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1. Product Overview

EB480 battery cell balancer is a battery maintenance equipment specially designed for new energy batteries developed by Smartsafe. It is used to quickly solve the cruising range degradation caused by the difference in cell capacity due to inconsistent cell voltages. It has the characteristics of simple operation, stable performance, strong anti harmonic ability and convenient carrying. It can be applied to power battery production, new energy vehicle enterprise R & D, new energy battery pack maintenance and other scenarios.

1.1 Product Features

- Adopt the latest equalizing maintenance technology and avoid the interference to BMS (Battery Management System), EB480 is designed for lithium battery pack daily discharge, charge, and equalizing maintenance.
- Based on wide voltage range design, EB480 can be applied to lithium battery packs testing with various voltage levels.
- Equalizing maintenance test mode can activate the lithium battery performance completely.
- Voltage and temperature monitoring and protection during test can prevent over-charge and over-discharge.
- Multiple discharge auto-stop conditions make testing mode more intelligent and flexible, and avoid over-charge and over-discharge.
- Intelligent equalizing function based on each cell voltage monitoring and equalizing charge.
- Support equalizing maintenance parameter customization.
- Support multiple protection design and alarm settings of voltage, current, temperature abnormal to protect the battery and the balancer.
- Support functions such as overvoltage, undervoltage, overcurrent, output short circuit, anti-reverse protection and overheating protection.
- Adopt wave width modulation technology, high efficiency, high power factor, low noise, low electromagnetic interference.
- 7-inch touch screen, easy to operate.
- Built in memory, supporting automatic storage of operation records.
- Portable design, easy to carry and transport.

1.2 Main Function and Test Range

Mainly used for lithium battery pack charge & discharge test and equalizing maintenance, suitable for various voltage levels.

1.3 System Components

The device consists of main unit and equalizing cables. The main unit includes color display screen, data processing unit, data monitoring unit, auxiliary power unit, power consuming unit, and panel operation unit.

1.4 Working Conditions

NO CORROSIVE, NO EXPLOSIVE, NO ELECTRICAL BREAKDOWN AIR OR CONDUCTIVE DUST.

1.5 Environment & Energy Impact

The balancer can convert the tested battery energy into heat and use cooling system to blow the heat

out of the unit, so during the discharge test, please pay more attention to heat dissipation and ventilation.

1.6 Protection & Alarm

This balancer has hardware and software protection functions such as reverse connection, overvoltage, overcurrent, overtemperature, communication error, etc.

2. Precautions for Safe Use

2.1 Safe Working Period & Production Date

The designed safe working period for this balancer is 5 years, please refer to the factory inspection list for the production date.

2.2 General Rule

Please follow the user manual to use this balancer.

2.3 Common Incorrect Operation

1） Tools for connecting is not well insulated.
2） Operating without following the user manual.

2.4 Damage Probably Caused By Incorrect Operation

1） Short circuit accident: Tools is not well insulated, or battery pack positive and negative electrodes are too close.
2） Failure to follow the correct operation method will cause the device not working properly.

2.5 Emergency Treatment In Exceptional Cases

Disconnect the device power supply and test cables.

2.6 Precautions In Exceptional Circumstances

If the operator uses tools without well insulation or improper operate to cause short circuit, please separate the cables immediately.

2.7 Other Safety Alerts

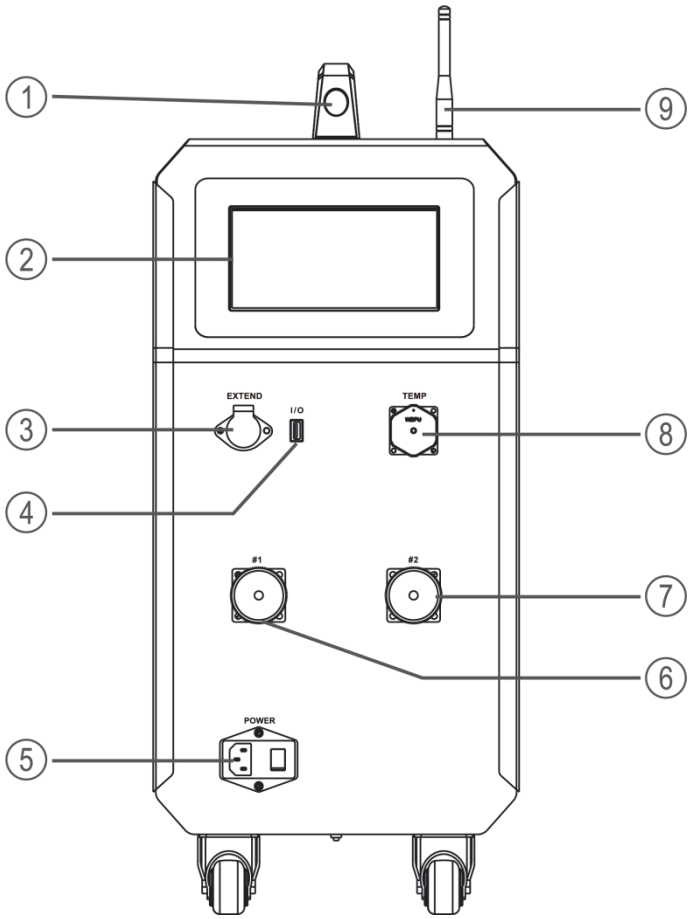
Strict compliance with safety operating norms and correct operating procedure.

3. Technical Features

Function Parameter	
Model	EB480
Power input	AC 90~265V
Charging & discharging voltage range	1.8~4.5V
Voltage measurement accuracy	±0.1%FS±2mV (Maximum range 5V)
Charging & discharging current range	0.1~ 5A
Current measurement accuracy	±1%FS±0.05A (Maximum range 5A)
Battery Temperature Detection accuracy	±2℃ (-25℃--85 ℃) Charge and discharge temperature range is settable
Max channel quantity in single unit	4 string x Max 12 cells
Charging & discharging power	1200W Max
Equalization Test Port	26Pin*2
Temp Test Port	24Pin
Display	7-inch TFT LCD screen, resolution 800*480
PC Data communication	TCP/IP， USB-Device
Wireless communication	Wi-Fi (Wi-Fi antenna external)
Data transfer	U Disk (USB-Host)
Charging mode	Constant current charging + constant voltage charging
Discharge mode	Constant current (constant power, constant resistance discharge selectable)
Protections	Overcurrent and overvoltage protection for input and output
Safety Testing	
Breaking down test	AC input-metal shell: 2200Vdc 1min
	DC input-metal shell: 2200Vdc 1min
Working Environment	
Cooling	Forced air cooling
Temperature	Operating temperature: -5~40℃; Storage temperature: -20~70℃
Humidity	Relative humidity 0-90% (40±2℃)
Elevation	Rated altitude of 2000 meters
Size and Weight	
Dimension	640*276*490mm
Weight	28kg

4. Operating Instructions

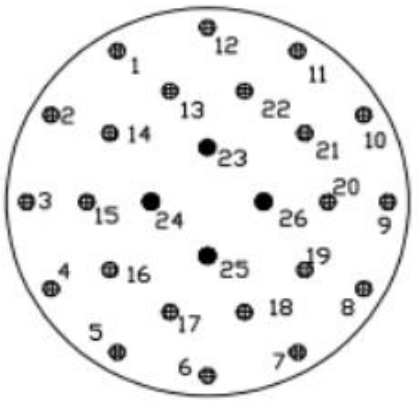
4.1 Panel Description



No.	Name	Description
1	Handle	Easy to move the device
2	Display	7-inch touch screen
3	Communication Port	RS485 extend port, reserved for functional expansion, need to be used with dedicated communication lines
4	USB Port	for data download and device system upgrades
5	AC input & Main Switch	Single Phase 90~265V AC input, max input 10A
6	1# Equalization Unit Port	26pin, equalization harness socket, max 12cells*2/unit
7	2# Equalization Unit Port	26pin, equalization harness socket, max 12cells*2/unit
8	Temp Acquisition Port	24pin, temperature acquisition port
9	Antenna stick	to enhance the received signal

4.2 Interface PIN Definition

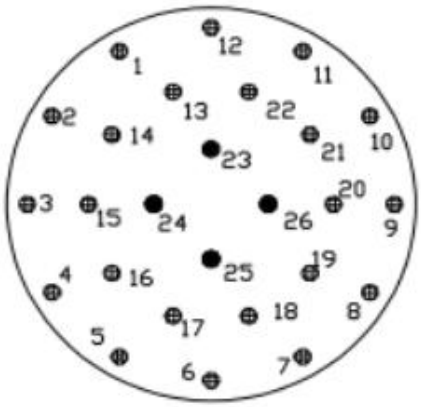
1) 26PIN：Equalization port #1



26 Pin Aviation Plug

Pin_SN	Description	Line Marker	Pin_SN	Definition	Line Marker
1	Cell #1 -	B1-	14	Cell #13 -	B13-
2	Cell #1 +	B1+	15	Cell #13 +	B13+
3	Cell #2 +	B2+	16	Cell #14 +	B14+
4	Cell #3 +	B3+	17	Cell #15 +	B15+
5	Cell #4 +	B4+	18	Cell #16 +	B16+
6	Cell #5# +	B5+	19	Cell #17 +	B17+
7	Cell #6 +	B6+	20	Cell #18 +	B18+
8	Cell #7 +	B7+	21	Cell #19 +	B19+
9	Cell #8 +	B8+	22	Cell #20 +	B20+
10	Cell #9 +	B9+	23	Cell #21 +	B21+
11	Cell #10 +	B10+	24	Cell #22 +	B22+
12	Cell #11 +	B11+	25	Cell #23 +	B23+
13	Cell #12 +	B12+	26	Cell #24 +	B24+

2) 26PIN：Equalization port #2



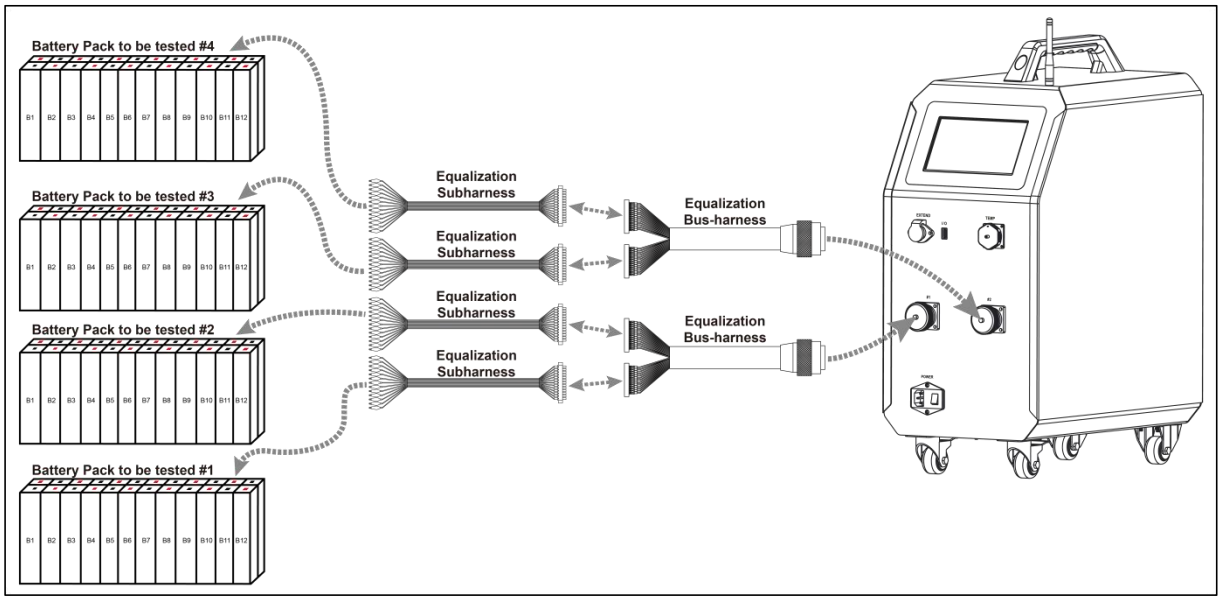
26 Pin Aviation Plug

Pin_SN	Definition	Line Marker	Pin_SN	Definition	Line Marker
1	Cell #1 -	B1-	14	Cell #13 -	B13-
2	Cell #1 +	B1+	15	Cell #13 +	B13+
3	Cell #2 +	B2+	16	Cell #14 +	B14+
4	Cell #3 +	B3+	17	Cell #15 +	B15+
5	Cell #4 +	B4+	18	Cell #16 +	B16+
6	Cell #5 +	B5+	19	Cell #17 +	B17+

