BM200-**
Battery Tester-Charger-Discharge-Maintainer

User Manual

REV2.0

Revision Date：Feb 2024

Features

BM200-xx is an intelligent instrument that integrates the four functions of battery testing(analyzing), charging, discharging and maintenance.

It is designed with a portable aluminum alloy shell, color TFT display.

BM200 is widely used for performance testing and routine maintenance of most power batteries and energy storage batteries.

BM200-05 is for 2V~4.8V 2Ah~400Ah Li-ion /LiFePO4 /Pb-Acid /NiMH

BM200-32 is for 2V~30V 2Ah~100Ah Li-ion /LiFePO4 /Pb-Acid /NiMH

The four main functions are

1.**Charging**: can set constant current & constant voltage for charging process.

2.**Discharge**: can set constant current value & cut-off voltage for discharging.

3.**Test/analyze**: can measure battery voltage, internal resistance, SOC, SOH,true effective capacity Ah value and charge/discharge curves.

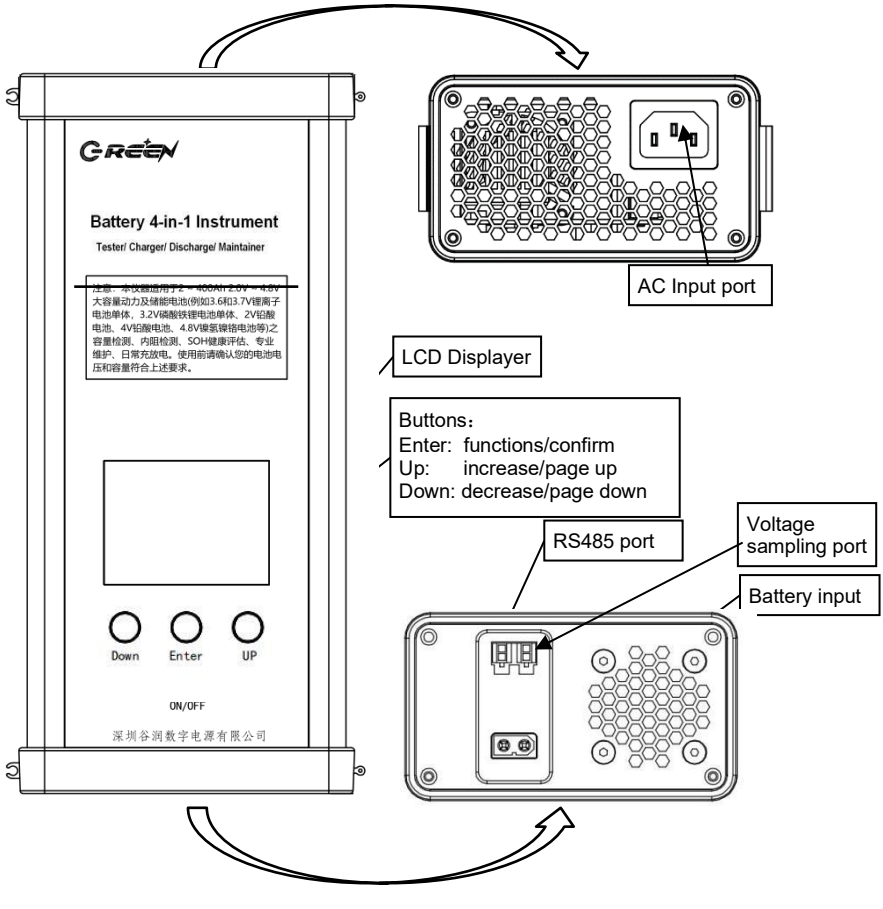
4.**Maintenance**: for the battery that has been left standing or in standby for more than 6 months, do a auto maintenance process to keep or recover battery good active capacity and health life.

Input of BM200 is AC100~240V, universal global voltage range. The adjustable range of output constant current charging current is 2A~30A (for -05) or 1A~6A (for -32); The charging limit voltage and the discharge cut-off voltage can also be adjusted manually. It has a variety of abnormal safety protection measures such as battery reverse connection, wrong connection, short circuit, overvoltage, undervoltage, over-current and over-current heat.

The BM200-**B has a Bluetooth module communication function, through which users can view the historical charge and discharge data and curves of the battery pack through the mobile phone or tablet APP, and remotely set and control the working status of the BM200.

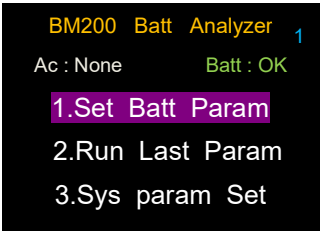
BM200-xx-D has 485 communication function, the main control is a PC computer, each module is slave mode. When multiple BM200 batteries are connected in series or parallel, up to 255 strings of large-capacity battery cells can be detected and maintained at the same time.

