



ENGLISH



# Power Base LV - MATE

## Reference Manual

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# 1. Safety Precautions

It is very important and necessary to read the user manual carefully (in the accessories) before installing or using battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage battery, potentially rendering it inoperable.



Observe these instructions and keep them located near the Li-ion Battery for future reference.



For more information about this product, please visit the official website: <http://www.zruipower.com>



Work on a Li-ion Battery should be carried out by qualified personnel only.

## 1.1. General warnings



While working on the Li-ion Battery wear protective eyeglasses and clothing.



Any uncovered battery material such as electrolyte or powder on the skin or in the eyes must be flushed with plenty of clean water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water.



Explosion and fire hazard. Terminals of the Li-ion Battery are always alive; therefore, do not place items or tools on the Li-ion Battery. Avoid short circuits, too deep discharges and too high charge currents. Use insulated tools. Do not wear any metallic items such as watches, bracelets, etc. In case of fire; you must use a type D, foam or CO2 fire extinguisher.



Do not open or dismantle the battery. Electrolyte is very corrosive. In normal working conditions contact with the electrolyte is impossible. If the battery casing is damaged do not touch the exposed electrolyte or powder because it is corrosive.



Li-ion batteries are heavy. If involved in an accident they can become a projectile! Ensure adequate and secure mounting and always use suitable handling equipment for transportation.



Handle with care because a ion battery is sensitive to mechanical shock.



Do not expose cable outside, all the battery terminals must be disconnected



Do not place at a children or pet touchable area.



Do not use cleaning solvents to clean battery.



Do not expose battery to flammable or harsh chemicals or vapors.



Do not paint any part of battery; include any internal or external components.



Do not drop, deform, impact, cut or spearing with a sharp object.



Do not wet the battery and avoid of direct sunlight.



Do not use a damaged battery.



Please contact the supplier within 24 hours if there is something abnormal.



Any foreign object is prohibited to insert into any part of battery.



The warranty claims are excluded for direct or indirect damage due to items above.

## 1.2. Charge and discharge warnings



If the battery is stored for long time, it is required to charge them every six months, and the SOC should be no less than 90%.



Battery needs to be recharged within 12 hours, after fully discharged.



Do not connect battery with PV solar wiring directly.



Use only with a ZRGP approved BMS.



If charged after the Lithium Battery was discharged below the “Discharge cut-off voltage”, or when the Lithium Battery is damaged or overcharged, the Lithium Battery can release a harmful mixture of gasses such as phosphate.



The temperature range over which the battery can be charged is **0°C to 45°C**. Charging the battery at temperatures outside this range may cause severe damage to the battery or reduce battery life expectancy.



The temperature range over which the battery can be discharged is **-10°C to 55°C**. Discharging the battery at temperatures outside this range may cause severe damage to the battery or reduce battery life expectancy.

### 1.3. Transportation warnings



The battery must be transported in its original or equivalent package and in an upright position. If the battery is in its package, use soft slings to avoid damage.



Do not stand below a battery when it is hoisted.



Never lift the battery at the terminals or the BMS communication cables, only lift the battery at the handles.

#### **NOTE:**

- Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/AC.10/11/Rev.5).

- For transport the batteries belong to the category UN3480, Class 9, Packaging Group II and have to be transported according to this regulation. This means that for land and sea transport (ADR, RID & IMDG) they have to be packed according to packaging instruction P903 and for air transport (IATA) according to packaging instruction P965. The original packaging complies with these instructions.

### 1.4. Disposal of lithium batteries



Batteries marked with the recycling symbol must be processed via a recognized recycling agency. By agreement, they may be returned to the manufacturer.



Batteries must not be mixed with domestic or industrial waste.



Do not throw a battery into fire.

### 1.5. Before Connecting

- ◆ After unpacking, please check product and packing list first, if product is damaged or lack of parts, please contact with the local retailer;
- ◆ Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode;
- ◆ Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device;
- ◆ It is prohibited to connect the battery and AC power directly;
- ◆ The embedded BMS in the battery is designed for 48V DC, please DO NOT connect battery in series;
- ◆ Battery system must be well grounded and the resistance must be less than 100mΩ;
- ◆ Make sure the grounding connection set correctly before operation.

- ◆ Please ensure the electrical parameters of battery system are compatible to related equipment;
- ◆ Keep the battery away from water and fire.

## 1.6. In Using

- ◆ If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shutdown;
- ◆ It is prohibited to connect the battery with different type of battery.
- ◆ It is prohibited to put the batteries working with faulty or incompatible inverter;
- ◆ It is prohibited to disassemble the battery (QC tab removed or damaged);
- ◆ In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited;
- ◆ Please do not open, repair or disassemble the battery except staffs from ZRGP or authorized by ZRGP. We do not undertake any consequences or related responsibility which because of violation of safety operation or violating of design, production and equipment safety standards.

## 2. Introduction

Power Base LV -MATE series lithium iron phosphate battery is one of new energy storage products developed and produced by ZRGP, it can be used to support reliable power for various types of equipment and systems. Power Base LV -MATE series is especially suitable for application scene of high power, limited installation space, and restricted load-bearing and long cycle life.

Power Base LV\_MATE series has built-in BMS battery management system, which can manage and monitor cells information including voltage, current and temperature. What's more, BMS can help extending cycle life by balancing cells during charging and discharging.

Multiple batteries are allowed to be connected in parallel to expand capacity and power to meet the requirements of longer power supporting duration and higher power consumption.

### 2.1. Lithium iron phosphate battery

The lithium iron phosphate battery (LiFePO<sub>4</sub> or LFP) is the safest of the mainstream lithium battery types. A single LFP cell has a nominal voltage of 3.2V. A 51.2V LFP battery consists of 16 cells connected in series.

LFP is the chemistry of choice for very demanding applications. Some of its features are:

- ◆ Rugged - It can operate in deficit mode during long periods of time.
- ◆ High round trip efficiency.
- ◆ High energy density - More capacity with less weight and volume.
- ◆ High charge and discharge currents - Fast charge and discharges are possible.
- ◆ Flexible charge voltages.

The lithium iron phosphate battery is therefore the chemistry of choice for a range of very demanding applications.

### 2.2. Power Base LV -MATE Features

- ◆ The whole module is non-toxic, pollution-free and environment-friendly;
- ◆ Cathode material is made from LiFePO<sub>4</sub> with safety performance and long cycle life;
- ◆ Battery management system (BMS) has protection functions including over-discharge, over-charge, and over-current and high/low temperature;
- ◆ The system can automatically manage charge and discharge state and balance current and voltage of each cell;
- ◆ Flexible configuration, multiple battery modules can be internal for expanding voltage and Capacity.
- ◆ Adopted self-cooling mode rapidly reduced system entire noise;
- ◆ The module has less self-discharge, up to 6 months without charging it on shelf, no memory effect, excellent performance of shallow charge and discharge;
- ◆ Working temperature range is from **-10 to 55 °C** , (Charging **0~45 °C** ; discharging **-10~55°C** )with excellent discharge performance and cycle life;
- ◆ Small volume, light weight, plug-in embedded design module, easy to install and maintain;

## 2.3. Specifications



Figure 2.1. Overall system diagram

No.	Items		Parameters									
1	Model		Mate LV_50 Series					Mate LV _100 Series				
2	Main Control Module		ZR-MC100-200M1					ZR-MC100-200M2				
3	Battery Module Type		ZR-FS4850-16OSJ1					ZR-FS48100-16OSJ1				
4	Battery Module Chemistry		LiFePO4									
5	Battery Module QTY		2	3	4	5	8	2	3	4	5	8
6	Nominal Capacity(Ah)		100	150	200	250	400	200	300	400	500	800
7	Nominal Energy(kWh)		5.12	7.68	10.24	12.8	20.48	10.24	15.36	20.48	25.6	40.96
8	Voltage	Nominal(V)	51.2									
		Recommend Charging(V)	56.8									
		Max. Charging(V)	58.4									
		Discharge Cut-off(V)	46.8									
9	Current	Max. Charging(A)	50	75	100	125	125	75	100	125	125	125
		Max. Discharging(A)	85	125	175	210	210	175	210	210	210	210
		Peak for 10s(A)	90	135	180	211	211	180	211	211	211	211
10	Weight (Approx.)		165kg @12.8 kWh					236kg @25.6 kWh				
11	Dimensions (L*H*W))		635 x 965 x 350 mm @12.8 kWh					735*1040 *400mm @25.6 kWh				
12	Communication		RS485, CAN									
13	Cycle Life		4000 times@80%DOD									
14	Designed Calendar Life		≥10 years									
15	Safety Function		Over-charge, Over-discharge, Over-current, Low/High-temperature, Low-voltage, Short-circuit Protections									
16	Parallel Capability		Maximum 8 units (Recommended 6 units)									



## 2.4. Equipment Interface Instruction



Figure 2.2.Main control module positive

No.	Instructions	NO.	Instructions
1	Power switch	2	Display screen
3	Status code		

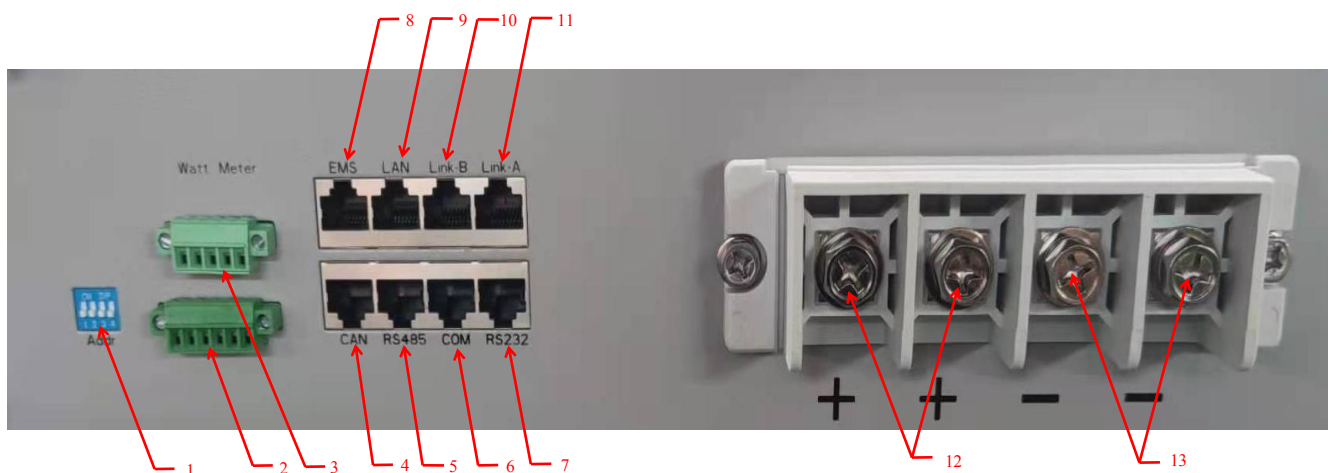


Figure 2.3.Interface definition of main control module

No.	Instructions	No.	Instructions
1	Address Dial Switch	8	Reserve
2	Inverter CAN /RS485communication port	9	Reserve
3	Reserve	10	Parallel communication port B
4	Inverter CAN communication port	11	Parallel communication port A
5	Inverter RS485communication port	12	Charge and discharge positive electrode
6	CAN upgrade communication port	13	Charge discharge negative electrode
7	RS232 communication interface	14	

## Power switch

Power switch: turn on/off the input and output of the whole system.

