



GREENTEK



**GREENTEK Battery
Energy Storage
Pack User Manual**

**Graphene-LFP
Li-ion Battery**






PREFACE

Summary:

This document mainly introduces the product introduction, application scenario, installation, commissioning, system maintenance and technical data of GREENTEK Battery Energy Storage Pack ,Graphene-LFP Lithium-ion battery (LIB) and its expansion options.

Symbolic Convention:

The following symbols may appear in this article, and they represent the following meanings:

Symbol	Explanation
 DANGER	Indicates a hazard with high risk that will lead to death or serious injury if not avoided.
 Warning	Indicates a hazard with medium risk that may lead to death or serious injury if not avoided.
 Attention	Indicates a hazard with low-level risk that may cause slight or moderate injury if not avoided.
 Notice	It is used to transmit equipment or environmental safety warning information. If not avoided, it may lead to equipment damage, data loss, equipment performance degradation or other unpredictable results.The "instructions" do not involve personal injury.
 Explanation	Indicates a hazard with high risk that will lead to death or serious injury if not avoided.

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1. Safety precautions

1.1 General security

Statement

When installing, operating and maintaining the equipment, please read this manual first and follow the signs on the equipment and all safety precautions.

The "notice", "attention", "warning" and "danger" in the manual do not represent all safety precautions to be observed, but only supplement all safety precautions. The company shall not be liable for any violation of general safety operation requirements or safety standards for design, production and use of equipment.

The equipment shall be used in an environment that meets the requirements of design specifications, otherwise it may cause equipment failure, and the resulting equipment function abnormalities or component damage, personal safety accidents, property losses, etc. are not within the scope of equipment quality assurance. The installation, operation and maintenance of the equipment shall comply with local laws, regulations and specifications. The safety precautions in the manual are only a supplement to local laws, regulations and specifications.

The company shall not be liable for any of the following circumstances.

- ◆ If the equipment is operated under the severe conditions described in this manual.
- ◆ The installation and use environment exceeds the provisions of relevant international or national standards.
- ◆ Disassemble, change the product or modify the software code without authorisation.
- ◆ Failure to follow the operational instructions and safety warnings written in the equipment label, user manual and/ or other relevant documents.
- ◆ Damage caused by customer's own transportation.
- ◆ Damage caused by storage conditions not meeting the requirements suggested in the user manual or other relevant documents.

General requirements



Installation of the equipment in live connections with other devices or ON mode is strictly prohibited.

- ◆ It is strictly prohibited to install, use and operate the equipment and the related accessories, including but not limited to handling equipment, operating equipment and cables, plug and unplug signal interfaces connected to the equipment, in outdoor setting, in severe weather such as lightning, rain, snow and force gale.
- ◆ After installation is complete, the empty packaging materials such as cartons, foam, plastic, tie wrap etc. should be removed.
- ◆ In case of fire, evacuate the building or equipment area and press the fire alarm bell or dial the fire alarm telephone. Under no circumstances shall re-enter the burning building.
- ◆ It is strictly prohibited to intentionally alter, damage the equipment, or block the identification and product label on the equipment.

- ◆ When installing the equipment, use the right tools to avoid accidental damages.
- ◆ Paint the accidental scratches caused during equipment transportation and installation before leaving the site. It is strictly prohibited to expose the scratched parts to the outdoor environment for a long time.
- ◆ Do not unassemble or unscrew any component of the equipment without the permission of the manufacturer.
- ◆ In any case, do not change the structure and installation sequence of the equipment without the permission of the manufacturer.
- ◆ While handling the equipment, make sure that the battery terminals and/or other peripheral hardware components/parts are not subject to undue stresses that may cause internal or external damages.
- ◆ It is not allowed to reverse engineer, decompile, disassemble, adapt, implant execute or other derivative operations on the equipment software, and it is not allowed to study the internal implementation of the equipment in any way.

Personal safety

- ◆ Wear appropriate personal protective equipment during equipment operation. In case of any fault that may cause personal injury or equipment damage, the operation shall be terminated immediately, the person in charge shall be reported, and effective protective measures shall be taken.
- ◆ Before using the tool, please master the correct use method of the tool to avoid personal injury and equipment damage.
- ◆ When the equipment is running, the shell temperature is high and there is a risk of unwanted burning. Be cautious when touching a running equipment.
- ◆ In case of battery failure, the temperature may exceed the burning threshold of the touchable surface, and contact should be avoided.
- ◆ Do not open or damage the battery. The released electrolyte is harmful to the skin and eyes. Avoid contact.
- ◆ Do not place irrelevant items on the top of the equipment or insert them anywhere in the equipment.
- ◆ Do not place inflammables around the equipment.
- ◆ The battery shall never be placed in the fire.
- ◆ Do not place the battery pack in water or other liquids.
- ◆ Do not short-circuit the battery terminal, it may cause combustion.
- ◆ Although a Class III equipment, the device is prone to cause a high short circuit current and electric shock if proper safety procedures are not followed. Therefore, when using the battery, pay attention to the following precautions :
 - a) Remove watches, rings or other metal objects.
 - b) Use tools with insulated handles .
 - c) Wear rubber gloves and boots .
 - d) Do not place tools or metal parts on the top of the battery .
 - e) Disconnect the charging power supply before connecting or disconnecting the battery terminal.
- ◆ Do not use water or detergent to clean the device and attached accessories.

- ◆ Do not stand lean or sit on the equipment.
- ◆ If the battery pack has fallen or seriously impacted during the installation somehow, it is strongly recommended not to use the equipment without prior health checks by the manufacturer to avoid unwanted safety risks in cell leakage, electric shock, and so forth.

Treatment measures for battery leakage

In case of battery electrolyte leakage, avoid contact with leaked liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. In case of battery electrolyte leakage, the following measures shall be taken.

Inhalation: evacuate the contaminated area, allow fresh air to pass the area, and seek medical help immediately.

Eye contact: immediately flush eyes with plenty of water for at least 15 minutes, avoid rubbing eyes, and seek medical help immediately.

Skin contact: immediately wash the contact area with plenty of water and soap and seek medical help immediately.

Ingestion: seek medical help immediately.

Fire treatment measures

- ◆ In case of fire, the system should be isolated immediately by turning off the power where possible.
- ◆ Use carbon dioxide, FM-200 or ABC dry powder fire extinguisher to extinguish the fire.



When the battery temperature is too high, it may cause battery deformation, damage, electrolyte overflow and toxic gas leakage. Please keep away from it to avoid skin irritation and chemical burns.

Flood emergency measures

- ◆ Isolate the battery system and turn off the power to ensure personal safety.
- ◆ If any part of the battery is flooded, do not touch the battery to avoid electric shock.
- ◆ Do not use the flooded battery. Contact the battery recycling company for scrapping.