View of product

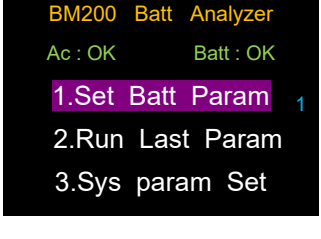


How to use

1.Connect battery: Before use, please confirm the battery unit you connect (BM200-32 voltage does not exceed 30V,BM200-05 voltage does not exceed 4.8V), please use the special red and black crocodile cable delivered by the machine, connect the red to the positive electrode of the battery, connect the black to the negative electrode of the battery, and connect the fine red and black cables matching the red and black crocodile cable to the voltage sampling interface. Insert the yellow plug of the cable into the "Battery Access jack", as shown on the previous page. If the battery is properly connected and there is still power in the battery, the LCD of the BM200 will light up, and the following screen will be displayed:



2. Connect AC power: If you only want to test battery parameters quickly, you can skip to step 3 directly, without connecting to AC power.To charge, discharge and maintain battery, or accurately measure the battery capacity Ah value and healthy SOH value,

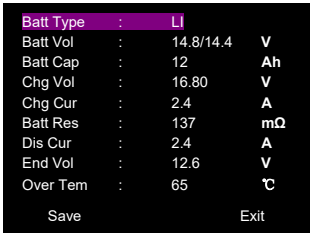


please insert mains power (AC100V~240V), if AC power is connected, LCD displays the following information:

Note: Following examples are all based on BM200-32 @ 12V12Ah PB-Acid battery.

3.Set Battery Parameter: BM200 can be used for many types batteries. To get the accuracy test results and charge safety, at first you should set the connected battery parameters. ***If the battery connected is the same as last time, please refer to Clause 3.2; Otherwise, please execute the following***

3.1 select [1. Set battery param] (When the background of this item is highlighted, it means selected, the same below), press <Enter> Key , screen will be:



[Battery type]: Select of one from LiFePO4, Li-Ion, Pb-Acid, NIMH, NICD,

[Battery voltage]: Select battery nominal voltage from 2.0V ~ 29.0V, marked on battery label.

[Battery capacity]: Input the Ah value of battery capacity, which is marked on battery label.

[Charge voltage]: Charge voltage limit during charging process, marked on battery label.This step can be skipped, BM200 will auto set a good default data.

[Charge current]: Set a constant current for charging process, recommend is 0.1C~0.5C.This step can be skipped, BM200 will auto set a good default data.

[Battery in-resist]: Set the battery internal resistance, which is listed on battery datasheet.This data is only used for evaluate battery SOH. If you have no data,this step can be skipped, BM200 will auto set a genaral default data.

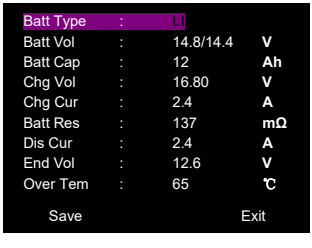
[Discharge current]: Set a constant current for discharge process, recommend is 0.1C~0.5C.This step can be skipped, BM200 will auto set a good default data.

[Discharge cut-off]: Set cut-off voltage for discharge process. Recommend is 0.8*rating voltage.This step can be skipped, BM200 will auto set a good default data.

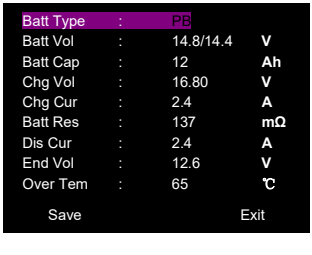
Note: [Battery type], [Battery voltage], and [Battery capacity] is necessary forsetting process, the rest 5 items can be skipped if you have no special request.

Press <Up> or <Down> keys to highlight the items, press <Enter> key to Confirm selection, then press <Up> or <Down> change data, press<Enter> when the data is correct as you wanted.

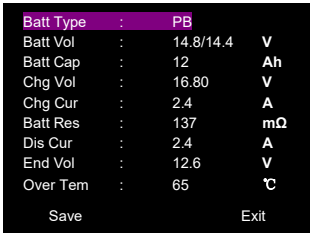
For example, select the battery type column, press the "Enter" key, and the "PB" on the right side of the battery type changes from white font to black font, indicating that the current parameter can be modified by the "Up" or "Down" key. The details are shown in the following figure.



At this time, press the "Down" key twice, the "LI" on the right side of the battery type becomes "PB", and the corresponding voltage and other parameters will also change accordingly, as shown in the following figure.



