



PRODUCT MANUAL

Lithium iron phosphate battery,
ferrous lithium or LiFePO_4

51.2V100AH





LEGAL GUARANTEES

In accordance with Law 1480 of 2011 Consumer Statute and Decree 735 of 2013 of Legal Guarantee:

- To request a guarantee, the customer is obliged to report the damage to the product, make it available to the company at the guarantee service point at AV CL 80 69 70 Unit 1C, and indicate the invoice number to determine its date of purchase.
- The delivery of the repaired product will be delivered to the customer at the warranty service point, unless the customer requests to send it to a different destination, in which case the customer must assume the cost of freight.
- In any case, when a product repair guarantee is denied or approved, the respective written report must be issued supporting the evidence that justifies the decision.
- In no case will Tb Plus Energy proceed with the replacement of the product given under warranty since, if the repair does not proceed, a credit note will be issued which covers the acquisition of another new product or service or the return of the money paid.
- If the failure repeats once the product has been repaired, only the credit note applies, which covers the acquisition of another new product or service or the return of the money paid.
- When the customer opts for a refund of the money, it will be for the amount of the sale price. For this purpose, they must send a communication signed by the legal representative, which indicates the bank details to make the return, the which will be effective within fifteen (15) business days after receipt of the return request.
- The repair of the product will be carried out within 30 business days following the claim, which is carried out by filling out the GP-F-018 Warranty Form, which is completed in the PQRF Guarantees tab on the WEB page www.tbplusenergy.com or at the following link:
https://forms.office.com/Pages/ResponsePage.aspx?id=K987JK0Nuke_1n30RF9URwiKWAfZovhDrWEVYGmhK95UOVZYUFBWMUpaQVZBM0hIS0RKUjdLSkdIWS4u
- Once the guarantee form has been completed, the client has 15 days to make it available at the guarantee service point.
- The product manuals in which proper use, installation instructions and periods covered by the warranty are reported are found in the PQRF Product manuals tab on the website www.tbplusenergy.com.

Warranty

- Tb Plus Energy guarantees that each product is free of defects in materials and manufacturing, and offers a guarantee for a period of **60 months** from the purchase of the product.

Note: All our batteries communicate with the main inverter brands that are distributed in Colombia.

1 INTRODUCTION

Product description

- Ferrous lithium battery (LiFePO4) based on very high quality square cells.
- 51.2V100AH 5120WH -Lifespan@80%DOD greater than 6000 cycles.
- Expected duration greater than 15 years.
- 5 year warranty extendable to 10 years.

Properties

- High energy density.
- High resistance to high temperatures and humidity.
- Good charging efficiency at high temperatures.
- Electronically regulated temperature management by BMS.
- High energy retention.
- Superior useful life.
- Integrated electronics.
- High security: Built-in protection functions.
- Quality certificate.
- Simple installation.
- Greater care for the environment and less pollution.

Advantages

- Easy installation and connection between several batteries (up to 15 modules).
- High charging currents that shorten charging times.
- High discharge currents allowing them to be connected in series.
- High efficiency between charging and discharging, with very little energy loss.
- Greater continuity of current available.
- Easy installation.
- Thanks to the BMS (Battery Monitoring System) there is protection for each of the cells and therefore the battery. It performs individualized monitoring of the voltage of each of the cells, charging and discharging, as well as the system temperature. Based on the information found, adjustments are made to have a perfect balance and guarantee the longest useful life of the system.

2 IMPORTANT: SAFETY MEASURES AND TIPS

2.1 General rules

- Follow these instructions and keep them safe for future reference. Any work carried out on the Tb Plus Energy® battery must be carried out exclusively by qualified personnel.
- Protective clothing and glasses should be worn when working on the battery.
- Avoid contact of the battery with water or any other liquid or gas.
- Avoid high temperatures. Store and install the battery in a cool, dry place.
- Do not attempt to open or disassemble the battery. The electrolyte is very corrosive. Under normal working conditions, it is impossible to come into contact with the electrolyte. If the battery case is damaged, do not touch the electrolyte or the powder it contains as it is corrosive.
- In case of a massive escape, leave the area immediately.
- Splashes of battery materials, such as dust or electrolyte, on the skin or in the eyes should be rinsed immediately with plenty of clean water. Next, medical assistance must be requested. Spills on clothing should be cleaned with water.
- Danger of explosion and fire. The Lithium battery terminals always have current, so no objects or tools should be placed on it. Avoid short circuits, too deep discharges and too high charging currents. Use insulated tools. Do not wear any metal objects, such as watches, bracelets, etc. In the event of a fire, a type D foam or CO2 extinguisher should be used, never water.
- In case of risk of fire, take the battery to a safe place without risk of spreading or harming third parties.
- Ferrous Lithium batteries are very heavy. If present in an accident, they can become a projectile. Make sure it is securely fastened and always use appropriate handling equipment for transport. Handle them with care, as the batteries are sensitive to shock.
- If charged after being discharged below the Discharge Cut-Off Voltage, or if damaged or overcharged, the battery may release a harmful mixture of gases, such as phosphate.
- Failure to follow the instructions for use, repairs carried out with non-original parts or by unauthorized personnel will void the warranty.
- Be especially careful in especially humid environments such as boats or places very close to the sea, lakes or other large bodies of water. In these places it is especially important to be able to ventilate the environment periodically; it is also important to place an anti-humidity component such as silica.

Damaged batteries may leak electrolyte or produce flammable gas.

In case a damaged battery requires recycling, you must follow local recycling regulations (Regulation (EC) No 1013/2006 for the European Union) to process and use the best available techniques to achieve relevant recycling efficiency.

For any product quality or recycling issues, please contact Tb Plus Energy® at www.tbplusenergy.com.

2.2 Transportation warnings

- The Tb Plus Energy® battery must be transported in its original packaging or equivalent and in a horizontal position.

If the battery is in its packaging, use padding to prevent damage.

Do not get under a battery while it is being lifted. Never use the terminals to lift the battery, only use the handles.

Batteries are tested according to the UN Manual of Tests and Criteria, part III, subsection 38.3 (ST/SG/AC.10/11/Rev.5).

- For transport, batteries belong to category UN3480, Class 9, Packing Group II and must be transported in accordance with this regulation. This means that they must be packaged for land or sea transport (ADR, RID & IMDG) according to packaging instructions P903 and for air transport (IATA) according to instructions P965. The original packaging meets these regulations.

2.3 Disposal of batteries

- Batteries marked with the recycling symbol must be disposed of through an accredited recycling agency. They can also be returned to Tb Plus Energy® or its authorized distributor by agreement. Batteries must not be mixed with domestic or industrial waste.

3

GENERAL INFORMATION ABOUT PHOSPHATE BATTERIES IRON AND LITHIUM

Lithium iron phosphate (LiFePO₄) batteries are the safest batteries on the market.

3.1 Resistance

A lead-acid battery will fail prematurely due to sulfation if:

- Operates in deficit mode for long periods of time (that is, if the battery is rarely or never fully charged).
- If it is left partially discharged or, even worse, completely discharged.

A ferrous lithium battery does not need to be fully charged. This is a decisive advantage of these batteries compared to lead-acid ones.

Other advantages are the wide working temperature range, excellent cyclic performance, low internal resistance and high efficiency (see below).

The chemical composition of Tb Plus Energy® ferrous lithium batteries are the right choice for very demanding applications.

3.2 High efficiency

In several applications (especially off-grid, solar and/or wind applications), energy efficiency can become of crucial importance.

The full cycle energy efficiency (discharge from 100% to 0% and charge back to 100%) of a normal lead-acid battery is 80%.

The full cycle efficiency of a ferrous lithium battery is 92%.

The charging process of lead-acid batteries becomes particularly inefficient when the 80% state of charge is reached, resulting in efficiencies of 50% or even lower in solar systems where reserves for several days are needed (batteries running between 70% and 100% load).

In contrast, a ferrous lithium battery will still achieve 90% efficiency under mild discharge conditions.

3.3 Correlation energy, size and weight.

Thanks to a high degree of energy density, Tb Plus Energy® ferrous lithium batteries save up to 70% space and 70% weight.

3.4 Great flexibility

Ferrous lithium batteries are the easiest to charge on the market. They do not need to be fully charged. Therefore, multiple batteries can be connected in parallel and no damage will occur if some batteries are more charged than others.

However, it is very important to connect completely new batteries and not mix batteries that have had different numbers of life cycles used. That is, do not connect new batteries and used batteries, or used batteries with different usage times, together, as it will negatively influence the service life of the product.

3.5 BMS (Battery Monitoring System)

- A ferrous lithium cell will fail if the voltage across it drops below its limit.
- A ferrous lithium cell will fail if the voltage across it increases above its limit.
- The battery cells do not self-balance at the end of the charge cycle.

The cells in a battery are not 100% identical. Therefore, at the end of a cycle, some cells will be fully charged or discharged before others. The differences will increase if the cells are not routinely balanced/equalized.

In other storage technologies, even after one or more cells have been fully charged, a small amount of current will continue to flow (the main effect of this current is the decomposition of water into hydrogen and oxygen). This current helps to fully charge those cells that are not yet fully charged, thus equalizing the state of charge of all cells.

However, the current passing through a ferrous lithium cell when fully charged is almost zero, so lagging cells will not finish fully charging.

Over time, the differences between cells can become so significant that, even when the overall battery voltage is within limits, some cells will fail due to over- or under-voltage. Therefore, cell balancing is highly recommended.

This balancing function is one of the main functions of the BMS, so this system is essential to avoid damage to large battery banks. In addition to this function, the BMS also:

- It will prevent undervoltage in the cells by disconnecting the load when necessary.
- It will prevent overvoltage in the cells by reducing the charging current or stopping the charging process.
- It will shut down the system in case of overheating.
- Short circuit detection.

Important warning

Batteries can be damaged due to excessive discharge or charging. Damage from overdischarge can occur if small loads (e.g. alarm systems, relays, standby current from certain loads, current drain by battery chargers or charge regulators) slowly discharge the battery when the system is not in use.

If there is any doubt about possible residual current draw, isolate the battery by opening the battery switch when the system is not in use and perform checks.

Residual discharge current is especially dangerous if the system has been completely discharged and a low voltage trip has occurred in the cells. After the disconnection caused by the low voltage in the cells, there is still a reserve of 1Ah in the battery per battery of approximately 100Ah capacity. The battery will be damaged if the remaining capacity reserve in the battery is removed. A residual current of 10mA, for example, can damage a 200Ah battery if the system is left in a discharged state for more than 8 days.

4 INSTALLATION

Batteries must always be installed in a horizontal position.

4.1 Connections

- In series: Batteries CANNOT be connected in series.
- In parallel: Up to 15 batteries can be connected in parallel.

4.2 Short circuit protection

When installing a single battery or connected in parallel with devices such as solar inverters, a safety relay must be installed.

4.3 Before using

At the time of shipment, the batteries are charged to approximately 30%.

When charging batteries connected in parallel, the voltage of the batteries or cells with the highest initial state of charge will reach full charge sooner, leaving behind the batteries or cells with a lower initial state of charge. This could result in overvoltage of the batteries or cells plus with the highest initial state of charge, thus causing the BMS to interrupt the charging process.

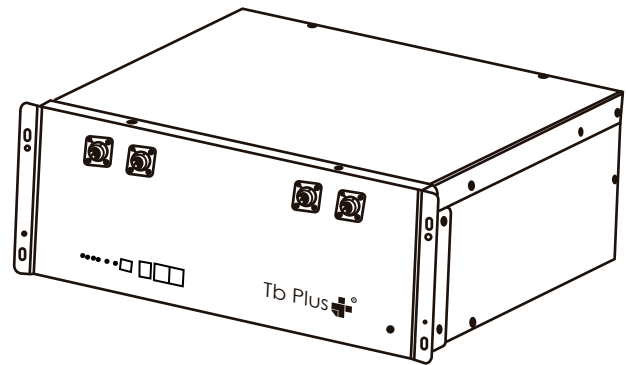
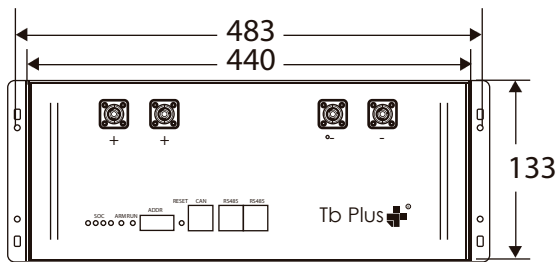
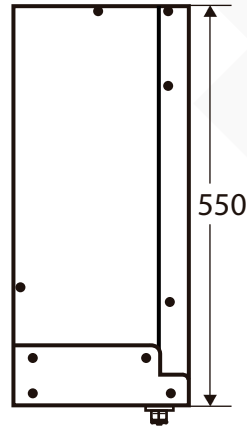
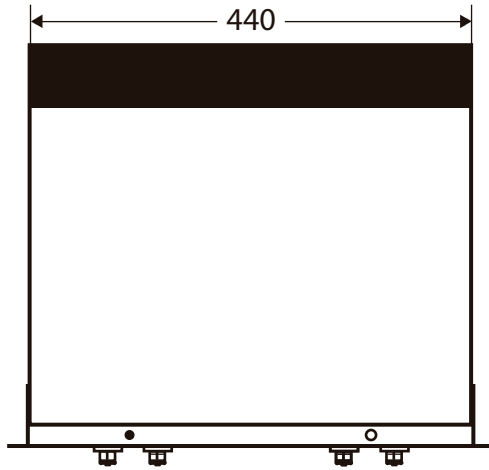
This is why at Tb Plus Energy® we strongly recommend that new batteries be charged to a value of 100% before including them in a parallel configuration.

This can be done by charging the batteries individually at a low rate with a charger or power supply according to the charging values indicated in the data sheet. To completely balance the cells, it is recommended to add an absorption period of several hours at the voltage recommended in the technical sheet.