Battery recycling

- ◆ Dispose of waste batteries according to local laws and regulations. Do not treat batteries as domestic waste.
- ◆ If the battery leaks or bulges, contact technical support or battery recycling company for scrapping.
- ◆ When the battery is not functioning beyond its service life, contact the battery recycling company for scrapping.
- ◆ Avoid exposing the battery to high temperature or direct sunlight.
- ◆ Avoid exposing the battery to high humidity or corrosive environment.

1.2 Personnel requirements

- ♦ The personnel responsible for the installation and maintenance of this equipment must understand various safety precautions and master the correct operation methods.

1.3 Electrical safety

General requirements



Before making electrical connection, please ensure that the equipment is not damaged, otherwise electric shock or fire may be caused.

- ♦ All electrical connections must meet the national electrical standards.
- ♦ The cable provided by the user shall meet the requirements of local laws and regulations.
- ♦ Use special insulating tools for high voltage operation.

DC operation



It is forbidden to install or remove the battery from the live power line. When the power cord contacts the live conductor with the power switch ON, it will produce arc or electric spark, which can lead to fire or personal injury.

- ♦ Before connecting the power cord, double check the identification label for correctness.
- ♦ If the equipment to be connected has multiple input, all the input must be disconnected prior to connecting the battery pack.

Wiring requirements

- ♦ The laying of the cable in high temperature environment may cause damage to the insulations. The distance between the cable and the periphery of the heating device or heat source area shall be at least 30mm.
- ♦ Similar cables shall be grouped together, and different groups of cables shall be laid at least 30mm apart. Mutual winding or cross laying is prohibited.
- ♦ The cables used must be firmly connected, well insulated and of appropriate specifications.

2.Product introduction

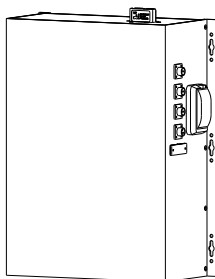
2.1 Product introduction

Function

GREENTEK Graphene-LFP LIB is a self- and inverter-managed, modular, DC-coupled 48V battery energy storage pack, which can store and release electric energy according to the requirements of the inverter .

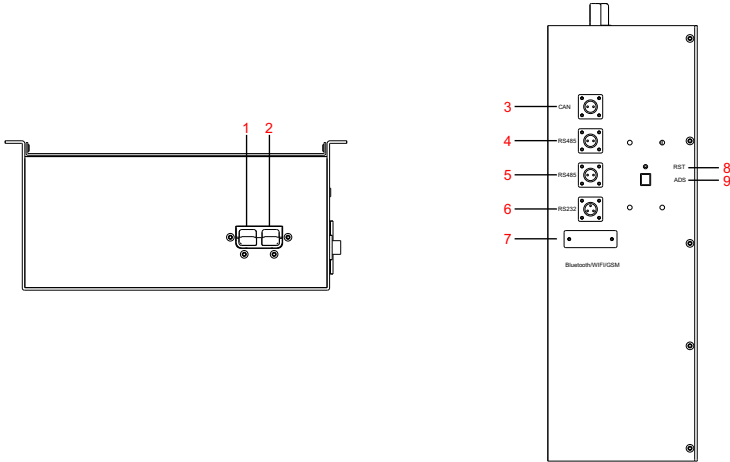
- ◆ Battery charging: When the battery pack is connected to the battery terminal of the inverter by maintaining the polarity and correct voltage specification, it will be charged to store energy under the control of the inverter.
- ◆ Battery discharge: When the power to the load is insufficient for On-grid or Live installation, or unavailable for Off-grid installation, battery pack will release the stored energy under the control of the inverter.

Model



NO.	Voltage	Capacity	IP Level	ESI
1	51.2V	80Ah	IP65	Bluetooth
				WIFI
				GSM

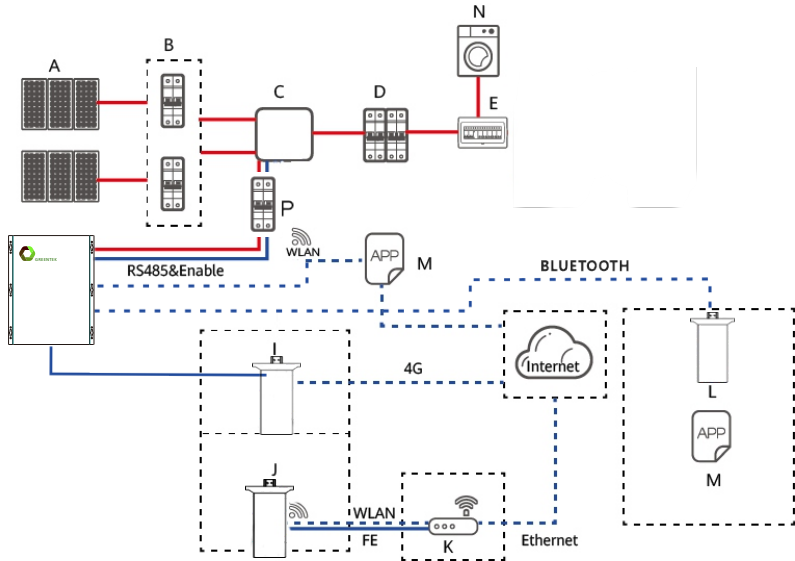
2.2 Appearance description



NO.	Description	Functional Description
1	Battery-	Negative terminal
2	Battery+	Positive terminal
3	CAN/RS485	For controlling the battery pack with external devices, such as inverter
4	RS485	RS485 communication interface (to use for multiple packs' parallel connections)
5	RS485	RS485 communication interface (to use for multiple packs' parallel connections)
6	RS232	RS232 communication interface (to access the BMS tools through computer to monitor and manage the configuration of the battery pack)
7	External interface	Wireless communication interface for WiFi, Bluetooth and GSM to monitor battery performance using Mobile App, independently of inverters
8	RST	ON/OFF button
9	ADS Dialer	Display connection address



TYPICAL OFF-GRID SYSTEM DIAGRAM WITH SOLAR PV



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- | | | |
|---------------------------------|----------------------------|--------------|
| (A) PV module | (B) DC switch | (C) Inverter |
| (D) AC switch | (E) Power Distribution Box | |
| (F) Intelligent power collector | (G) Power grid | (H) Battery |
| (I) GSM | (J) WIFI | (K) Router |
| (L) Bluetooth | (M) APP | |
| (P) DC switch | | |

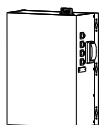
Explanation

- ◆ The input and output of the battery energy storage system are connected to the battery terminals of the inverter.
- ◆ Following are the modes to communicate with the battery energy storage system:
 - The Inverter can be connected through CAN/RS485 interface to realize the communication and control between the inverter and battery.
 - The battery can be accessed through Bluetooth and APP to view and monitor the performance.
 - The battery can be accessed through WIFI and APP to view and monitor the performance.
 - The battery can be accessed through GSM and APP to view and monitor the performance.