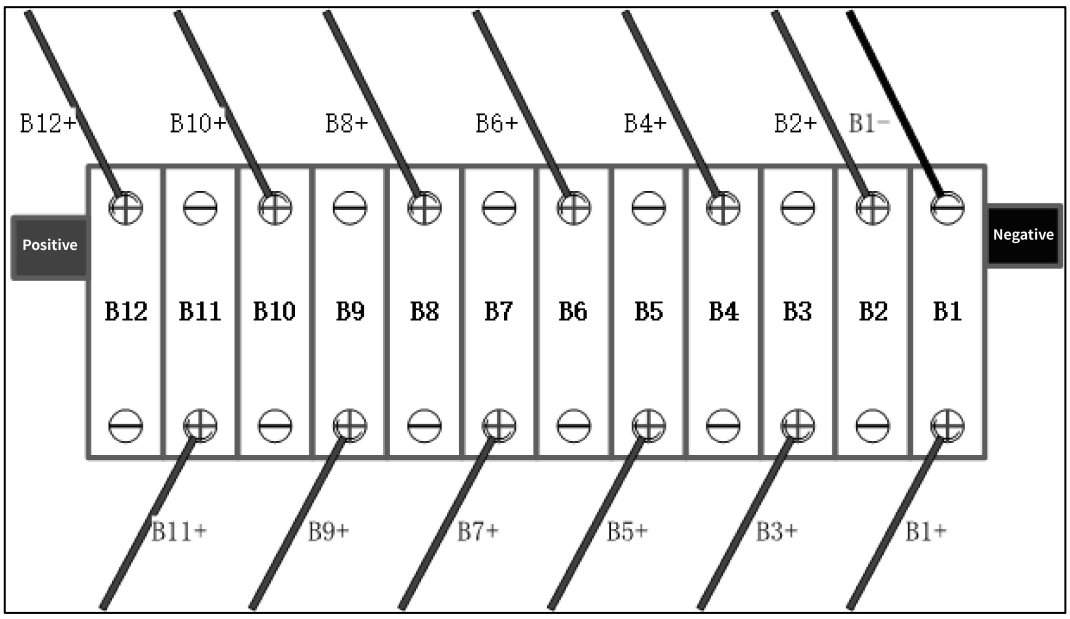
7	Cell #6 +	B6+	20	Cell #18 +	B18+
8	Cell #7 +	B7+	21	Cell #19 +	B19+
9	Cell #8 +	B8+	22	Cell #20 +	B20+
10	Cell #9 +	B9+	23	Cell #21 +	B21+
11	Cell #10 +	B10+	24	Cell #22 +	B22+
12	Cell #11 +	B11+	25	Cell #23 +	B23+
13	Cell #12 +	B12+	26	Cell #24 +	B24+

4.3 Main Unit Connection

Firstly connect the equalization bus-harness to the equalizing test socket of the balancer, then plug the equalization bus-harness and the equalization subharness, and finally clamp the clamps of the equalization subharness on the battery module under test in turn.



4.3.1 Equalization subharness and Battery Pack Connection



According to the wire label on the equalization subharness, B1 - is connected to the negative electrode of No. 1 single cell (B1), B1 + is connected to the positive electrode of No. 1 single cell (B1), B2 + is

connected to the positive electrode of No. 2 single cell (B2), and connected in sequence.

Note: the nearest to the negative terminal of the battery module is the No. 1 single cell.

4.3.2 Working Power Supply Connecting

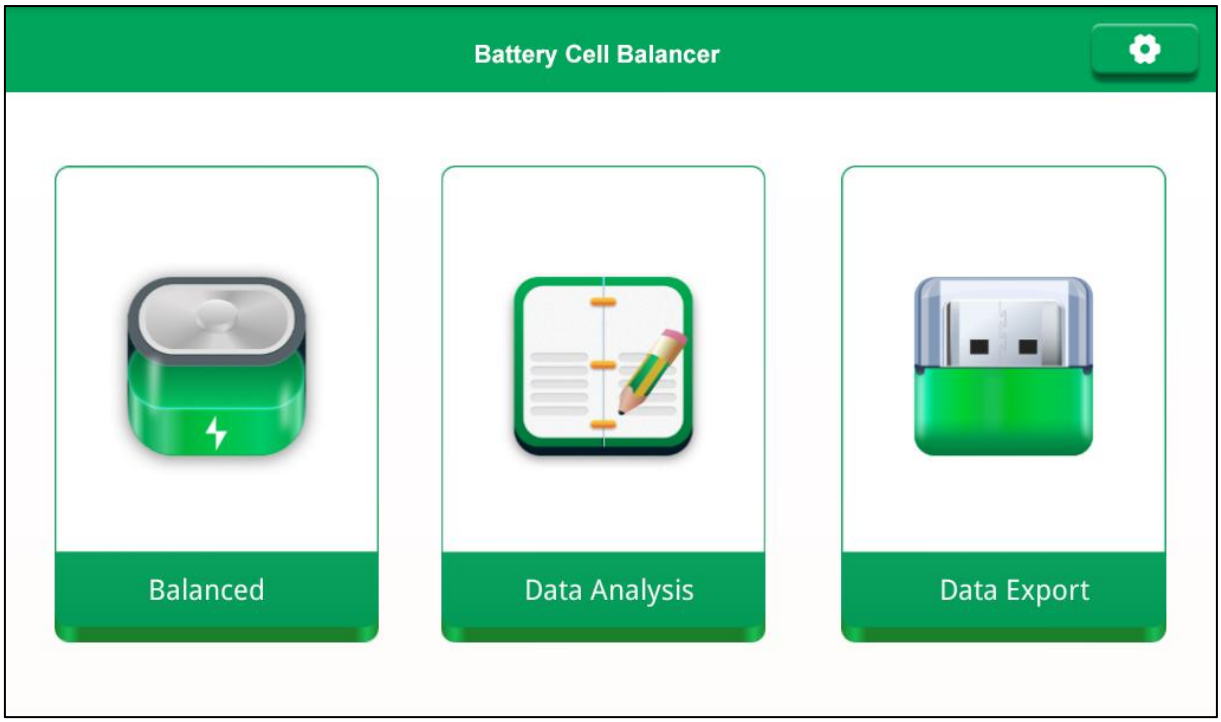
Connect the power supply cord with the main unit AC socket, and please ensure AC power supply can support Single phase 90~265V AC Max 10Amp output.

4.4 Main Unit Operation

4.4.1 Welcome Screen

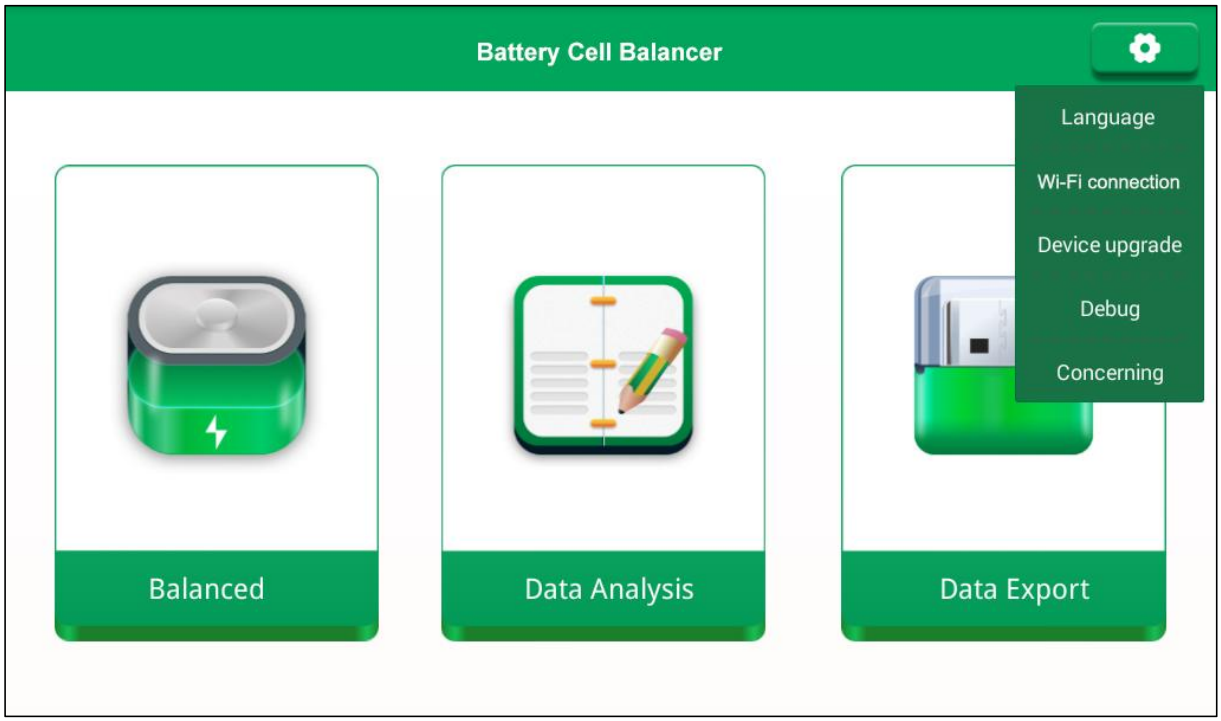
4.4.2 Main Menu

Click the function module on the main menu to enter the corresponding function operation interface.