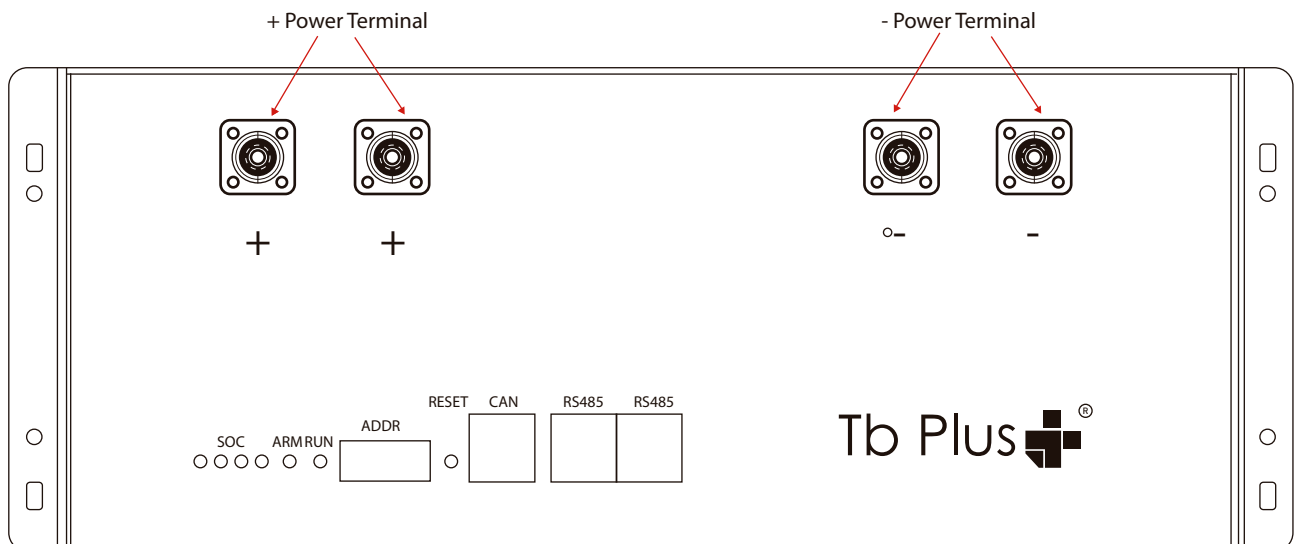
5 TECHNICAL VARIABLES

TECHNICAL DATA SHEET 51.2V100AH	
Reference	TB-48100S3
Composition	LiFePO4
Rated voltage	51.2V
Internal resistance	≤30mΩ
Rated capacity	100AH
Rated power	5120Wh
Self discharge rate	≤3.5% monthly
Useful life (@25°C, 80% DOD)	≥6000 cycles
Parallel connected battery function	Max 10 groups in parallel, recommended for less than 6 groups
Recommended charging voltage	56.0 - 57.6V
Recommended charging current	50A
Maximum charging current	100A
Discharge cut-off voltage	44.8V
Recommended discharge current	50A
Max continuous discharge current	100A
Width	440mm
Depth	550mm
Height	133mm
Total width	483mm (19" Rack mounted type)
Weight	Aprox 46kg
Communication interface	R485/CAN
Charging temperature	0°C a 45°C (32°F a 113°F)
Discharge temperature	-20°C a 60°C (-4°F a 140°F)
Storage temperature	0°C a 45°C (32°F a 113°F)
Safety standard	UN38.3 (battery)
Water and dust resistance	IP30

6 DIMENSIONS



7 BASIC OPERATION



ON/OFF

On/off button.

SOC

Indicates the current battery capacity level.

RUN

When lit, it indicates that the battery is in operational mode.

ALM

When the red LED is on, it indicates that the battery is under protection. If the light flashes it indicates an alarm.

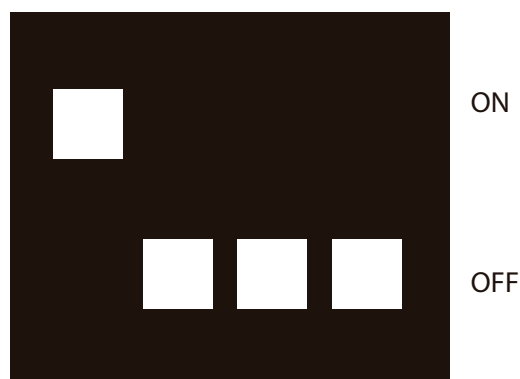
LED indicator

STATUS	CONDITION	RUN	ALM	LED INDICATOR			
Stand by	Operational	Flash 1	OFF	Module capacity			
	Warning	Flash 1	Flash 3				
Charge	Operational	OFF	OFF	Module capacity (Flash 2 to Maximum capacity)			
	Warning	OFF	Flash 3				
	Overload protection	OFF	OFF	OFF	OFF	OFF	OFF
	Temperature, overcurrent, protection disabled	OFF	OFF	OFF	OFF	OFF	OFF
Discharge	Operational	Flash 3	OFF	Module capacity			
	Warning	Flash 3	Flash 3				
	Low voltage protection	OFF	OFF	OFF	OFF	OFF	OFF
	Temperature, overcurrent, short circuit connection reverse, protection disabled	OFF	OFF	OFF	OFF	OFF	OFF
Disabled		OFF	OFF	OFF	OFF	OFF	OFF
Notes: About flash type: Flash 1 (light 0.25sec / OFF 3.75sec); Flash 2 (light 0.5sec / OFF 0.5sec); Flash 3 (light 0.5sec. / OFF 1.5sec)							

ADD

ADD Switch: 4 ADD switches, Dip1 to define different baud rate ("0" is 115200, "1" is 9600). "0" and "1", see the picture on the right. "0XXX" sets the baud rate 115200 and "1XXX" sets the baud rate 9600. The setting will be active only after battery reset.

The address of the secondary batteries will be assigned automatically. 1 "main" battery can monitor up to 15 secondary batteries.



To configure the batteries, the ADD switch must be configured according to the following

ADD BUTTON POSITION					CORRESPONDING BATTERY
	#1	#2	#3	#4	
					Configuration for independent battery use
0	OFF	OFF	OFF	OFF	Settings for Main Battery
1	ON	OFF	OFF	OFF	Configuration for secondary battery (N1)
2	OFF	ON	OFF	OFF	Configuration for secondary battery (N2)
3	ON	ON	OFF	OFF	Configuration for secondary battery (N3)
4	OFF	OFF	ON	OFF	Configuration for secondary battery (N4)
5	ON	OFF	ON	OFF	Configuration for secondary battery (N5)
6	OFF	ON	ON	OFF	Configuration for secondary battery (N6)
7	ON	ON	ON	OFF	Configuration for secondary battery (N7)
8	OFF	OFF	OFF	ON	Configuration for secondary battery (N8)
9	ON	OFF	OFF	ON	Configuration for secondary battery (N9)
10	OFF	ON	OFF	ON	Configuration for secondary battery (N10)
11	ON	ON	OFF	ON	Configuration for secondary battery (N11)
12	OFF	OFF	ON	ON	Configuration for secondary battery (N12)
13	ON	OFF	ON	ON	Configuration for secondary battery (N13)
14	OFF	ON	ON	ON	Configuration for secondary battery (N14)
15	ON	ON	ON	ON	Configuration for secondary battery (N15)

RS232

RS232 communication terminal (RJ11 Port) to export battery information.

CAN

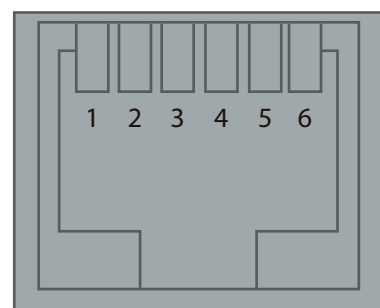
CAN communication terminal (RJ45 port) to export battery information.

RS485

RS485 communication terminal (RJ45 port) for communication between batteries.

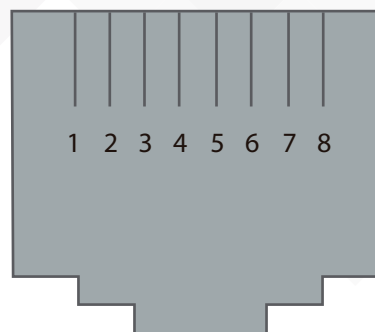
RJ11 port

NO	RJ11 PIN
1, 2, 6	NC
3	TX (single face)
4	RX (single face)
5	GND



RJ45 port

NO	RJ45 PIN
1, 8	RS485-B
2, 7	RS485-A
3, 6	GND
4	CAN-H
5	CAN-L



RESET

Press for more than 3 seconds to reset the battery.

DRY CONTACT

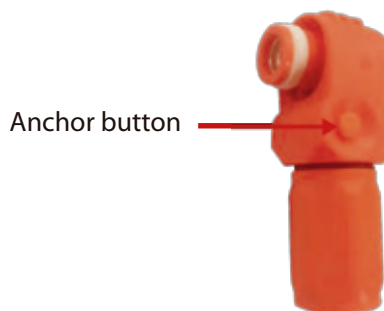
“Dry contact” input and output terminal.

POWER TERMINAL

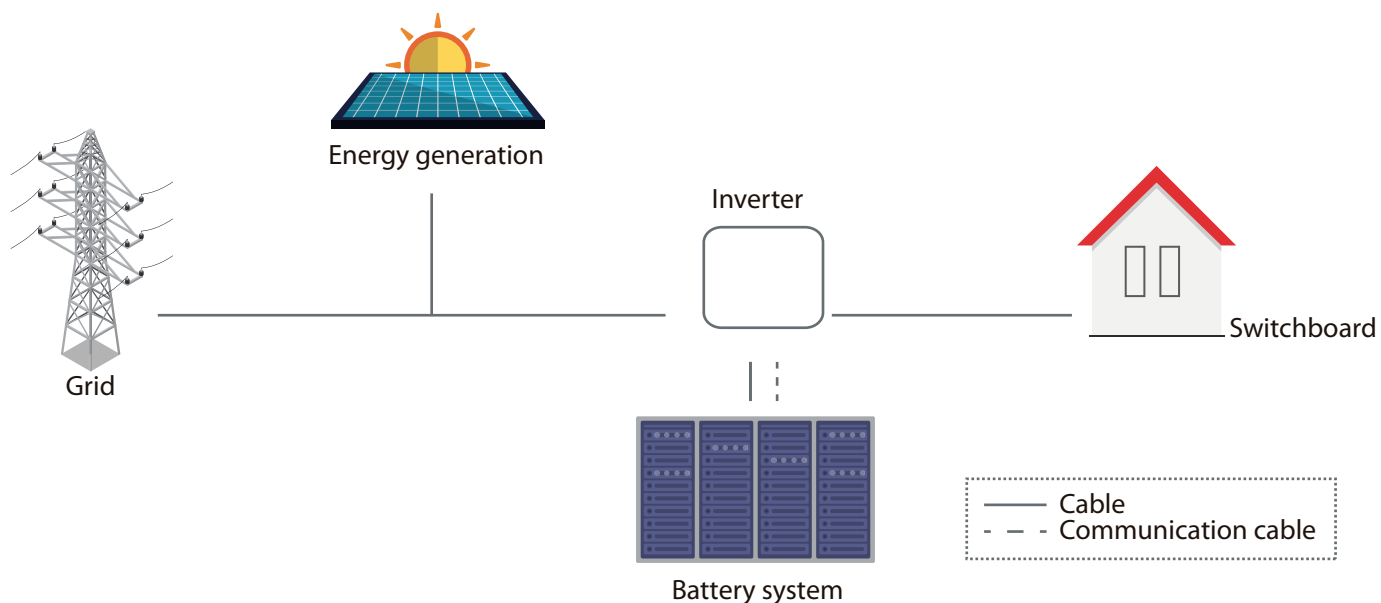
Power cable terminal. There are two pairs of terminals with the same function, one that connects to the equipment and the other to another battery to expand the capacity.

For each battery module, each terminal can have charge and discharge function.

Power cables use waterproof Amphenol connectors. The anchor button must be pressed to disconnect it.


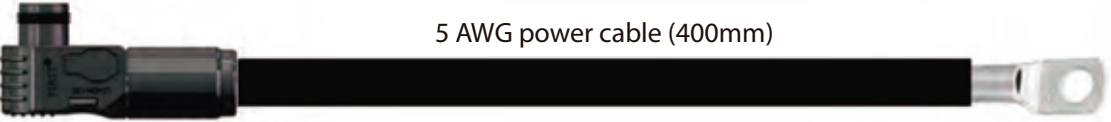



8 BASIC INSTALLATION DIAGRAM



9 CABLING

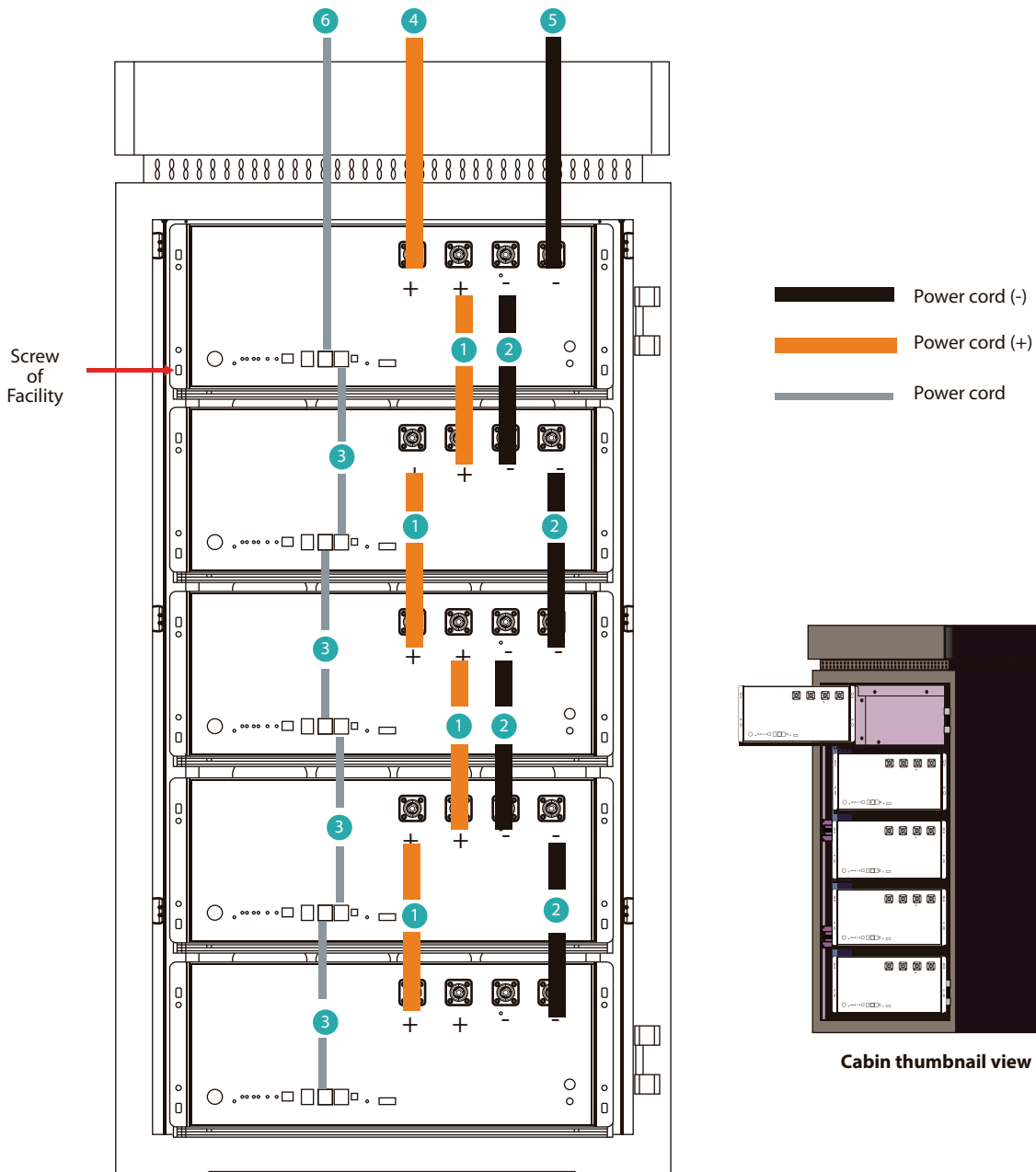
Connection to rack bars

- 1  5 AWG power cable (400mm)
- 2  5 AWG power cable (400mm)
- 3  Communication cable (250mm)

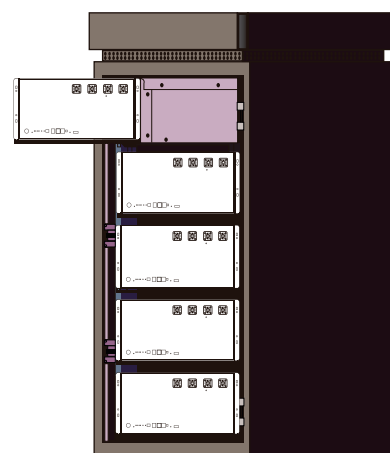


10 INSTALLATION

- (1) Install the battery modules, preferably in a cabin. (If you need a cabin please contact Tb Plus Energy[®]).
- (2) Tighten the four corresponding screws per module.
- (3) Connect the cables according to the diagram.
- (4) Connect the cables to the inverter.
- (5) Make sure all cables are properly routed.
- (6) Turn on all modules (ON/OFF button).
- (7) Configure ADD according to the table (see point 7 "Basic operation", "ADD" section). Module number 1 will be the "Primary" and the others will be the "secondary".