3.Product installation

3.1 Unpacking inspection

Please confirm whether the outer package of the product is damaged before unpacking. After unpacking, please carefully check the product for damage or missing accessories. In case of damage or missing accessories, please contact the supplier directly for assistance.



A



B



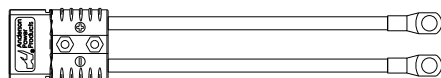
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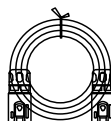
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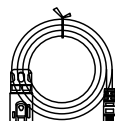
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F



G



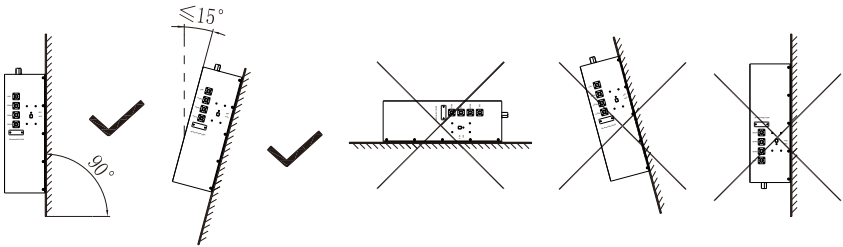
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NO.	QTY	Description
A	1	Battery Pack
B	1	User Manual
C	6	Expansion screws M10
D	1	MSDS Transportation certificate
E	1	RS232 communication cable
F	1	Anderson Plug Battery Adapter 1m
G	n	Additional RS485 communication cables for parallel connections: customised according to Order
H	n	CAN/RS485 communication cable

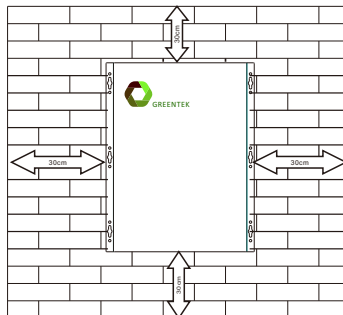
3.2 Basic installation requirements

- ◆ Must be installed in a dry and well-ventilated site to ensure good heat dissipation.
- ◆ Indoor installation only.
- ◆ The surrounding environment should be free from unusual infrared radiation, organic solvents and corrosive gases.

- ◆ The installation location shall be reasonably away from fire source.
- ◆ The installation location shall not be accessible by children.
- ◆ The installation location shall be sufficiently away from water sources, such as water tap, sewer pipe, sprinkler etc., to avoid water infiltration.
- ◆ The installation wall or floor or cabinet must be strong enough to carry the weight of the battery for a long time. Please follow your local regulatory guidelines (if any).
- ◆ Do not place inflammables and explosives around the battery.
- ◆ When the battery is running, please make sure that the natural convection cooling isn't compromised by blocked vents. Battery operating temperature for charging 0-55°C and discharging -20 ~ 60 °C.
- ◆ For wall mount installation, the battery can be installed on a vertical or backward inclined plane. Please refer to the following figure:

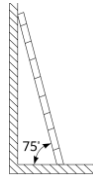


- ◆ To ensure good heat dissipation and convenience in operations and maintenance, sufficient clearance around the battery must be reserved. Please follow your local regulatory guidelines (if any). A typical picture of such clearance requirements is shown below:



3.3 Ladder use safety

- ♦ Wooden or FRP ladder shall be used where climbing is involved.
- ♦ When using the herringbone ladder, the pulling rope must be firm, and someone must hold the ladder during operation.
- ♦ Before using the ladder, please confirm that the ladder is intact, the bearing weight of the ladder meets the requirements. Overweight is strictly prohibited.
- ♦ The ladder should be placed in a stable place. The gradient of the ladder should be 75°, which can be measured with an angle ruler, as shown in the figure below.



3.4 Drilling safety

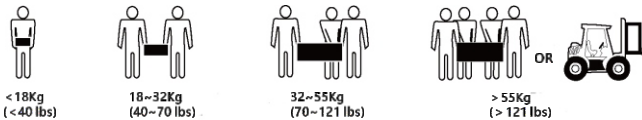
The following safety precautions shall be considered when using a drill machine:

- ♦ Wear goggles and protective gloves when drilling.
- ♦ The battery shall be covered to protect from debris. Debris must be cleaned once installation is complete.

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3.5 Safety of handling heavy objects

- ♦ When carrying heavy objects, be prepared to bear the load to avoid being crushed or sprained by the heavy objects.

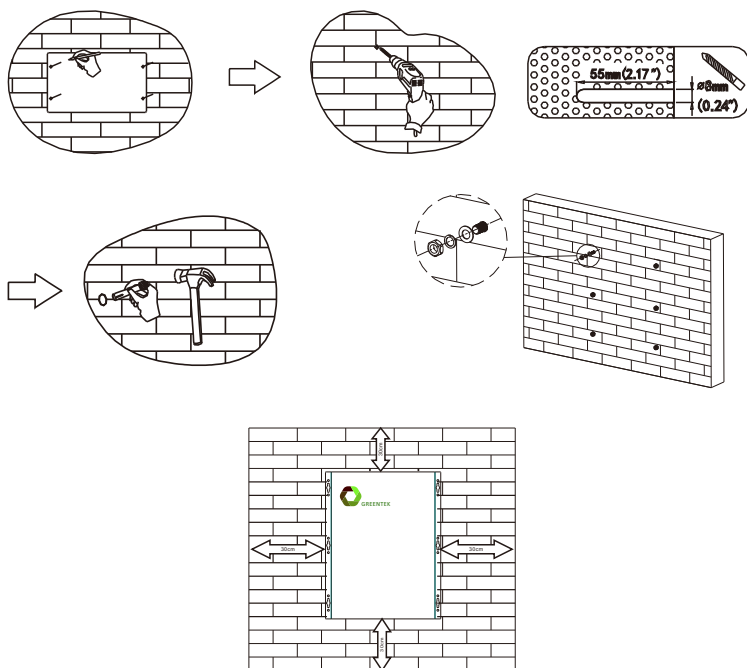


- ♦ When handling the equipment by hand, wear protective gloves to avoid injury.

3.6 Installation guidelines

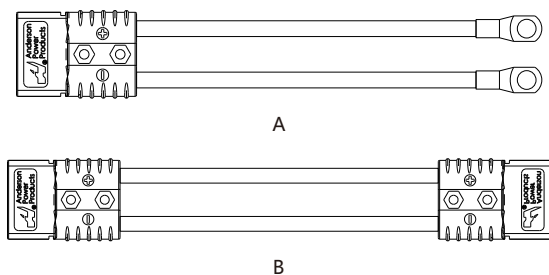
- ♦ Determine the exact location for battery installation. For wall mount installation, the thickness of the wall shall be greater than or equal to 100mm; please follow local regulatory guideline, if any.
- ♦ Use the cardboard to determine the specific location of the hole; Keep the top edge of the cardboard horizontal.
- ♦ Drill 6 holes at the marked position with the hole diameter of $\varnothing 8$; The hole depth shall not be less than 55mm.
- ♦ Knock 6 expansion screws into the drilled holes.
- ♦ Hang the battery mounting on the screw.