## Display screen

Display screen: the interface can observe the operation status information SOC, SOH, charging and discharging power, alarm fault indication, charging and discharging status display and system status indication of the whole system.

## Status code

Status code: When the system status code is displayed as protection information, only the value will be displayed. When the system status code is displayed as fault information, err and fault value will be displayed. The definition of alarm is shown in the table below:

numerical value	Alarm indication	numerical value	Alarm indication
000	No breakdown	009	Low discharge temperature
001	Over voltage protection	011	High ambient temperature
002	Low voltage protection	012	Excessive differential pressure
003	Charging over current protection	013	Discharge circuit failure
004	Discharge over current protection	014	Charging circuit fault
005	Short circuit protection	015	Cell failure
006	Charging high temperature	016	NTC failure
007	High discharge temperature	017	Voltage acquisition fault
008	Low charging temperature		

### NOTE:

- When the system is charged, the display streamline gathers in the middle, and when it is discharged, the display streamline disperses to both sides

## Master address dial switch

Dial switch: 4-digit dial switch, address "0" and "1", as shown in the figure. After setting, you need to restart the system and activate it.

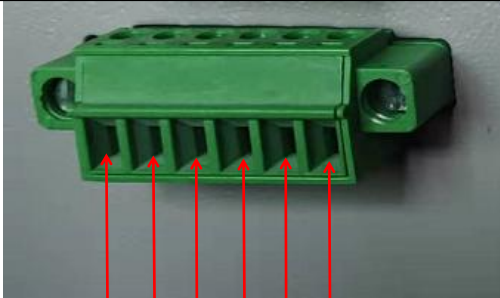


When the system groups are in parallel, the communication between two levels is needed. Both master and slave packets need hardware address configuration, and the hardware address can be set through the dial switch on the board. The definition of switch is shown in the table below.

Address Coding	Dial Code Switch Position				Definition
	#1	#2	#3	#4	
1	ON	OFF	OFF	OFF	The host computer can monitor the operation of other systems by setting the main package
2	OFF	ON	OFF	OFF	Set to the slave Pack 2
3	ON	ON	OFF	OFF	Set to the slave Pack 3
4	OFF	OFF	ON	OFF	Set to the slave Pack 4
5	OFF	ON	ON	OFF	Set to the slave Pack 5
6	ON	OFF	ON	OFF	Set to the slave Pack 6
7	ON	ON	ON	OFF	Set to the slave Pack 7
8	OFF	OFF	OFF	ON	Set to the slave Pack 8
9	ON	OFF	OFF	ON	Set to the slave Pack 9
10	OFF	ON	OFF	ON	Set to the slave Pack10
11	ON	ON	OFF	ON	Set to the slave Pack 11
12	OFF	OFF	ON	ON	Set to the slave Pack 12
13	ON	OFF	ON	ON	Set to the slave Pack13
14	OFF	ON	ON	ON	Set to the slave Pack 14
15	ON	ON	ON	ON	Set to the slave Pack 15

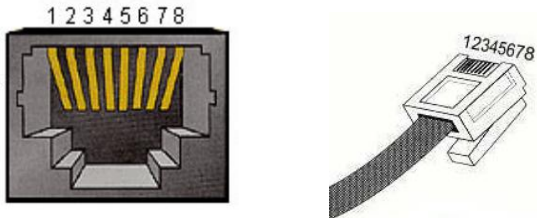
### Inverter CAN/RS485 communication port

Inverter CAN/RS485 communication port: (RJ45 port) follows can protocol and RS485 protocol. For the output system information, the system master uses this interface to communicate with External inverter PC and other equipment.

Port definitions	RJ45 Pin	Function
	1	RS485-B
	2	RS485-A
	3	RS485 -GND
	4	CAN-L
	5	CAN-H
	6	CAN -GND

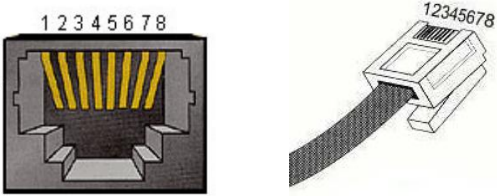
### RS232 communication port

RS232 communication port: (RJ11 port) comply with RS232 protocol (baud rate: 9600), for manufacturers or professional engineers debugging or service.

Port definitions	RJ11 Pin	Function
	1	NC(NO connect)
	2	NC(NO connect)
	3	RS232-GND
	4	RS232-TX
	5	RS232-RX
	6	RS232-GND
	7	NC(NO connect)
	8	NC(NO connect)

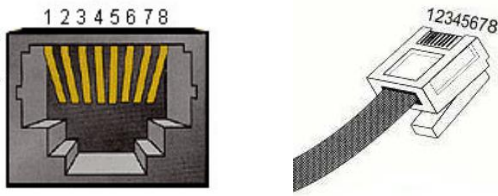
### COM communication port

COM communication port: Connect the monitoring host computer to query the data and monitor the running status of the system

Port definitions	RJ45 Pin	Function
	1	RS485-B
	2	RS485-A
	3	CAN -GND
	4	RS485-GND
	5	RS485-GND
	6	CAN -GND
	7	CAN-L
	8	CAN-H

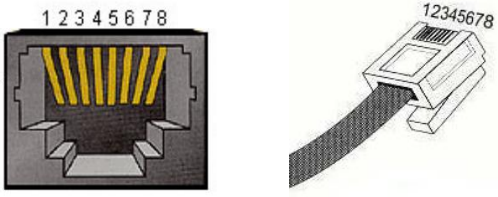
### Inverter RS485 communication port

Rear panel RS485 communication port: (RJ45 port) follows can protocol and RS485 protocol. For the output system information, the system master uses this interface to communicate with External inverter PC and other equipment.

Port definitions	RJ45 Pin	Function
	1	RS485-B
	2	RS485-A
	3	RS485-GND
	4	NC(NO connect)
	5	NC(NO connect)
	6	RS485-GND
	7	RS485-A
	8	RS485-B

### Inverter CAN communication port

Rear panel CAN communication port: (RJ45 port) follows can protocol and RS485 protocol. For the output system information, the system master uses this interface to communicate with External inverter PC and other equipment.

Port definitions	RJ45 Pin	Function
	1	CAN-H
	2	CAN-L
	3	CAN -GND
	4	CAN-H
	5	CAN-L
	6	CAN -GND
	7	CAN-H
	8	CAN-L

### Rear panel Link A / Link B communication port

Link A / B communication port: the definition of link a and B on the rear panel of the interface main control module is the same. RS485 interface is used for parallel communication between the main control modules, and up to 15 devices can be connected in parallel.

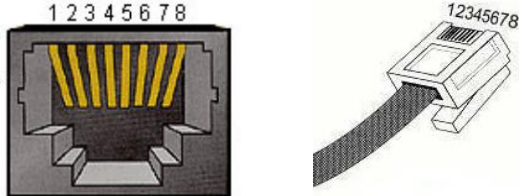
Port definitions	RJ45 Pin	Function
	1	RS485-B
	2	RS485-A
	3	RS485-GND
	4	NC(NO connect)
	5	NC(NO connect)
	6	RS485-GND
	7	RS485-A
	8	RS485-B



Figure 2.4. Battery module interface definition

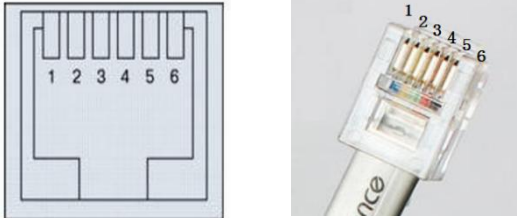
No.	Instructions	NO.	Instructions
1	Address Dial Switch	2	RS232 communication interface
3	Power switch		

Power switch

Power switch: turn on / off the input and output of the whole battery module.

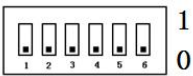
RS232 communication port

RS232 communication port: (RJ11 port) comply with RS232 protocol (baud rate: 9600), for manufacturers or professional engineers debugging or service.

Port definitions		RJ11 Pin	Function
		1	NC
		2	RS232-GND
		3	RS232-TX
		4	RS232-RX
		5	RS232-GND
		6	NC

Address dial switch

ADD Switch: 6 ADD switches, “0”and “1”, refer to picture right. The settings will be active only after restart the battery.



When the battery communicates with the inverter, the address of the battery pack must be set to 1, and the address of the parallel slave should be greater than 1.

When the battery Pack is connected in parallel, cascading communication is required. Hardware address configuration is required for both the master PACK and the slave PACK, and

the hardware address can be set by the dial switch on the board. The definition of the switch refers to the table below.

Address Coding	Dial Code Switch Position						Definition
	#1	#2	#3	#4	#5	#6	
1	ON	OFF	OFF	OFF	OFF	OFF	Set the master Pack, and the inverter communicates with the battery at that address
2	OFF	ON	OFF	OFF	OFF	OFF	Set to the slave Pack1
3	ON	ON	OFF	OFF	OFF	OFF	Set to the slave Pack 2
4	OFF	OFF	ON	OFF	OFF	OFF	Set to the slave Pack 3
5	ON	OFF	ON	OFF	OFF	OFF	Set to the slave Pack 4
6	OFF	ON	ON	OFF	OFF	OFF	Set to the slave Pack 5
7	ON	ON	ON	OFF	OFF	OFF	Set to the slave Pack 6
8	OFF	OFF	OFF	ON	OFF	OFF	Set to the slave Pack 7
9	ON	OFF	OFF	ON	OFF	OFF	Set to the slave Pack 8
10	OFF	ON	OFF	ON	OFF	OFF	Set to the slave Pack 9
11	ON	ON	OFF	ON	OFF	OFF	Set to the slave Pack10
12	OFF	OFF	ON	ON	OFF	OFF	Set to the slave Pack 11
13	ON	OFF	ON	ON	OFF	OFF	Set to the slave Pack 12
14	OFF	ON	ON	ON	OFF	OFF	Set to the slave Pack13
15	ON	ON	ON	ON	OFF	OFF	Set to the slave Pack 14
16	OFF	OFF	OFF	OFF	ON	OFF	Set to the slave Pack 15
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
62	OFF	ON	ON	ON	ON	ON	Set to the slave Pack 61
63	ON	ON	ON	ON	ON	ON	Set to the slave Pack 62

### Battery anode and Battery cathode

Positive and negative connection: the battery modules are connected in parallel through the connecting terminals, and finally the main control module is connected in parallel. The power cable adopts waterproof connector. When connecting the power plug, its corresponding interface must be aligned.