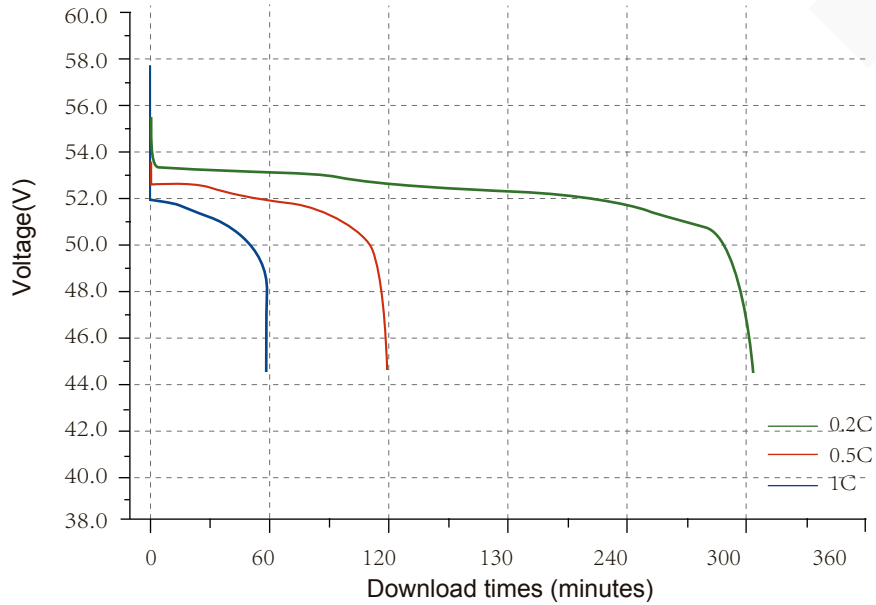
Cabin battery module wiring diagram



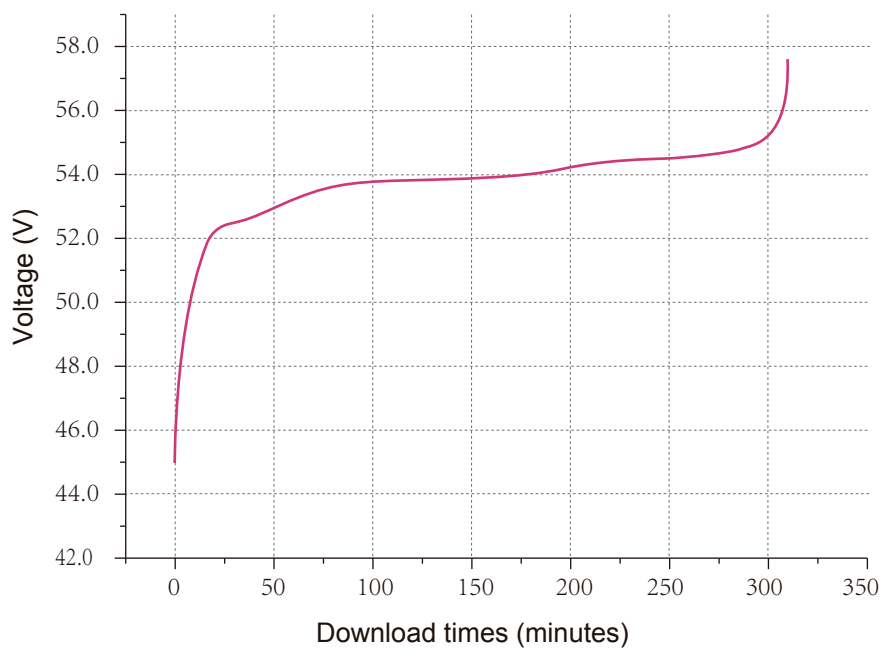
Cabin thumbnail view

11 BEHAVIOR GRAPHICS

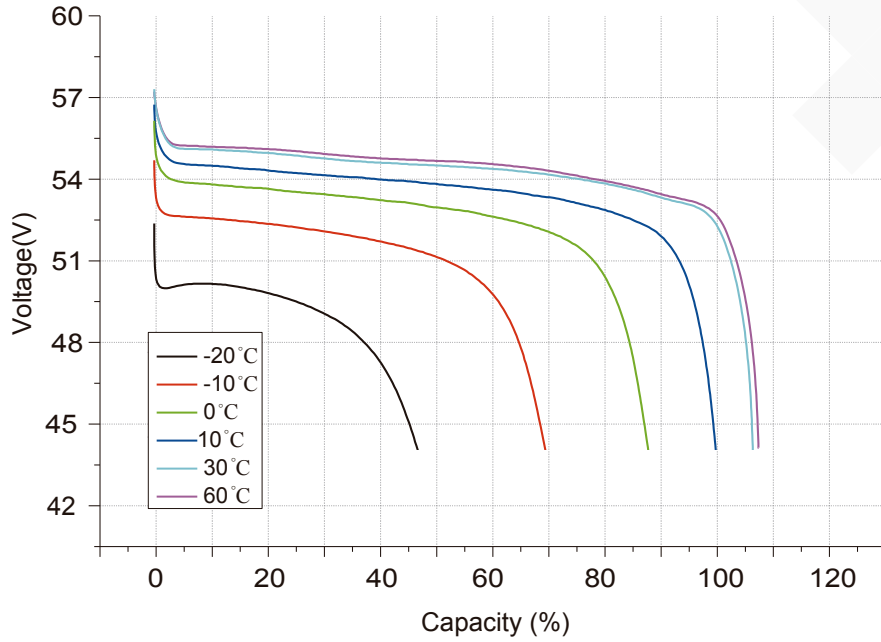
11.1 Discharge curve at different speeds @25°C



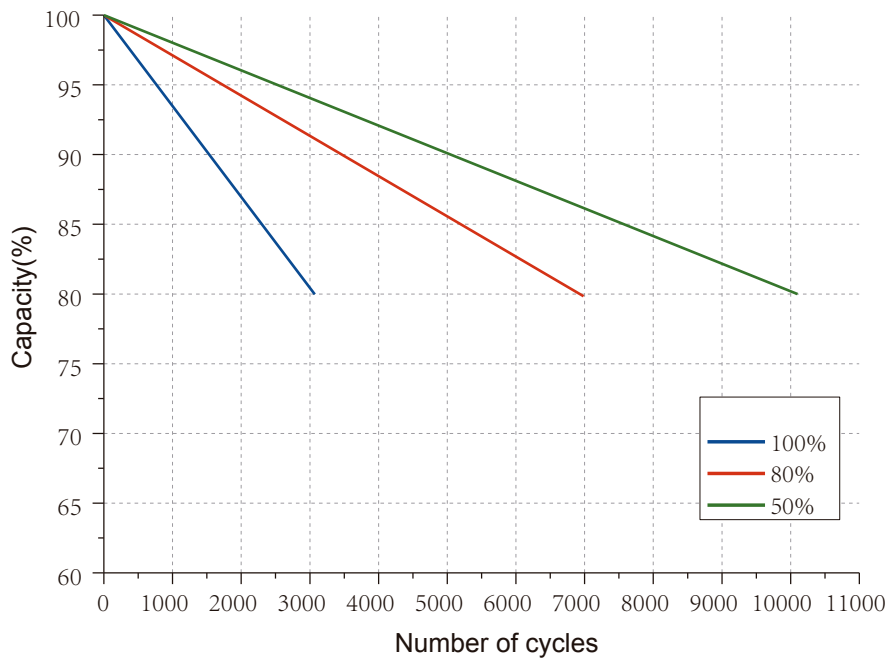
11.2 Charging characteristics @0.2C, 25°C



11.3 Capacity under different temperature



11.4 Life cycle under different DOD @0.5C, 25°C



12 TROUBLESHOOTING

12.1 Determination of the problem based on:

The battery can be turned on or not.

If the battery is on, check that the red light is off, flashing or on;

If the red light is off, please check whether the battery can be charged/discharged or not.

12.2 Preliminary steps of determination:

1. The battery cannot turn on, the lights do not turn on or flash.

If the external battery switch is on, the RUN light is flashing, and the external power supply voltage is different from the battery voltage, the battery still cannot power on, please contact Tb Plus Energy® or your authorized dealer.

2. The battery can be turned on, but a red light comes on and cannot be charged or discharged. If the red light is on, that means the system is abnormal, please check the values as follows:

a) Temperature: above 50°C or below -10°C, the battery cannot work.

Solution: Move the battery to the normal operating temperature range between -10°C and 50°C.

b) Current: if the current is higher than the maximum current value indicated on the technical sheet, battery protection will be activated.

Solution: Check whether the current is too big or not, if so, to change the setting on the power supply side.

c) High voltage: if the charging voltage is higher than that indicated on the technical sheet, battery protection will be activated.

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

d) Low voltage: when the battery is discharged to values other than those indicated on the data sheet, battery protection will be activated.

Solution: Charge the battery for a while, the red light goes out.

Excluding the above four points, if the fault still cannot be located, please turn off the battery power switch and repair.

12.3 The battery cannot be charged or discharged

1. Cannot load:

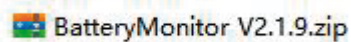
Solution: Disconnect the power cables, measure the voltage on the power side and make sure it is within the load levels. After this, restart the battery, connect the power cable and try again, if it still does not work, turn off the battery and contact Tb Plus Energy® or your authorized dealer.

2. Can not be downloaded:

Solution: Disconnect the power cables, measure the voltage on the battery side and make sure it is within discharge levels. After this try again and if it still cannot discharge, turn off the battery and contact Tb Plus Energy® or your authorized dealer.

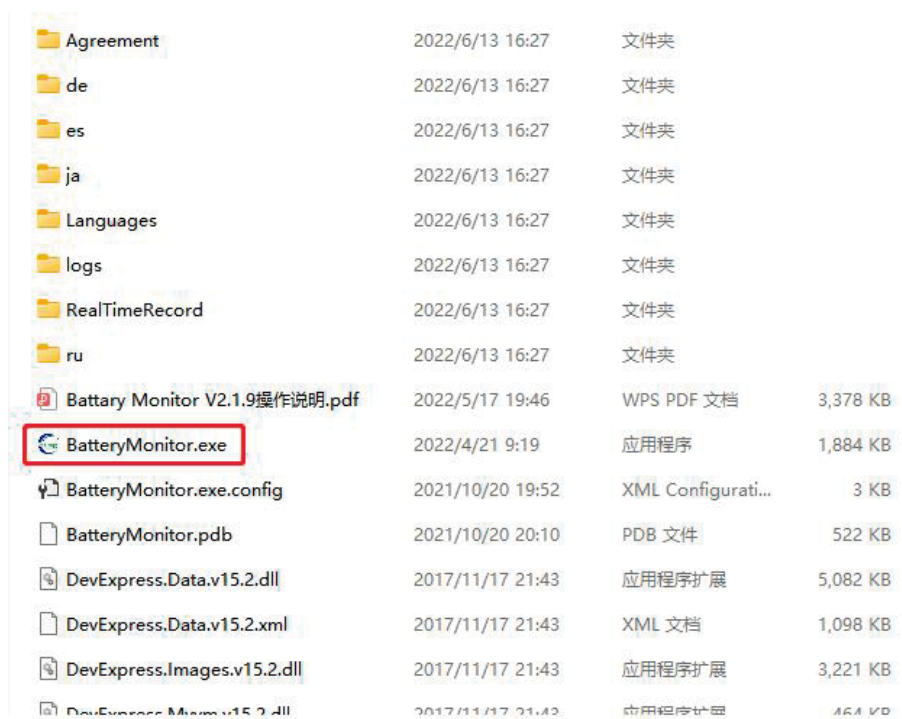
13 UPPER COMPUTER OPERATION

13.1 Unzip the file from the host computer



13.2 Open the monitor software

- Open the folder.
- Select the top computer software.
- Double click to open the top computer.



13.3 Load protocol file

- Select import protocol.
See figure 3-1.
- Open the folder (select the **agreement** in the top folder on your computer).
See figure 3-1.
- Select the EN protocol suffix in the Agreement folder that corresponds to the English protocol (for example, 16s_V20_ADDR_EN)
See figure 3-2.
- Click OK.
See figure 3-3.