◆ Lock nut to secure battery.



4. Electrical connection

4.1 Cable connection

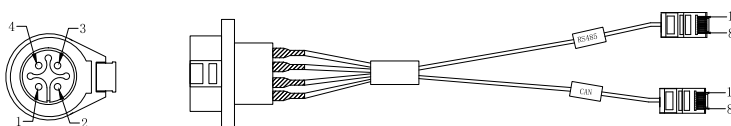


Anderson connector is used on the DC input side of the battery energy storage system. The specific connections are as follows:

NO.	Terminal	Cable diameter	Length	Description
A	Anderson/SC25-8	25mm ²	1-3m	Used for connection between battery and inverter
B	Anderson	25mm ²	1-3m	For battery parallel connection

4.2 Communication line connection

4.2.1 CAN/RS485 Communication point definition for inverter connection



Communication	Terminal_PIN	8P8C_PIN
RS485_B	1	1
RS485_A	2	2
CANL	3	4
CANH	4	5

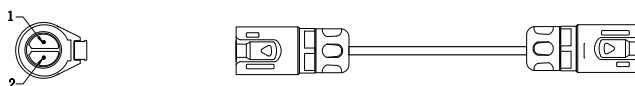
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4.2.2 RS232 Communication point definition



PIN	RS232
1	RX
2	TX
3	GND

4.2.3 RS485 Communication point definition

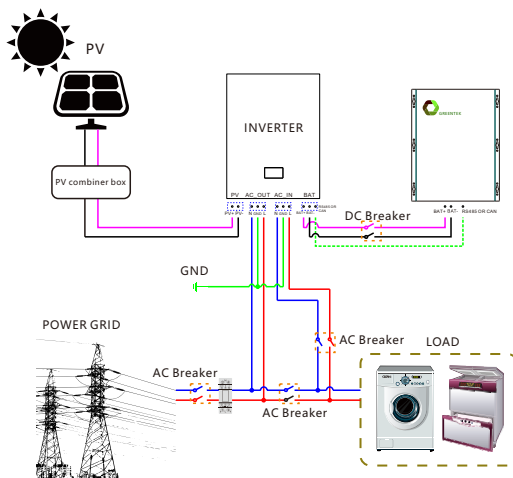




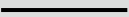



PIN	RS485
1	RS485_B
2	RS485_A

Explanation

- ♦ RS232 communication: Used to establish communication between the battery BMS tools and computer to monitor and manage configurations of the battery.
- ♦ RS485 / CAN communication: Used to establish communication between the battery and inverter.
- ♦ RS485 communication: Additional two RS485 interfaces are used to establish communication among parallel battery packs. Addresses PIN: 1 - 15.
- ♦ Different inverters have communication protocols with different pin definitions. Please pay due attention while connecting the inverter with the battery pack through communication line.

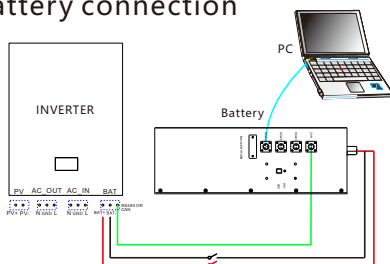
4.3 System connection diagram



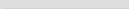
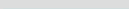


Cable color	Description	Cable color	Description
	DC positive wire		Live Wire
	DC negative wire		Naught wire
	Ground wire		Communication line

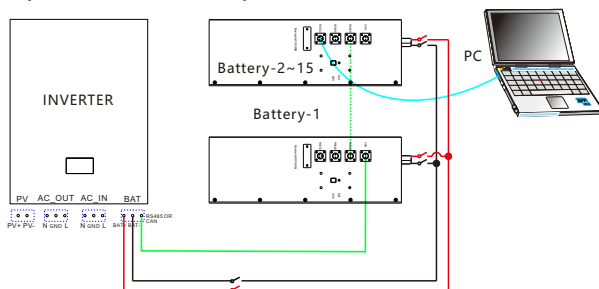
4.4 battery connection

4.4.1 Single battery connection




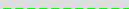



Cable color	Description	Cable color	Description
	DC positive wire		RJ45 Communication Line RS485/CAN communication
	DC negative wire		RJ11 Communication Line

4.4.2 Multiple batteries in parallel



















The power lines between each battery are the same length(insert DC Breakers between the parallel batteries)

Cable color	Description	Cable color	Description
	DC positive wire		RJ11 Communication Line
	DC negative wire		Parallel Communication line
	RJ45 Communication Line RS485/CAN communication		

Explanation

- ♦ The maximum number of batteries can be connected in parallel is 15pcs.
After parallel connection, the address of ADS needs to be assigned,
as shown below:

Address	Dial switch				Remark	
	#1	#2	#3	#4		
0	OFF	OFF	OFF	OFF		
1	ON	OFF	OFF	OFF		Battery PACK1(Main PACK)
2	OFF	ON	OFF	OFF		Battery PACK2
3	ON	ON	OFF	OFF		Battery PACK3
4	OFF	OFF	ON	OFF		Battery PACK4
5	ON	OFF	ON	OFF		Battery PACK5
6	OFF	ON	ON	OFF		Battery PACK6
7	ON	ON	ON	OFF		Battery PACK7
8	OFF	OFF	OFF	ON		Battery PACK8
9	ON	OFF	OFF	ON		Battery PACK9
10	OFF	ON	OFF	ON		Battery PACK10
11	ON	ON	OFF	ON		Battery PACK11
12	OFF	OFF	ON	ON		Battery PACK12
13	ON	OFF	ON	ON		Battery PACK13
14	OFF	ON	ON	ON		Battery PACK14
15	ON	ON	ON	ON		Battery PACK15

- ♦ The inverter only needs to communicate with the host (Pack1).
- ♦ When multiple batteries are connected with multiple inverters, it is best to connect through the combiner box. If it is not connected through the combiner box, the wiring shall be confirmed with the manufacturer. Cables from each battery to the inverter remain the same length.

Notice

- ♦ Batteries are not allowed to be connected in series.
- ♦ Batteries of different chemistries, designs, batches and technical parameters can not be bundled and used together.
- ♦ Please note that Enclosure does not require additional grounding.

5.System tuning

5.1 Check before power ON

NO.	Inspection items	Acceptance criteria
1	Battery is installed in right location	The installation is correct, firm and reliable.
2	Reasonable cable layout	The cable layout is reasonable to meet the user's and regulatory requirements.
3	Beautiful binding of cable ties	The cable ties shall be uniform and no sharp corners shall be left at the cut.
4	Disconnect switch	"DC switch" and all switches connected to the battery are in "off" state.
5	Accuracy in cable connections	The DC input line, energy storage line and signal line are connected correctly, firmly and reliably.
6	Unused terminals and interfaces	Install insulating tape on unused terminals and interfaces.
7	The installation environment meets the requirements	The installation area is reasonable, clean and tidy, and there is no construction residue.

