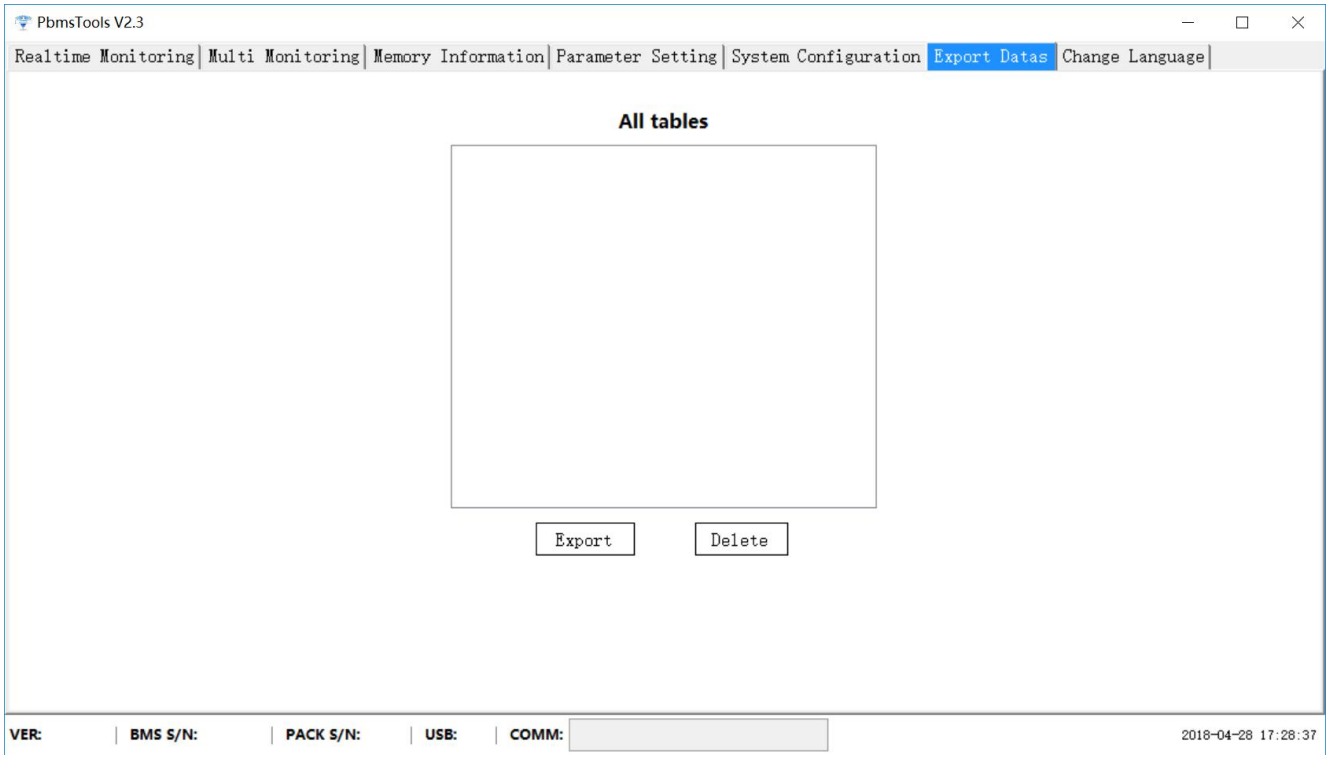


Figure F: Export Data

(8) In the change language TAB(As shown figure G),the TAB for change software's language