After modifying the parameters, press the "Enter" key to return to the column option, the "PB" on the right side of the battery type is changed from black font to white font, as shown in the following figure.



The remaining parameters are modified similarly.

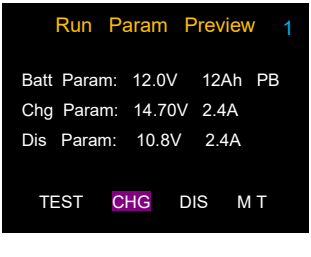
After that, press <Save>. Then screen will enter 3.3 step.

Note: After modifying a parameter, you need to save it. For example, if you press Enter for 2 seconds to forcibly exit, the parameter will not be saved, but the last saved parameter will be restored.

3.2 Select [2. Run last param], if the battery data is same as last time for BM200.

Press <Up> or <Down> keys to highlight the items, press <Enter> key to Confirm selection, ***Then screen will enter 3.3 step.***

3.3 After done 3.1 or 3.2 step, screen will be following:



If the parameters are correct, users can select the four listed in the menu according to their task requirement functions. Use <Up>, <Down> and <Enter> to select and run.

If errors are found in the preview parameters, please press <Enter> for more than 2 seconds, and the system will return to the home page to reset battery parameters.

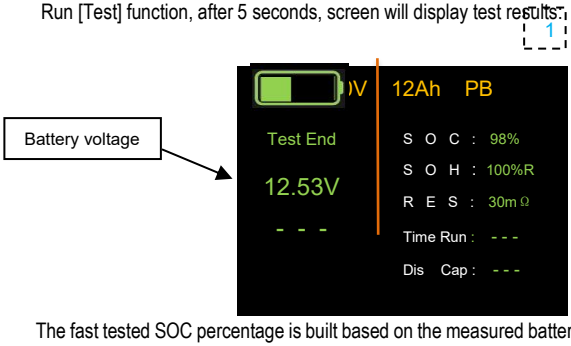
4. Main functions

4.1 [Test]: Measure battery voltage, internal-resistance, SOC and SOH within 5 seconds

SOC, means State-of-charge of battery, range is 0 ~ 100%.

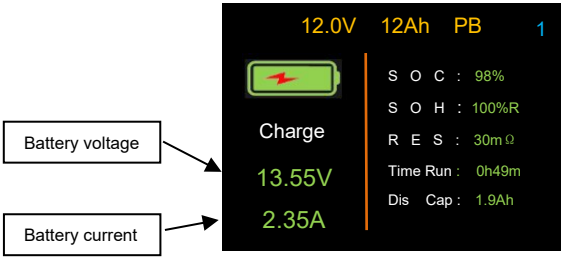
SOH, means State-of-health of battery, range0~100%.

Run [Test] function, after 5 seconds, screen will display test results:

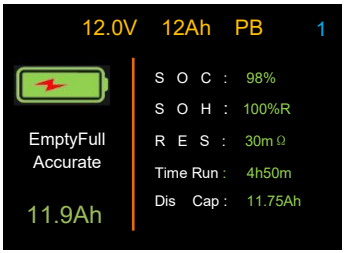


The fast tested SOC percentage is built based on the measured battery voltage and equipment learning. This SOC is calculated by looking up the voltage-SOC table. This fast tested SOC error may be relatively higher.The fast tested SOH, battery health status, is also based on the tested internal resistance of battery. This SOH is calculated by looking up the resistance-SOH table.This fast tested SOC error also may be relatively higher.To obtain accurate SOC and SOH, please select [Maintenance] function and run a cycle.

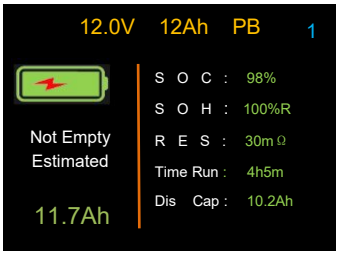
4.2 [Charge]: According to the selected battery type and charging parameters, the system automatically calls the best charging process curve. When charging, the LCD displays the following information:



After battery is fully charged, the display screen will two different display contents:



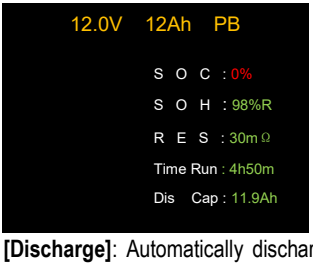
When you charge battery from empty state, after full charged, you will get an accurate capacity.