After the inspection, press and hold the RST key (3 ~ 6S) and release it, the protection board will be activated automatically.

5.2 Battery function description

5.2.1 Buzzer action description

NO.	Mode	Description
1	Fault	Beep 0.25S every 1S
2	Protection	Beep 0.25S every 2S (except over voltage protection)
3	Alarm	Beep 0.25S every 3S (except over voltage alarm)



Explanation

The buzzer function can be enabled or disabled by the computer. It is disabled by default.

5.2.2 RST key description

NO.	Mode	Description
1	Fault	BMS is in Sleep state. Press the key for 3-6s and release. Protection board is activated.
2	Dormancy	BMS is in the active state. Press the key (3 ~ 6S) and release , the protection board is dormant.
3	Reset	BMS is active. Press the key (6 ~ 10s) and release it, the protection board is reset.

Explanation

After the BMS is reset, it still retains the parameters and functions set by the computer. If initial parameters need to be restored , it can be realized by selecting the "restore default value" from the computer, the relevant operational record and stored data remain unchanged (such as power, cycle times, protection records, etc.).

5.2.3 Sleep, Wake Up and Shut Down

Sleep:

When any of the following conditions occurs, the system enters into the low power consumption mode:

- ◆ Single or overall over discharge protection is not released within 30 seconds.
- ◆ Press the RST key for 3 - 6S and release.
- ◆ The minimum monomer voltage is lower than the sleep voltage, and the duration reaches the sleep delay time (no communication, no protection, no balance and no current).
- ◆ The standby time exceeds 24 hours (no communication, no charge and discharge, no mains power).
- ◆ Forced shutdown by computer software.

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Notice

To enable forced sleep mode, ensure that the input terminal of the battery is not connected with external charger or inverter, otherwise it will not be able to enter into the low power consumption mode.

Wake up:

When the system is in the low power consumption mode and meets any of the following conditions, the system will exit the low power consumption mode and enter into the normal operation mode:

- ◆ Connect the charger, and the output voltage of the charger shall be greater than 48V.
(the battery voltage of 16 strings needs to be greater than 51.2V)
- ◆ Press the RST key for 3 - 6S and release.
- ◆ Activation of RS232 interface.

Notice

When the battery enters into Sleep mode due to single or overall over discharge protection, automatic Wake up triggers regularly in every 4 hours and switch the battery to normal operation mode. If automatic Wake up fails to enable regular operations of the battery for 10 consecutive times, press RST key for 3 to 6S, and release.

Shut Down:

Apart from the Sleep mode conditions, the battery can be fully shut down anytime by forcefully turning off the BMS software tools through the computer. The battery can be made inactive (switched off)

- by turning off the DC breaker/ switch
- by unplugging the input Anderson plug from the battery.

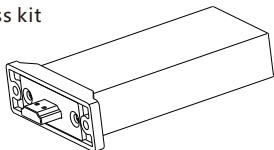
5.3 wireless kit(Optional)

The wireless kit can be either of the following three modules:

- ◆ Bluetooth
- ◆ WIFI
- ◆ GSM

Customers can confirm their module preferences while placing order.

Drawing outline of the wireless kit

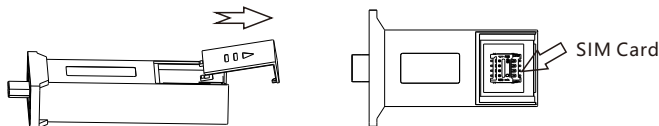


How to connect the wireless kit:

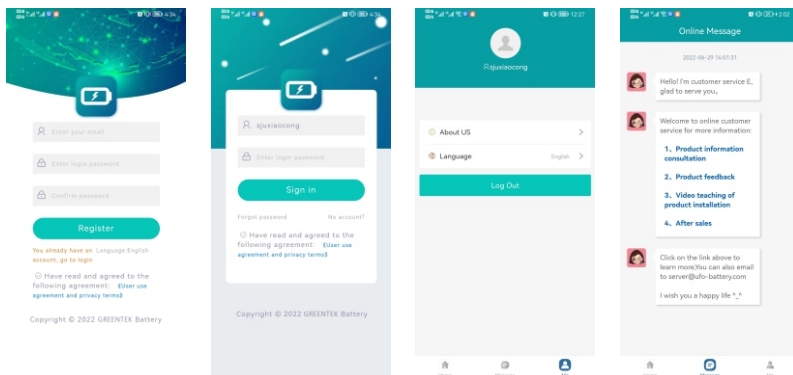
- ◆ Insert the module into the external wireless kit port, download the wireless kit app, install the app, and register the account.
- ◆ Select the module and turn it ON. Click Add Device.

Explanation

- ◆ The maximum connection range of Bluetooth is 12 meters.
- ◆ GSM needs to be plugged in the corresponding SIM card and use network services. The installation method of SIM card is shown in the figure below:

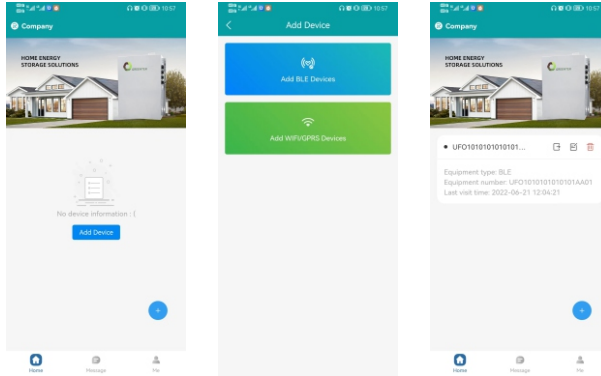


App interface description and operation steps



Download and Open the Mobile App "GREENTEK MONITOR" in your Android Mobile Phone. Link can be found from the Techplus website: www.techplussolutions.com.au.

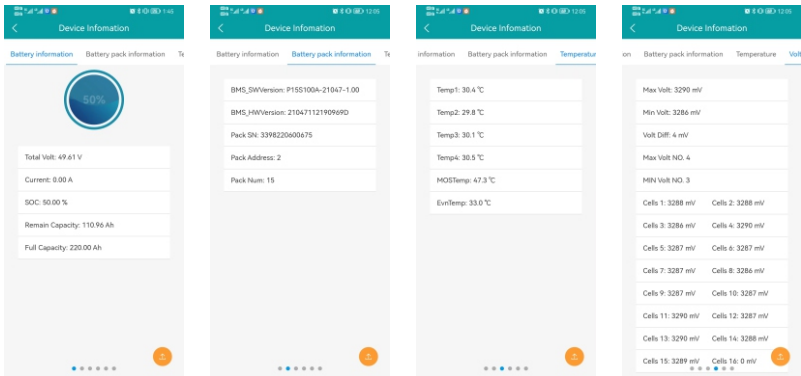
- ♦ User registration : Click "NO account?", Register account.
- ♦ Login account: after entering the account name and password, click "sign in" to login the account.
- ♦ Customer service: click "message" below to communicate with customer service.
- ♦ Switch languages: click "me" at the bottom right to switch languages.