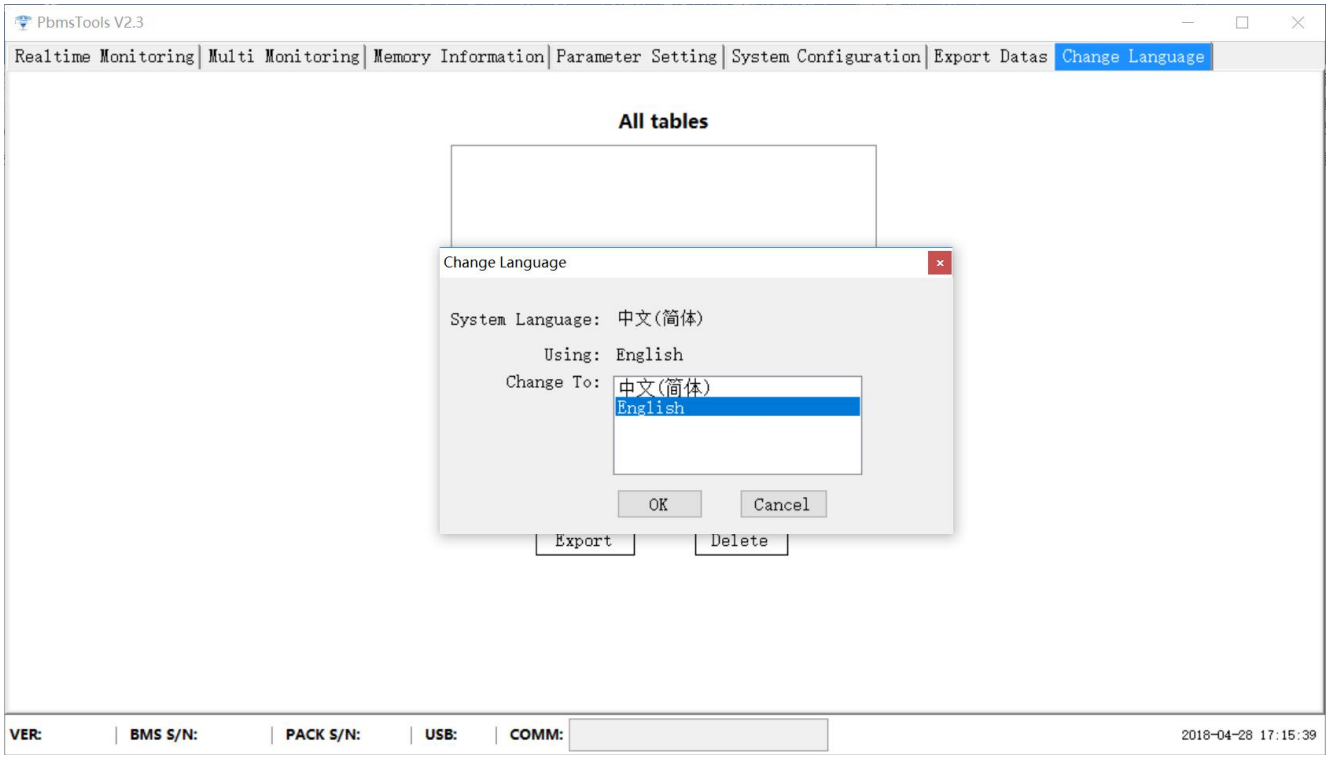
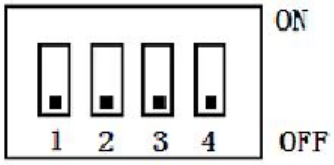


Figure G: Change Language

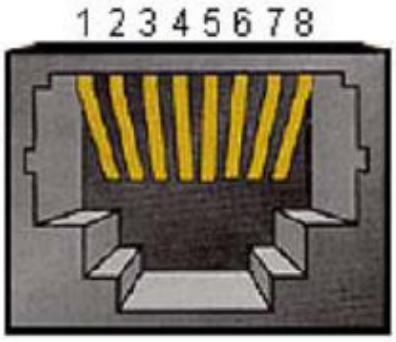
5-12 Address Switch function(Only in Parallel)

When battery work in parallel, main pack and slave packs need address as follows:

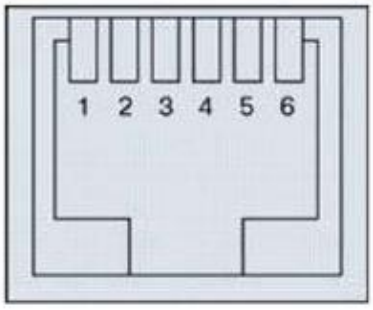


Address	Dial Switch				Remark
	#1	#2	#3	#4	
0	OFF	OFF	OFF	OFF	Slave Pack0
1	ON	OFF	OFF	OFF	Slave Pack1
2	OFF	ON	OFF	OFF	Slave Pack2
3	ON	ON	OFF	OFF	Slave Pack3
4	OFF	OFF	ON	OFF	Slave Pack4
...	...	...	...	...	...
...	...	...	...	...	...
14	OFF	ON	ON	ON	Slave Pack14
15	ON	ON	ON	ON	Slave Pack15

5-13 Communication Function



RS485 interface



RS232 interface

Fig8 Communication Port Interface

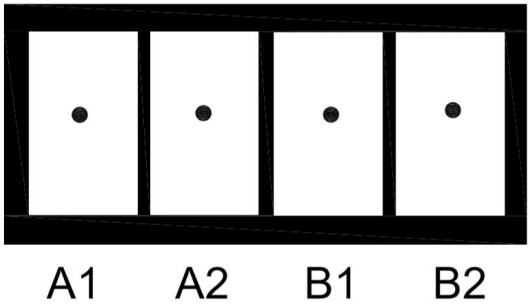
RS485 Terminal Port	Definition
Pin1,8	RS485_B
Pin2,7	RS485_A
Pin3,6	GND
Pin4,5	NC