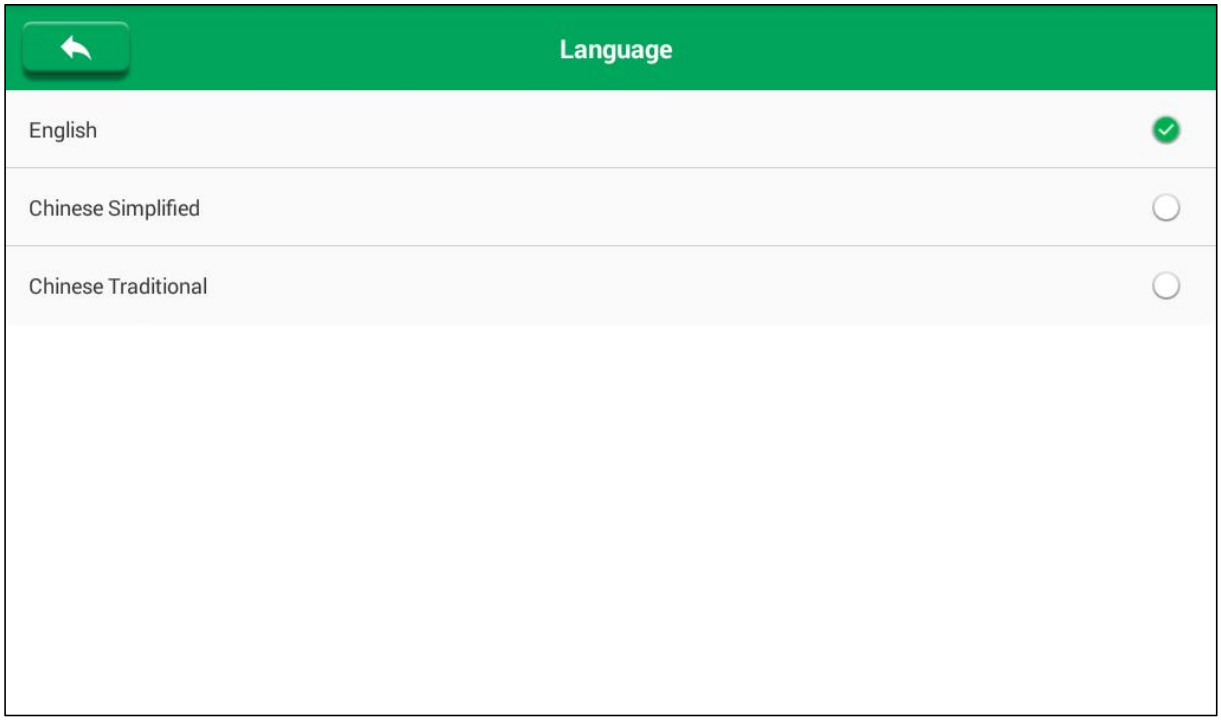


4.4.3 General Settings

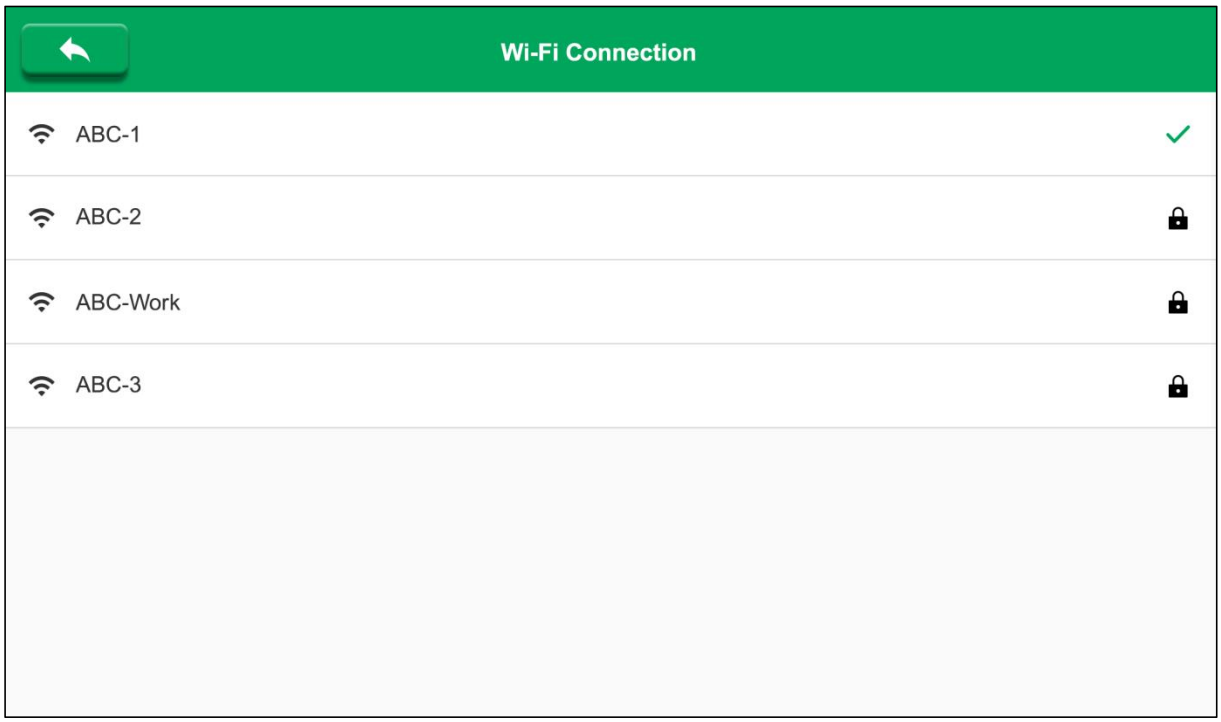
"System settings" mainly includes **Language settings**, **Wi-Fi connection**, **Device upgrade**, **Debug** and **Concerning**. Click the button in the upper right corner of the main interface, and select the options to be set or viewed in the expanded list.



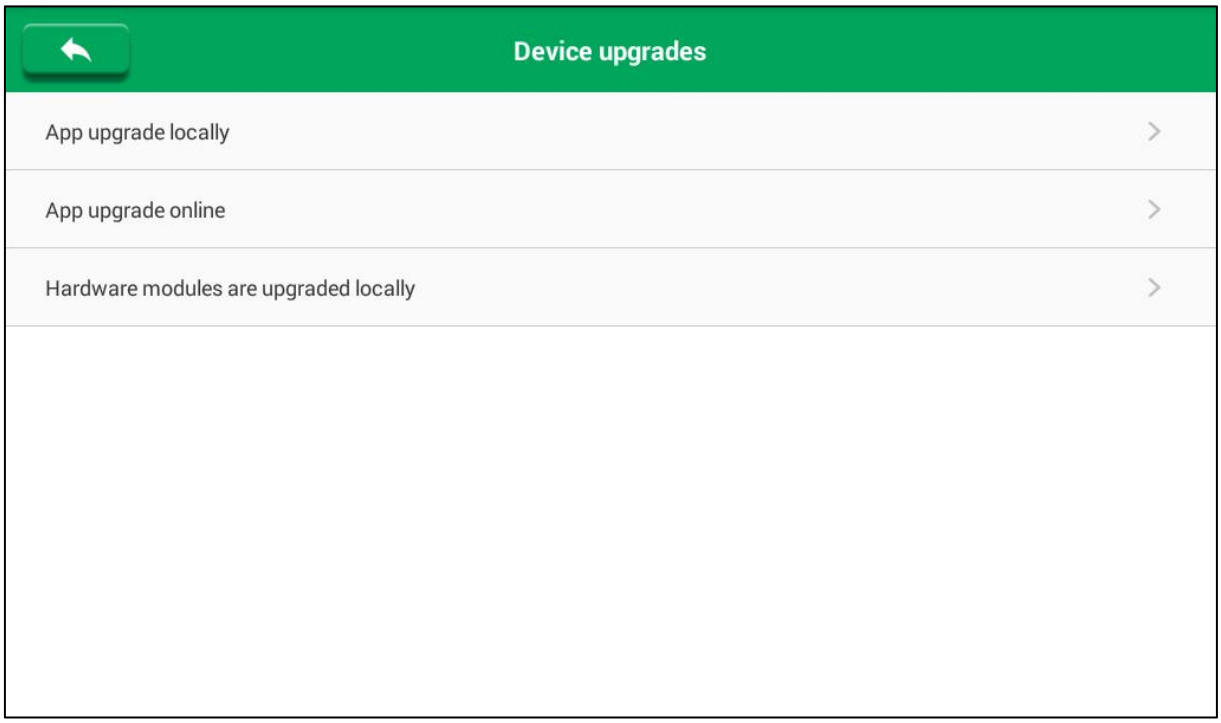
Language settings：Used to change the system language.



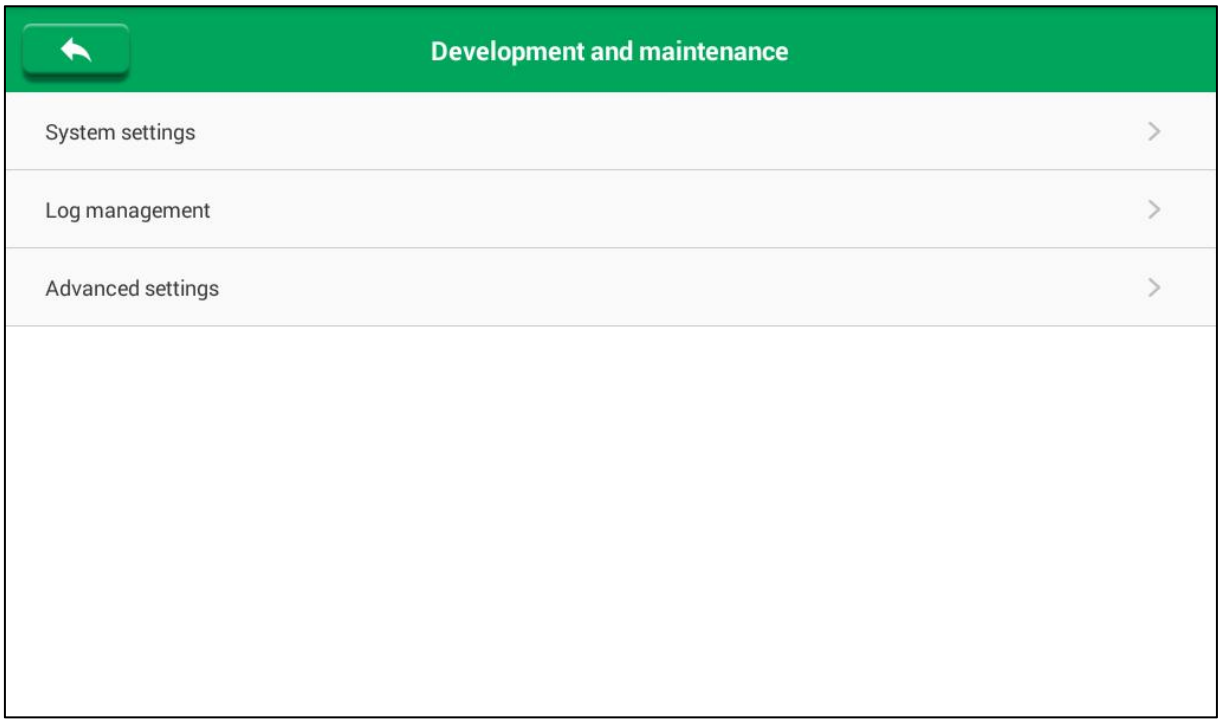
Wi-Fi connection：Used for Wi-Fi connection setting of the balancer.



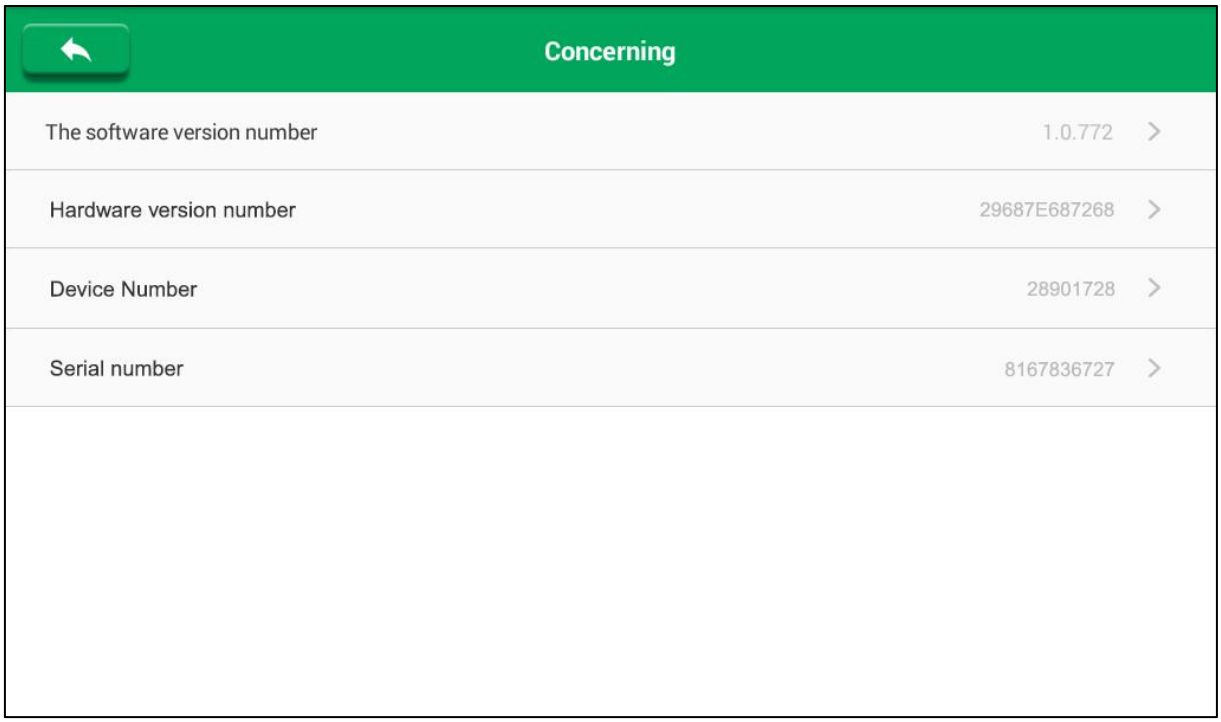
Device upgrade：Can use U disk for local upgrade, or choose upgrade online.