## 2.5. Sleep and Wake up

### 2.5.1 Sleep

#### 2.5. Wake up

##### 2.5.1 sleep

- 1) The main control module will turn off the main relay when the battery module has a charging and discharging MOS fault.
- 2) When the battery module has the output of under voltage protection battery shutdown, the main control closes the main relay.

### 2.5.2 Wake up

When the system is in sleep mode, after completing the operation, the system will exit the low power mode and enter the normal operation mode:

- 1) Connect the charger, and the output voltage of the charger must be greater than 48V.
- 2) Connect the upper computer to observe whether the communication between the main control and the battery is normal
- 3) Observe whether the upper computer has charging current.
- 4) After successful charging, the system will enter normal mode.

#### Note:

- when the DC bus has a voltage greater than 48V DC, the system main control module is powered and the main relay is closed to charge the battery module and establish communication. If the battery module cannot charge and establish communication, the main control module will delay about 10s to disconnect the main relay

## 2.6. Forced discharge mode

When the battery is in the sleep mode of under voltage protection and the minimum battery voltage is greater than 2.0V, turn off the power switch first, wait for 2S, and then turn on the power switch. The battery enters the forced discharge mode for 5 minutes. In the forced discharge mode, the battery powered main control inverter works. If the inverter is connected to the commercial power to charge the system, the battery will exit the forced discharge mode and switch to the normal mode. If the on load discharge current of the inverter exceeds 20A or there is no charging current within 5 minutes, the battery will enter the sleep mode again.

## 2.7. Automatic parallel

With automatic parallel function; when the slave battery (address > 1) is powered on, the charge and discharge switch is in disconnect state. When the voltage difference between the slave battery and master battery is less than the condition of "the minimum voltage difference between the slave and the master", the master sends the command to the slave. After the slave receives the command from the master, the charge and discharge switch will be connected and the slave is integrated into the master system to complete the parallel operation.



### 3. How to use the ZRGP Ems Tools

#### 3.1. ZRGP Ems Tools connection

- 1) Connect the RS485 interface of the battery to the computer using the RS485 communication line (this accessory is an optional accessory, need to be purchased separately from the manufacturer).
- 2) Unzip the package file of the ZRGP Ems Tools in the same file directory, pay attention to the directory do not store other files.

名称	修改日期	类型	大小
data	2020/6/22 9:35	文件夹	
SaveData	2020/6/22 9:35	文件夹	
ReadMe	2020/3/16 15:21	DOCX 文档	438 KB
ZRGP EmsTools.aliaes	2020/4/27 14:54	ALIASES 文件	1 KB
ZRGP EmsTools	2020/4/27 14:54	应用程序	4,310 KB
ZRGP EmsTools	2020/4/27 14:54	配置设置	1 KB
ZRGP EmsTools.tlb	2020/4/27 14:54	TLB 文件	56 KB
ZRGP EmsTools	2020/4/27 14:54	文本文档	1 KB

Figure 3.1. Unzip of ZRGP Ems Tools

- 3) Open the ZRGP Ems tools icon, enter the Protocol selection interface, select the EMS Low Voltage Protocol version and enter the password (please contact the manufacturer for the password) to log in the software.

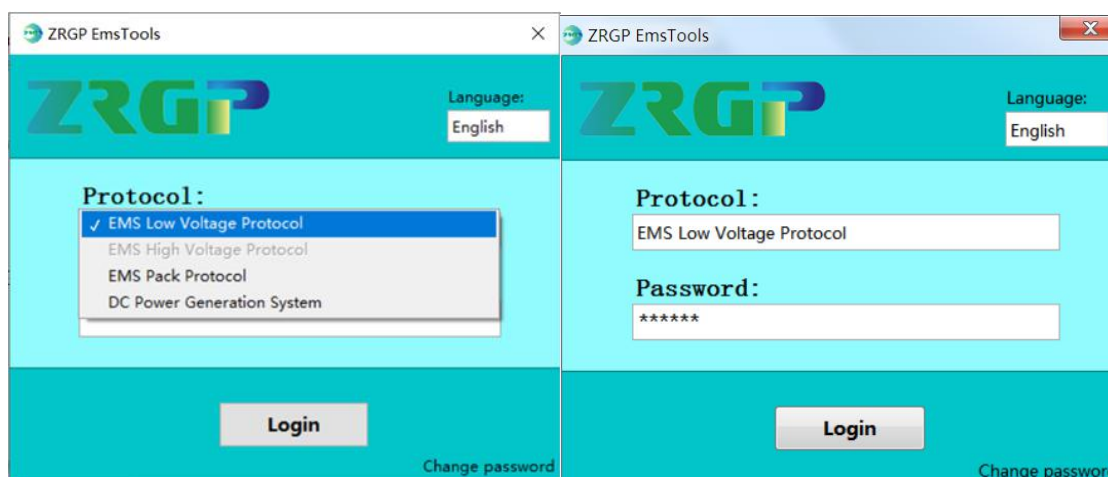


Figure 3.2. Protocol selection interface



Figure 3.3. Enter the password

- 4) Users can set different languages according to their own needs. We support four languages, which are Simplified Chinese, English, Japanese and Spanish.

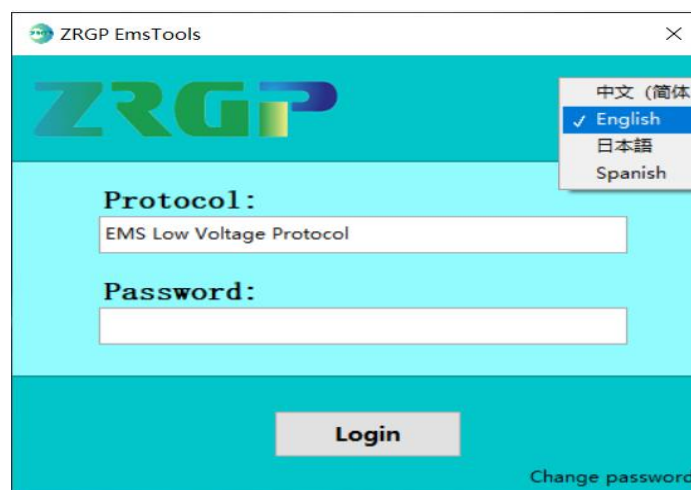


Figure 3.4. ZRGP Ems tools language selection

- 5) Select the serial port number in the EMS low-voltage version of the ZRGP Ems tools, and

the baud rate is 9600 by default. Click "Open COM" and "Monitor ON" button.

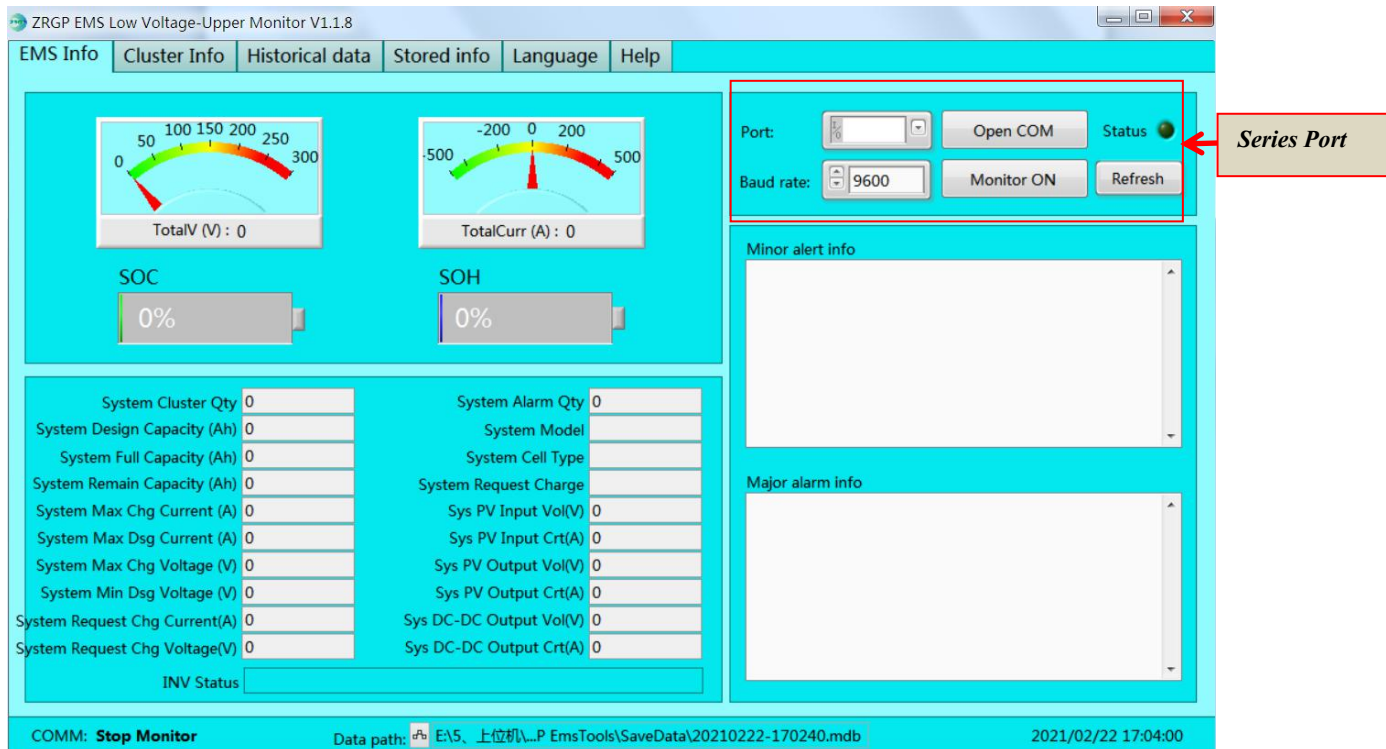


Figure 3.5. ZRGP Ems tools serial port settings

6) The corresponding functions can be selected through the navigation bar of the ZRGP EMS .