When you charge battery from non-empty state, after full charged, it can get an estimated capacity

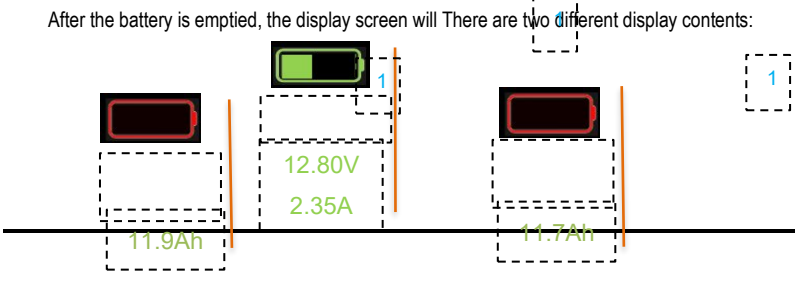
After the battery is fully charged, to view the charging curve of the battery, please press <Up> Key, screen will display the complete battery charging curve, as follows:

Press <Up> or <Down> key again, you can switch the graph and list pages alternately.



4.3 [Discharge]: Automatically discharge according to the selected parameters;During discharging process, screen will be following view:

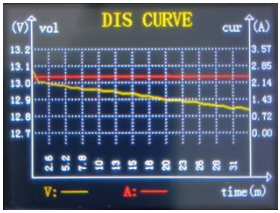
After the battery is emptied, the display screen will There are two different display contents:



When discharge battery from full charged state, after discharged empty, it will get an accurate capacity.

When discharge battery from non-full state, after discharged empty, it will get an estimated capacity.

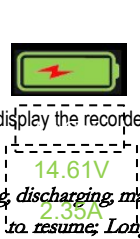
After the battery is fully charged, to view the charging curve of the battery, please press <Up> Key, screen will display the complete battery charging curve, as follows:



Press <Up> or <Down> key again, you can switch the graph and list pages alternately

4.4 [Maint]: Automatic maintenance based on selected battery parameters:

For batteries that have been idle for more than 6 months or have been floating charged for a long time, it should be regularly (preferably every 6 months or so)standard charging and discharging maintenance process. The standard maintenance procedure is to use 0.2C current first fully charge the battery - then drain the battery with 0.1C current - then use 0.1C charge current to full fill the battery. After finished this maintenance process, the vitality, the life time and the effective capacity of battery will be protected and improved to the maximum.After starting the automatic maintenance function, the LCD screen displays the status message of "Maintain **", here ** refers to CH--charging, DS--discharging, OK-- completion all maintenance jobs.Examples are as follows:



Generally, a complete maintenance process takes about 30 hours. After the process is completed, the battery capacity Ah value is the most accurate. Press <Up> key, the display screen will display the recorded complete battery charging/discharging curves.

Tips: During charging, discharging, maintenance and other processes, the user can press <Enter> briefly Pause, press again to resume; Long press <Enter> for 2 seconds to terminate the current process and return to the initial main page

5. Use Bluetooth: The BM200-B has Bluetooth module communication function, through which users can view the historical charge and discharge data and curves of the battery pack through the mobile phone or tablet APP, and remotely set and control the working status of the BM200.**

Currently, the BM200 series only provides Android apps. For details,please refer to Appendix Ⅰ "BM APP for Android".**

Attention: Once the BM200 device is successfully connected to the mobile phone or tablet through Bluetooth, the function buttons on the BM200 panel will be temporarily frozen and disabled. At this time, only the function buttons in the mobile phone or tablet APP can control the battery setting and function operation of the BM200. The panel buttons of the BM200 can be restored.

6.Use 485 communication: BM200-D has 485 communication function, the master control is a PC computer, all BM200 modules is slave mode. When multiple BM200s are connected in series or parallel, multiple large-capacity battery cells can be tested and maintained at the same time. The PC client can set and control the detection of battery charge and**

discharge, and can also store complete battery charge and discharge data and curves. For details about how to use the BM_Client software, see Appendix 2 Introduction to Using the BM_CLIENT Software.

Note: Once the BM200 device is connected to the PC, the function buttons on the BM200 panel will be temporarily frozen and disabled. At this time, only the function buttons in the PC can control the battery setting and function operation of the BM200. After the PC communication software is terminated, the panel buttons of the BM200 can be restored to normal.