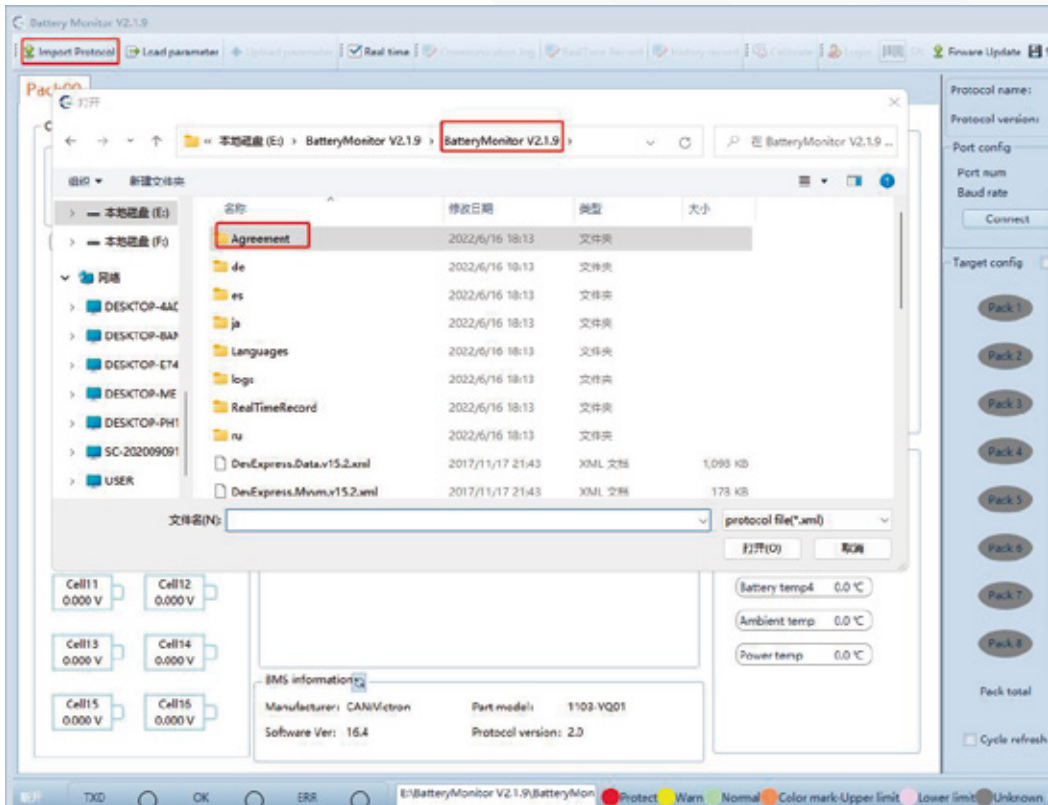


Figure 3-1

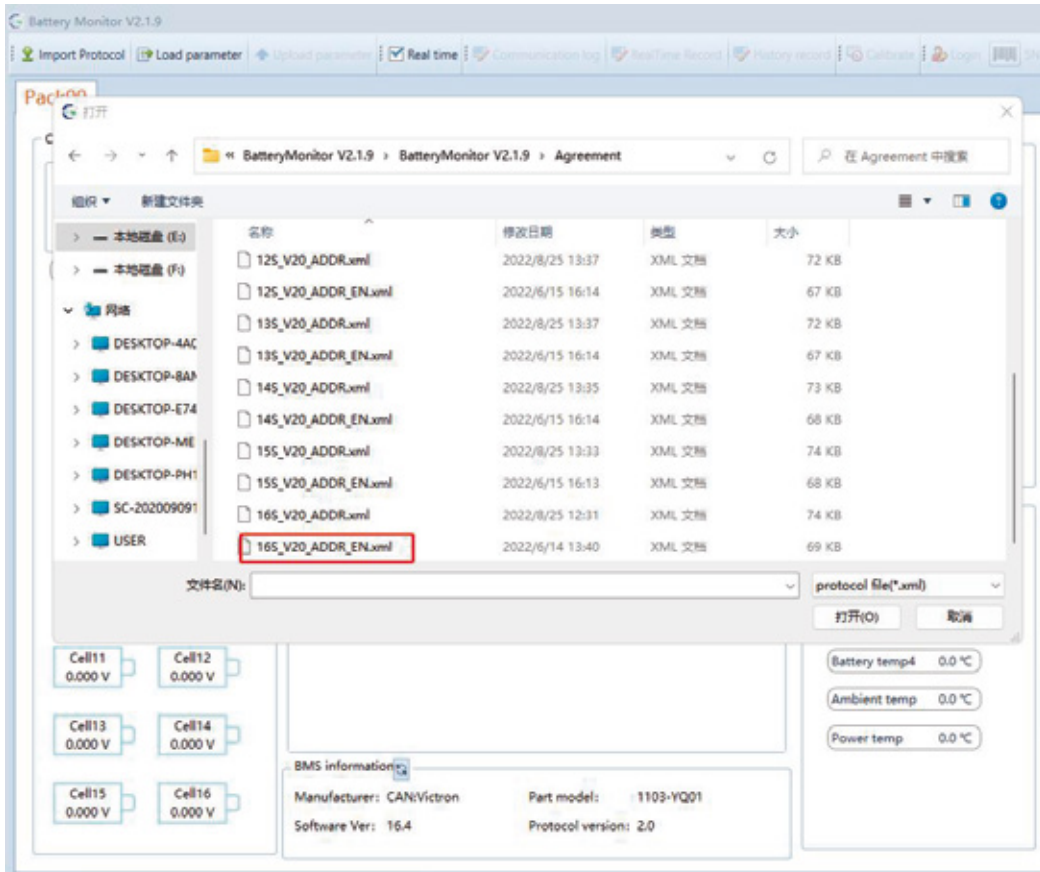


Figure 3-2

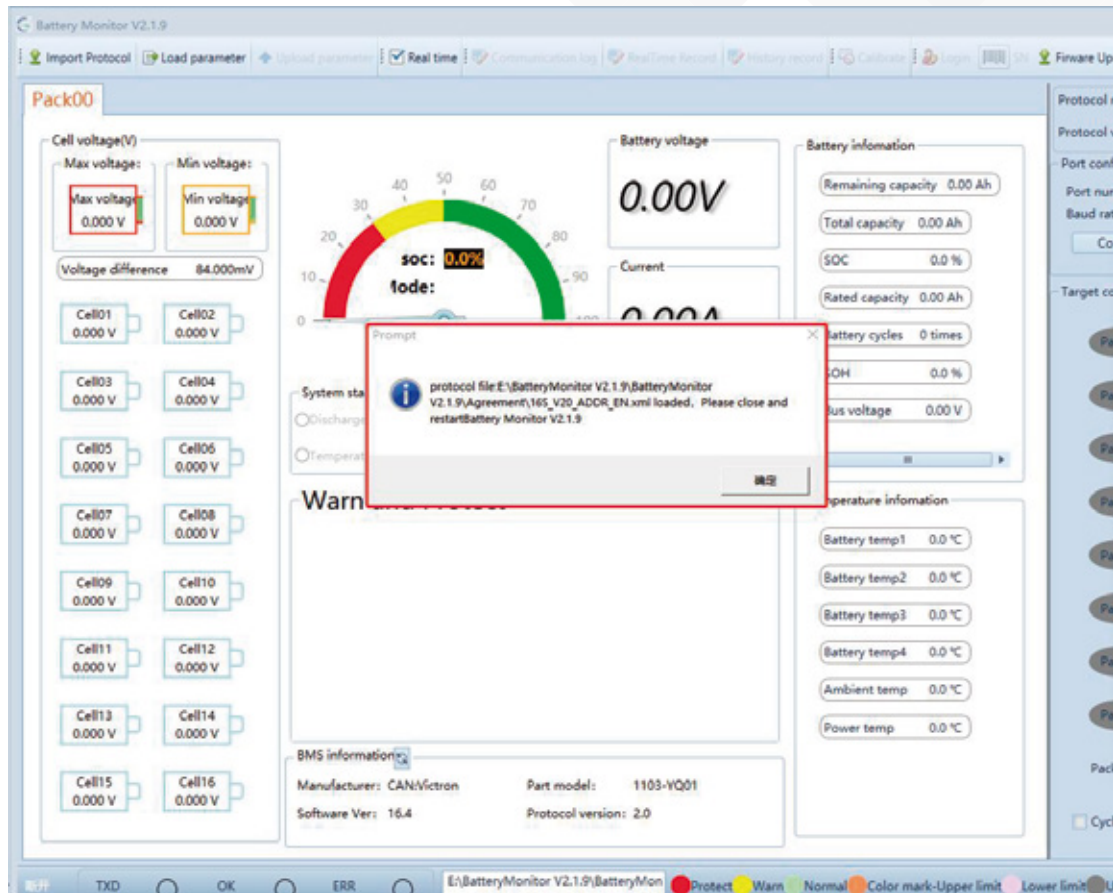


Figure 3-3

13.4 Communication port configuration

- **Port number** (upper computer will automatically identify the USB serial port number to 485)
- **Transmission speed:** 19200
- See figure 4-1.
- Click **Connect**.
- See figure 4-2.

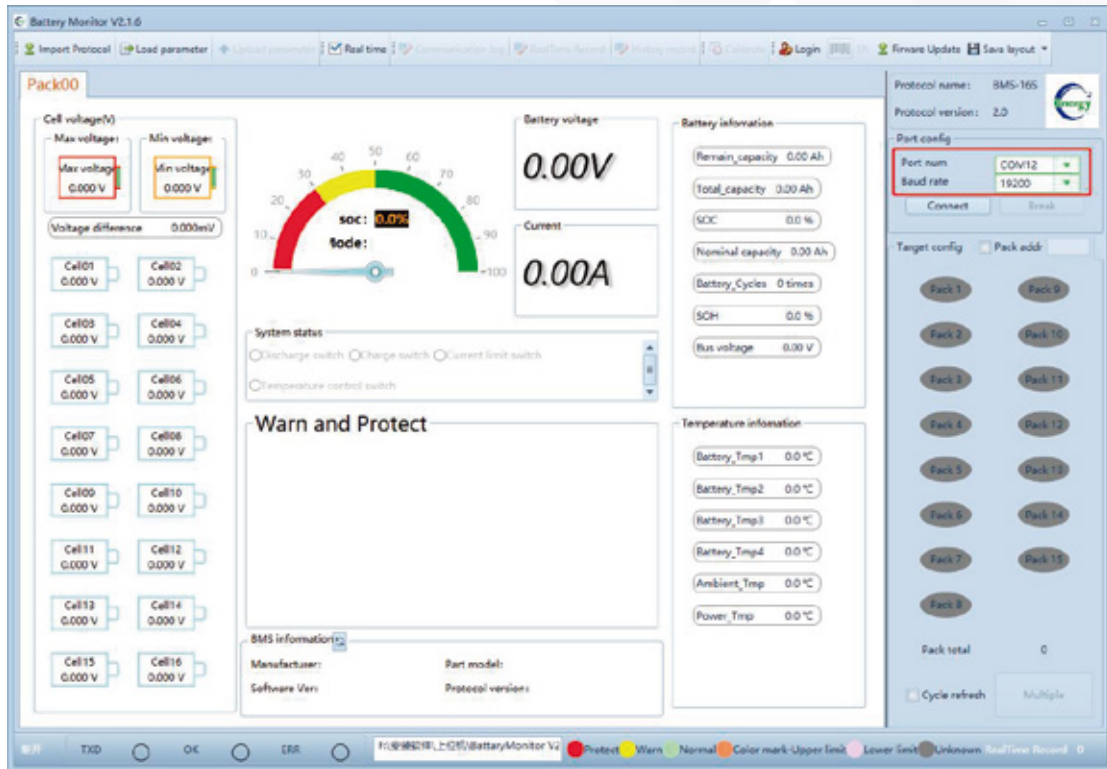


Figure 4-1

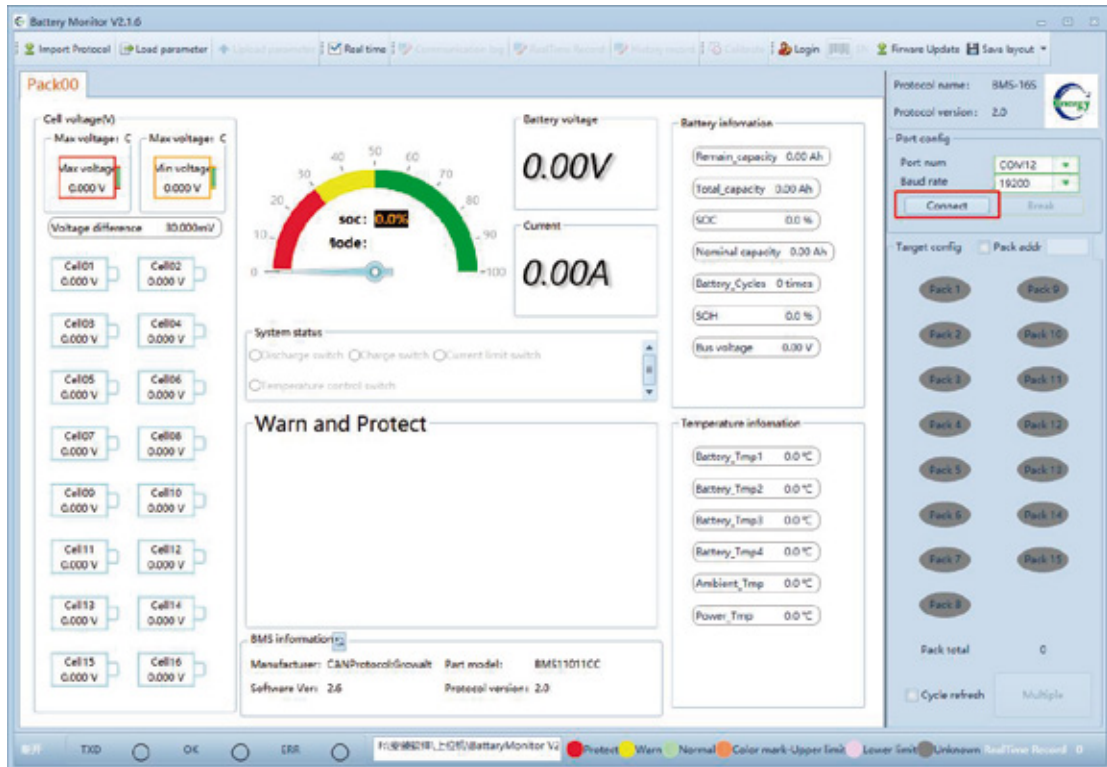


Figure 4-2

After successful connection, the upper computer displays the battery data.
See figure 4-3.