Debug：Only for development and maintenance.

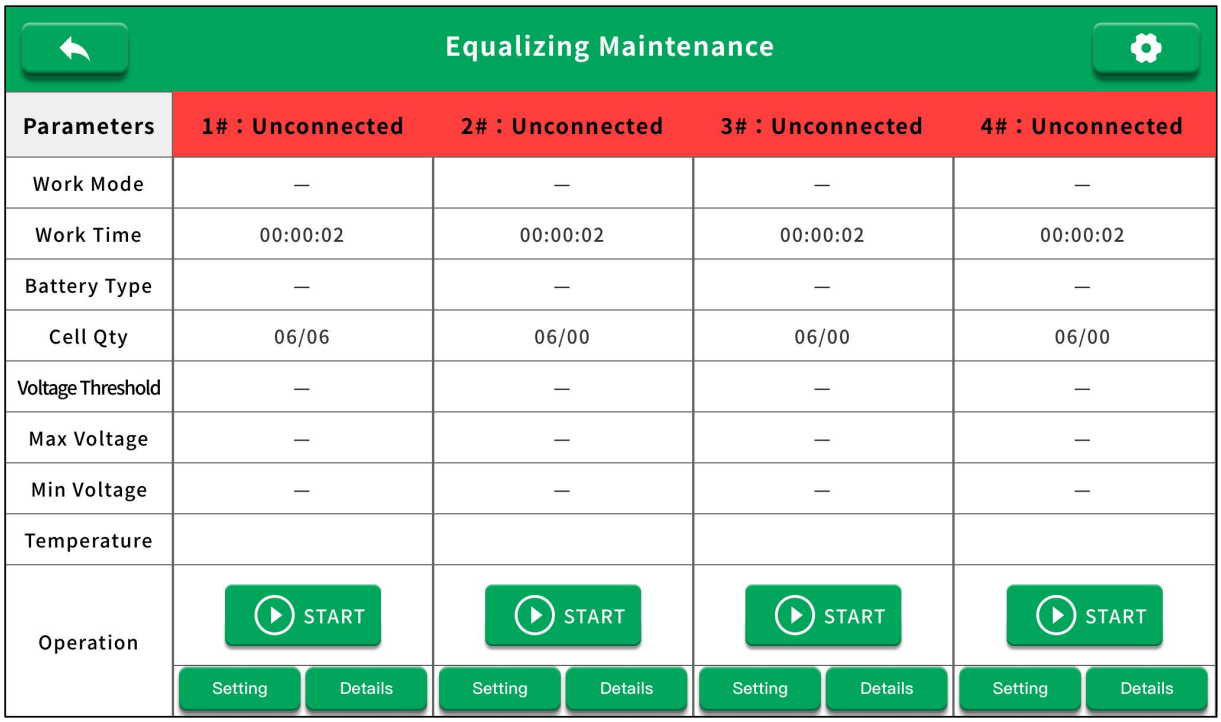


Concerning：Used to view information such as software and hardware version number, device number and serial number.



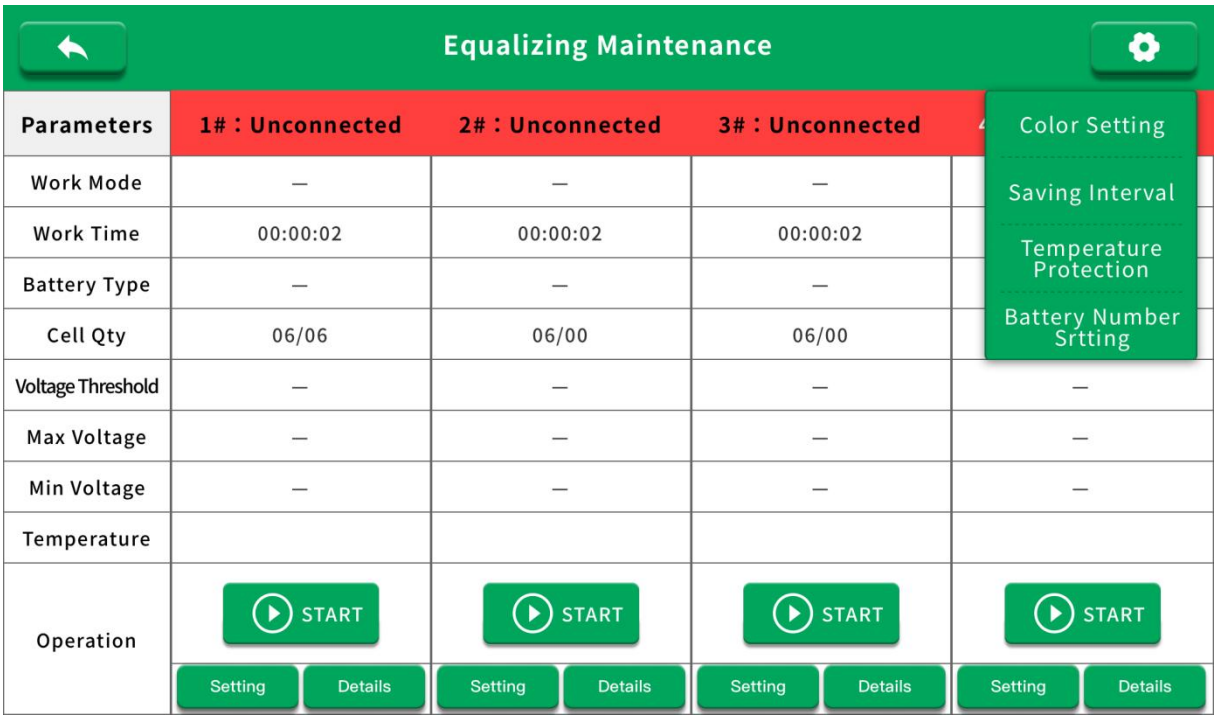
4.5 Equalizing Maintenance

Tap **Balanced** in the main interface to enter the following interface.



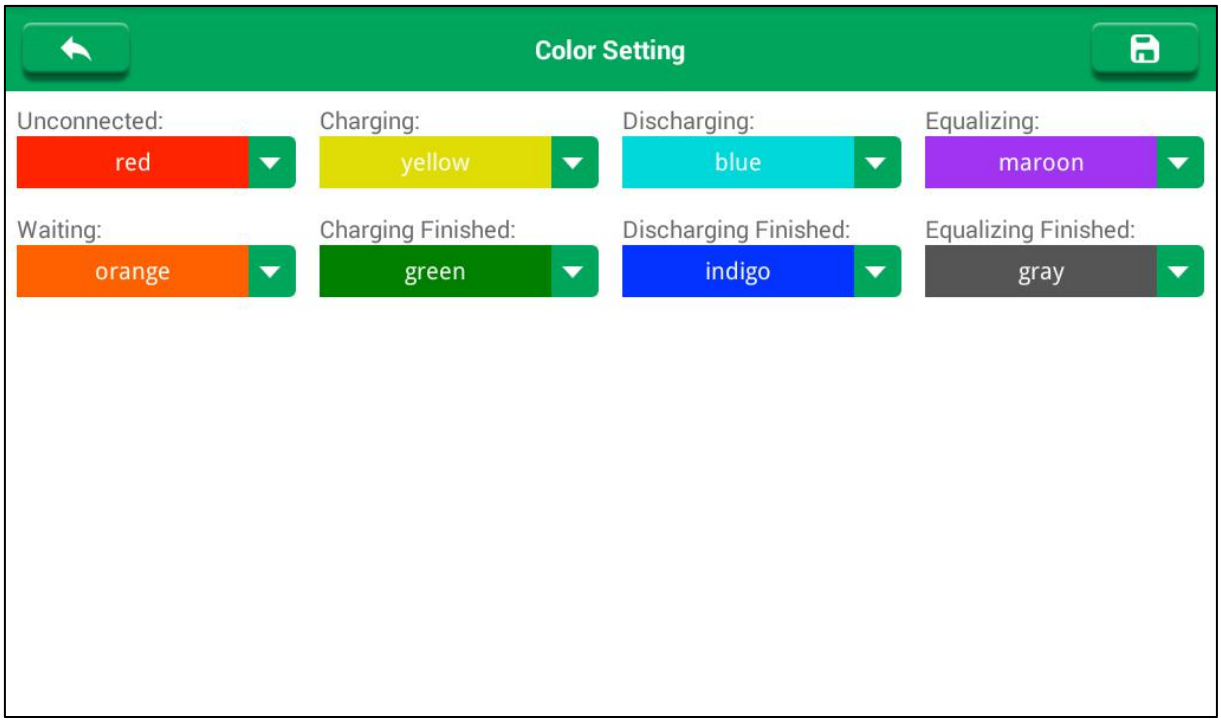
4.5.1 Equalizing Maintenance Setting

Tap the button in the upper right corner and select the option to be set in the expanded list.



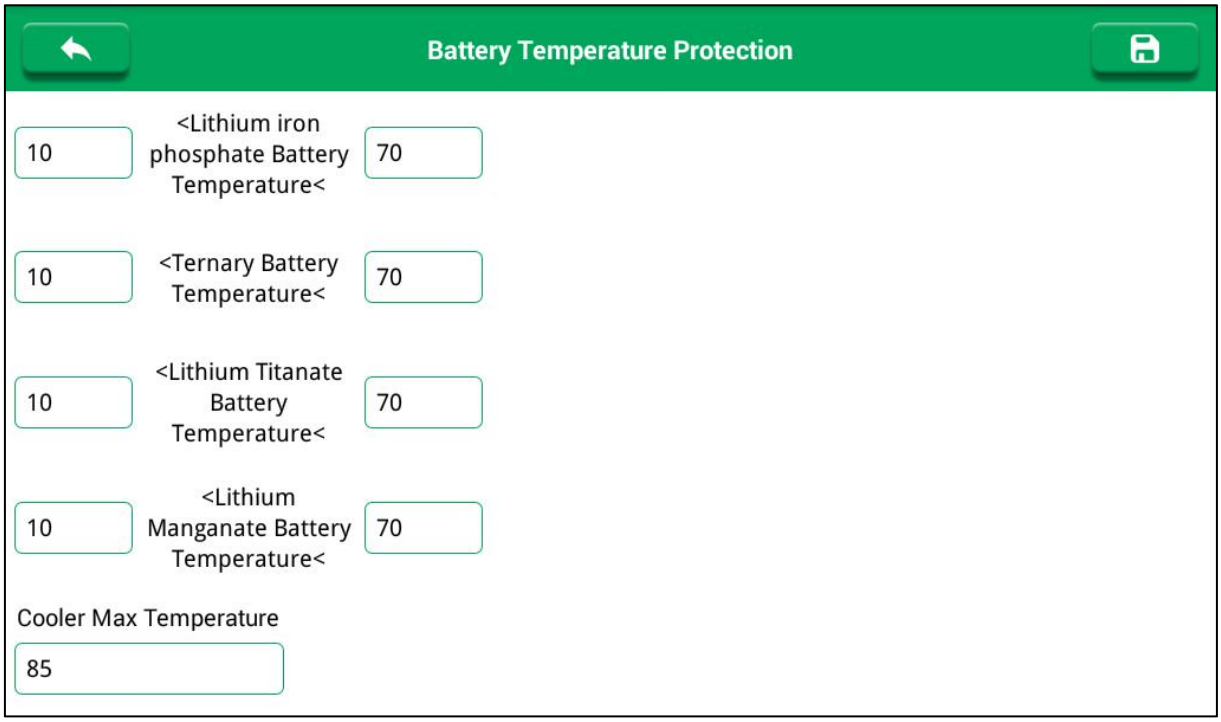
1） Color Setting

Used to set the color display of the balancer in various working status.