Specification

Items \ model	BM200-05 [B, D]	BM200-32 [B, D]
AC input power	100~240V 50HZ	
Suitable battery type	Pb-Acid(AGM, VRLA, Gel), Li-Ion, LiFePO4, NiMH, NiCd	
Charging method	PreCharge -- C.C main charge -- special charge CV or CC -- end charge	
Suitable battery capacity	2Ah ~ 400Ah	2Ah ~ 100Ah
Suitable battery voltage*1	2.0V ~ 4.0V	2.0V ~ 29.4V
Charge/discharge voltage set	2.0V ~ 5.0V	2.0V ~32.0V
Charge current set	2A ~ 30A	1A ~ 10A (200W Max)
Discharge current set	1A~25A (90W Max.)	1A~ 6A (90W Max)
Temperature compensation	Auto compensation charge voltage according to environment temperarure	
Voltage test precision	+- 1.0%	
Current test precision	+- 2.5%	
Capacity test precision	+- 2.5%	
Abnormal protection	Shorted, reversed, OVP, OCP, OLP, OTP,	
Bluetooth function	-B model have this function	
RS485 communication	-D model have this function（Default model）	
Cascade function		
Size and weight	240*115*65mm, 1.5kg	
Safety standard	CE, EN62368, EN61000	

Note 1* : When multiple modules are used in series and parallel, internal resistance and capacity detection, performance maintenance, and series balancing can be performed for each cell of a multi-string battery pack.

Safety notes

- ✧ Be sure to understand the information of the battery to be charged or discharged accurately. If the parameters is set up incorrectly the battery may severely be damaged. Especially Lithium battery can cause a fire or an explosion by over-charging.
- ✧ If any malfunction is observed immediately terminate the process and refer to the operation manual.
- ✧ Keep away the unit from dust, damp, rain, heat direct sunshine and vibration. DO not drop it.
- ✧ This device and the battery to charge or discharge should be set up on a head-resistant, non-inflammable and non-conductive surface. Never place them on a car seat, carpet or similar. Keep all the inflammable volatile materials well away from operating area.
- ✧ The outer case slots and fan serve to cool the device so must not be covered of enclosed. Provide good ventilation.
- ✧ Please only use the official cable and clips, which are provided with device package. Other type cable or clip will affect testing and charging accuracy.
- ✧ Please clamp battery terminal poles tightly, otherwise the test result will be not Accuracy.
- ✧ Please don't want to charge batteries when:
  - The battery voltage exceeds the limit of BM200's specification.
  - Battery pack, which consists of different types of cell.
  - Non-rechargeable batteries (Explosion hazard).
  - Faulty or damaged battery.
  - Battery fitted with an integral charge circuit or special protection circuit.
  - Batteries are electrically linked to user's loads in device.

Appendix Ⅰ: BM** APP for Android

Brief introduction

This APP software is designed for BM** family Battery Tester-Charger-Discharger-Tender, as a convenient user tool. This software is used to pair, connect and communicate through BLE Bluetooth. Through this function, users can view the historical charging and discharging data and curves of the battery pack with Android phones, and remotely set and control the working state of the device.

How to use

In main page, there are three function buttons: [SEARCH BLE], [SET BATTERY PARAM] and [RUN LAST PARAM], also, there are three status on the lower of main page: AC power, Battery and BLE 。When Bluetooth connected successfully, the "BLE" will show "OK" , when AC power and Battery connected correctly, their status are all show "OK".

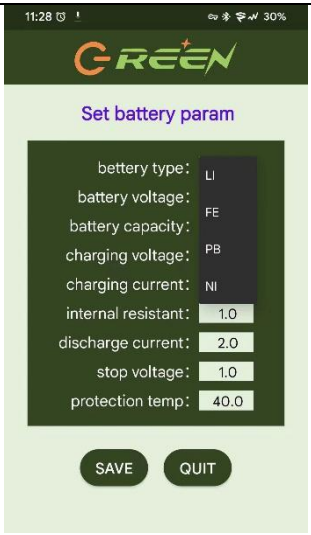
Connect Bluetooth:

Click [SEARCH BLE] button, find your BM** device and select it. Note: Before use, you need to give the software Bluetooth permission and location permission and open Bluetooth and location, otherwise you will not be able to search for Bluetooth devices.

Note: Once the BM device is successfully connected to the mobile phone or tablet computer through Bluetooth, the function keys on the BM panel will be temporarily frozen and disabled. At this time, only the function keys in the mobile phone or tablet APP can control the battery settings and function operation of the BM. When the APP program is terminated and closed, the BM panel keys can resume their normal functions.

Set battery parameter:

Click [SET BATTERY PARAM] button, enter below page:

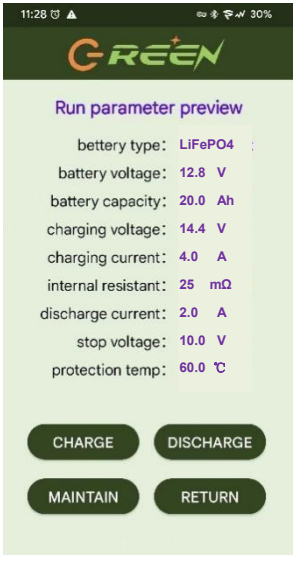


Please see page 5 (section 3.1) to learn how to set all these parameters value.