Add device

Click "home" in the lower left corner of the app to switch to the add product module.

- ♦ Click "Add Device" or "+" to add products.
- ♦ Please refer to the wireless module operation manual for the specific connection method.



Click the connected battery to view the following information:

Battery information

- ♦ You can view the relevant information of battery voltage, working current and capacity.

Battery pack information

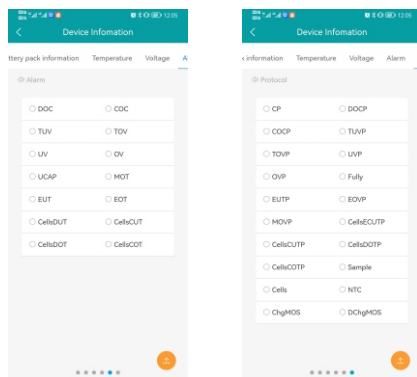
- ♦ You can view the number information of battery accessories.

Temperature

- ♦ You can view the temperature information of each part of the battery.

Voltage

- ♦ You can view the information about the cell voltage.



Alarm

♦ You can view battery alarm related information.

NO.	Items	Description	NO.	Items	Description
1	DOC	Discharge over current alarm	8	MOS OT	MOS High temperature alarm
2	COC	Charge over current alarm	9	EUT	Low environment temperature alarm
3	TUV	Total over discharge alarm	10	EOT	High environment temperature alarm
4	TOV	Total over charge alarm	11	DUT	Discharge low temperature alarm
5	UV	Cell over discharge alarm	12	CUT	Charge low temperature alarm
6	OV	Cell over discharge alarm	13	DOT	Discharge high temperature alarm
7	USOC	Low SOC alarm	14	COT	Charge high temperature alarm

Protection

♦ You can view information about battery protection.

NO.	Items	Description	NO.	Items	Description
1	CP	Short Circuit Protection	12	DUTP	Discharge low temperature protection
2	DOCP	Discharge over current protection	13	CUTP	Charge low temperature protection
3	COCP	Charge over current protection	14	DOTP	Discharge high temperature protection
4	TUVP	Total under voltage protection	15	COTP	Charge high temperature protection
5	TOVP	Total over voltage protection	16	PCB	PCB Protection
6	UVP	Cell over discharge protection	17	Sample	Sample Protection
7	OVP	Cell over voltage protection	18	Cells	Battery Cells Protection
8	Fully	Fully protection	19	NTC	NTC Protection
9	EUT	Low environment temperature protection	20	chg MOS	Charge MOS protection
10	EOT	High environment temperature protection	21	dhg MOS	Discharge MOS protection
11	MOS OT	MOS High temperature protection			

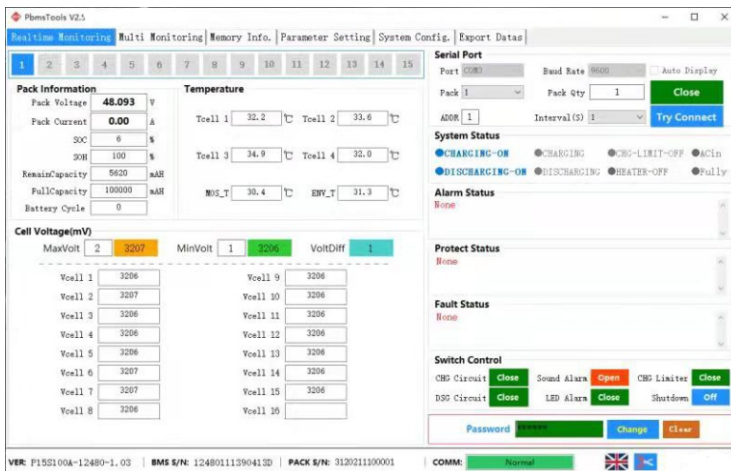
6. Battery Monitoring and Configuration Management using Personal Computer (PC)

6.1 Software running environment

The software runs on PC and it is compatible with Windows operating system. The system environment requires the support of Microsoft .Net Framework version 2.0 or above. Please confirm that it has been installed before use. The installation is as follows:



- ◆ Download Microsoft .Net framework
- ◆ Double click the downloaded program to install it
- ◆ This software does not need to be installed independently, but only needs to meet the environment. Download or Save a copy of BMS Software tools in the PC and double click the PbmsTools icon to run it.



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6.2 Connect the computer

- ◆ Ensure that the BMS board is powered ON (not in sleep state), with the correct ADS address setting and communication cable connected between battery and PC.
- ◆ Start the computer Software.
- ◆ Click the "try to connect" button to search the serial port to try to connect. Or manually select the serial port and click the "open serial port" button link.

Explanation

If connection fails, the following could be the reasons:

- ◆ Using wrong host computer.
- Solution: Use a computer with right configurations.

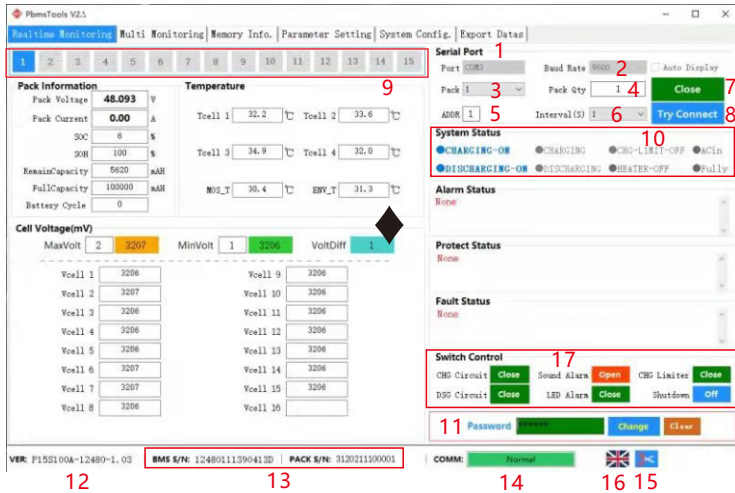
- ◆ Poor communication line or wrong wiring
Solution: replace the communication line or correct the wrong wiring.
- ◆ The computer USB interface is not recognized
Solution: change the USB interface
- ◆ Driver not installed:
Solution: install the driver corresponding to the communication line.

Method for checking whether the communication line driver has been installed:

- ◆ Check whether there is a relevant COM port in the "serial port" from the drop-down of the computer. If it is not found, it may not be installed.
- ◆ Press the Windows key and R key at the same time to open the [run] window, enter the devmgmt.msc command, and open the [device manager].