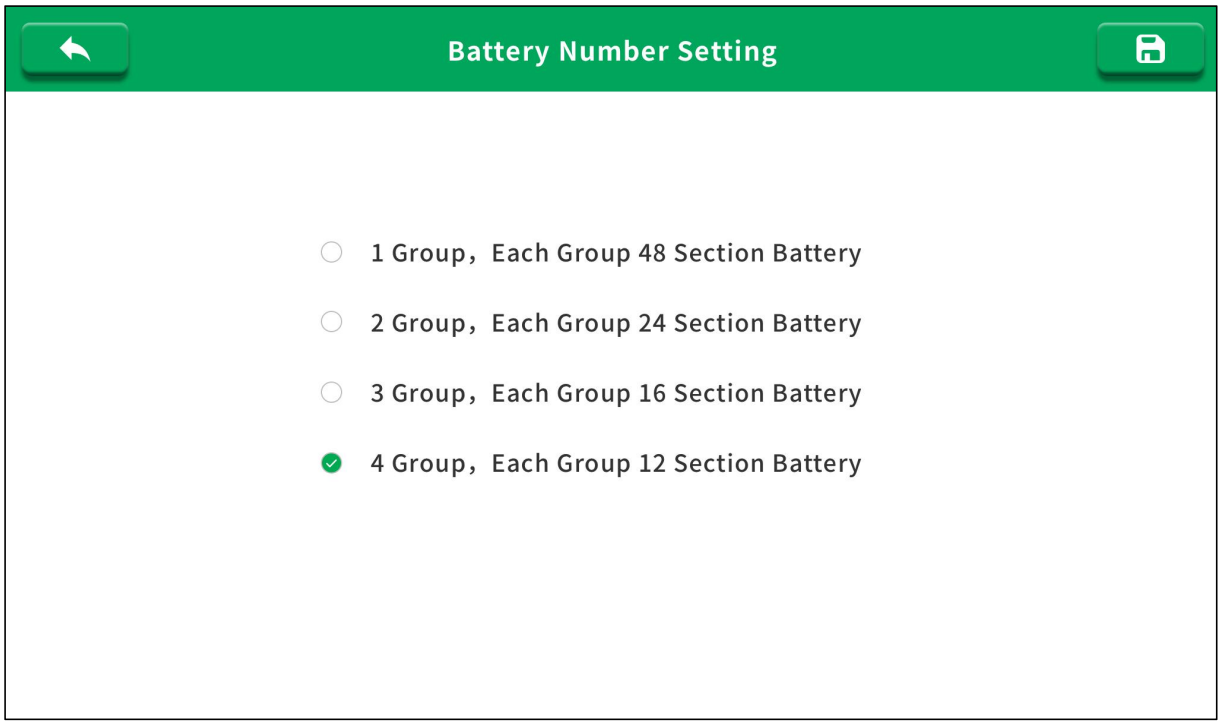
2） Temperature Protection

Used to set the temperature protection high and low limit for different type of lithium battery packs and the balancer internal cooler. If the battery temperature exceeds the set range during the use of the equipment, it will stop working and pop up an alarm message.



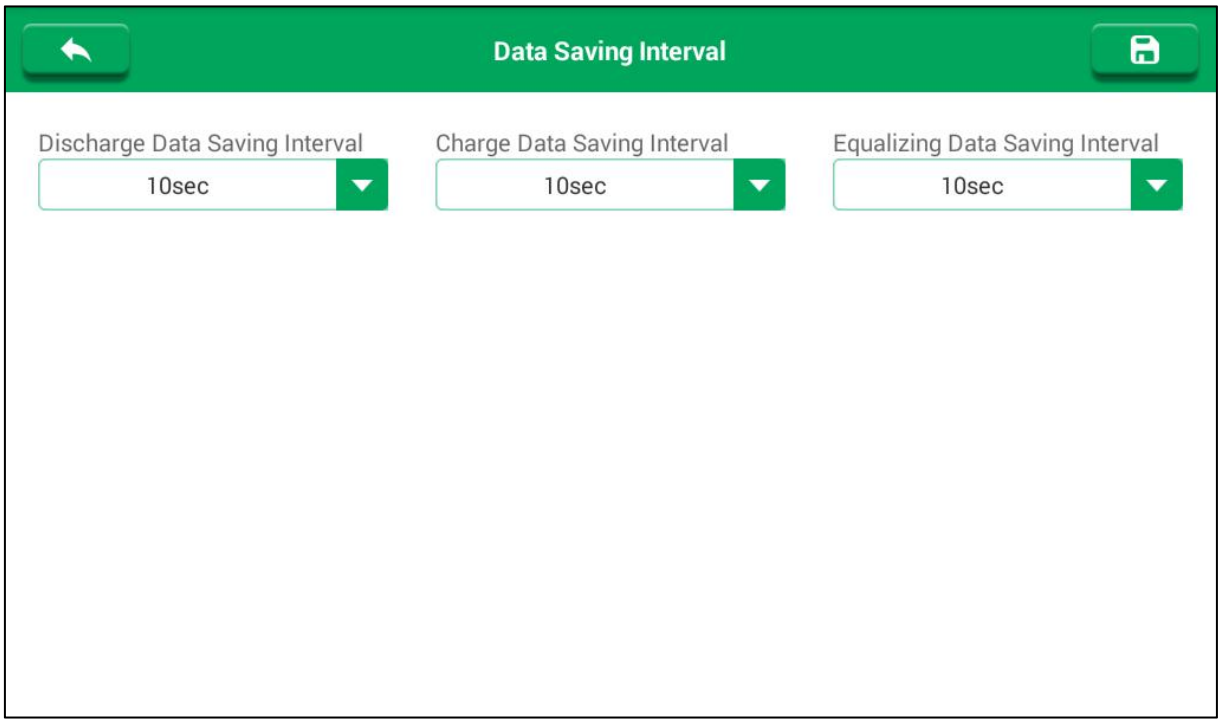
3） Battery Number Setting

Used to adjust the number of cells in the battery pack.



4） Saving Interval

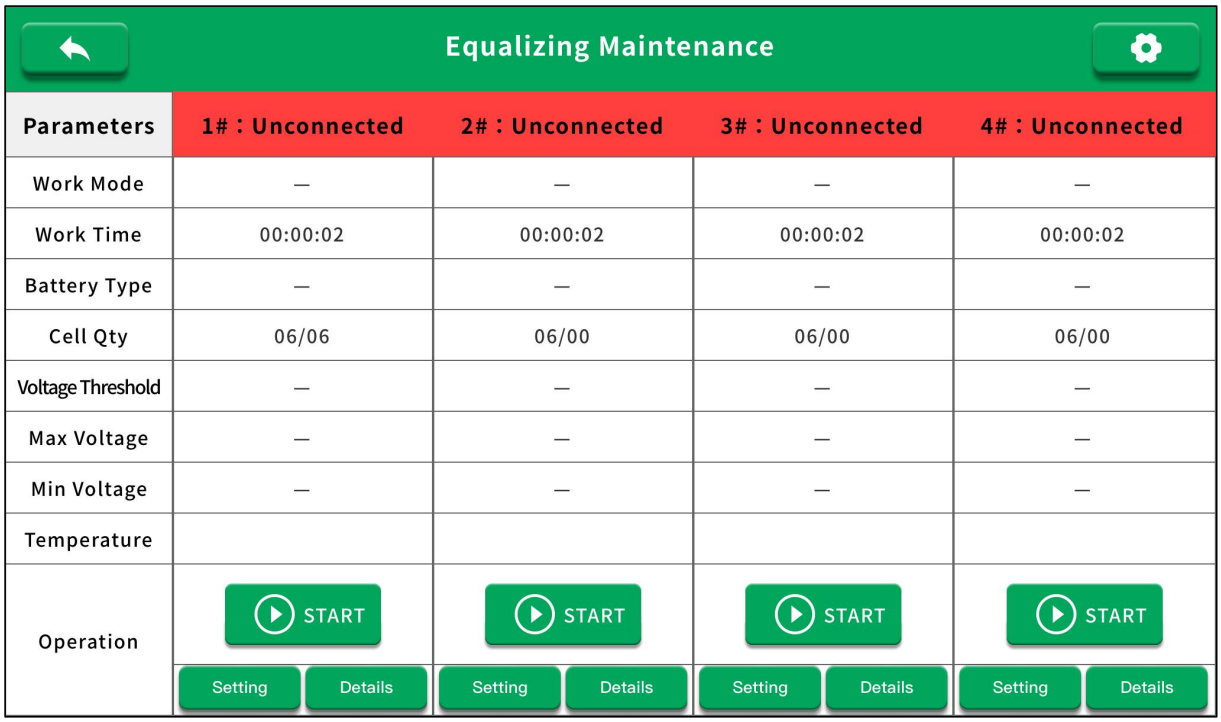
Used to set the data saving interval time of discharge, charge and equalizing.



4.5.2 Parameters

The balancer can maintain at most 4 groups of batteries, each with 12 batteries (subject to the number of connected batteries).

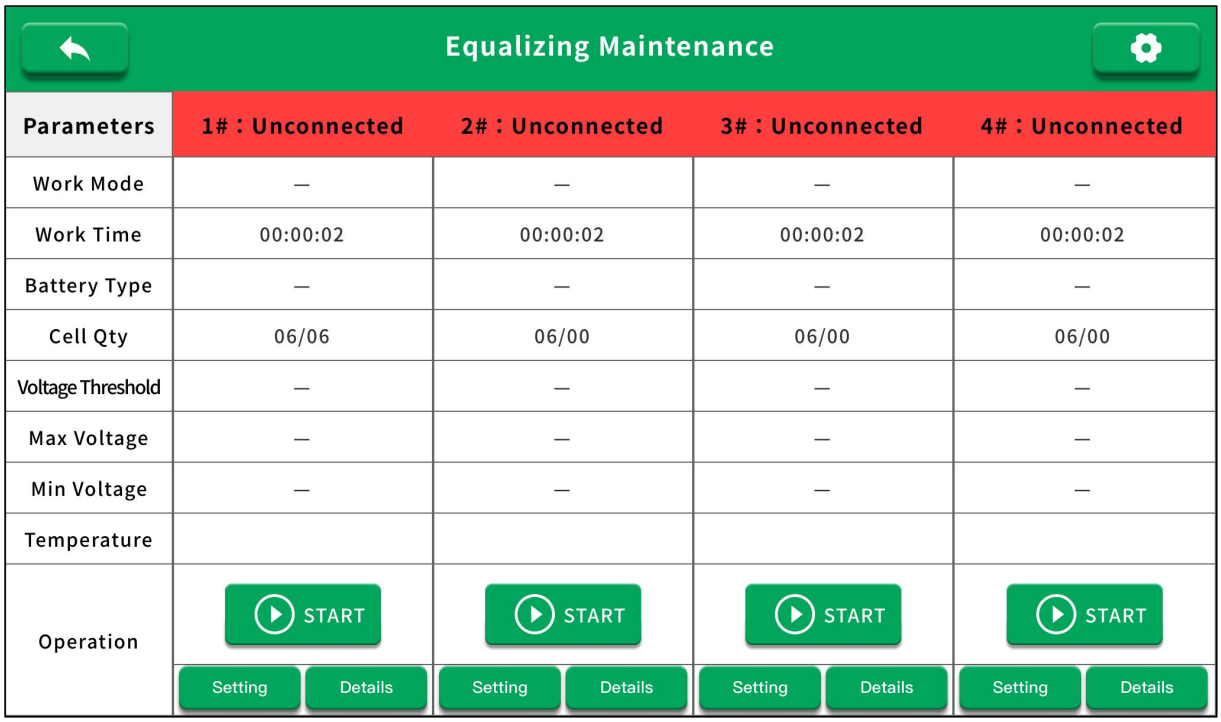
When power on, if the battery pack is connected correctly, the current status of the battery pack will be displayed after the battery pack number. If the battery pack is not connected or there is a connection failure, the display status is: unconnected.