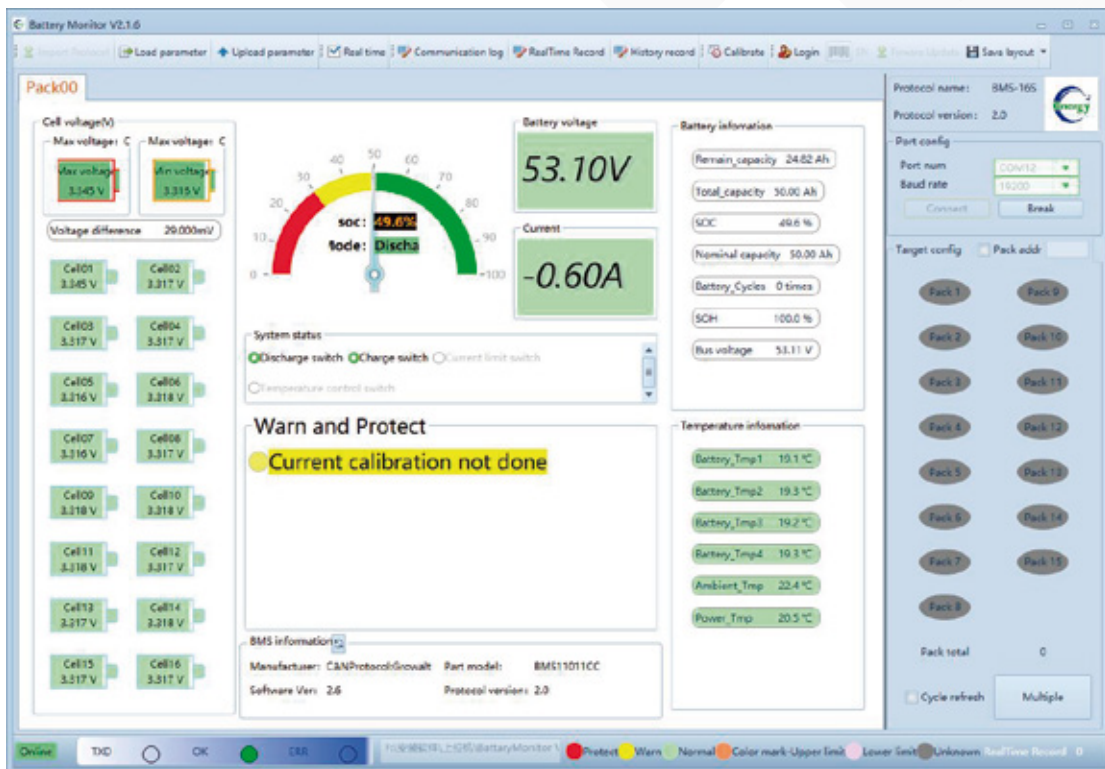
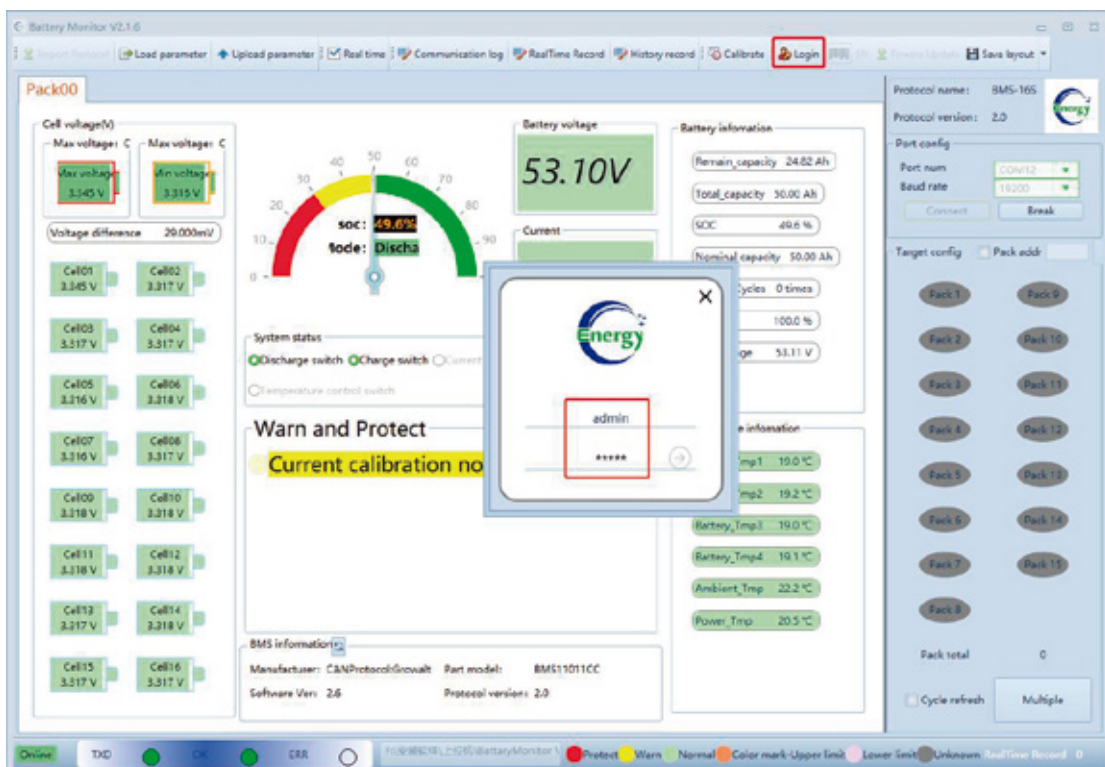


Figure 4-3

13.5 Access

Account: administrator

Password: administrator



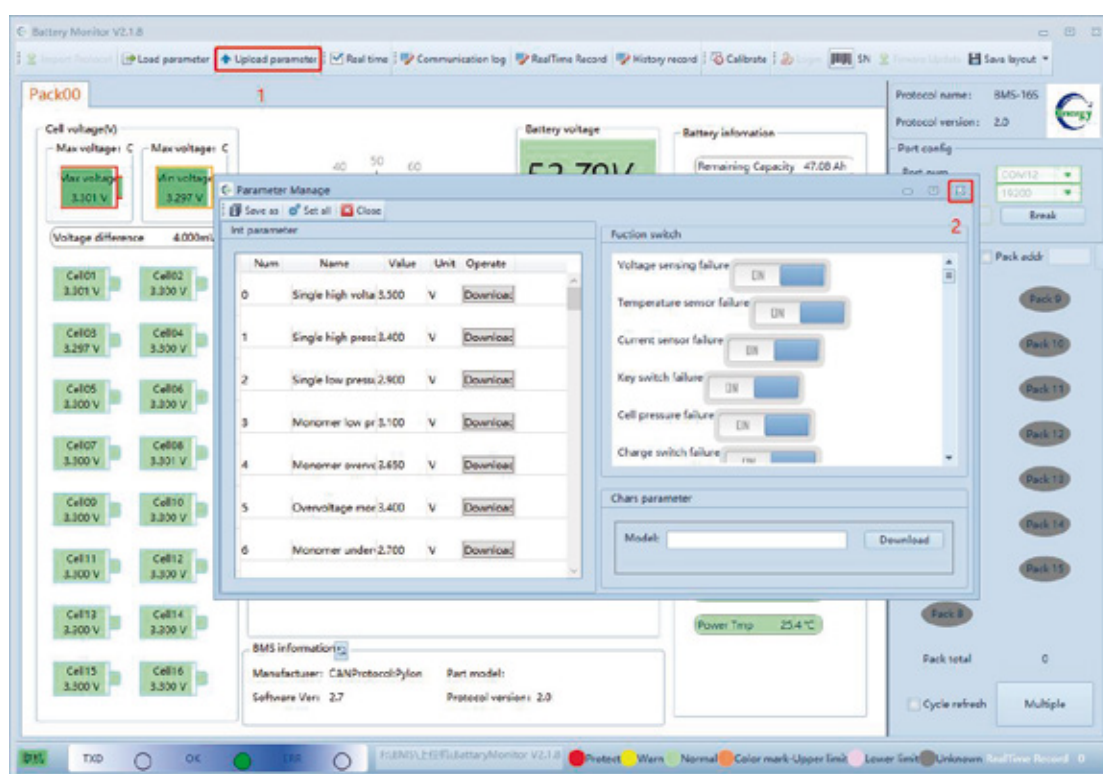
13.6 Loading parameters

Load Parameter: Download parameter to BMS from upper computer.

Upload Parameter: Upload parameter to upper computer from BMS.

13.6.1 Upload parameters

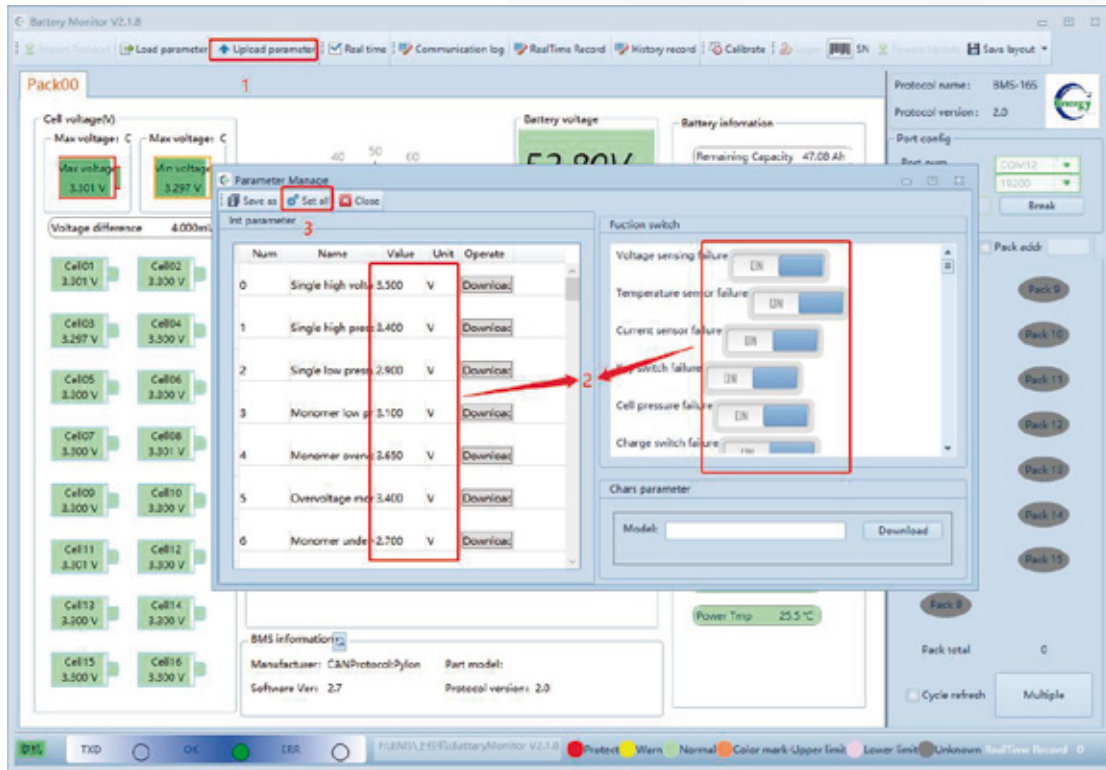
When you use the top computer for the first time, it is not allowed to download parameters directly without checking; you need to load the parameters first and then close them.



13.6.2 Modify parameters

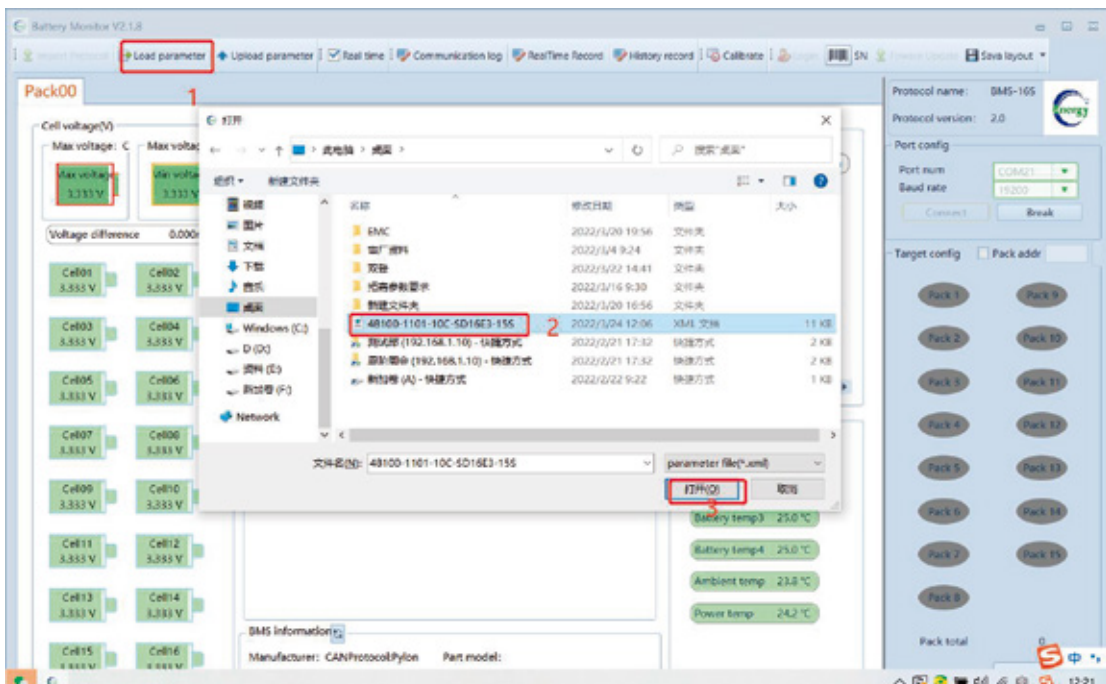
- Click "**Upload parameters**" here to upload parameters from BMS.
- Change the internal parameters of the BMS and function switches.
- Click **Set all** to enable the modification.

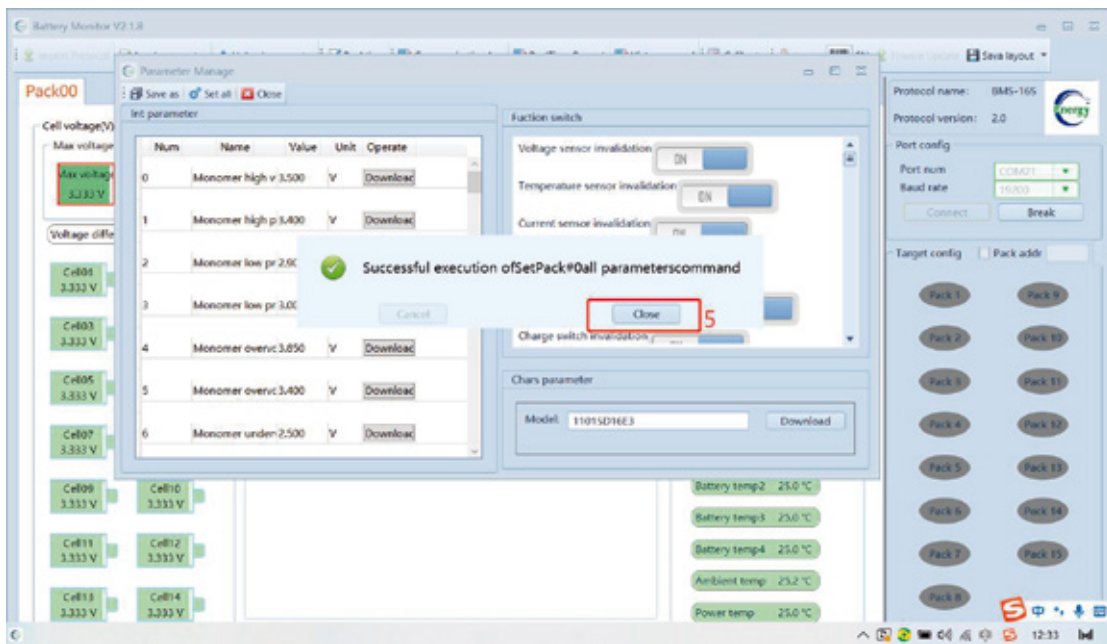
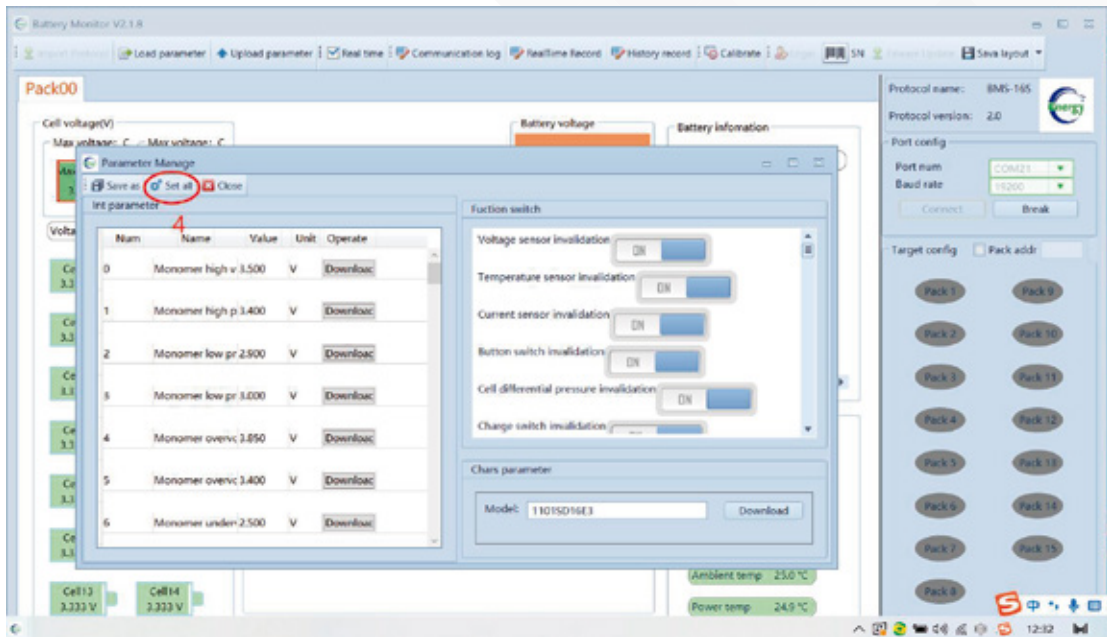
Note: The red numbers in the following figure indicate the operation sequence.