RS485 Communication Port Definition

RS232 Terminal Port	Definition
Pin3	BMS Transmit, PC Receive
Pin4	BMS Receive, PC Transmit
Pin2,5	GND
Pin1,6	NC

RS232Communication Port Definition

5-14 Dry Contact



There are 2 roads dry contact:A road & B road.

NO.	Point	Description	Remarks
A road	A1	NC	Dry contact will be NO when battery alarm
	A2		
B road	B1	NC	Dry contact will be NO when battery alarm
	B2		

6. Operations

6-1. LED Indicators

LED Indicators:
There are 6 LEDs on front panel to show the battery working status:

PACK Status	Normal/Alarm/ Protection	RUN	ALM	SOC Indication LEDs				Remark
		●	●	●	●	●	●	
Power Off	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	All off
Standby	Normal	Flash 1	OFF	Indication by SOC (The top SOC Led Flash 2)				Standby state
	Alarm	Flash 1	Flash 3					Cell low voltage
Charge	Normal	ON	OFF	Indication by SOC (The top SOC Led Flash 2)				ALM Led on when Cell over-charge voltage Alarm
	Alarm	ON	Flash 3					
	Over Charge Protection	ON	OFF	ON	ON	ON	ON	If no mains supply, LED as standby
	Temperature. Over-current Fault Protection	OFF	ON	OFF	OFF	OFF	OFF	Close charge
Discharge	Normal	Flash3	OFF	Indication by SOC				
	Alarm	Flash3	Flash 3					
	Under Discharge Protection	OFF	OFF	OFF	OFF	OFF	OFF	Close discharge
	Temperature. Over-current. Short Circuit Fault Protection	OFF	ON	OFF	OFF	OFF	OFF	Close discharge
Fault		OFF	ON	OFF	OFF	OFF	OFF	Close charge Close discharge

Fig7 LED Operating Status

Flash	ON	OFF
Flash1	0.25Sec	3.75Sec
Flash2	0.5Sec	0.5Sec
Flash3	0.5Sec	1.5Sec

NOTE: LED function can be set by monitor software, the default if on.

6-2. Buzzer Operation(Optional)

Model	Description and Status
Fault	Buzzing 0.25S per 1Sec
Protection	Buzzing 0.25S per 2Sec(expect for over-charge protection)
Alarm	Buzzing 0.25S per 3Sec(expect for over-charge alarm)

NOTE: Buzzer function can be set by monitor software, the default if off.

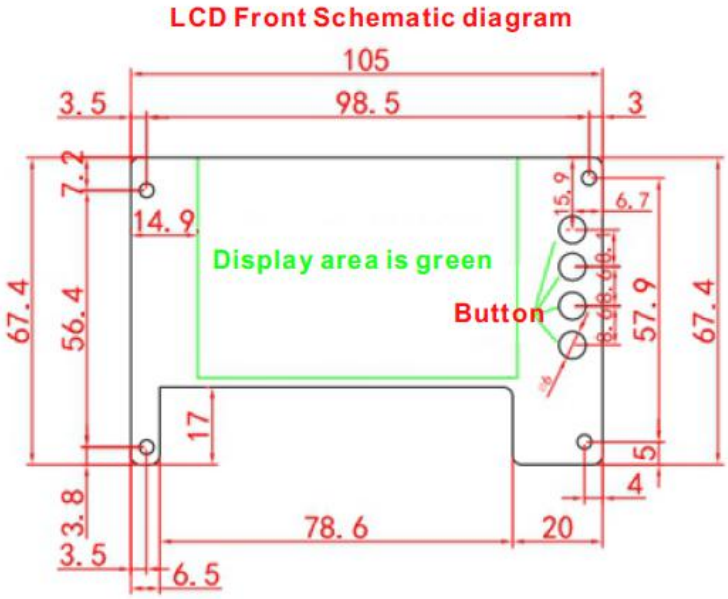
6-3. **Reset key function**

Mode	Pressing and Holding time		
	0-3Sec	3-6Sec	>6Sec
Normal	Indication by SOC	Transfer to Sleeping mode	Reset