6.3 Interface function

6.3.1 Real time monitoring



NO.	Item	Description
1	Serial port	Serial port: you can select the drop-down item to select the serial port to communicate. (Note: available when the serial port is not opened)
2	Baud rate	Baud rate: you can select the drop-down item to select the baud rate of communication. (Note: available when the serial port is not opened)
3	PACK	Pack: the drop-down item can be selected. When FF is selected, access the RS232 interface of the host to obtain all pack data. (Note: available when the serial port is not opened)
4	PACK QTY	Number of packs: the total number of packs read by the upper computer from the BMS board (when applied to multiple computers in parallel, the pack data is obtained from the main pack).
5	ADDR	Address: the currently read BMS address value.
6	Intervals	Interval (seconds): optional. The interval between the upper computer reading data from the BMS board.
7	Close	Turn on the serial port: turn on or off the serial port by alternating the function buttons.

NO.	Item	Description
8	Try connect	Try to connect: search for available serial ports and open them.
9	Pack serial number group	The data key, which is the package serial number, displays the package being read and presented on the current interface with white words on a blue background; "Auto" key, alternate function buttons. Available when FF is selected for pack in 3 and monitoring is started, i.e. each pack data is displayed automatically in cycle (when applied to multiple machines in parallel).
11	Administrator password column	Some setting functions can only be used after entering the administrator password. When the password is entered correctly, the input box will turn green. At this time, you have obtained the authority of the administrator.
12	Version	software version number of BMS.
13	S/N	Barcode and pack s / N of BMS board.
14	Monitor communication status	Communication status between upper computer and BMS board.
15	Screenshot function	Click to enter the screenshot status, and the toolbar will appear after marking out the screenshot area with the mouse.
16	Flag Icon	Displays the flag icon of the current language country. Click to switch languages.
17	Switch control	When the button is red, it indicates that the function processing is off, and when it is green, it indicates that it is on.

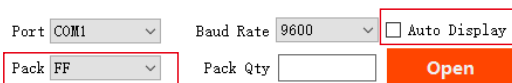
Explanation

◆ Try to connect:

First set the baud rate and pack on the upper computer, connect the BMS board with the RS232 communication line, then insert the USB interface of the RS232 communication line into the USB port of the computer, and then click the "try to connect" button to automatically search and open the effective serial port.

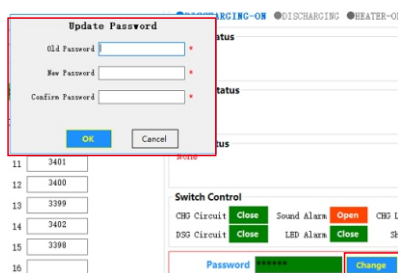
◆ Automatic rotation pack:

When FF is selected in the "pack" drop-down item, the "rotation" check box in the interface becomes available. Check it to use the rotation function. Uncheck it to cancel the rotation function.



◆ Change Password:

Click the "Change" button at the bottom right of the interface to pop up the password modification window. Enter the old password and the new password and then confirm. Note: there is no function to retrieve the password. Please remember the modified new password.

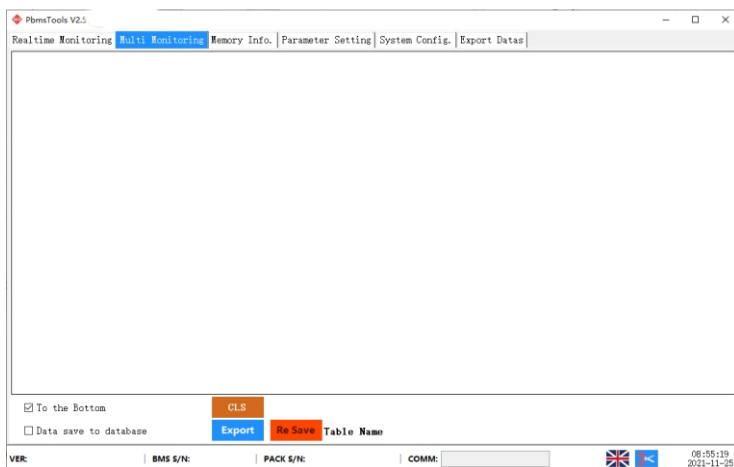


- ◆ Get administrator privileges:
Enter the administrator password in the "administrator password" input box at the bottom right of the interface. After correctly entering the password, the input box turns green. At this time, you have obtained administrator permission.



6.3.2 Monitoring and Managing Batteries in Parallel Connections

- ◆ Interface:
Click the main interface tab [Multi Monitoring] to enter the interface.



- ◆ To the Bottom:
Check "To the Bottom" at the bottom left to display the monitored real-time data in the data area. Note: this function only displays the data on the interface, and the data has not been saved.
- ◆ Clear interface data:
Click the button "CLS" to clear the real-time data on the interface.
- ◆ Record data
Check "Data save to database" to start recording data. When there is data recording, the number of saved data will appear on the right.
- ◆ Export data
Click the "Export" button to export the recorded real-time data. You can also export on the export data page.

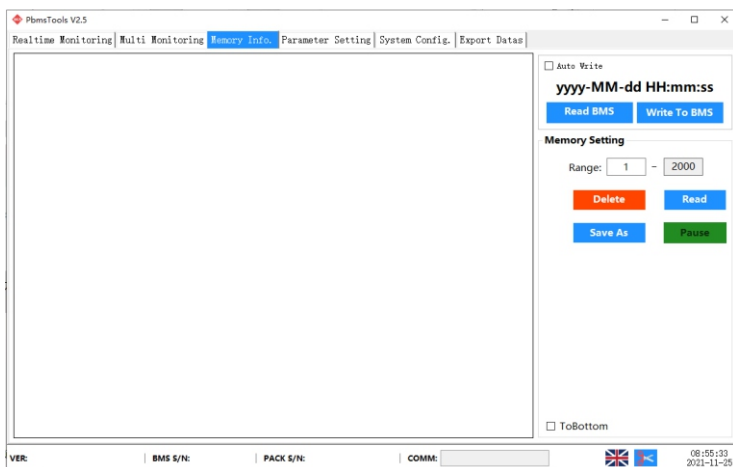
6.3.3 Store information.

- ◆ Interface:
Click the main interface tab [Memory Info.] to enter the interface.
- ◆ Read / write BMS time:
Click the "Read BMS" button on the upper right to read the BMS time.
Click the "Write To BMS" button on the upper right to write the BMS time.
- ◆ Storage settings:
Range: start sequence number and maximum sequence number.
Read records: read stored records.

Pause / continue: when reading, click "pause" to read, and then click again to continue reading.

Save record: save the record on the interface to local.

Delete record: delete the storage record of BMS board.



Explanation

When reading, the prompt "no more data" indicates that the reading has been completed.

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6.3.4 Parameter setting

◆ Interface:

Click the main interface tab [Parameter Setting] to enter the interface.