13.6.3 Load parameter

- Click **Load parameters** (step 1 below)
- Choose the **target parameter document** (step 2 below) and click open (step 3 below).
Click **Set all** (step 4 below).
- Click **Close** (step 5 below) after indicating success.
- The parameters have been set correctly.





13.7 Communication protocol configuration

Click **CAN**, select the corresponding CAN protocol according to the type of inverter

- 6 options: PN-GDLT / GRWT / VCTR / SMA-SF / GINL / Studer.

Protocol Type	Supported Inverted Brands
PN-GDLT	Pylon/Goodway/TBB/Luxpower/Deye
GRWT	Growatt SPF/SPH
VCTR	Victron
SMA-SF	SMA/Sofar
GINL	Solis
Studer	Studer

See figure 7-1.

- After changing the protocol, confirm whether the protocol was changed successfully, update the protection board information
See figure 7-2.
- The corresponding manufacturer information will be displayed in the **"BMS Information"** box.
See figure 7-3.

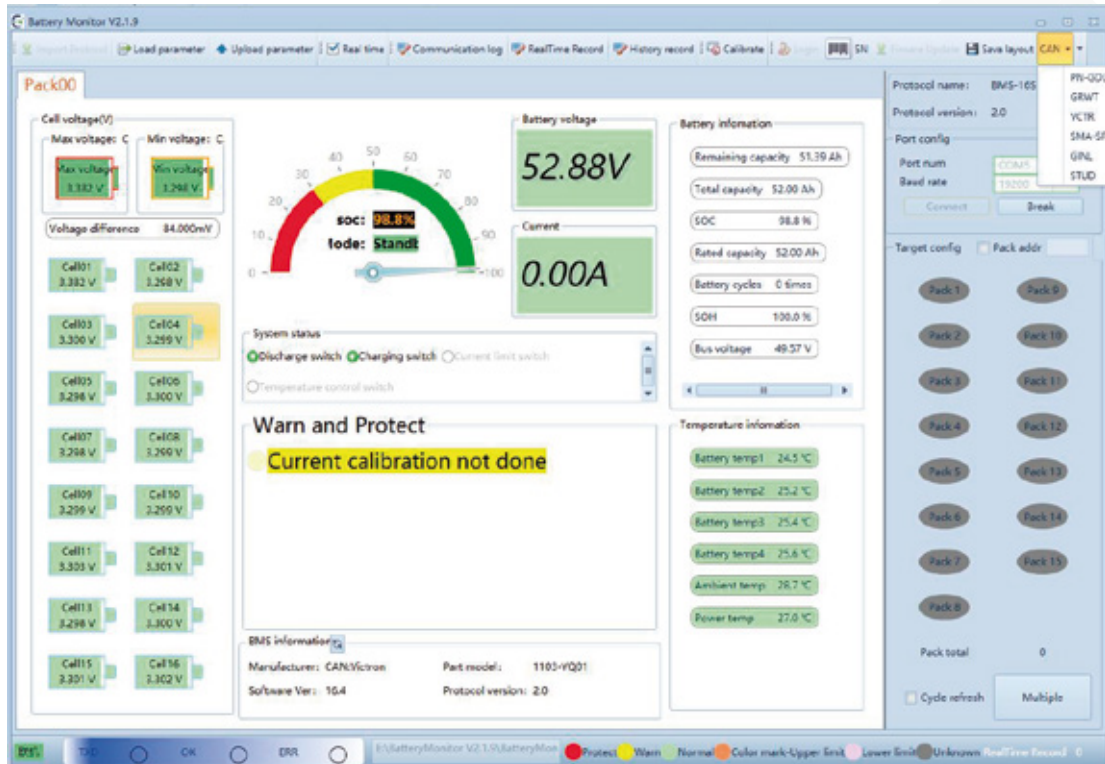


Figure 7-1

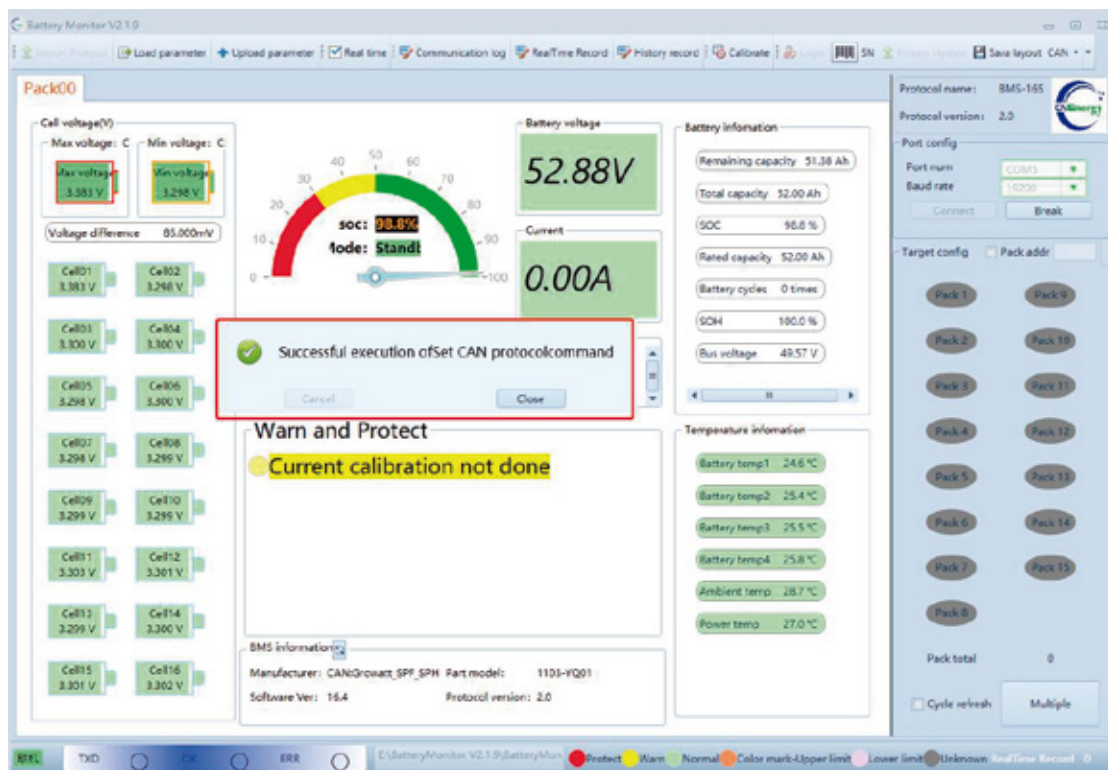


Figure 7-2

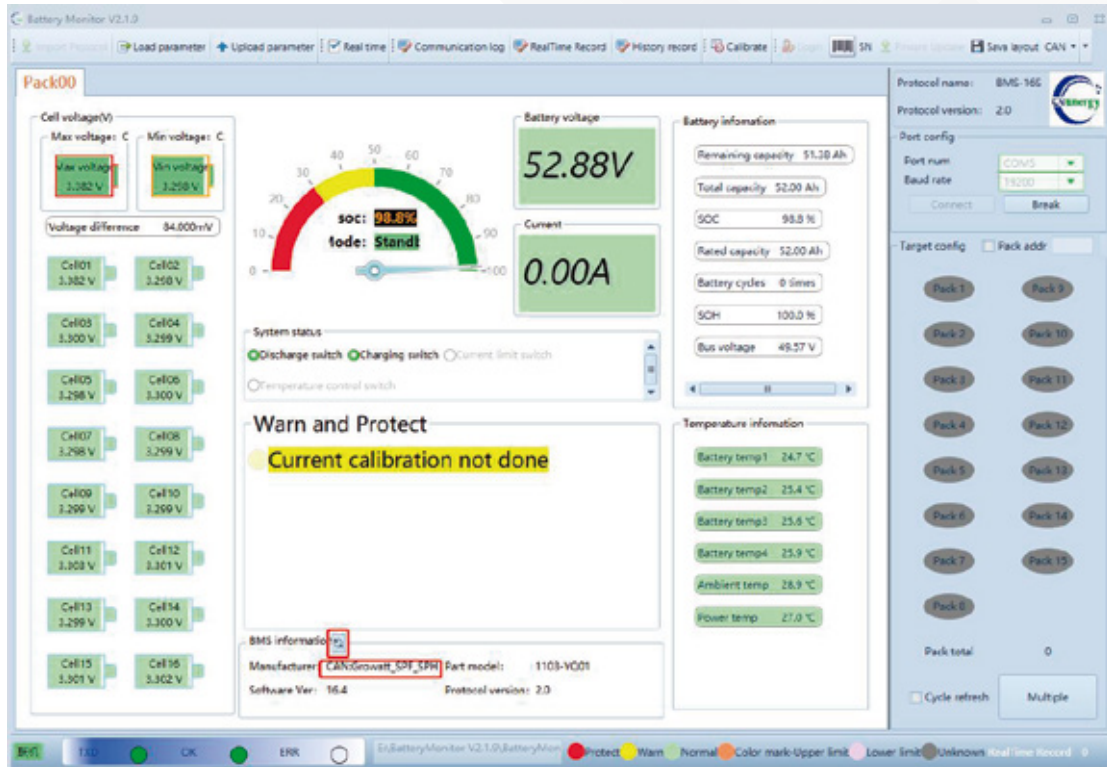




Figure 7-3

BMS information 


Manufacturer: **CAN:PNG_DYE_Luxp_TB** Part model: 1103-YQ01
 Software Ver: 16.4 Protocol version: 2.0

BMS information 

Manufacturer: **CAN:Growatt_SPF_SPH** Part model: 1103-YQ01
 Software Ver: 16.4 Protocol version: 2.0

BMS information 

Manufacturer: **CAN:Victron** Part model: 1103-YQ01
 Software Ver: 16.4 Protocol version: 2.0

BMS information 

Manufacturer: **CAN:SMA_SOFAR** Part model: 1103-YQ01
 Software Ver: 16.4 Protocol version: 2.0

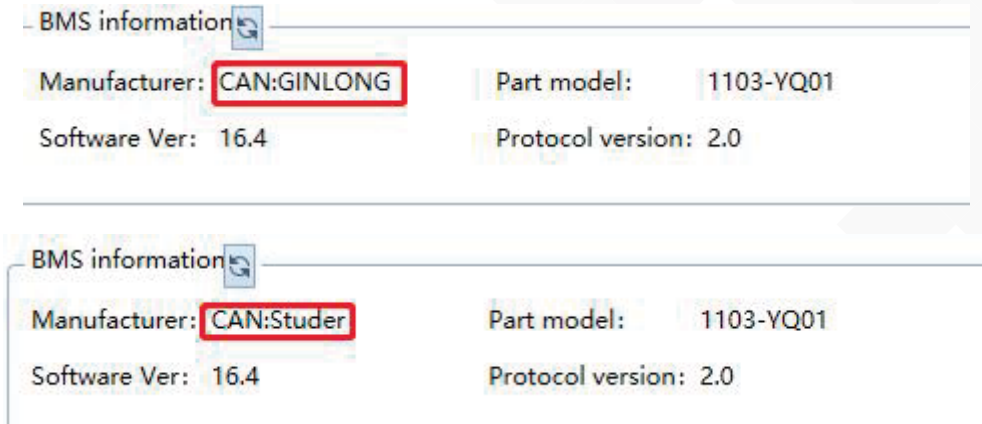


Figure 7-4 (other manufacturer information)

13.8 Introduction to screen interface

After successful connection, the red box below is the interface Introduction screen.

See figure 8-1.

Detailed introduction see Table 8-1.

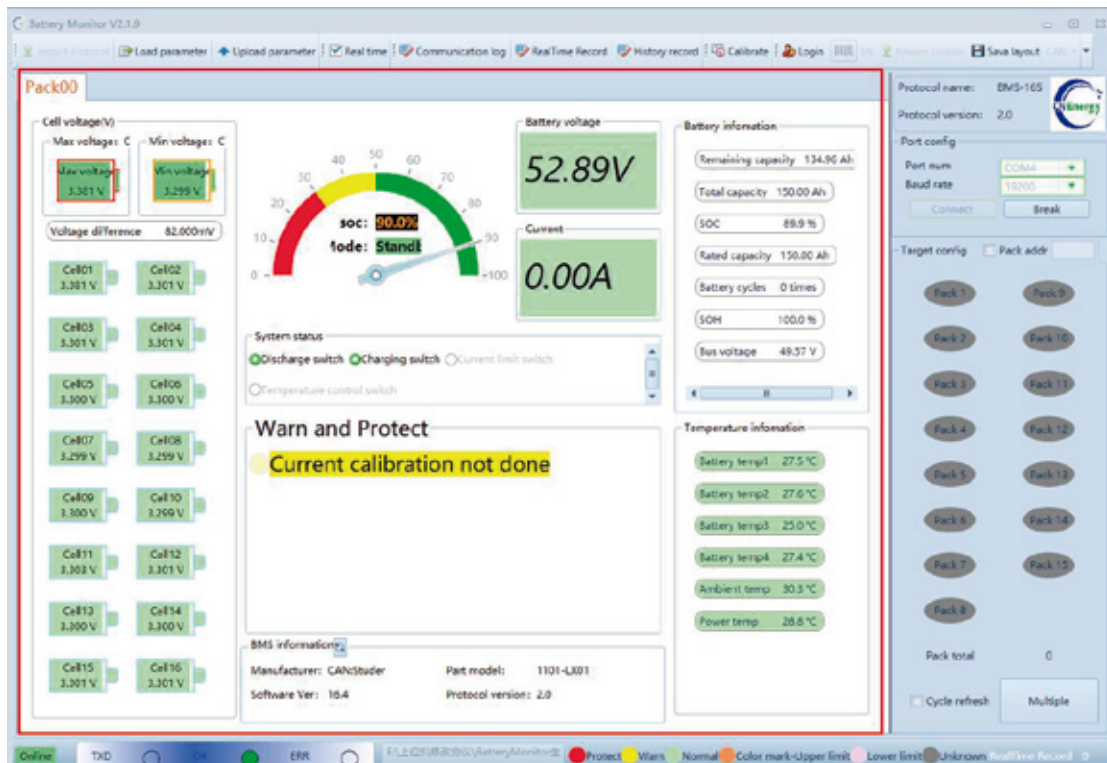


Figure 8-1

Name	Description	Notes	Figure
Maximum voltage	Higher voltage cell		
Minimum voltage	Lowest voltage cell		
Voltage difference	Voltage difference between maximum voltage and the minimum voltage		
Battery voltage	Total battery voltage		
Current	Charging current or discharge current (negative value)		
Remain capacity	Current battery capacity	Upload parameter-Num59 can set current capacity	
Total capacity	Actual capacity after full battery		
SOC	State of charge	$\text{Remain_capacity} / \text{Total_capacity} * 100\%$	
Nominal capacity	Rate capacity	$\text{Remain_capacity} / \text{Total_capacity} * 100\%$	
Battery_cycles	Cycle number	The number of cycles will be increased by one when the cumulative discharge capacity reaches 80% of the full capacity	
SOH	State of health		
Bus voltage	Port voltage. Detection of external voltage	When there is no external connection, the bus voltage is equal to the total battery voltage	
Discharge switch	Discharge switch indicator	Green: switch connected Gray: switch disconnected	
Charge switch	Charge switch indicator	Green: switch connected Gray: switch disconnected	

Name	Description	Notes	Figure
Current limit switch	Current limit switch indicator	Green:switch connected Gray:switch disconnected	
Temperature control switch	Temperature control switch indicator	Green:switch connected Gray:switch disconnected	
Warn and Protect	BMS warning and protect display area		
Battery Temp1	Cell temperature1 value		
Battery Temp2	Cell temperature2 value		
Battery Temp3	Cell temperature3 value		
Battery Temp4	Cell temperature4 value		
Ambient Temp	Ambient temperature value		
Power Temp	Power temperature value		

Table 8-1

13.9 Parallel mode

Selection of parallel packages

- When multiple batteries are combined (maximum to 16), make sure the corresponding address marked by the BMS is consistent with the address set (pack x, pack x) by the upper computer (click the pack number to brighten or dim the icon).