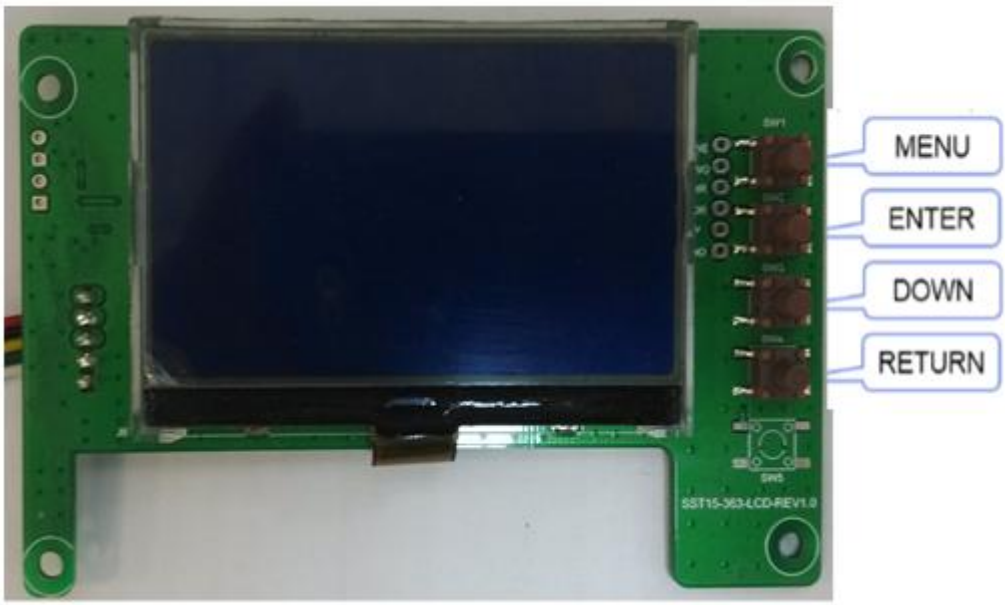
Sleeping Mode	Wake up from Sleeping mode