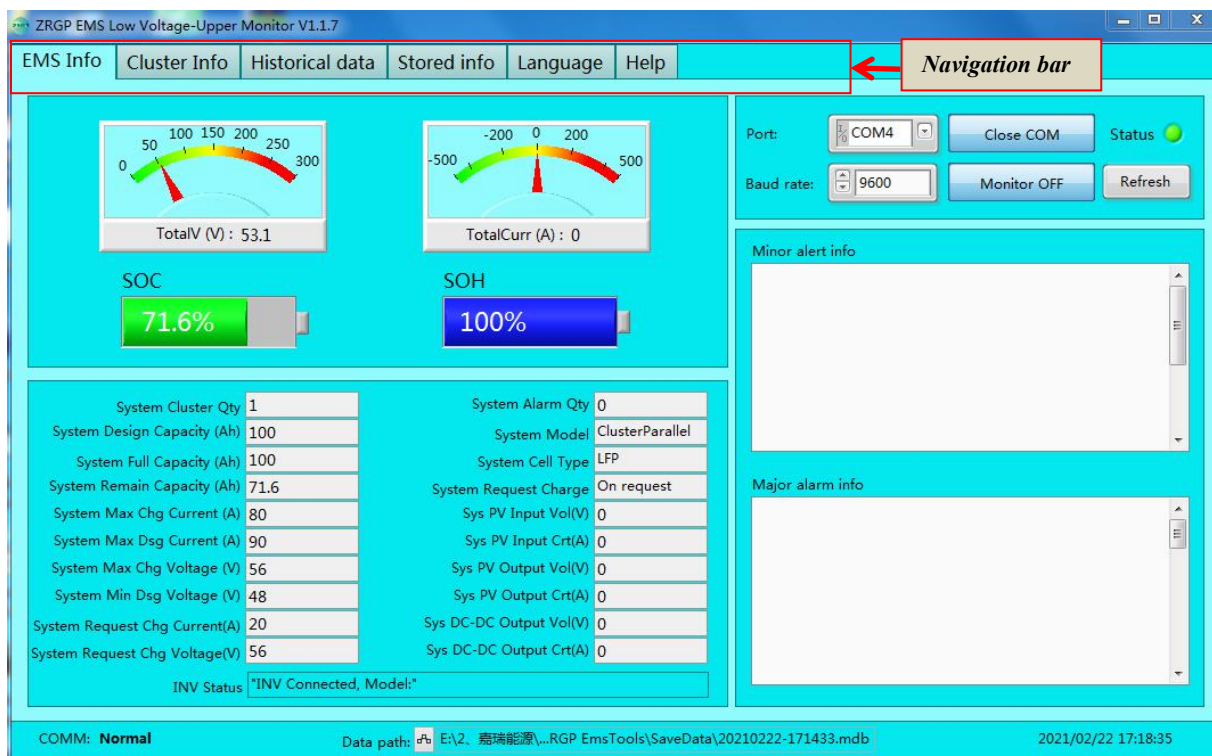


Figure 3.6. ZRGP Ems data acquisition

7) Cluster information operation information, you can select the corresponding operation information through the navigation bar. A total of 15 clusters can be monitored.

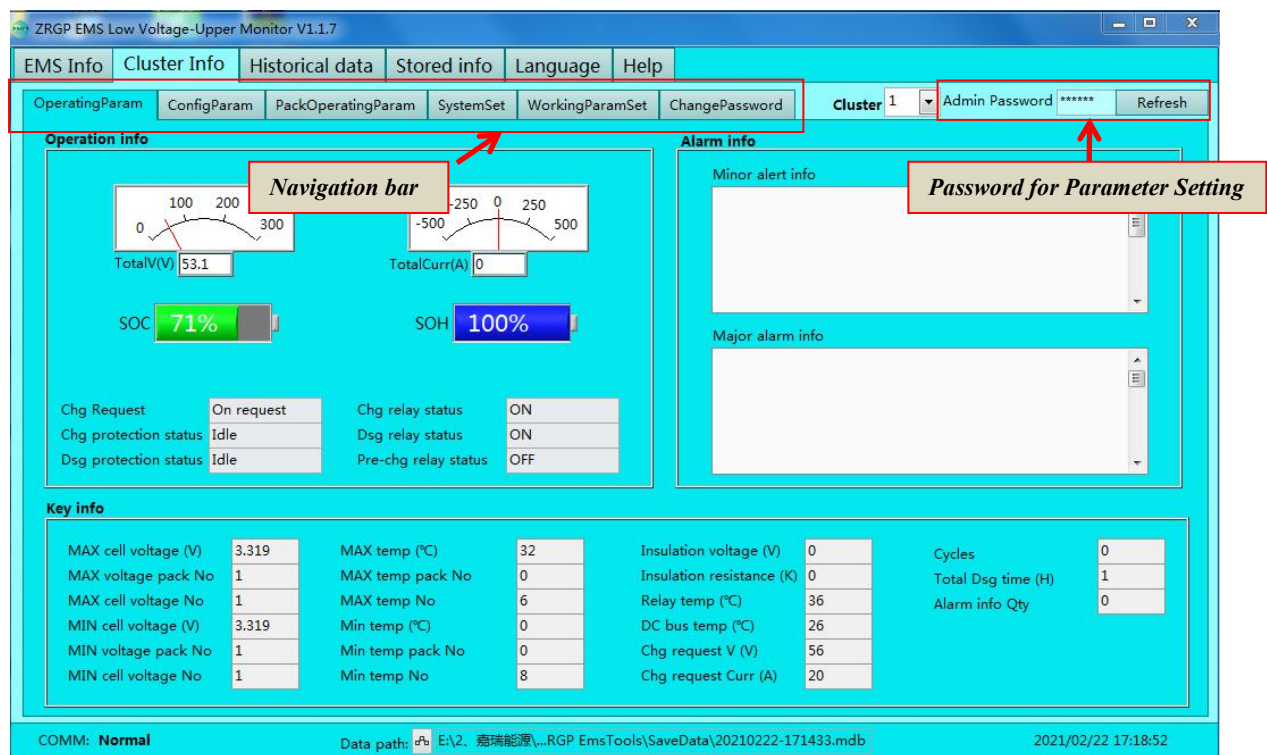


Figure 3.7. ZRGP Cluster data acquisition

8) The configuration parameter interface displays the manufacturer identification, software version, hardware version, production serial number, temperature quantity and module battery quantity of a cluster in real time.

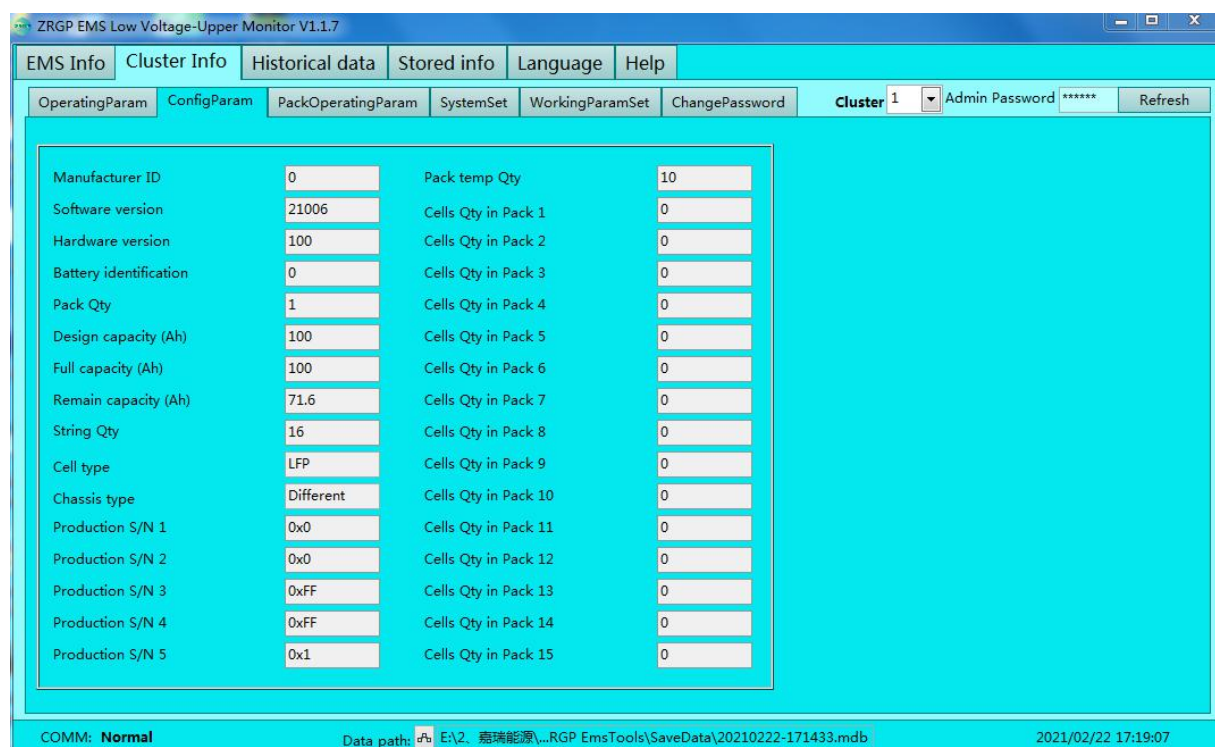


Figure 3.8. ZRGP Cluster Matching parameters

9) The interface displays the running information of the battery module in real time. The module running parameter interface can monitor up to 15 battery modules, and select the module through the pack button on the interface your address.





Figure 3.8. Module operation parameters

10) The system setting interface can read and write the number of clusters, the number of cluster modules, the Precharge time, the main control address and the inverter protocol of the system. When writing the parameters, the system setting password is required.