See figure 9-1.

- When confirming the number of parallel machines, click connect to top computer (Cycle Refresh) and select Cycle Refresh. The upper computer can see the number of parallel machines and update the packet data.

See figure 9-2.

On the top interface of the computer, you can click **Multiple** to view each group of data in the PACKAGE.

- See figure 9-3.

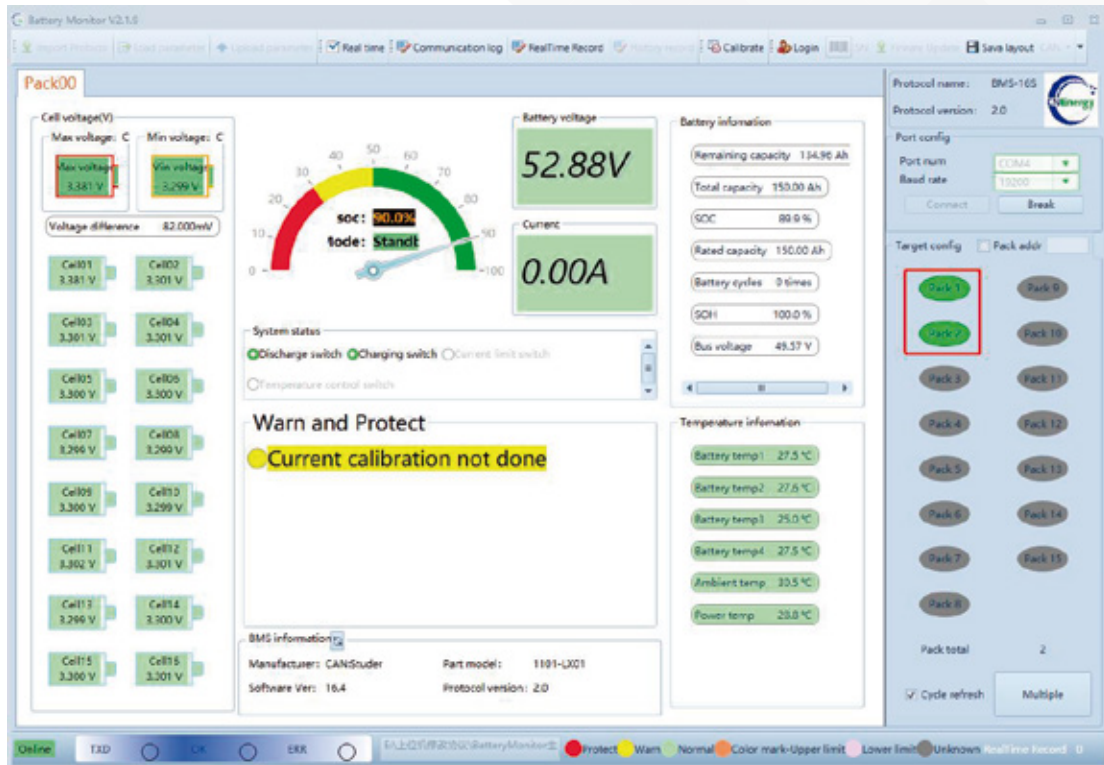


Figure 9-1

In Figure 9-1, 2 package icons are shown in the package frame, this means there are 3 packages in parallel status. Only the slave package can be displayed in the package frame.

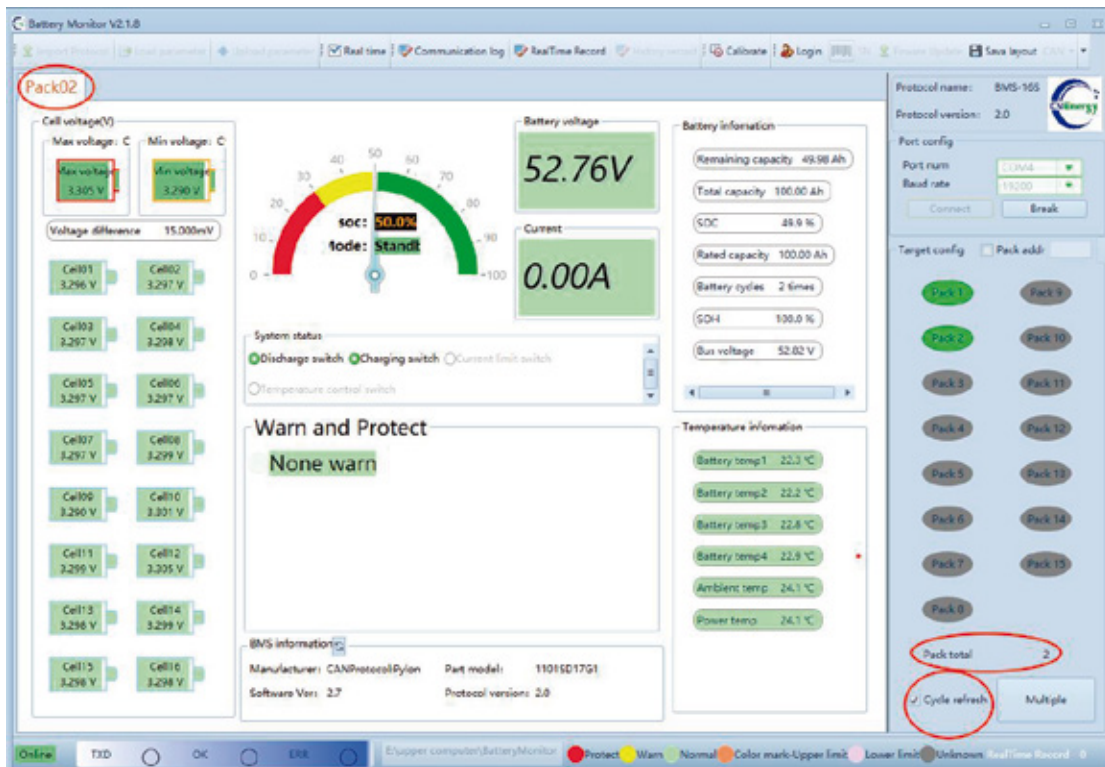


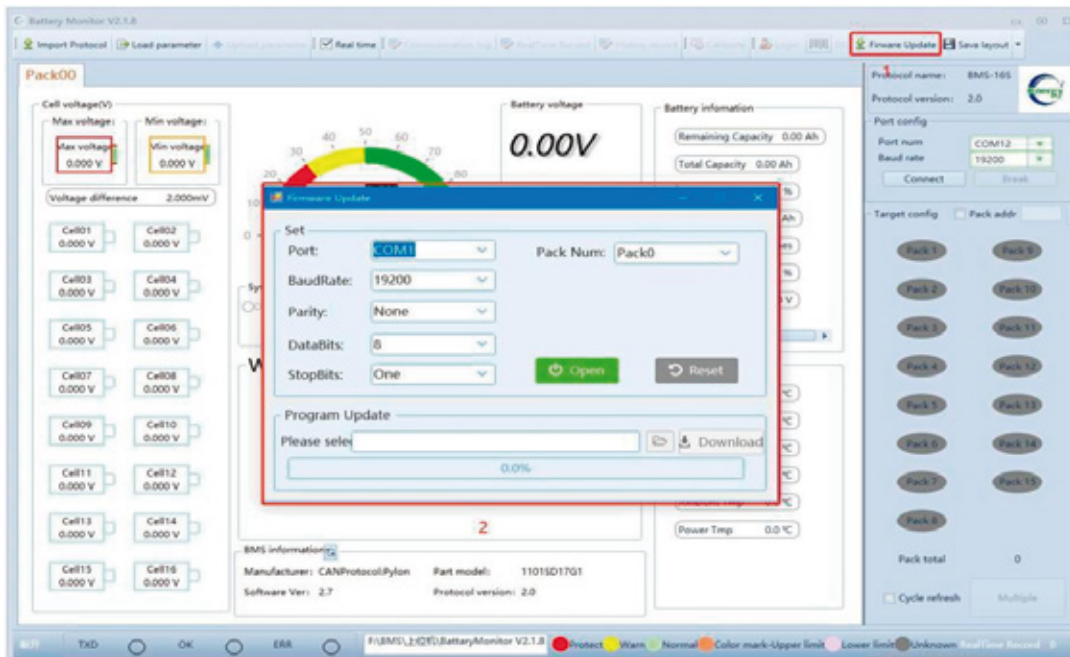
Figure 9-2



Figure 9-3

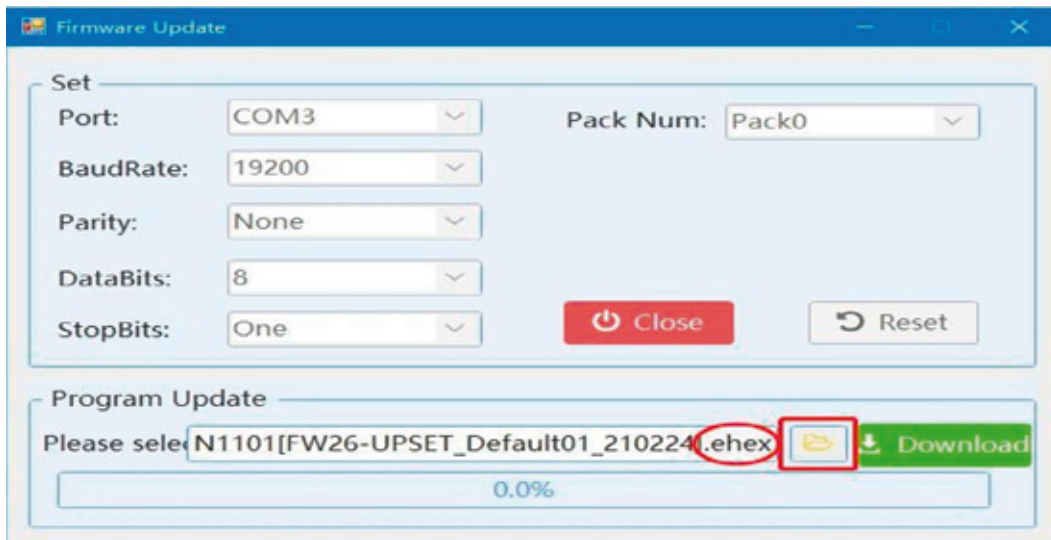
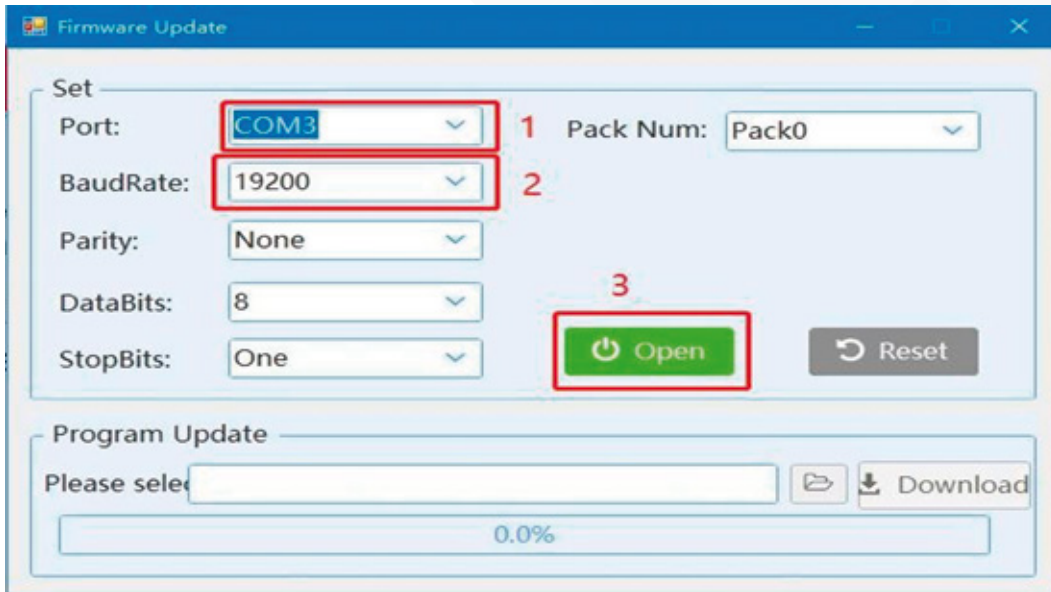
13.10 Firmware update