7-4 Display function instruction

1) Size chart



2) Reference of real figure



3) Display rendering

4) Functional Specifications

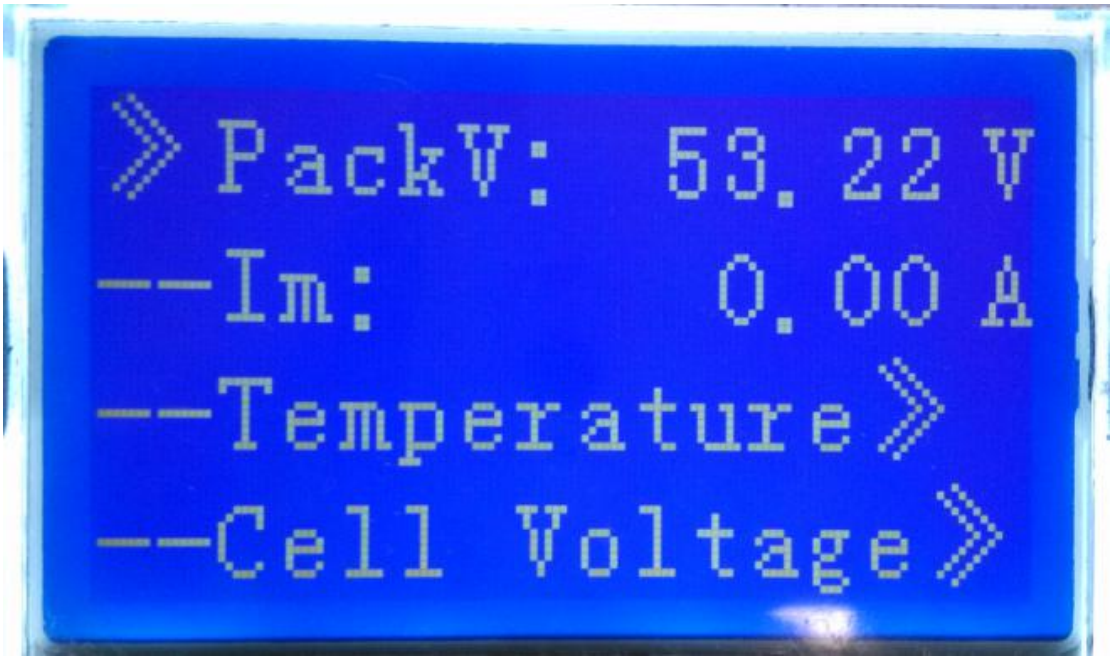
4.1 Interface introduction

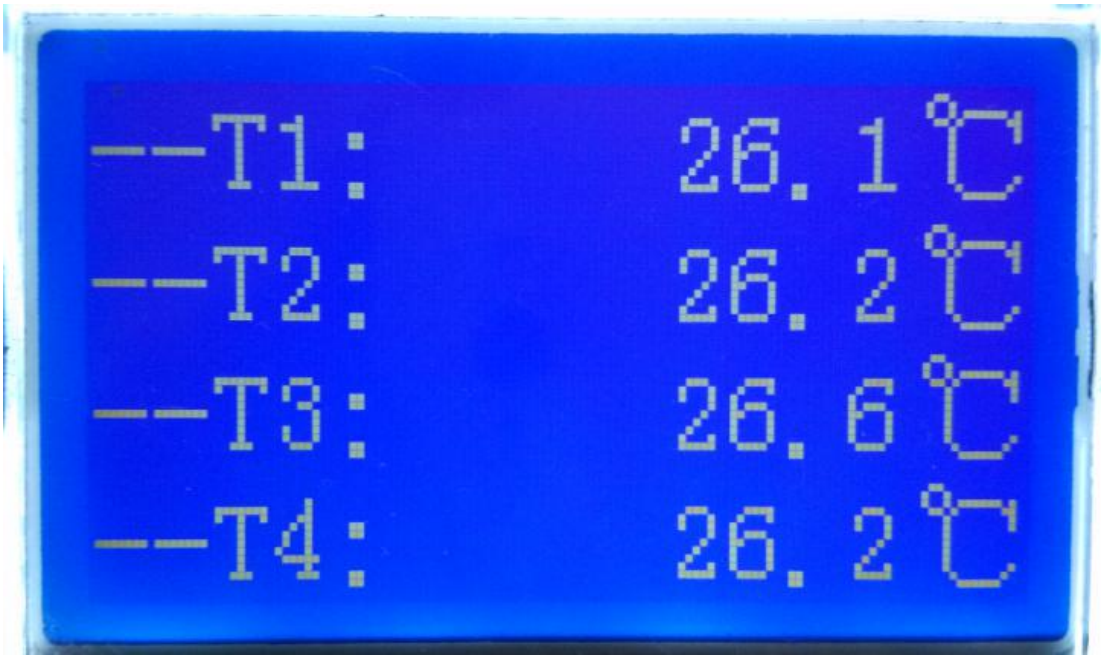
1) Main menu page

Electricity/dormancy activated, will show the welcome screen, press the MENU button to enter the main menu page. As shown in the figure below :