◆ Function:

Read parameters: read all parameters in the interface.

Write parameters: overwrite BMS parameters. This operation requires administrator privileges.

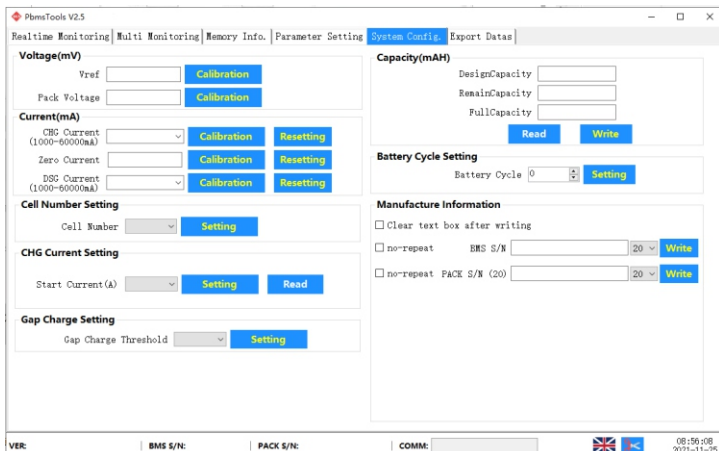
Restore default parameters: restore all parameters to the default parameters. The default parameters are from the preset parameters in BMS. This operation requires administrator privileges.

Import parameters: read the data in the local file into this interface. Note: the data is only read on the interface and has not been written into the BMS. If you need to write, please execute the write operation.

6.3.5 System settings

◆ Interface:

Click the main interface tab [System Config.] to enter the interface.



◆ function:

Just follow the interface prompts. Some function operations require administrator privileges.

6.3.6 Export data

After checking "record data" on the [parallel monitoring] page, the recorded data can be exported on this page. The table is named after the starting time point of the record. The data can be saved for up to two months, and the expired data will be automatically cleared. You can double-click the table name to export data.



6.4 Replacing inverter protocol on battery BMS(Optional)

Software running environment

This function can only be realized by installing the protocol conversion board. Before using this function, please confirm whether the protocol conversion board is installed on this battery.

This software does not need to be installed independently, but only needs to meet the environment. Double click the main program icon to run it.

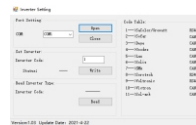
- ◆ Connect the computer to the battery via the USB-RS485 communication cable.



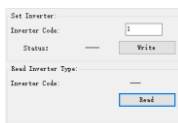
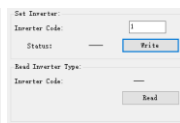
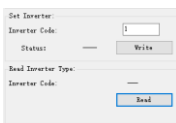
- ◆ Setting for DID.



- ◆ Click to open the Inverter software on the PC.
- ◆ Select the right serial port.



- ◆ Click the "Read" button to read the current inverter code.
- ◆ Click the "Write" button the inverter code that you need.
- ◆ Click the "Read" button to read the inverter code again, and confirm whether the operation was successful or not.
- ◆ Reference table of different inverter code.



Code Table:		
1	→SaCuler/Growatt	RS485
2	→Sofar	CAN
3	→Beye	CAN
4	→Gooden	CAN
5	→Lux	CAN
6	→Sallis	CAN
7	→SMA	CAN
8	→Greentek	RS485
9	→Victron	RS485
10	→Victron	CAN
11	→Solark	CAN

7. Maintenance and replacement

- ◆ Please maintain the equipment when you are familiar with and understand the contents of this manual and have appropriate tools and test devices.
- ◆ Before carrying out maintenance work, please power down the equipment first, then follow the instructions of the delayed discharge label and wait for the corresponding time to ensure that the equipment has been powered down.
- ◆ During maintenance, please try to avoid irrelevant personnel entering the maintenance site, and temporary warning signs or fences must be erected for isolation.
- ◆ If the equipment fails, please contact your dealer in time.
- ◆ The equipment can be powered on again only after the fault is handled, otherwise it may cause fault expansion or equipment damage.
- ◆ Do not open the cover plate without authorization, otherwise there will be a risk of electric shock, and the resulting failure does not belong to the scope of warranty.
- ◆ Operation and maintenance personnel and professional technicians shall be fully trained in safe use and equipment maintenance, and shall operate with sufficient preventive measures and personal protective equipment.
- ◆ Battery maintenance shall be performed or supervised by personnel familiar with the battery and its required precautions.
- ◆ After the maintenance operation, check immediately to ensure that no tools or other parts are missing in the equipment.

8. Battery storage requirements

- ◆ When the battery is stored, it shall be placed correctly according to the identification of the packing box, and shall not be placed upside down or on the side.
- ◆ When the battery packing box is stacked, it shall meet the stacking requirements on the outer package.
- ◆ The battery shall be handled with care, and it is strictly prohibited to damage the battery.
- ◆ Storage environment requirements:
 - a. Ambient temperature: $-10^{\circ}\text{C} \sim 55^{\circ}\text{C}$, recommended storage temperature: $20^{\circ}\text{C} \sim 30^{\circ}\text{C}$.
 - b. Relative humidity: 35% RH ~ 85% RH.
 - c. Dry, ventilated and clean.
 - d. Avoid contact with corrosive organic solvents, gases and other substances.
 - e. Avoid direct sunlight.
 - f. The distance from the heat source shall not be less than two meters.
- ◆ When the battery is stored, it must be disconnected from all charging or discharging devices, and other peripheral equipment and accessories.
- ◆ The battery can be stored comfortably for 6 months if storage temperature is within -20 to $+25$ degree centigrade. If storage temperature varies from -20 to $+45$ degree centigrade, its performance shall be checked in every 30 days and take protective measures where necessary. As a rule of thumb, the stored batteries should be charged in every 3 months under normal storage environment.
- ◆ When the stored batteries are shipped, the principle of first in first out shall be followed.

- ◆ Battery maintenance shall be performed or supervised by personnel familiar with the battery and its required precautions.
- ◆ After the battery production test is completed, it needs to be supplemented to 30-50% SOC at least before storage.

9. Warranty products

Requirement:

During the warranty period, the company requires customers to provide invoices and dates for purchasing products. At the same time, the trademark on the product shall be clearly visible, otherwise the company reserves the right not to provide quality assurance. The replaced products shall be handled by the company, and the customer shall leave a certain time for the company to deal with the faults.

10. Exemption from liability

The company reserves the right not to provide quality assurance under the following circumstances:

- ◆ Beyond the free warranty period.
- ◆ Incorrect installation, modification or use.
- ◆ Operate in very harsh environments beyond those described in this manual.
- ◆ Failure due to damage caused by unauthorized installation, repair, change or disassembly.
- ◆ Failure due to damage caused by the use of non-standard components or software.
- ◆ Any installation and use beyond the scopes specified in the local and international Standards and Best Practice Guides.
- ◆ Damage caused by abnormal natural environment.

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