10.1 Open Firmware Update (BMS Boot State)

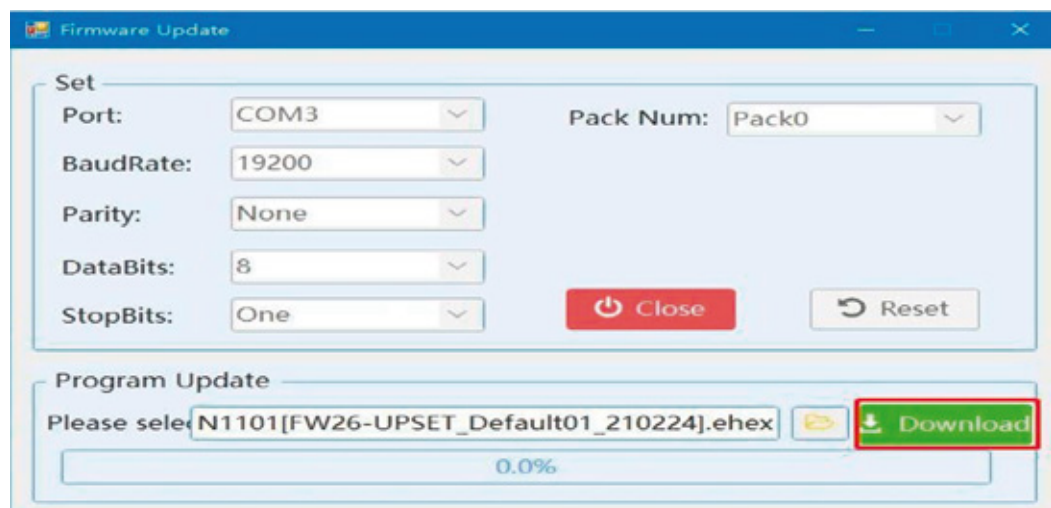


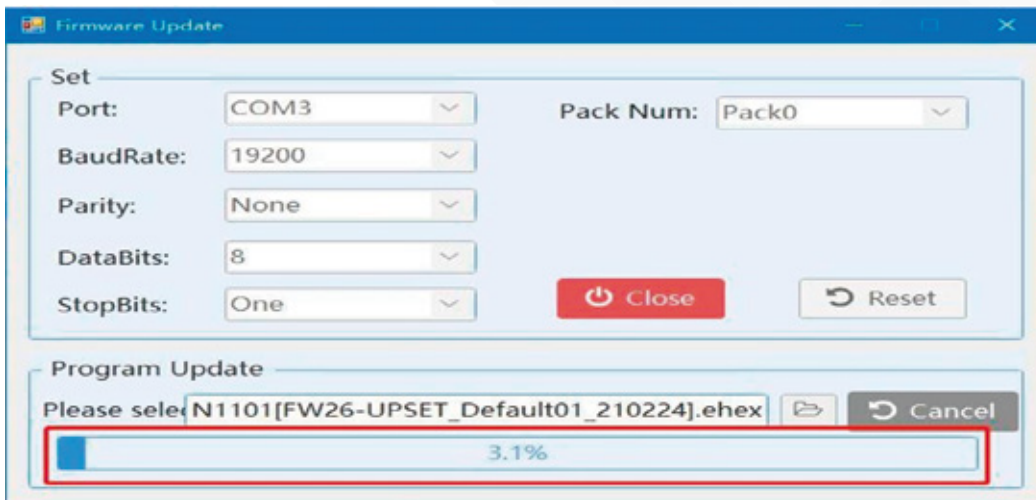
10.2 Use the USB communication line at 485, select the corresponding **port**, select the **baud rate** of 19200, and click **open**.

10.3 Select folder——Skip from the corresponding box——choose the destination program (This program. ehx format).

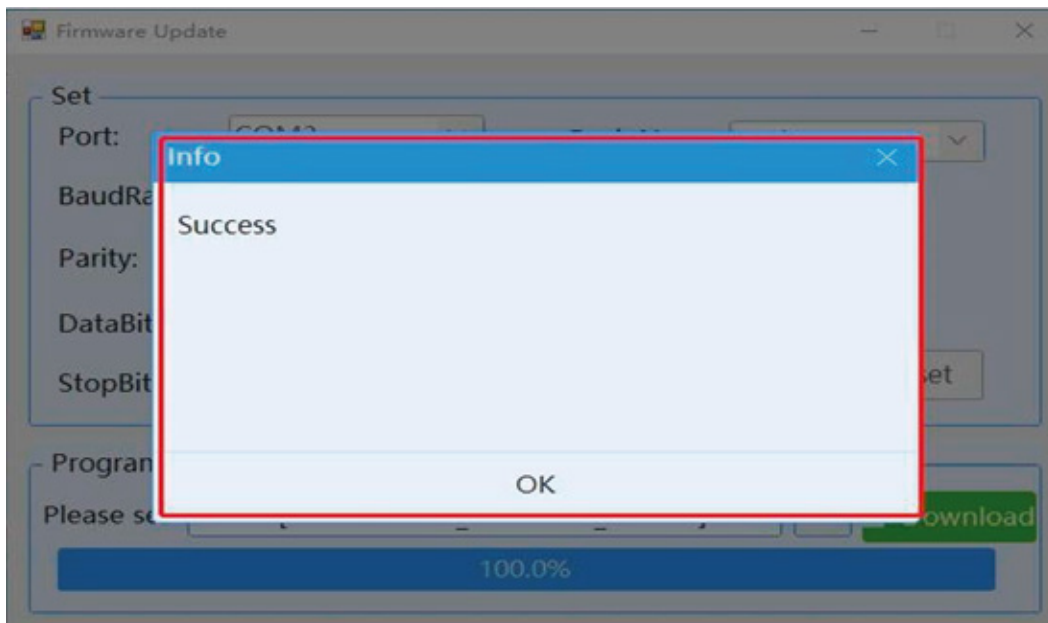


10.4 Click **download** and the progress bar will appear (When it reports an error, please try to press the reset button or download it several times.)

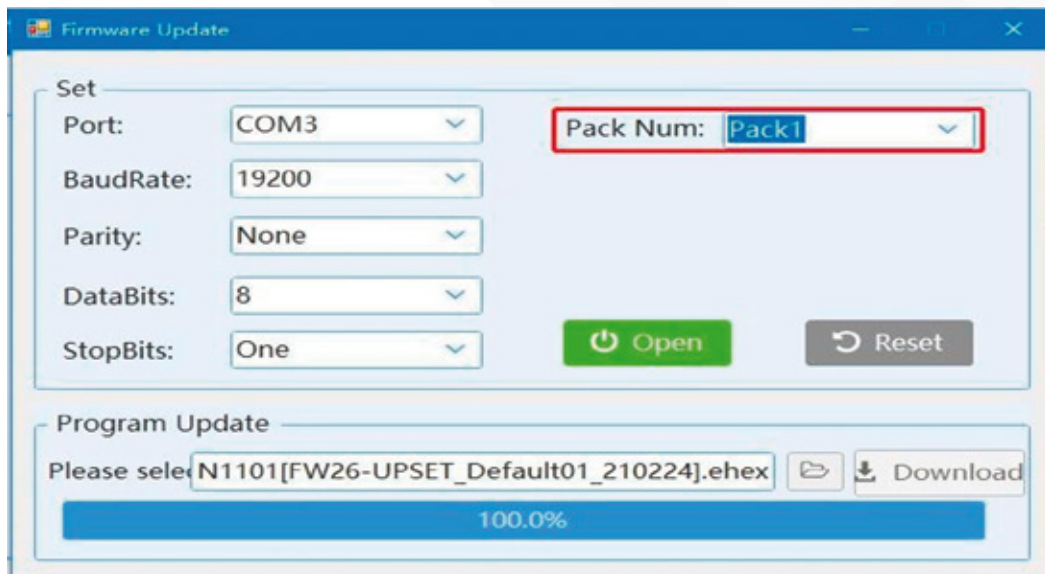




10.5 After the program update is successful (**OK**), request the successful download as proof that the program update is successful.



Note: This update software can also be updated according to the corresponding address. If the BMS address matches the package number address, it can be updated.



13.11 Real time registration

Real-time logging will record all real-time information of the battery. The function can be used to automatically monitor the operating status of the battery.

Click **Real time** to enable real-time logging.

See figure 11-1.

Click **Real time record** to edit detailed information.

See figure 11-1/11-2/11-3.

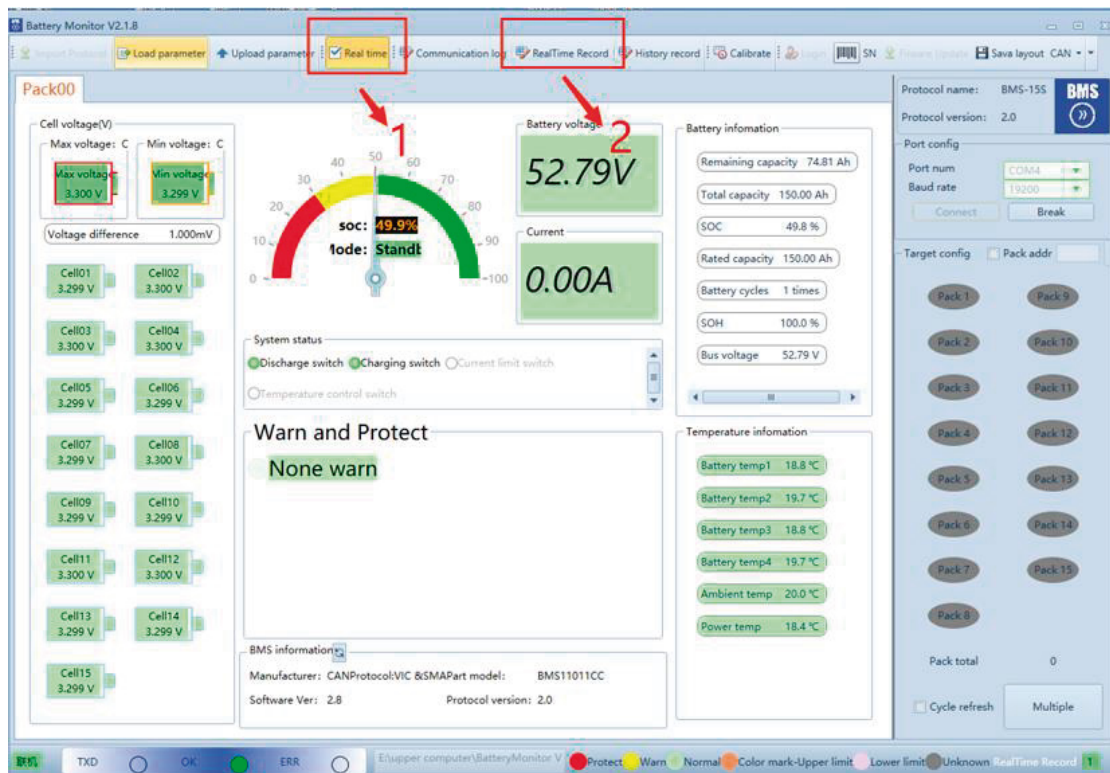


Figure 11-1

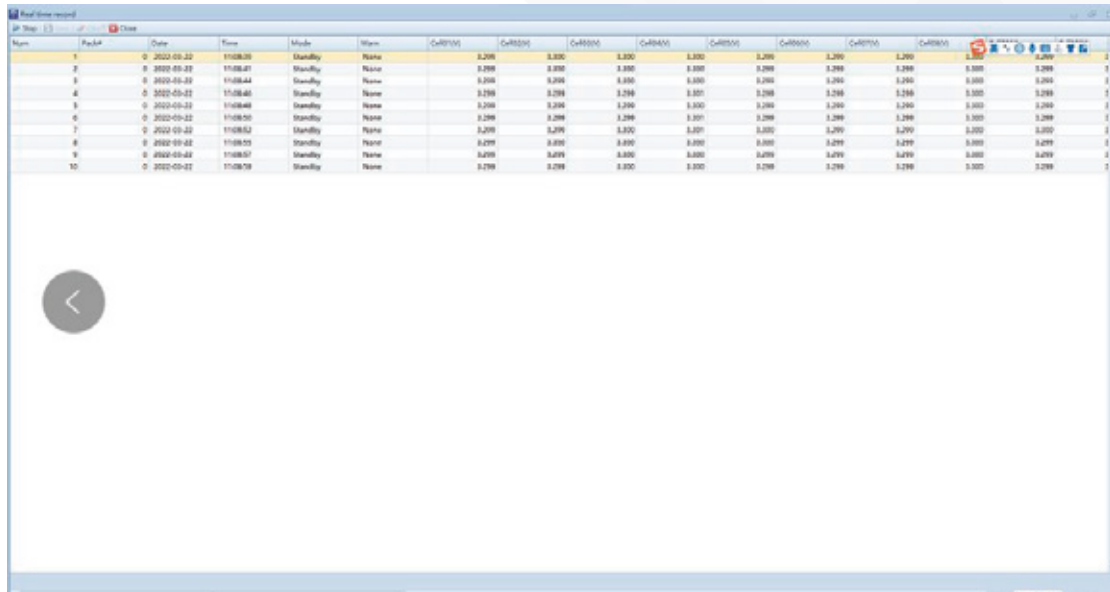


Figure 11-2

Click **STOP** to stop recording.

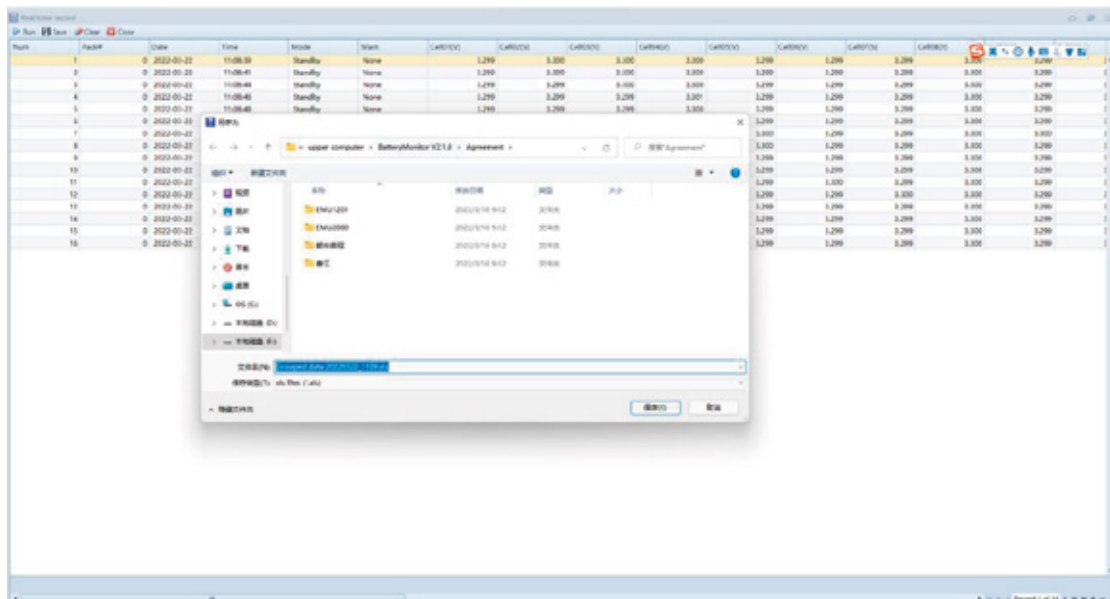
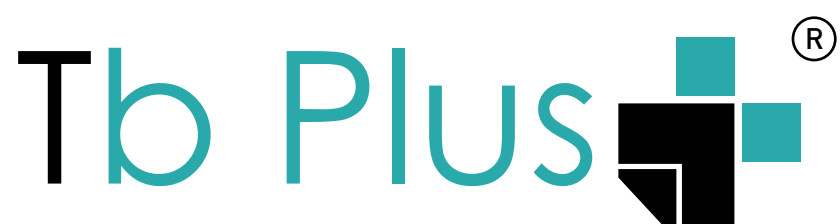


Figure 11-3

Click **RUN** to save again.

Click **Clear** to clear the log frame.

Click **Save** to export the registration document.



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