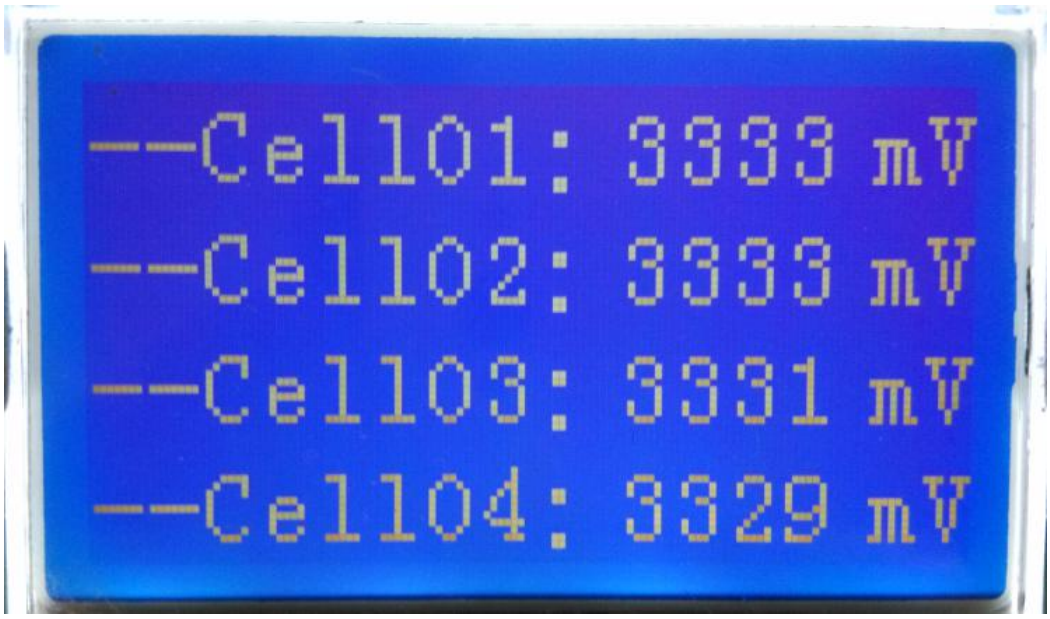
2) Battery parameters collection page

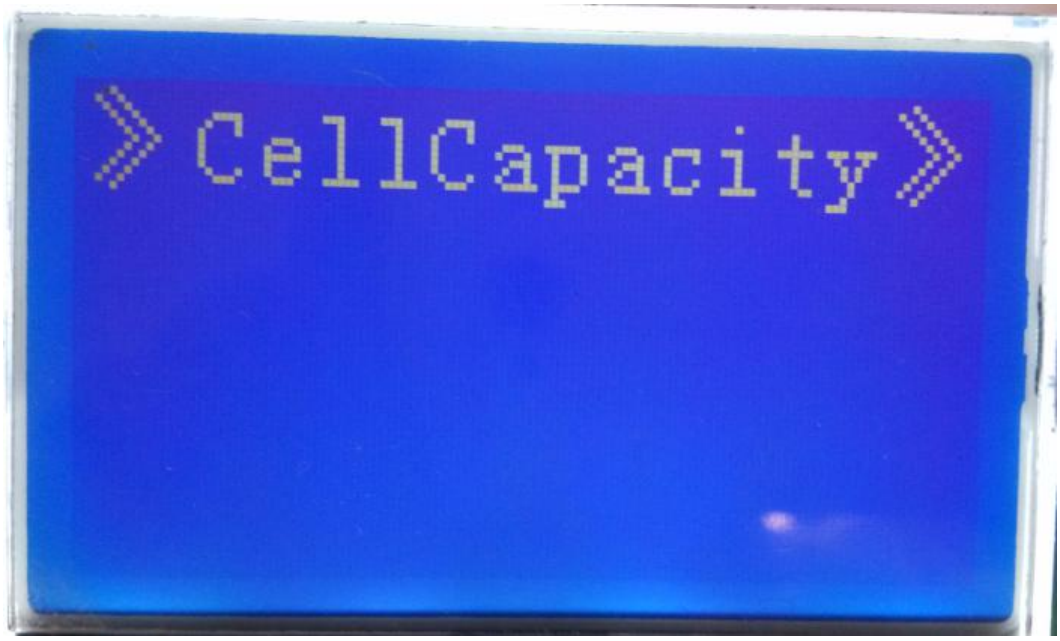
When the cursor "》" is point to "Battery Parameters Acquisition" , press ENTER key will enter into the page of "Battery Parameters Acquisition" , As shown in the figure below :

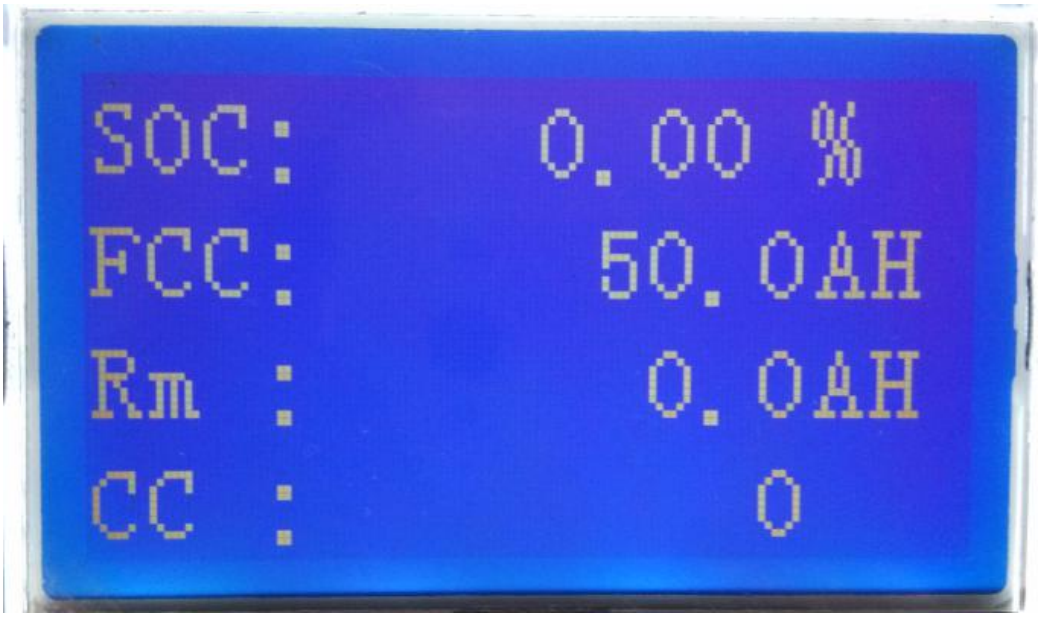





--PCB_T: 27.4℃
--ENV_T: 27.4℃


--Cell01: 3333 mV
--Cell02: 3333 mV
--Cell03: 3331 mV
--Cell04: 3329 mV


》CellCapacity》



3) Battery status page

When the cursor "》" is point to "Battery Status" , press ENTER key will enter into the page of "Battery Status" , As shown in the figure below :