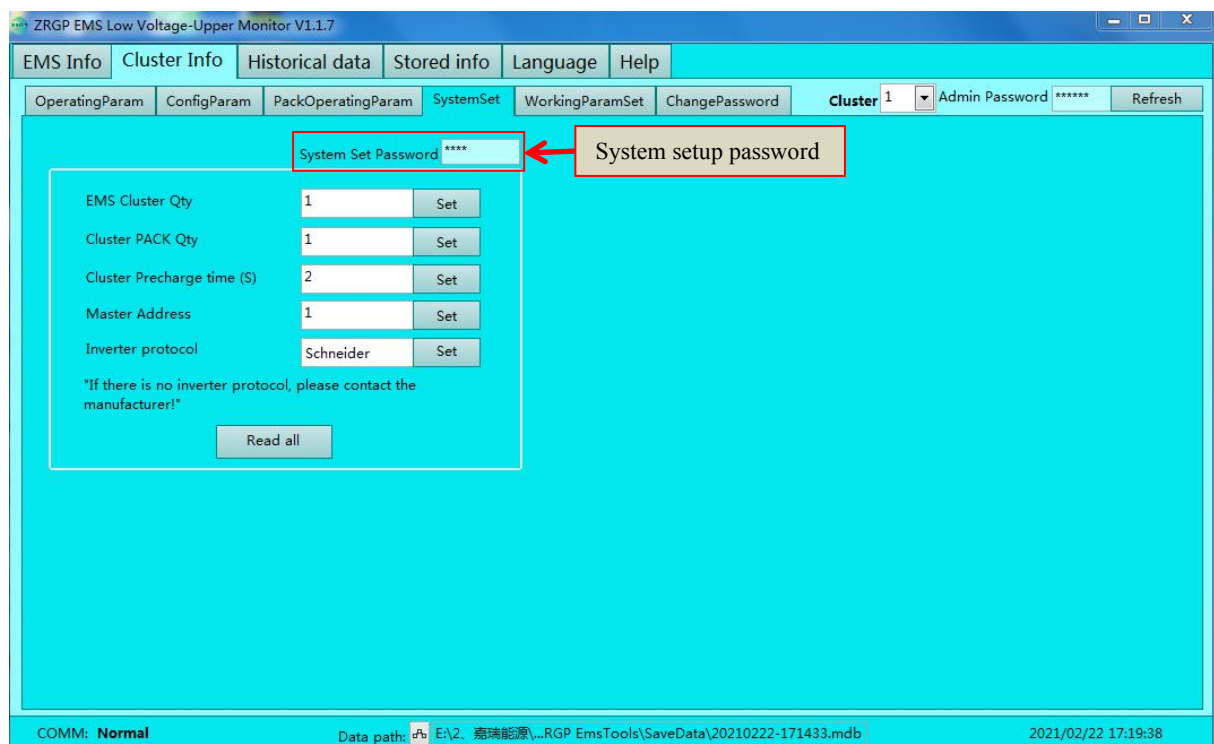


Figure 3.9. System setting interface

11) The interface can read and set the working parameters of the system, battery protocol, baud rate of can module, baud rate of RS-485 module, charging and discharging control and system time. It also has the functions of eliminating alarm sound, restoring factory setting, saving parameters and importing parameters.

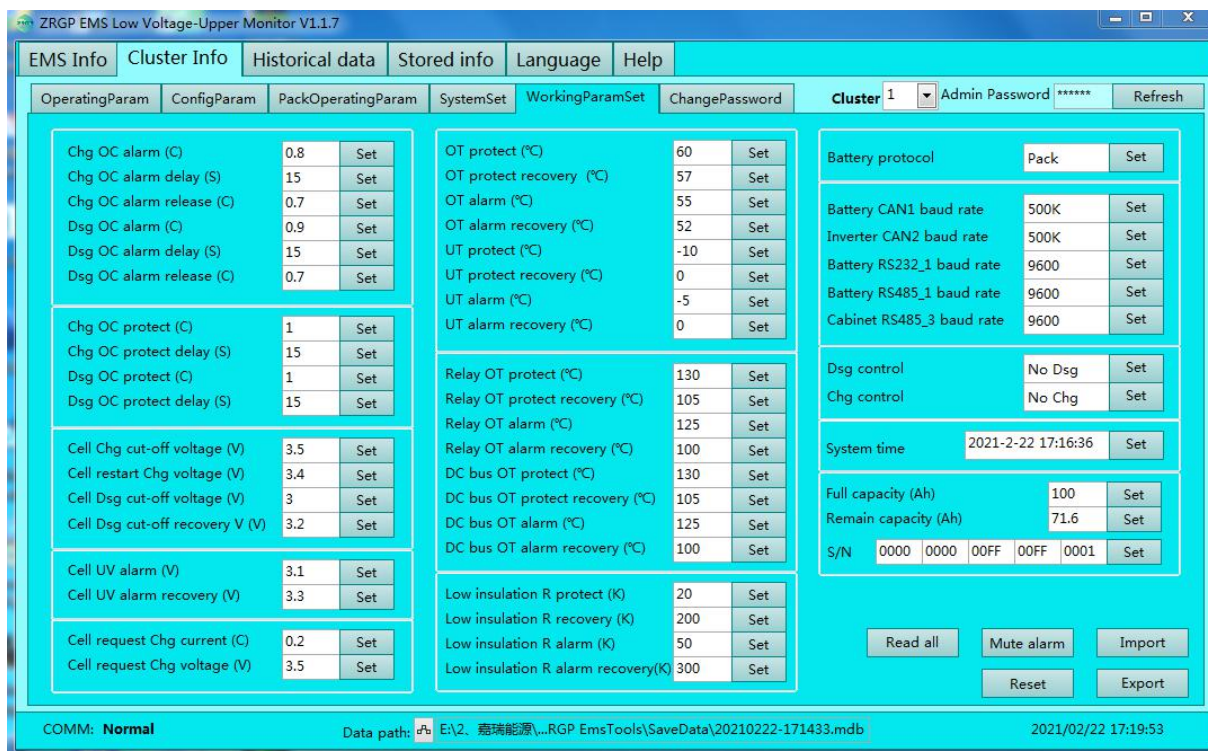


Figure 4.0. Working parameter setting interface

12) The password modification interface can modify the administrator password and system setting password. To change the password, you need to enter the old password, and the new password and confirm the new password should be consistent.

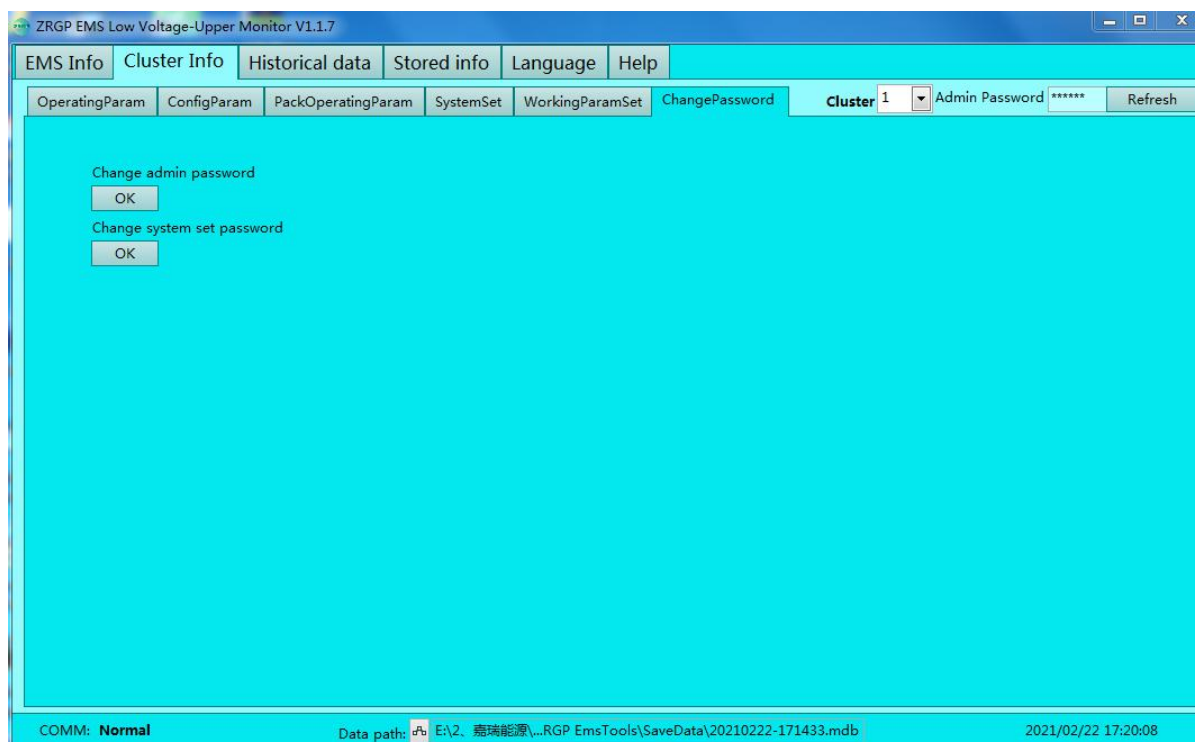


Figure 4.1. Password modification interface

13) Historical data recording

ZRGP Ems tools supports the function of real-time data recording, which can record the parameters and status information of the system.

By clicking the Historical data menu to switch, all the historical data which collected by ZRGP

Ems tools can be read at any time, those historical also can be export to computer and save into Excel format files.

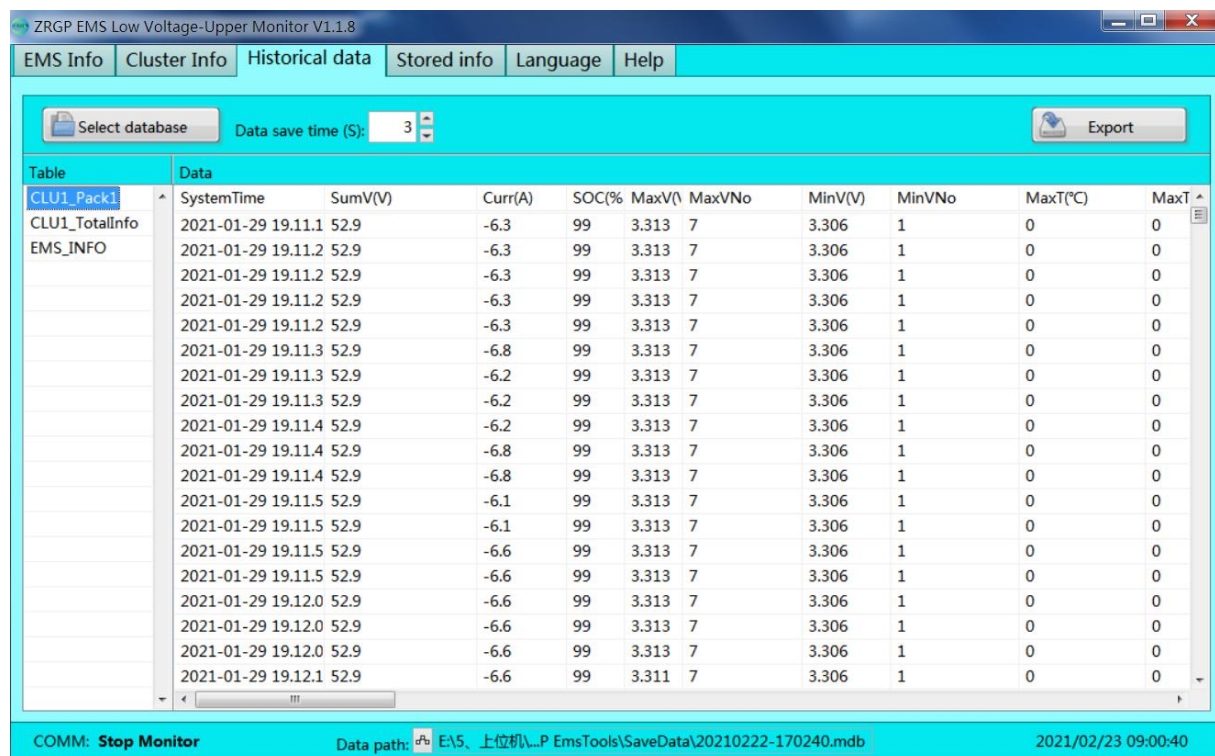


Figure 4.2. ZRGP Ems tools historical data recording

#### 14) Log recording

The BMS inside the battery pack uses FLASH chip to record the battery operation data, these data mainly include some parameters such as alarm, protection, fault, state switch, etc. and after-sales personnel can evaluate and analyze the running state of the product according to this log information, battery can support log recording for more than.