Parameters	Parameter Description	Parameters	Parameter Description
Battery pack number and status	Display the battery pack number and the status of the battery pack.	**Work Mode**	Charge, discharge or equalizing
Work Time	Work time since test started.	**Battery Types**	The type of lithium battery pack.
Cell Qty	Cell quantity in a battery pack.	**Voltage Threshold**	The end voltage to terminate the testing.
Max Voltage	The max voltage in all cells.	**Min Voltage**	The min voltage in all cells.
Temperature	Max temperature measured in battery pack.	**Operation**	Start/stop discharge, charge or equalizing.

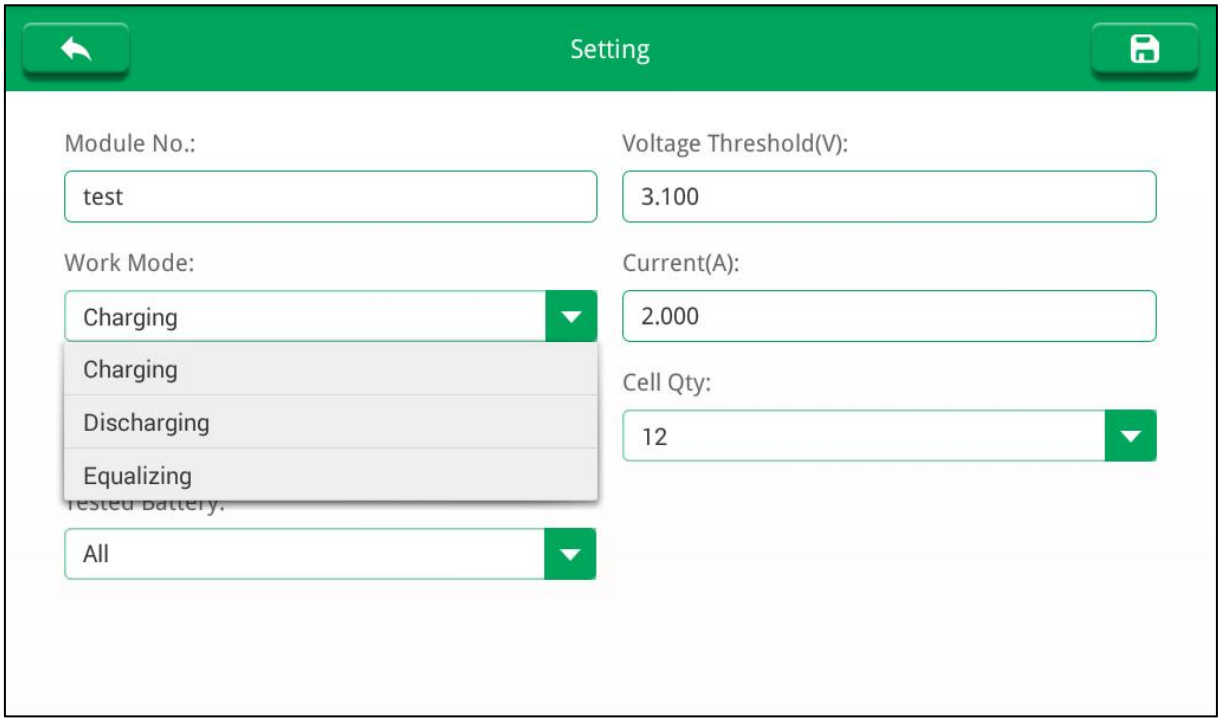
4.5.3 Battery Pack Settings

On the "Equalizing Maintenance" interface, tap **Settings** button below the battery pack to enter the corresponding setting interface for the battery pack.

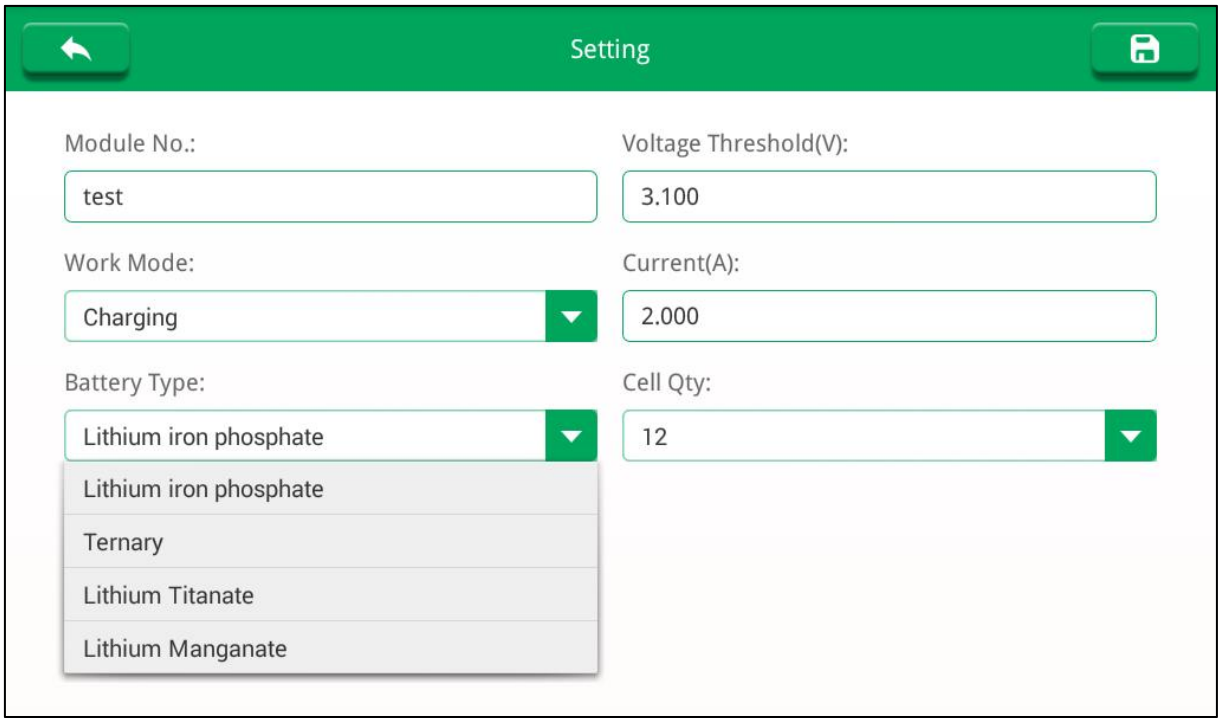


1） Module No.: Enter the battery pack number or the corresponding information for testing to name it.

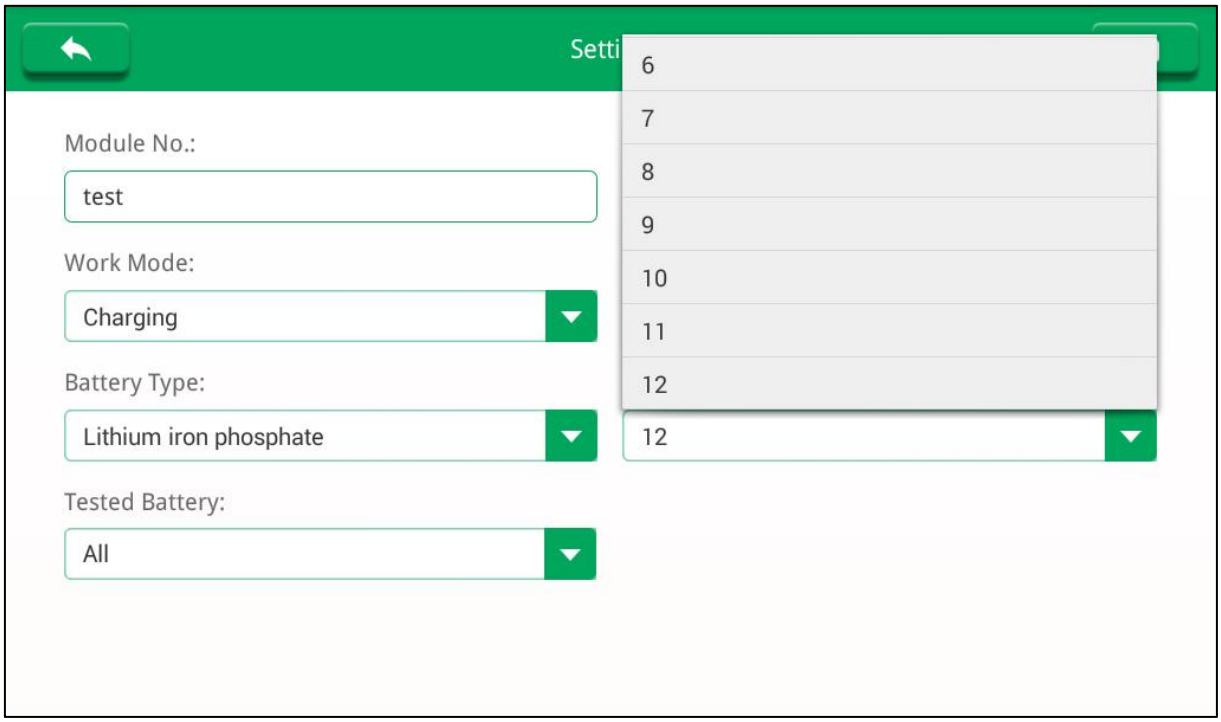
2） Work Mode: Click the drop-down menu to select the corresponding work mode (charge, discharge or equalizing).