Note: [Battery type], [Battery voltage], and [Battery capacity] is necessary for setting process, the rest items can be skipped if you have no special request.

Preview the running parameters:

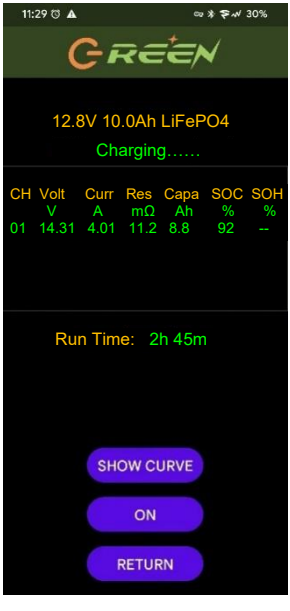
This interface will display the parameters you have just set. If the preview parameters are found to be incorrect, click the [RETURN] button to return to the operation parameter setting interface and reset the parameters.



Below the preview parameters are four function key buttons: [CHARGE], [DISCHARGE], [MAINTAIN] and [RETURN]. Click the function key to enter the corresponding operation interface.

Running view:

The upper part of the operation interface will display the battery voltage and capacity values set by the user. The mode displays different states, and then show the battery voltage, current, capacity, internal resistance, SOC and SOH. If the equipment works in multi section cascade mode, the "Serial Number" column will the tested data for each battery.



After charging or discharging done, click the [SHOW CURVE] button to enter the charging and discharging curve viewing interface. Click [SHOW CURVE] button again, return the earlier main data view screen.

[ON] button will let user start or stop the charging/discharging/maintaining process.

Appendix Ⅱ: Introduction to BM_Client software

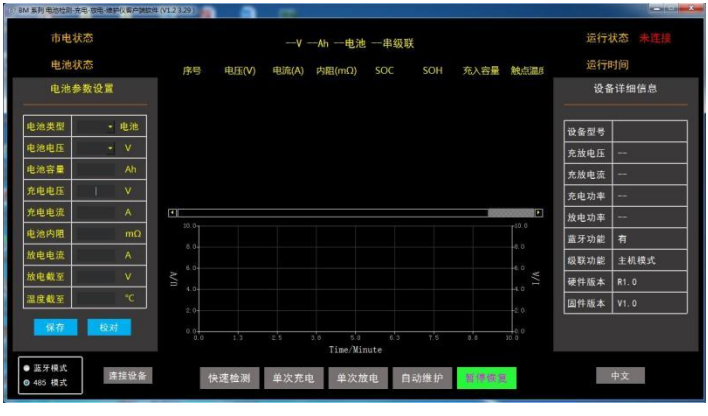
Software introduction

This software is the supporting application software of BM200 series battery detection, charge, discharge and maintenance instrument. The software is paired, connected and communicated with the battery detection and maintenance instrument through RS485, through which the user can view the historical charge and discharge data and curve of the battery pack on the computer, and remotely set and control the working state of the device.

Procedure of use

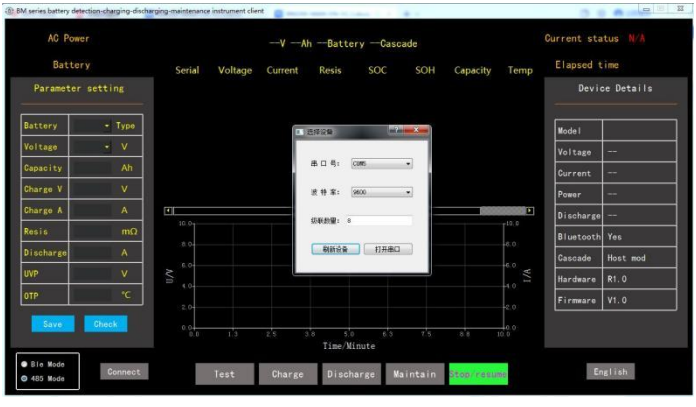
1.Communication connection: After the AC and battery are connected to the device, connect the communication cable (thin blue and white cable) matching the BM200 device to the 485 port of the device, and connect the other end to the PC client through an RS485/USB adapter. (For multiple BM200 devices, connect the 485 communication cable in parallel to the PC port.) The connection method is as follows:

Double-click to open the supporting software BM_Client, as shown in the following figure:



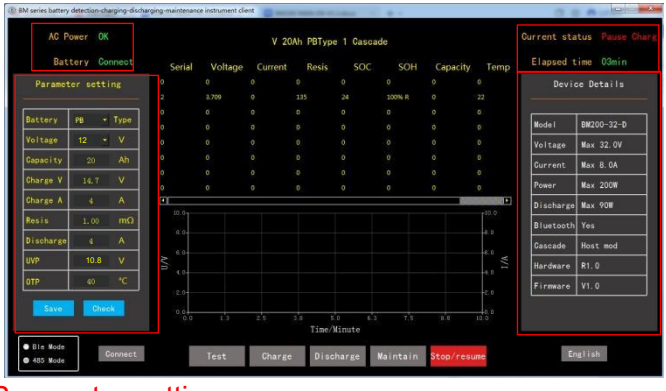
Click "中文" in the lower right corner to switch languages, and the interface shown below will be displayed：

Select "485 Mode" in the lower left corner and click "Connect ", the following pop-up window will appear in the middle of the screen:

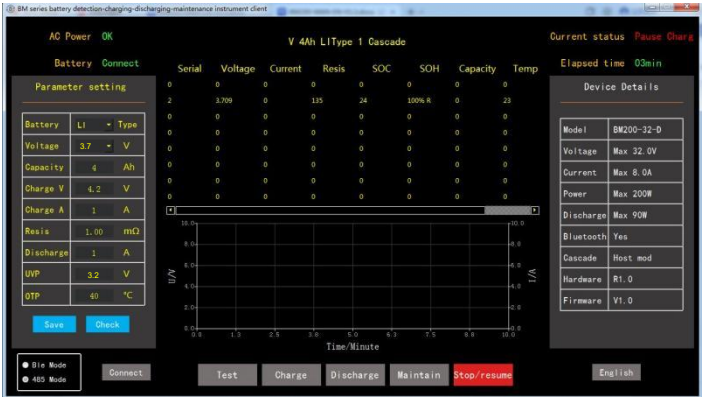


If the item bar of "Serial Port Number"（串口号） is blank, please click the lower left corner to "refresh the device"（刷新设备）, or the inverted triangle identifier on the right side of the item bar will pop up the corresponding serial port number. Note: The serial port number is slightly different according to the computer model. Set "Baud Rate"（波特率） to 9600. "Cascading Quantity"（级联数量） Set this parameter based on site requirements.

Click "Open Serial Port"（打开串口）. After the communication succeeds, the BM200 will enter the frozen state and cannot be used. You can only use the BM_Client software to control the BM200. At the same time, the BM_Client software interface displays the status and parameters of the current device, such as the information in the red box in the following figure:



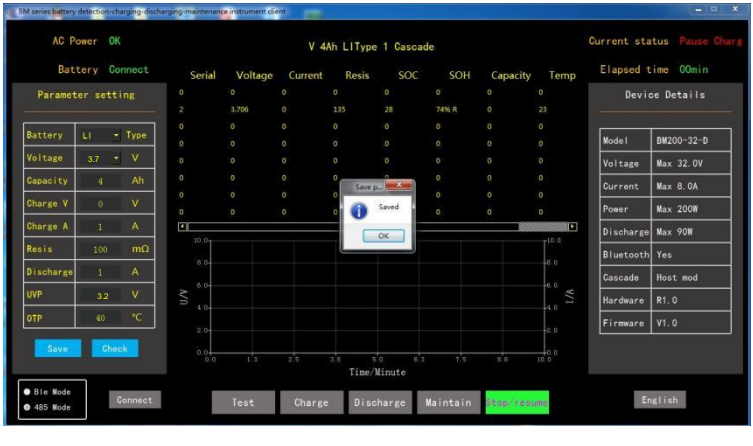
2. Parameter setting: After the communication connection is successful, you can modify the parameters in the "Battery Parameter Setting" list on the left of BM_Client. For example, if the battery parameters are lithium, 3.7V, and 4Ah, you can modify the parameters as shown in the following figure:



Click the blue box "Check" in the lower left to check parameters, and the BM200 will automatically jump to the parameter setting interface, as shown in the following figure:

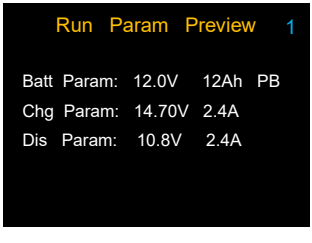
Batt Type	:	PB	
Batt Vol	:	14.8/14.4	V
Batt Cap	:	12	Ah
Chg Vol	:	16.80	V
Chg Cur	:	2.4	A
Batt Res	:	137	mΩ
Dis Cur	:	2.4	A
End Vol	:	12.6	V
Over Tem	:	65	℃

The BM200 displays the last saved parameter because the parameter has not been saved. Click "Save" in the blue box in the lower left corner to save the data. The following screen is displayed:



At the same time, the BM200 automatically modifies the battery parameters. The following figure is displayed:

Then automatically jump to the running parameters interface:



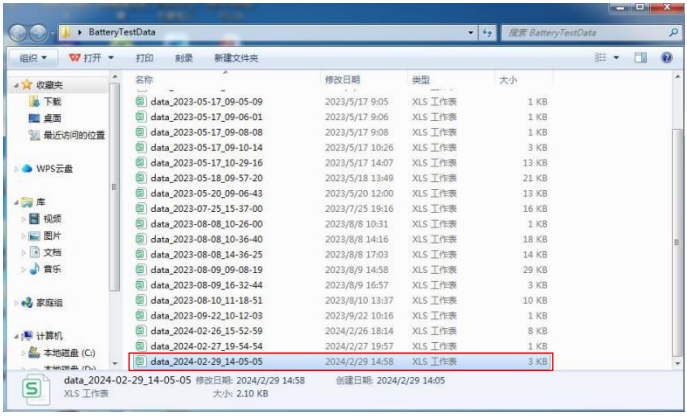
After the parameter modification is completed, the device can be controlled for charge and discharge test, and can be selected to run according to their actual needs Four functions (quick detection, single charge, single discharge, automatic maintenance), in the process of charging, discharge, maintenance and other any process, the user can click the "pause recovery" button to pause, or after suspension by clicking "pause recovery" to recover. At the same time, during the operation of the device, the user can view the current battery voltage, current, capacity, internal resistance, SOC, SOH value through the computer in real time, and with the charge and discharge curve. If the device works in multi-node cascading mode, the Serial Number column displays real-time detection data of each battery in the sequence of device addresses.

For example, to charge a single 3.7V lithium battery, click "Single charge" :

After clicking, the background color of the corresponding function module will light up green, and the BM200 will start charging from the machine. At the same time, the battery data starts to be displayed in real time in the red box and the charging curve starts to be recorded in the yellow box.

Tip: BM_Client can store complete battery charge and discharge data and curves. For example, when you perform a charge and discharge test using the BM_Client software for the first time, a BatteryTestData folder is generated in the corresponding file path of the BM_Client software. This folder will automatically organize the complete data of the battery charging and discharging process into a table. If the BM_Client software path is the computer desktop, the corresponding "BatteryTestData" folder will be automatically generated on the computer desktop when the charge and discharge is used for the first time, as shown in the figure:

Open the "BatteryTestData" folder, and the BM_Client software will write a set of data to the generated table every minute during the charge and discharge process, as shown in the figure:



The table in the red box is generated during the current charge and discharge process. For ease of management, the table is named the current date by default.

For example, the table name "date_2024-02-29_14-05-05" refers to the start time of battery charge and discharge at 14:05:05 on February 29, 2024, and then records a set of data every one minute and saves it in the current table, as shown in the figure:

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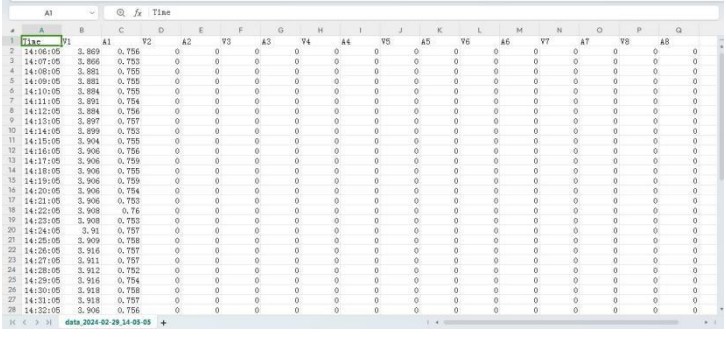

Time	V1	A1	V2	A2	V3	A3	V4	A4	V5	A5	V6	A6	V7	A7	V8	A8
14:06:05	3.869	0.756	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:07:05	3.866	0.753	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:08:05	3.881	0.755	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:09:05	3.881	0.755	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:10:05	3.884	0.755	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:11:05	3.891	0.754	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:12:05	3.884	0.756	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:13:05	3.897	0.757	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:14:05	3.899	0.753	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15:05	3.904	0.755	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:16:05	3.906	0.756	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:17:05	3.906	0.759	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:18:05	3.906	0.755	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:19:05	3.906	0.759	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:20:05	3.906	0.754	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:21:05	3.906	0.753	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:22:05	3.908	0.76	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:23:05	3.908	0.753	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:24:05	3.91	0.757	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:25:05	3.909	0.758	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:26:05	3.916	0.757	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:27:05	3.911	0.757	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:28:05	3.912	0.752	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:29:05	3.916	0.754	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30:05	3.918	0.758	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:31:05	3.918	0.757	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:32:05	3.906	0.756	0	0	0	0	0	0	0	0	0	0	0	0	0	0