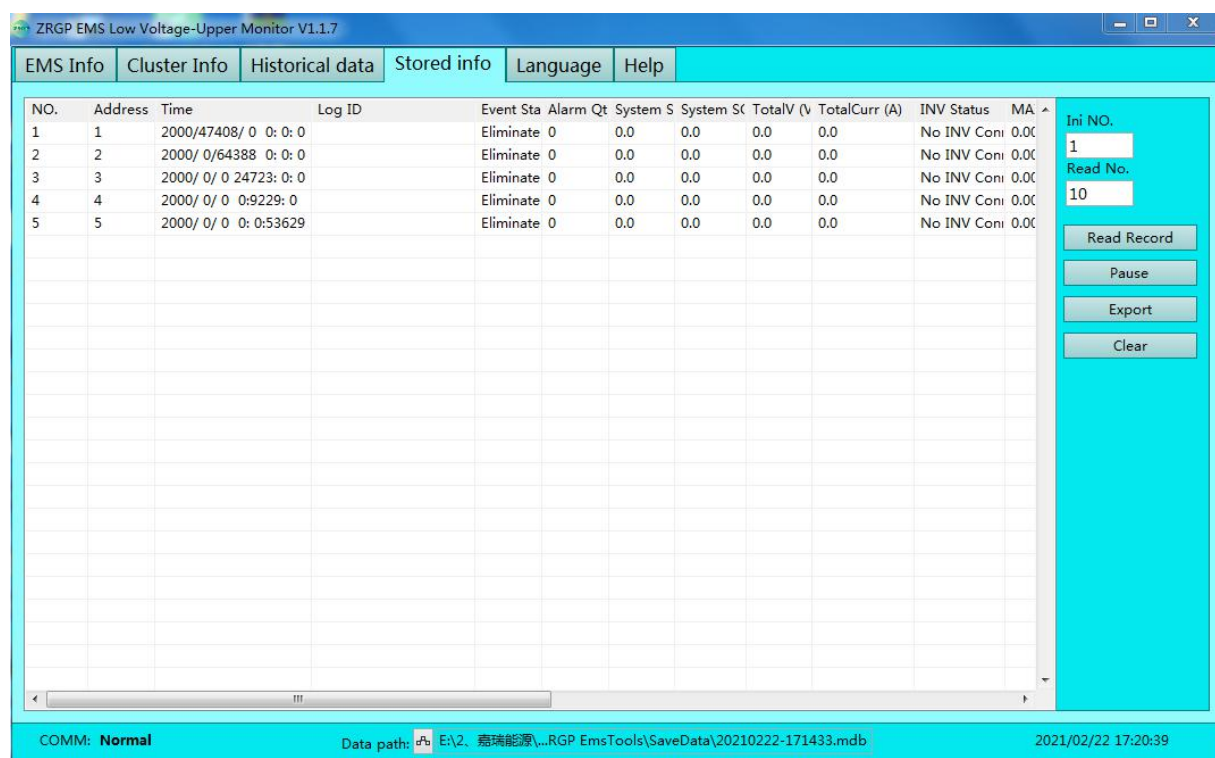


Figure 4.3. ZRGP Ems tools Log recording



## 15)Language Setting

In addition to setting the language on the login interface, users can also set it in the "language" option card in the navigation "Ar, as shown below:

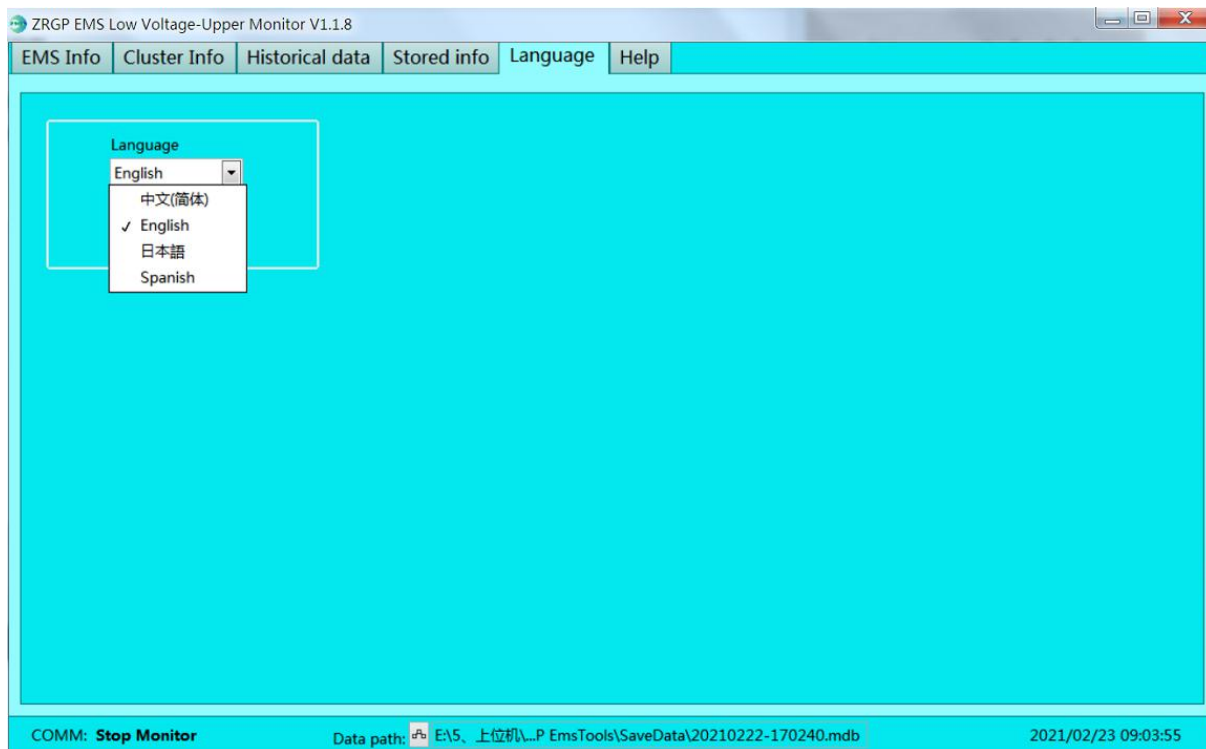


Figure 4.4. ZRGP Ems tools Language Setting

## 16)Help

The user can learn about the ZRGP EMS Pack software and open the help file at the "Help" option card in the navigation bar.



Figure 4.5. ZRGP Ems tools Help Function

## 4. How to match communication with inverter

### 4.1. Supported brands

At present, the energy storage products of our company have completed matching tests with some series inverters of the following brands, and we will continue matching tests with inverters of other companies. Please check our official website for the latest list of supporting brands. <http://www.zruipower.com>.



### 4.2. Inverter matching list

The list tab only lists the inverter manufacturers one of the same series products, general inverter manufacturers in the same series of other products, the communication protocol are the same, so our battery can be communicated with the other products of same series inverter, if encounter a series of products can't communication, please contact us.

The following inverter matching list may not be up to date. The list may change according to the software version upgrade, and the reference manual may does not change immediately according to the software version upgrade. Therefore, if the user wants to get the latest inverter matching support, please browse our the official website to check the relevant documents, <http://www.zruipower.com>.

The inverter manufacturer may upgrade its software version, which may cause problems in the communication between our battery and the inverter. Therefore, before communicating with the inverter, please confirm whether the software version of the inverter is consistent with the list. If not, please contact us.

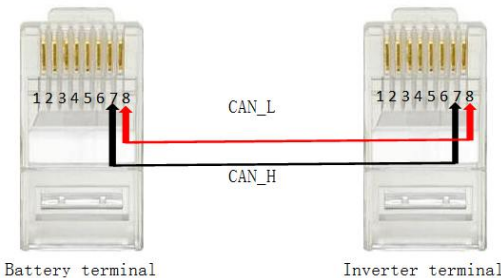
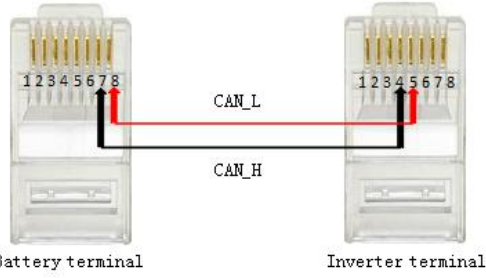
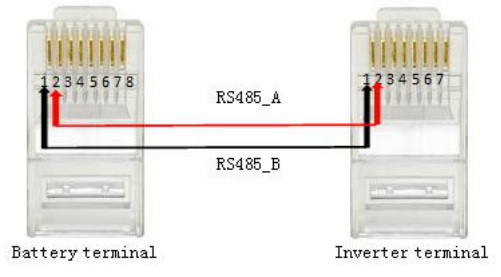
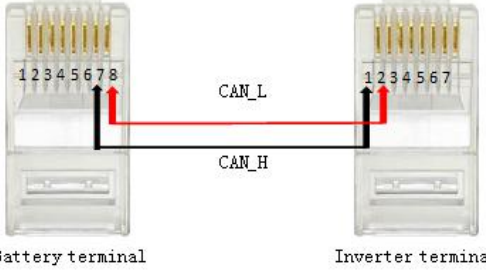
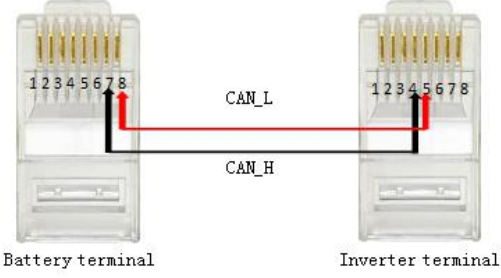
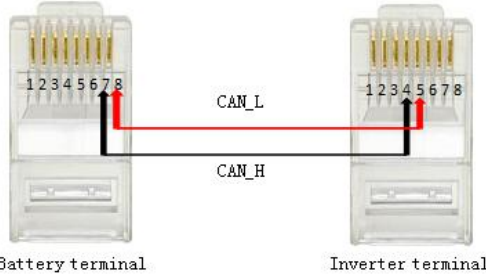
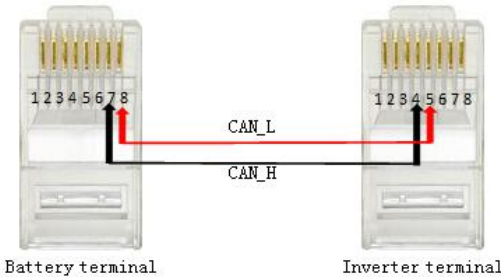
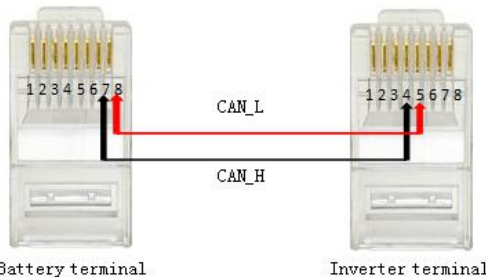
Inverter			Power Base Venus Firmware version	Communication mode
Brand	Type	Protocol Version		
Growatt	SPF 12KT HVM	V1.22	V22022	RS485
Studer	Xtender-XTH-8000-48	V1.0.3		Xcom-CAN
Sofar	HYD5000-ES	V6.0		CAN
Solis	RHI-5K-48ES	V1.2		CAN
Goodwe	GW5048-EM	V1.5		CAN
Victron	MultiPlus-II	V6.0		CAN
SMA	S16.0H-12	V2.0		CAN
Sermatec	SMT-5K-TL-UN	V1.2		CAN
Schneider	Conext™ Gateway	V2.0		RS485
PYLON	SUNSYNK-5K-SG01LP1	V1.2		CAN
Li_PLUS	ZRStandard	V1.2		CAN
Sol-ark	Sol-ark-12k	V1.31		CAN