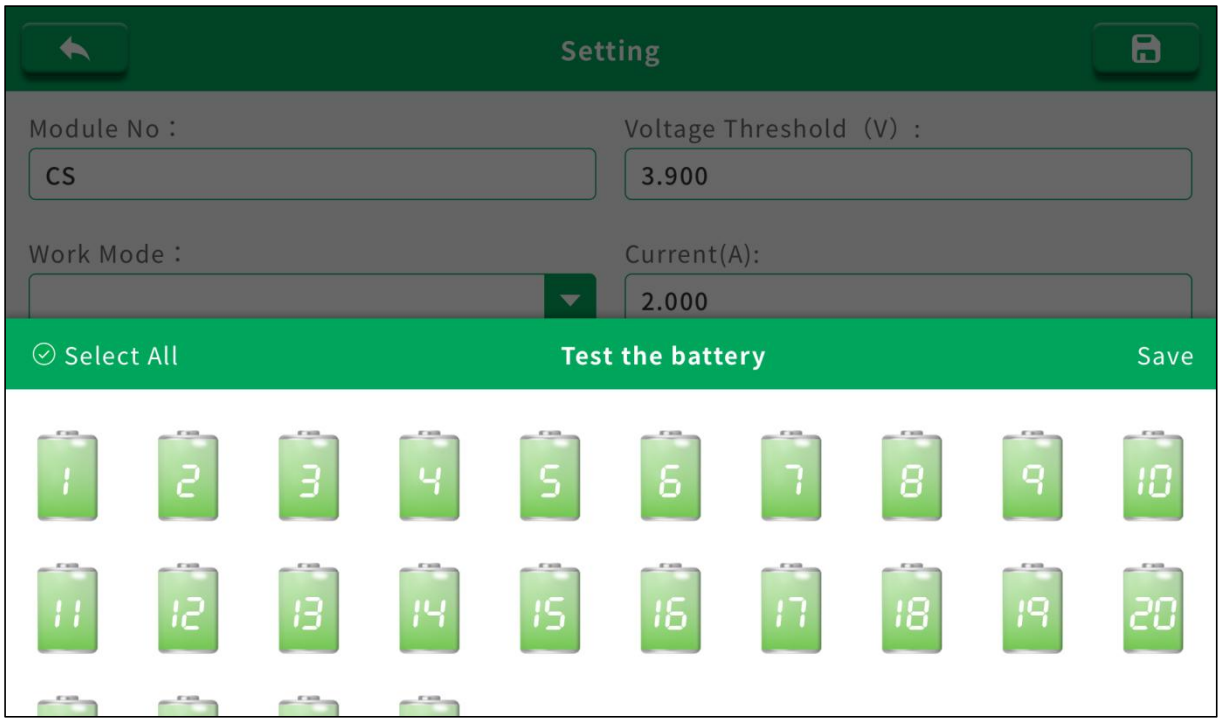
3） Battery Type: Click the drop-down menu to select the appropriate lithium battery pack.



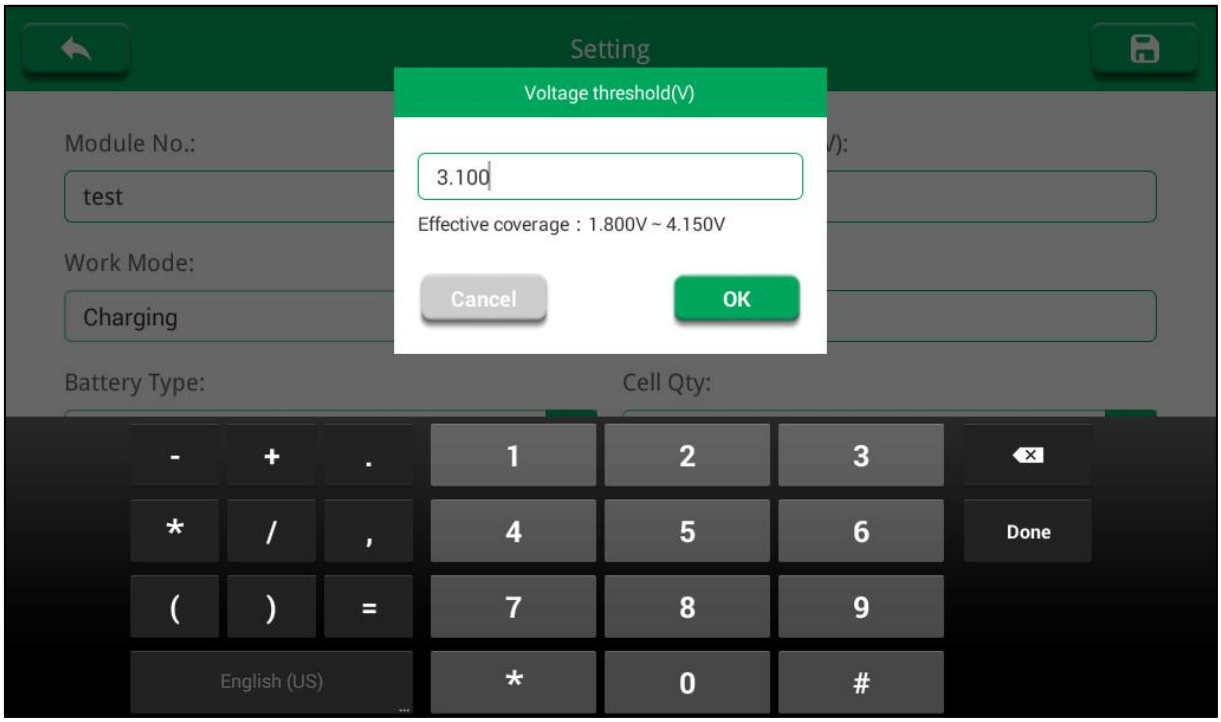
4） Cell Qty: Click the drop-down menu to select the corresponding cell number of the test battery pack.



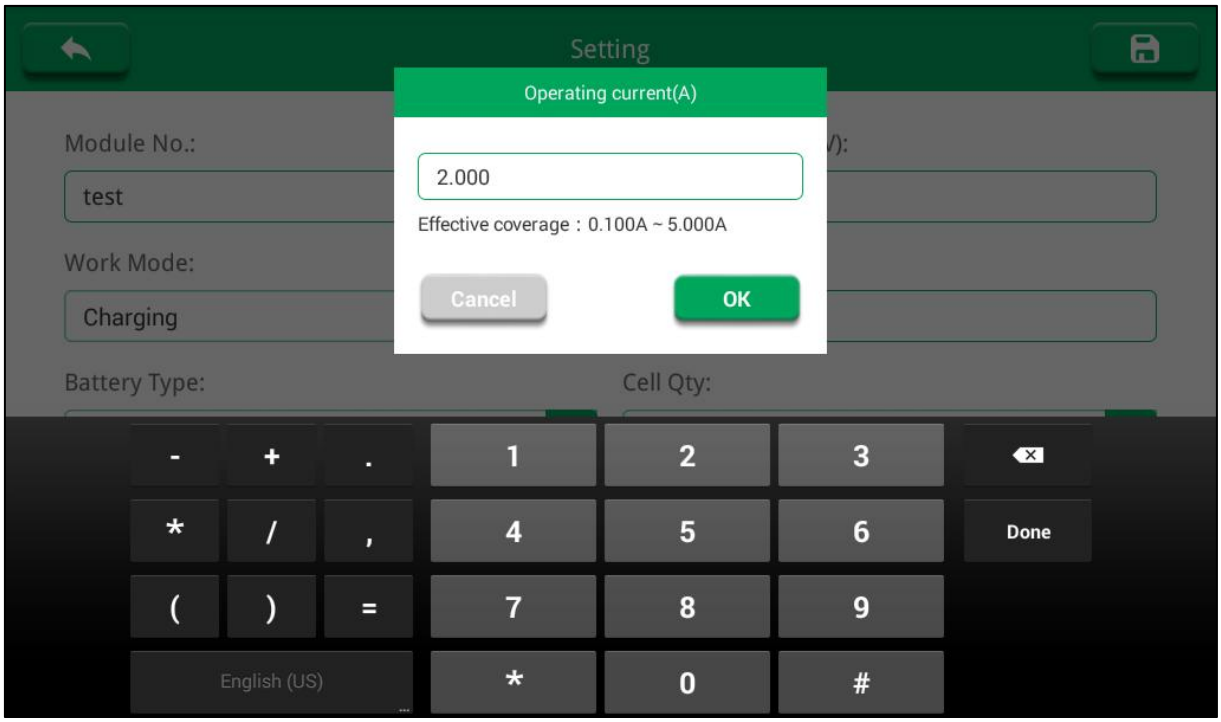
5） Test the Battery: Click **Select All** to select all batteries; deselect all, then click the battery that requiring to be tested.



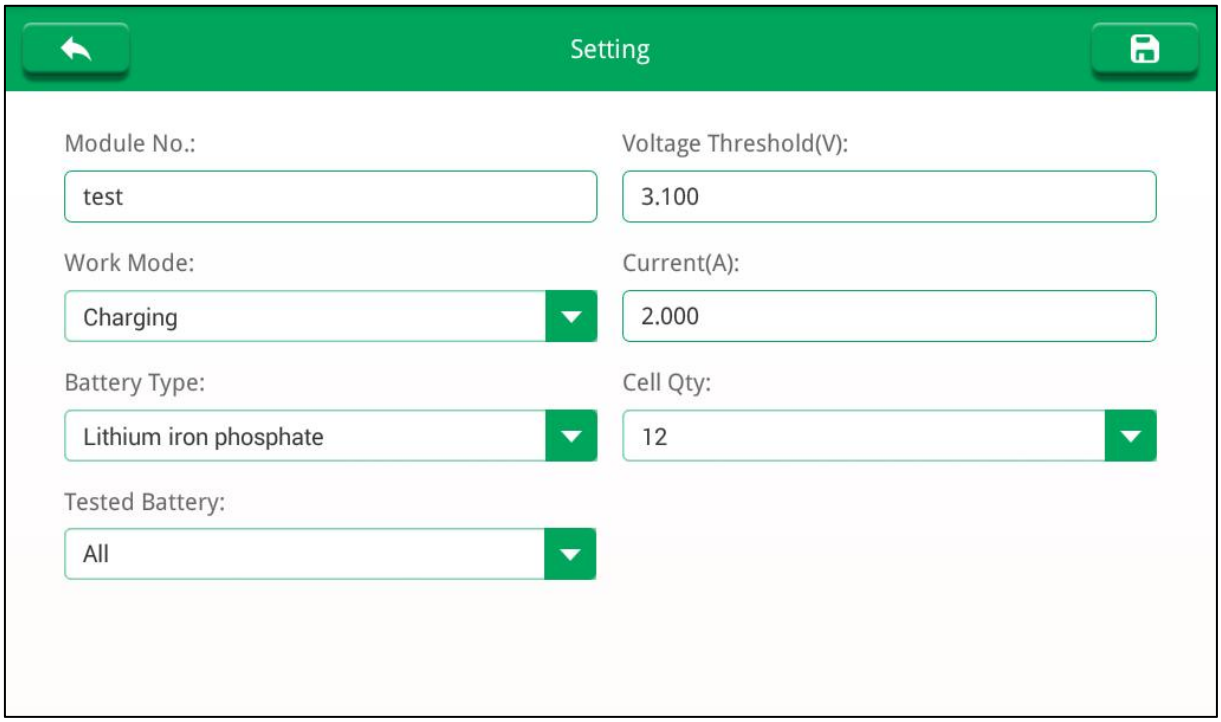
6） Voltage Threshold: Input the end voltage to terminate the testing.



7） Operating Current: Input the max discharge or charge current.



8） click to save the adjustment, and click back to the testing interface.



4.5.4 Start the Test

1） On the "Equalizing Maintenance" interface, tap Start button to start the test.

Equalizing Maintenance				
Parameters	1#：Unconnected	2#：Unconnected	3#：Unconnected	4#：Unconnected
Work Mode	—	—	—	—
Work Time	00:00:02	00:00:02	00:00:02	00:00:02
Battery Type	—	—	—	—
Cell Qty	06/06	06/00	06/00	06/00
Voltage Threshold	—	—	—	—
Max Voltage	—	—	—	—
Min Voltage	—	—	—	—
Temperature				
Operation	START	START	START	START
	Setting Details	Setting Details	Setting Details	Setting Details

2） Tap **Details** to view parameters such as cell voltage, working current, working status, test duration, and capacity of the corresponding test battery pack.