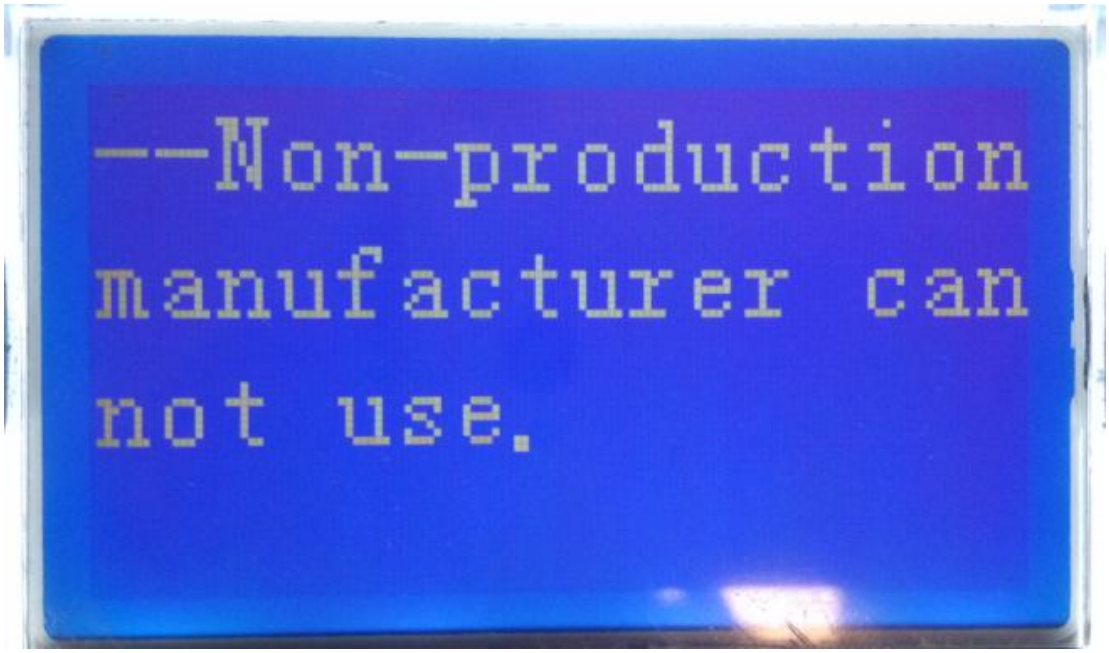

» SCP: 0
—O/UTP: 0
—OCP: 0
—UVP: 7


» OVP: 0


» OT : N
—OTP: N
—OV: N
—OVP: N

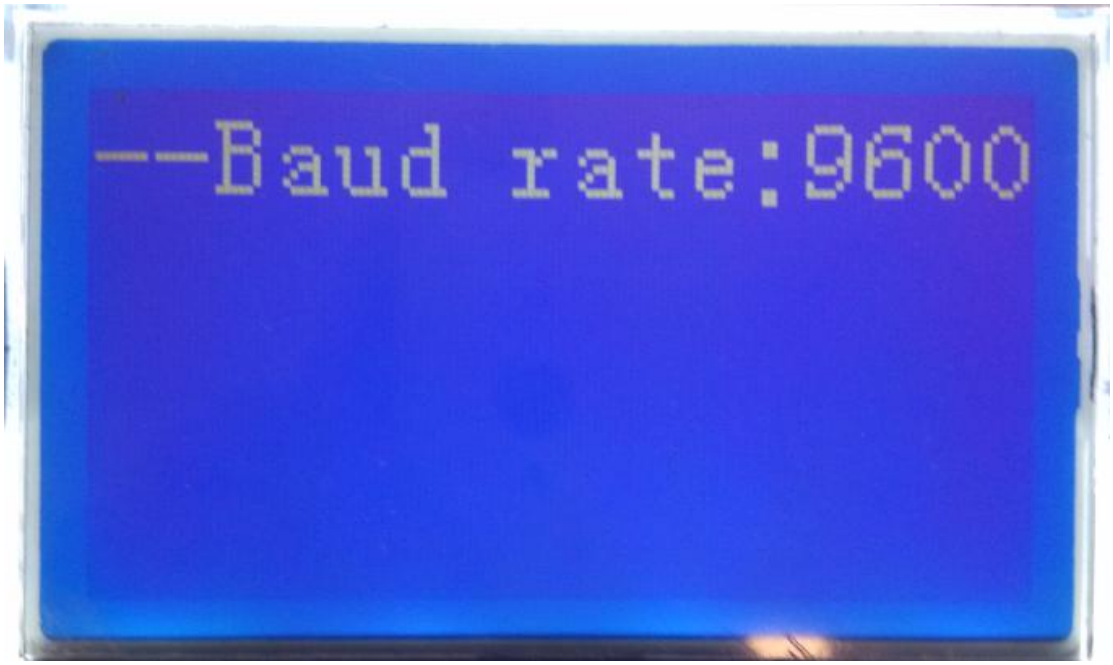
4) Parameter Settings

Screen can not set parameters



5) System Settings Page

Baud Rate : 9600 do not set



4.2 Key description

1) SW1----NEMU , SW2----ENTER , SW3----DOWN , SW4----ESC.

2) Each item is “》” or “--” as a beginning , among them “》” shows the current cursor position , press UP or DOWN key can move the cursor position ; with “》” end of the project , the content of the said project has not shown, press ENTER key can enter the corresponding page.

3) Press ESC key can be returned at the next higher level directory ; In any position ， press NEMU key can return to the main menu page.

4) In a dormant state, press any key, can activate the screen.

3.3 Dormancy/shutdown

Under normal operation condition, with no keystrokes 1 minutes later, system will enter a state of dormancy/shutdown.

Shutdown/dormancy state ，press any key ，screen can be activated.

7. Troubleshooting

If the battery does not operate correctly, please solve the problem by using the table below.

Symptom	**Possible cause**	**Remedy**
No indication and alarm in the front display panel	Sleeping mode	Press Reset to normal mode
No indication and alarm in the front display panel even Reset still no	Battery voltage too low	Charge battery immediately
Red LED Flashing when Standby	Battery cell low voltage	Charge battery immediately
Red LED Flashing when charging	Alarm for protection when charging	BMS show alarm, protect and adjustment
Red LED Flashing when Discharging	Battery too low and will shutdown	Charge battery immediately
RED LED Lighting continuous	Battery wrong	Need to repair

8. Storage and Maintenance

8-1. Storage

Before storing, charge the battery at least 7 hours. Store the Battery covered and upright in a cool, dry location. Recommend the best long-term storage temperature is 15℃ -25℃ . During storage, recharge the battery in accordance with the following table:

Storage Temperature	**Recharge Frequency**	**Charging Duration**
0℃ - 40℃	Every 3 months	1-2 hours

8-2. Maintenance

⚠ The battery system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.