### 4.3.Connection with inverter

This section will introduce how to hardware connect Power Base LV -MATE series products with 8.2 section “Inverter Matching List”. Inverters manufacturers may upgrade their products, resulting in hardware communication interface changes. If communication is not possible in the application according to the following wiring method, please contact with us.

The CAN/RS485 communication port of Power Base LV -MATE is connected with the communication interface of inverter.

<p><b>Connect to the Victron inverter</b></p>  <p>Battery terminal      Inverter terminal</p>	<p><b>Connect to the PYLON inverter</b></p>  <p>Battery terminal      Inverter terminal</p>
<p><b>Connect to the Growatt inverter</b></p>  <p>Battery terminal      Inverter terminal</p>	<p><b>Connect to the Sofar inverter</b></p>  <p>Battery terminal      Inverter terminal</p>
<p><b>Connect to the Solis inverter</b></p>  <p>Battery terminal      Inverter terminal</p>	<p><b>Connect to the Goodwe inverter</b></p>  <p>Battery terminal      Inverter terminal</p>
<p><b>Connect to the Sermatecl inverter</b></p>  <p>Battery terminal      Inverter terminal</p>	<p><b>Connect to the Sol-ark-12k inverter</b></p>  <p>Battery terminal      Inverter terminal</p>

**NOTE:**

- The above CAN and RS485 communication connections are not connected the ground wire, in the application of relatively large interference, it is recommended to connect the ground wire, the ground wire connection method is a single-ended shielding line.

## 5.Safe handling of lithium batteries Guide

### 5.1.Schematic Diagram of Solution

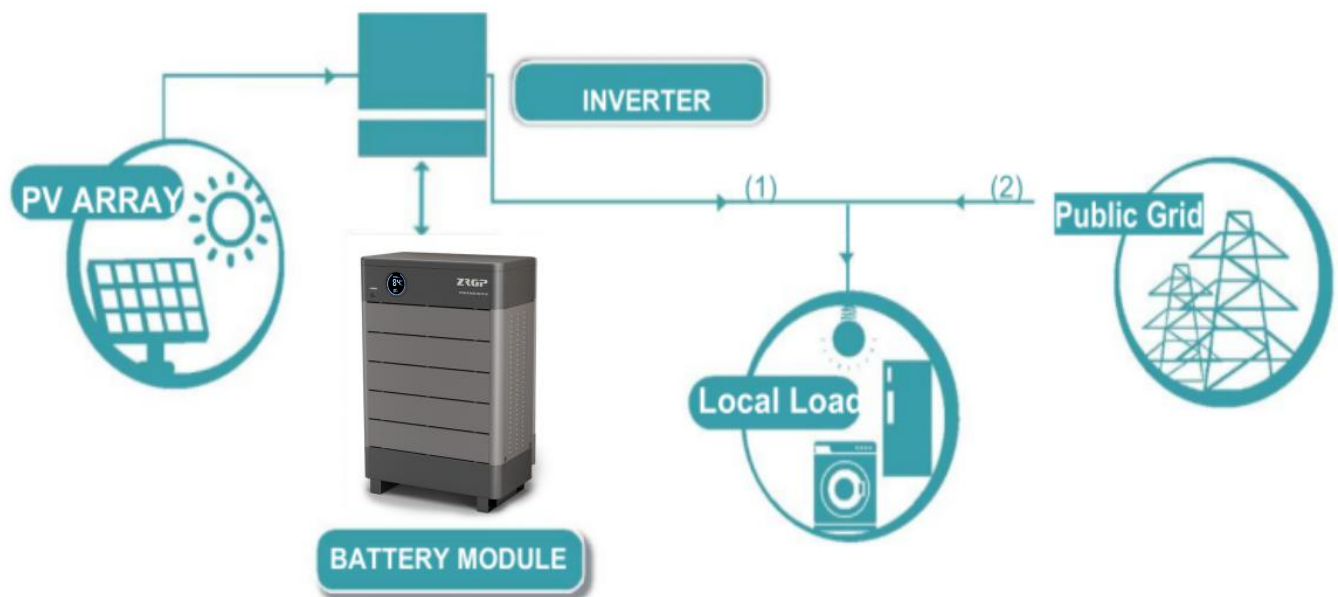


Figure 5.1. Schematic diagram of solution

### 5.2.Familiar with system

Be careful when unpacking the system. The whole system is heavy. Don't lift it with a pole. There are sliding wheels under the system to move. The weight of the battery can be found in the chapter "specifications".

Familiar with batteries. The battery poles are located on the right side of the battery. The battery polarity is shown on the left side of the battery. The positive pole is represented by "+" and the negative pole by "-".



Figure 5.2. Side view of the whole system



Figure 5.3. Side view of the whole system

### 5.3. Precautions before installation

Before installation, be sure to read the contents in Chapter 1 Safety Precautions, which is related to the operation Safety of installation personnel, please pay attention to.

### 5.4. Tools

The following tools are required to install the battery pack:



Wire cutter



Cable clamp



Screw Driver

#### **NOTE:**

● Use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

### 5.5. Safety Gear

It is recommended to wear the following safety gear when dealing with the battery pack:



Insulated gloves



Safety goggles



Safety shoes

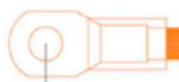
## 6.Installation

### 6.1.Package Items

Unpacking and check the Packing List:

1) Connector

Each system will be equipped with a positive connector and a negative connector. The two connectors are not connected to the cable, and users can wire according to the actual application needs.



Positive connector



Negative connector

- 2) Each system will be equipped with a positive terminal and a negative terminal. The two connectors are not connected with cables, so users can connect wires according to actual application needs.

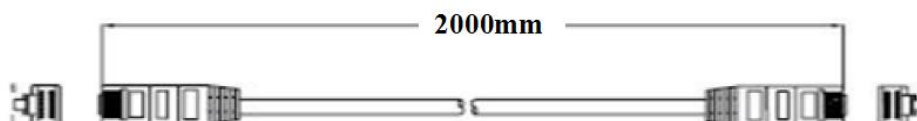


Positive connector



Negative connector

- 3) Communication connecting line between system and inverter



### 6.2.Installation Location

Make sure that the installation location meets the following conditions:

- ◆ The area is completely water proof.
- ◆ The floor is flat and level.
- ◆ There are no flammable or explosive materials.
- ◆ The ambient temperature is within the range from 0°C to 50°C.
- ◆ The temperature and humidity is maintained at a constant level.
- ◆ There is minimal dust and dirt in the area.
- ◆ The distance from heat source is more. than 2 meters.
- ◆ The distance from air outlet. of inverter is more than 0.5 meters.
- ◆ Do not install outside directly.
- ◆ Do not cover or wrap the battery case or cabinet.
- ◆ Do not place at a children or pet touchable area.
- ◆ The installation area shall avoid of direct sunlight.
- ◆ There is no mandatory ventilation requirements for battery module, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature.



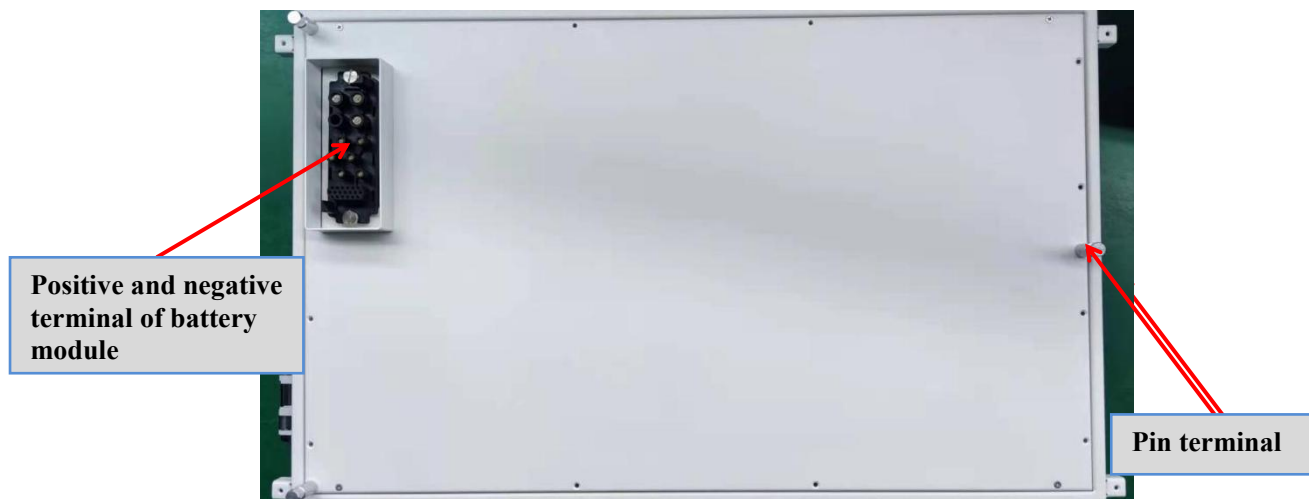
## CAUTION

If the ambient temperature is outside the operating range, the battery pack stops operating to protect, itself. The optimal temperature range for the battery pack to operate is 0°C to 45°C. Frequent exposure, to harsh temperatures may deteriorate the performance and life of the battery pack.

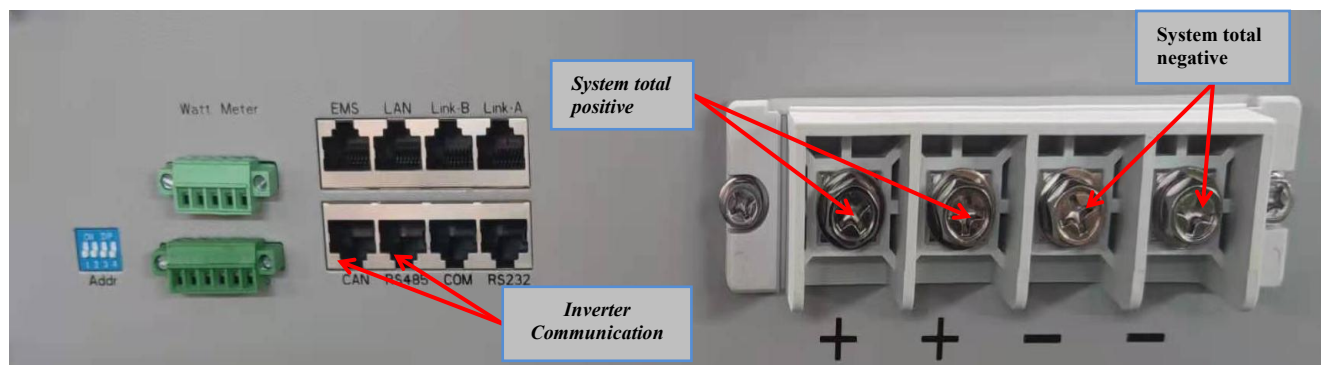
### 6.3.Parallel Installation

#### A. Stack the whole system

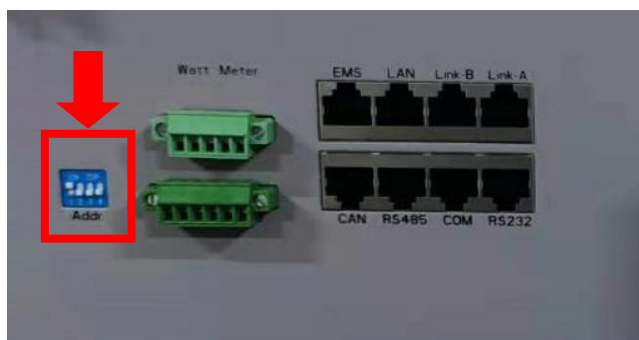
(1) Connect the battery module the corresponding pin terminals are stacked one by one.



(2) Connect the positive pole of the main control module to the positive pole of the inverter and the negative pole of the main control module to the negative pole of the inverter. Connect the inverter to the communication line, and select the communication port can or RS485 according to the inverter protocol.



(3) The master control address should be set to "1" for communication between the master control and the inverter. The master control switch should be turned off before connecting with the inverter.

**NOTE:**

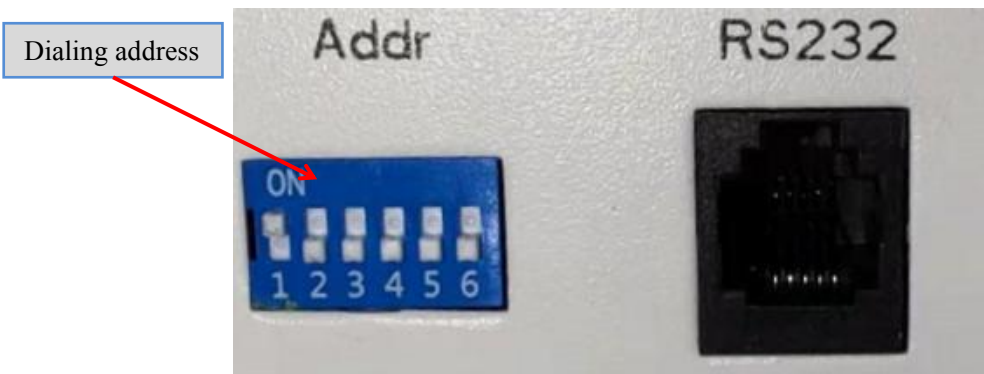
● Before starting the system, the operator should strictly check the connection terminal to ensure that the terminal is firmly connected, check whether the battery address is set correctly, and whether the inverter switches are in the off state. Do a good job in safety protection and turn on the inverter in the following order, When installing the system, the battery module bottom insulation skin remove

**B. Power on**

Check all connection terminals and communication lines carefully.

Turn on the power and turn on all battery modules:

(1) When the battery module is stacked and installed, it is necessary to check whether the dip switches are sorted by address 1 ~ 5 from top to bottom. After installation, press the switch button on the right panel of the lithium battery module



(2) After pressing the switch of the main control box, the power supply is completed after the main control box self checks for 6S, and the display screen is checked to see if there is a fault alarm. After the start, the system runs normally





## Wall-mount mode

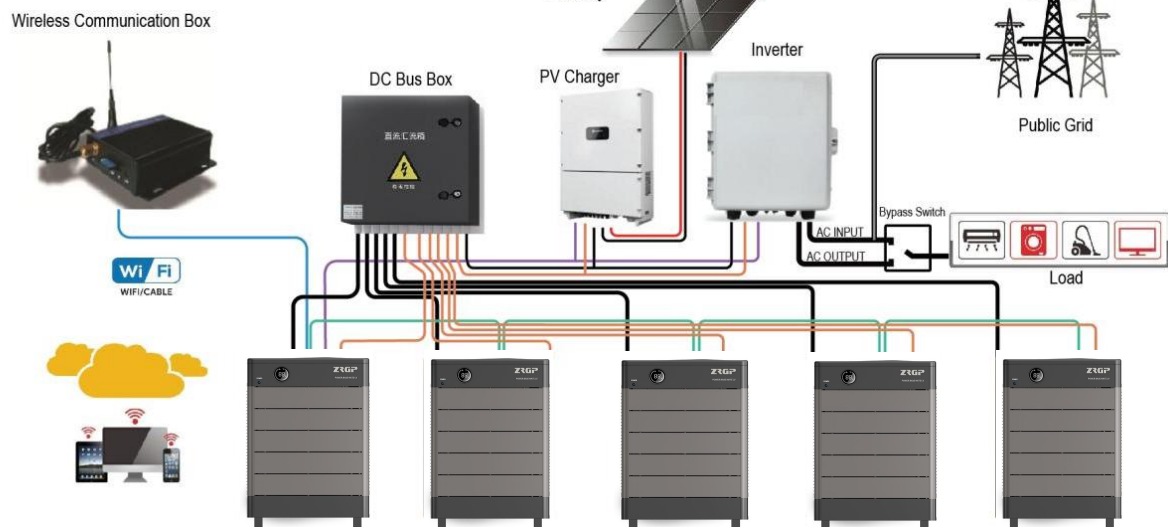


Figure 5.4. Schematic diagram of parallel solution



NOTE: After installation, do not forget to register online for full warranty: <http://www.zruipower.com>

### NOTE:

- In order to avoid current pulse during start-up, predischage function should be added to high voltage system. All connected batteries should be turned on first, and then the circuit breaker between high voltage system and inverter should be turned on.
- Circuit breaker shall be installed between high voltage system and inverter to protect system safety.
- All installation and operation must comply with local electrical standards.

## 7.Trouble Shooting Steps

### 7.1.Problem determination based on

- 1) Whether the battery can be turned on or not;
- 2) If battery is turned on, check the red light is off, flashing or lighting;
- 3) If the red light is off, check whether the battery can be charged/discharged or not.

### 7.2.Preliminary determination steps

- 1) The system can not be turned on, and the power indicator is not illuminated or flashing. If the external switch of the system is turned on, the running light flashes, and the external power supply voltage exceeds 48V, the system still can not be turned on for operation, please contact the dealer.
- 2) The system can be turned on, but red light is lighting, and cannot charge or discharge. If the red light is lighting, that means system is abnormal, please check values as following:

- a) Temperature: Above **55°C** or under **-10°C** , the system could not work.

Solution: to move system to the normal operating temperature range between **0°C and 45°C**

- b) Current: If current is greater than 360A, battery protection will turn on.

Solution: Check whether current is too large or not, if it is, to change the settings on power Supply side.

- c) High Voltage: If charging voltage above 57V, battery protection will turn on.

Solution: Check whether voltage is too high or not, if it is, to change the settings on power supply side.

- d) Low Voltage: When the battery discharges to 44V or less, battery protection will turn on.

Solution: Charge the battery for some time, the red light turn off

Excluding the four points above, if the faulty is still cannot be located, turn off battery and repair.

### 7.3.The battery cannot be charged or discharged

- 1) Cannot be charged:

Disconnect the power cables, measure voltage on power side, if the voltage is 53~54V restart the battery, connect the power cable and try again, if still not work, turn off battery and contact distributor .

- 2) Unable to discharge:

Disconnect the power cables and measure voltage on battery side, if it is under 44V please charge the battery; if voltage is above 48V and still cannot discharge, turn off battery and contact distributor.



## 8.Storage,Transportation and Emergency Situations

### 8.1.Storage

Recharge and maintain the battery pack regularly every three months to ensure the battery is in the best condition.

### 8.2.Transportation

Battery packs need to be packed before they can be shipped, during transportation, severe impact, extrusion, direct sunlight and rain should be protected.

### 8.3.Emergency Situations

#### (1). Leaking Batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below. Inhalation: Evacuate the contaminated area, and seek medical attention.

Contact with eyes: Rinse eyes with flowing water for 15 minutes, and seek medical attention.

Contact with skin: Wash the affected area thoroughly with soap and water, and seek medical attention.

Ingestion: Induce vomiting, and seek medical attention. 2)

#### (2). Fire

NO WATER! Only dry powder fire extinguisher can be used; if possible, move the battery pack to a safe area before it catches fire.

#### (3). Wet Batteries

If the battery pack is wet or submerged in water, do not let people access it, and then contact ZRGP or an authorized dealer for technical support.

#### (4). Damaged Batteries

Damaged batteries are dangerous and must be handled with the utmost care. They are not fit for use and may pose a danger to people or property. If the battery pack seems to be damaged, pack it in its original container, and then return it to ZRGP or an authorized dealer.

#### **NOTE:**

- Damaged batteries may leak electrolyte or produce flammable gas.
- In case a damaged battery needs recycling, it shall follow the local recycling regulation (ie. Regulation(EC) N° 1013/2006 among European Union) to process, and using the best available techniques to achieve a relevant recycling efficiency.
- Any further questions, please contact ZRGP: [info@zruipower.com](mailto:info@zruipower.com)



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