Equalizing Maintenance								
Parameters	1# : Unconnected					2# : Unconnected	3# : Unconnected	4# : Unconnected
Work Mode	No.	Voltage(V)	Current(A)	State	Capacity(WH)	----	----	----
	1#	----	0	Pause	----			
Work Time	2#	----	0	Pause	----	00:04:21	00:02:17	00:02:43
Battery Type	3#	----	0	Pause	----	----	----	----
Cell Qty	4#	----	0	Pause	----	12/00	12/00	12/00
Voltage Threshold	5#	----	0	Pause	----	----	----	----
	6#	----	0	Pause	----			
Max Voltage	7#	----	0	Pause	----	----	----	----
Min Voltage	8#	----	0	Pause	----	----	----	----
Temperature	9#	----	0	Pause	----			
	10#	----	0	Pause	----			
Operation	11#	----	0	Pause	----	START	START	START
	12#	----	0	Pause	----			
	Work State					Setting Details	Setting Details	Setting Details

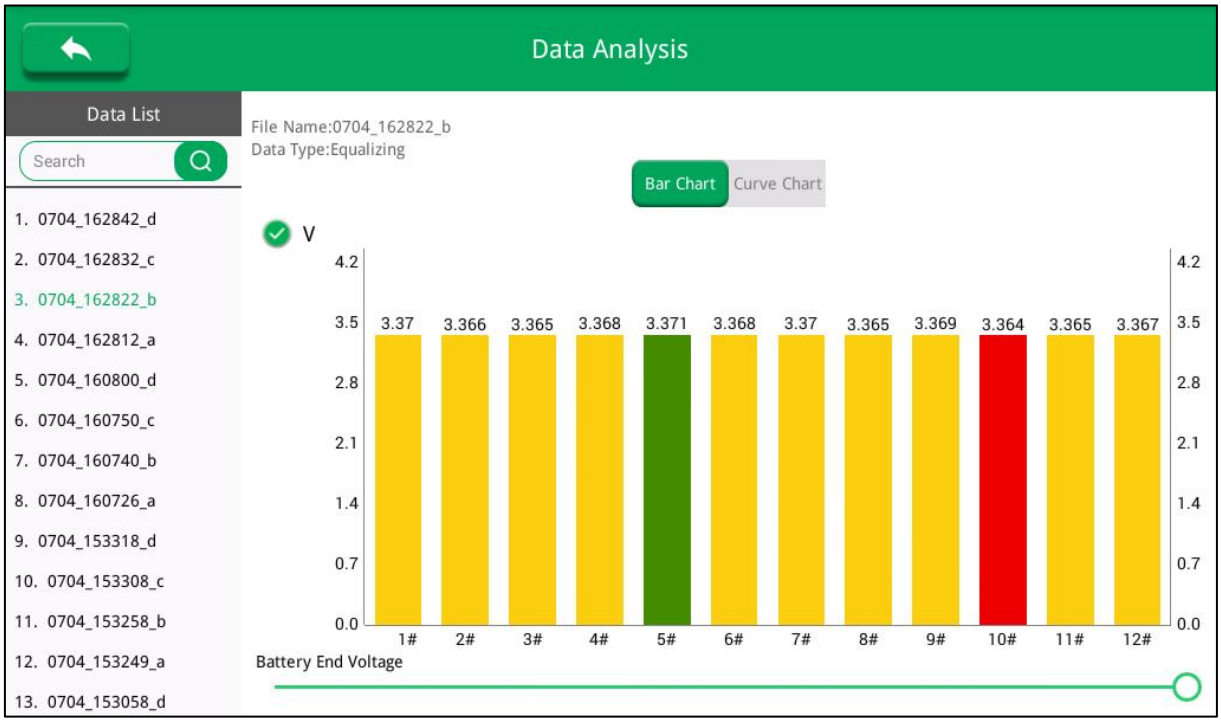
3） Equalizing Finished Conditions：

- When the cell voltage reach the voltage threshold, and current is less than 0.2A over 3 mins, the unit will display **Finished** on this cell channel.
- All working cell channels display ‘Finished’, the whole equalizing is complete.

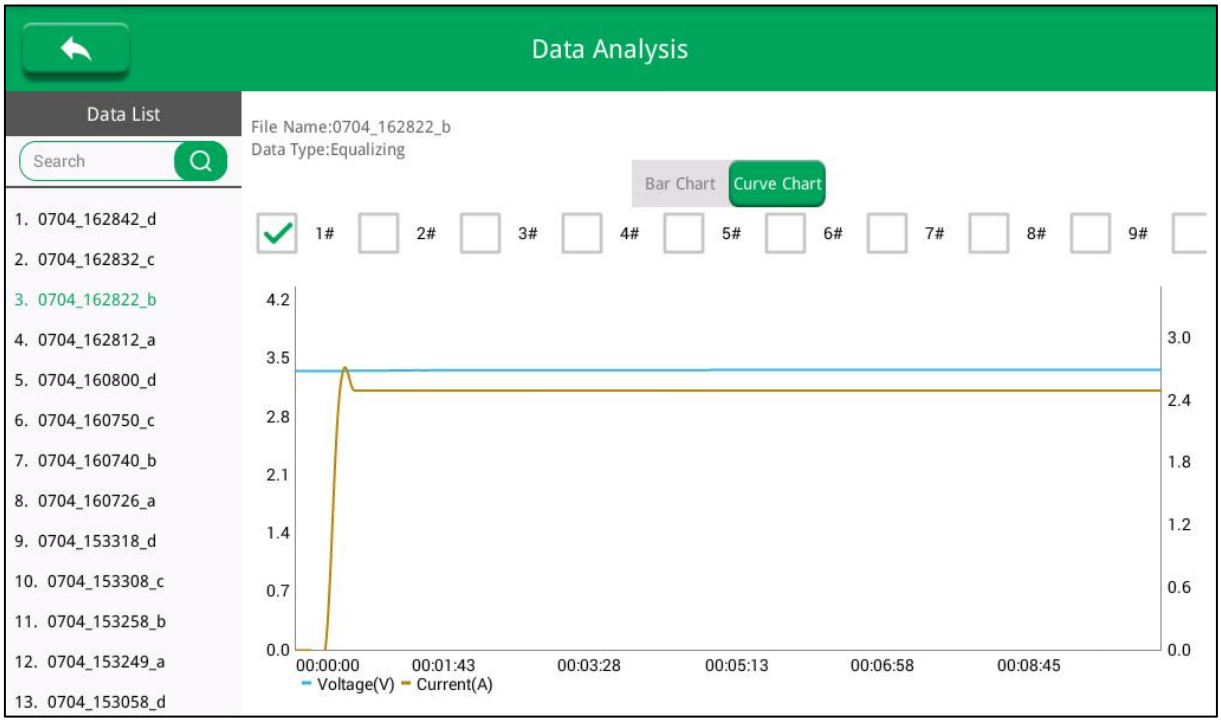
4.6 Data Analysis

After the test is completed, the test data is displayed in column chart or curve mode.

Tap **Bar Chart**, the test data voltage is displayed as a bar graph.

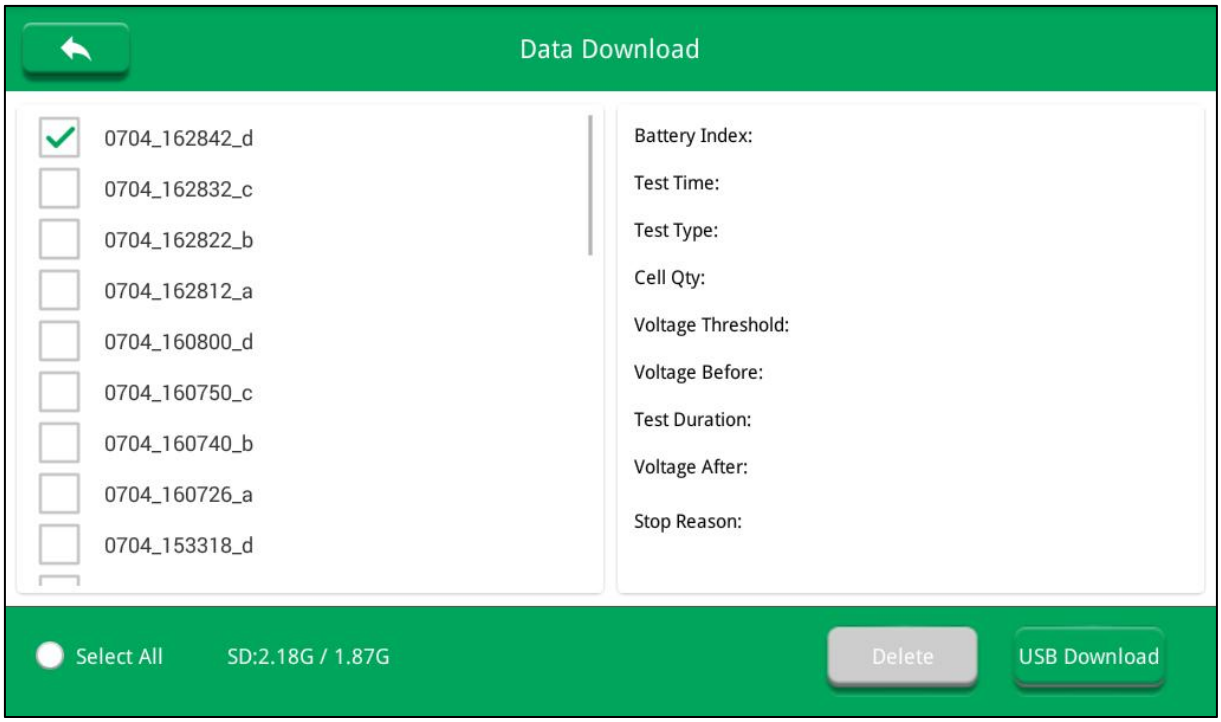


Tap **Curve Chart** to test the data voltage and display it as a curve graph.



4.7 Data Export

Test data can be transferred to U disk. On the main interface, tap Data Export to enter the data export interface, click the data to be transferred, insert a U disk and tap USB Download, the data will be stored in the U disk in Excel format.



5. Fault Analysis and Troubleshooting

No.	Fault Situation	Troubleshooting Methods
1	Main unit temperature is too high	Confirm the placement of the device, pay attention to ventilation, heat flow.
2	Internal memory insufficient	Periodically transfer data files to USB disk and delete some files to release the space
3	USB Error	Check the free space in USB disk

6. Transport & Storage

1） This balancer is equipped with special equipment box for packing, which is has anti-vibration and reliable for transportation.

2） Storage conditions: dry storage room, temperature: -20~70℃, Humidity: 95%Within.

7. Environmental Protection and Others

1） The outer carton of this equipment is made of recyclable material.

2） The main unit and other components are non pollution sources.

Warranty

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE SMARTSAFE PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

SMARTSAFE electronic product is warranted against defects in materials and workmanship for one year from date of delivery to the user.

This warranty does not cover any part that has been abused, altered, used for a purpose other than for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any automotive meter found to be defective is repair or replacement, and SMARTSAFE shall not be liable for any consequential or incidental damages.

Final determination of defects shall be made by SMARTSAFE in accordance with procedures established by SMARTSAFE. No agent, employee, or representative of SMARTSAFE has any authority to bind SMARTSAFE to any affirmation, representation, or warranty concerning SMARTSAFE automotive meters, except as stated herein.

Disclaimer

The above warranty is in lieu of any other warranty, expressed or implied, including any warranty of merchantability or fitness for a particular purpose.

Purchase Order

Replaceable and optional parts can be ordered directly from your SMARTSAFE authorized dealer. Your order should include the following information:

- Order quantity
- Part number
- Part name

Statement:

SMARTSAFE reserves the rights to make any change to product designs and specifications without notice. The actual object may differ a little from the descriptions in the manual in physical appearance, color and configuration. We have tried our best to make the descriptions and illustrations in the manual as accurate as possible, and defects are inevitable, if you have any question, please contact local dealer or after-sale service center of SMARTSAFE, SMARTSAFE does not bear any responsibility arising from misunderstandings.

FCC Caution:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:?(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.
To maintain compliance with FCC’s RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.