 Even after the unit is disconnected from the mains, components inside are still connected to the battery cells which are potentially dangerous.

 Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals.

 Only persons are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.

 Verify that no voltage between the battery terminals and the ground is present before maintenance or repair. In this product, the battery circuit is not isolated from the input voltage. Hazardous voltages may occur between the battery terminals and the ground.

 Batteries may cause electric shock and have a high short-circuit current. Please remove all wristwatches, rings and other metal personal objects before maintenance or repair, and only use tools with insulated grips and handles for maintaining or repairing.

 When replace the batteries, install the same number and same type of batteries.

 When replace the parallel batteries, make sure the new battery is full charged.

 Do not open or destroy batteries. Escaping electrolyte can cause injury to the skin and eyes. It may be toxic.

 Please replace the fuse only with the same type and amperage in order to avoid fire hazards.

 Do not disassemble the battery system.

9. Product Responsibilities and Consulting

1) We will not be liable for the accidents resulting from operation breaking this specification and user manual.

2) We will not send separate notice, provided that the contents of this specification are changed due to improvement of product quality or technological upgrading; provided that you want to understand the latest information of this product, please contact us.

3) The shelf life of this product is within 24 months after it is delivered; we will maintain the product, which is in the warranty period for free of charge, provided that it has any product quality problems within the specified operation range; we may replace the relevant parts, if we fail to maintain it, so as to achieve the purpose of sustainable use without performance

reduction; our after-sales service personnel will propose the specific maintenance and troubleshooting methods.

4) In case of any questions, please contact us:

Tel:

Fax: