Dear Client

Thank you for Purchasing our HTCFD-H Battery Charge and Discharge Tester. Please read the manual in detail prior to first use, which will help you operate the equipment skillfully.

Our aim is to continually improve and perfect the company's products, so there may be slight differences between your purchase equipment and its instruction manual. You can find the changes in the appendix. Sorry for the inconvenience. If you have further questions, welcome to contact with our service department.

The input/output terminals and the test column may bring voltage, when you plug in/pull out test line or power outlet, they will cause electric spark. PLEASE CAUTION RISK OF ELECTRIC SHOCK! To avoid risk of electric shock, be sure to follow the operating instructions!

SERIOUS COMMITMENT

All products of our company carry one year limited warranty from the date of shipment. If any such product proves defective during this warranty period we will maintain it for free. Meanwhile we implement lifetime service. Except otherwise agreed by contract.

SAFETY REQUIREMENTS

Please read the following safety precautions carefully to avoid personal injury and to prevent the product or any other attached products being damaged. In order to avoid possible danger, this product can only be used within the scope of the provision.

Only qualified technician can carry out maintenance or repair work.

--To avoid fire hazard or personal injury:

Use Proper Power Cord

Only use the power wire supplied by the product or meet the specifications of this product.

Connect and Disconnect Correctly

When the test wire is connected to the charged terminal, please do not connect or disconnect the test wire at will.

Grounding

The product is grounded through the power cord; besides, the ground pole of the shell must be grounded. To prevent electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, please do check that the product is properly grounded.

Pay Attention to the Ratings of All Terminals

To prevent the fire hazard or electric shock, please be care of all ratings and labels/marks of this product. Before connecting, please read the instruction manual to acquire information about the ratings.

Do Not Operate without Covers

Do not operate this product when covers or panels removed.

Use Proper Fuse

Only use the fuse with type and rating specified for the product.

Avoid Touching Bare Wire and Charged Conductor

Do not touch the bare connection points and parts of energized equipment.

Do Not Operate with Suspicious Faults

If you encounter operating faults/suspect there is damage to this product,

do not continue. Please contact with our maintenance staff.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in Explosive Atmospheres.

Ensure Product Surfaces Clean and Dry.

—Security Terms

Warning: indicates that death or severe personal injury may result if proper precautions are not taken

Caution: indicates that property damage may result if proper precautions are not taken.

Contents

1. Product Features

Uninterrupted power supply is the basic protection for running all the equipment and network systems of constantly improved informationization and automation. Whether it is AC or DC uninterrupted power supply system, battery as a backup power supply in the system plays an extremely important role. At ordinary times, battery is in the floating charge standby state, but once the AC power blacks out or other accidents occur, the battery will become the only power supply of the load.

It is known that battery has normal service life cycle, but it often has premature function failure due to such quality problems as material defect, structure defect or process defect, or improper use, etc. To test the standby duration and actual capacity of battery group and to ensure the normal system operation, the checking discharge test is conducted on the battery group on a regular basis or as needed according to the maintenance procedures of the power supply system, so that individual cell that has or is close to function failure can be detected in an early stage for replacement, thus guaranteeing the effectiveness of the whole battery group, or the expected life of the battery group is evaluated.

After years of R&D, the company has developed a series of highly intelligent battery charge and discharge tester with proprietary technology. This tester can be used as the discharge load in the battery off-line state, and realize the constant discharge of the set value by continuously regulating the discharge current. When discharging, the tester will automatically stop discharging when the voltage on the battery group terminal or the cell falls to the set lower limit value, or when the set discharging time is out, or when it reaches the set discharging capacity. In the meantime, the tester records all valuable and continuous real-time data during the process.

This tester system uses wireless relay access to the voltage monitoring information of cells, which is simple, safe and accurate.

The tester has a very friendly man-machine interface, which not only enables a variety of settings and data check under the menu prompt, but also stores the discharge process data in the memory that can be archived to the USB flash drive through the data interface. Such data can be analyzed through special software in upper computer to generate the curves and reports needed.

This instrument has perfect protection function, with sound and light alarm and clear interface prompts.

1.1 Functional Features

- PTC ceramic resistor is used to avoid red heat for a safer discharge process.
- The cell monitoring module adopts remote RF wireless communication mode for voltage data transmission, and can set up to 4 independent frequency bands, that is, it can transmit data simultaneously with up to 4 monitoring systems in the same area without interference or channeling.
- Wireless collection box can monitor each cell, realizing complete monitoring of battery group discharge process, and it has three data collection methods:
    1. Data transmission is carried out between the cell monitoring module and the tester master.
    2. Data transmission is carried out between the cell monitoring module and USB wireless terminal.
    3. Data transmission is carried out among the cell monitoring module, the tester master and USB wireless terminal.

- Each tester can monitor 25 cell collection boxes, and each cell collection box can be connected to 12 batteries, monitoring a total of 300 batteries. The tester can automatically screen the serial number and voltage value of the highest 6 batteries and the lowest 6 batteries, and display them in different colors on the display screen.
- Cell voltage value can be displayed in two ways, namely the sliding form and the sliding bar chart.
- PC software in upper computer can record and analyze the total voltage, discharge current, each cell voltage and other data, and generate the data reports accordingly, to visually show the battery group performance curve, graph, report, etc. and for printing and check.
- The USB interface of the tester can store the data of the discharge process into the USB flash drive, which then is imported into PC. The PC data management software can analyze the battery discharge process and generate corresponding data reports, further facilitating the data transfer and storage.
- Intelligent SCM ARM control, 7-inch 1024*600 HD LCD display, capacitive touch control operation, built-in Chinese-English switch menu, and simple and clear menu operation.
- Automatic stop protection function, over-temperature protection, over-voltage protection, over-current protection, reverse wiring protection, alarm prompt on screen upon any alarm stop, and automatic switch-off of the air circuit breaker.
- The conditions of charge/discharge termination can be set, including cell low voltage, group low/high voltage, small charge current, charge/discharge time, and charge/discharge capacity. When any of the conditions are met, the tester will automatically stop testing with buzzer prompt and automatically record the reason for stop.
- Online compensated charging/discharging can be carried out, and the discharge test can be carried out on the online working battery through an externally connected current clamp sensor, which greatly facilitates the testing work. This feature is especially suitable for applications where there is only a single set of backup batteries.
- RS485 remote control charge, discharge and activation functions.
- It has the functions of charge, discharge and activation in multi-machine parallel mode by only operating in the display screen of the parallel instrument with parameters as the master. The instrument with parameters as the slave can automatically follow the master's instructions to distribute power evenly, and start or stop operation.

1.2 Specification Parameters

Suitable Battery	DC10-60V
Charge voltage	DC10-120V
Charge current	0-50A
Discharge voltage	DC10-60V
Discharge current	0-150A
Working mode	Standalone mode, parallel master mode, parallel slave mode, and remote controlled mode
Protection performance	Battery test overvoltage protection, undervoltage stop, overcurrent protection, reverse wiring protection, 65℃ overtemperature protection, with LCD prompt and buzzer alarm
Cell voltage collection (optional)	Multi-band RF wireless module for communication distance of more than 100m, compatible with 2V/4V/6V/12V cell voltage monitoring, 1-25 groups of RF wireless monitoring modules for monitoring up to 300 batteries, and single wireless monitoring module for monitoring 12 cells
Control precision	Discharge current≤±1%; group terminal voltage≤±0.1%; cell voltage≤±0.05%
PC communication	RS485 interface, USB interface
Data storage capacity	Built-in SD card with a capacity of 8G and the USB flash drive with a capacity of 16G
Work Environment	
Heat radiation	Forced air cooling
Temperature	Working rage: -5-50℃ Storage temperature: -40-70℃
Humidity	Relative humidity 0-90% (40±2℃)
Elevation	Rated elevation of 4,000m
Noise	< 75dB
Working Power Supply	
Voltage	Power supply: single-phase AC220V (-20%-+30%), frequency: 45-65Hz; charging power supply: refer to nameplate parameters or case label
Electric strength test	Input-housing: 2200Vdc 1min Input-output: 2200Vdc 1min Output-housing: 700Vdc 1min
Safety	Compliance with EN610950
Wiring	
AC input	GB socket, suitable for 1-1.5mm^2 cable
Charge/discharge current wire	Cable quick plug (red for positive and black for negative), refer to “Shipping List” for detailed dimensions.
Parallel cable (optional)	2m 6-pin crystal plug wire

Note: Consult us for meters of other voltage classes and current classes.

2. Basic Working Principle

2.1 Battery Measurement Principle

Due to the complexity of battery electrochemical reaction, and different materials, structures, manufacturing processes and service environmental conditions, the characteristics of batteries from different manufacturers vary significantly. Even batteries produced by the same manufacturer are discrete to a certain extent. Up to now, there is no simple and effective method in the world that can quickly and accurately determine the battery performance. Battery performance test and failure prediction is still a very complex problem in electrochemical measurement.

The state of stationary acid-proof and explosion-proof lead-acid battery, which has been widely used in electric power, communication, finance, transportation and other industries, can be learnt by measuring the terminal voltage, and checking the electrolyte density, liquid level and temperature. However, the seal and barren liquor design of valve regulated lead-acid (VRLA) battery makes it difficult for us to learn about whether it is in a healthy status. Therefore, the test and maintenance means of acid-proof and explosion-proof battery are no longer applicable to VRLA battery, which is the shortcoming and difficulty of current battery operation management.

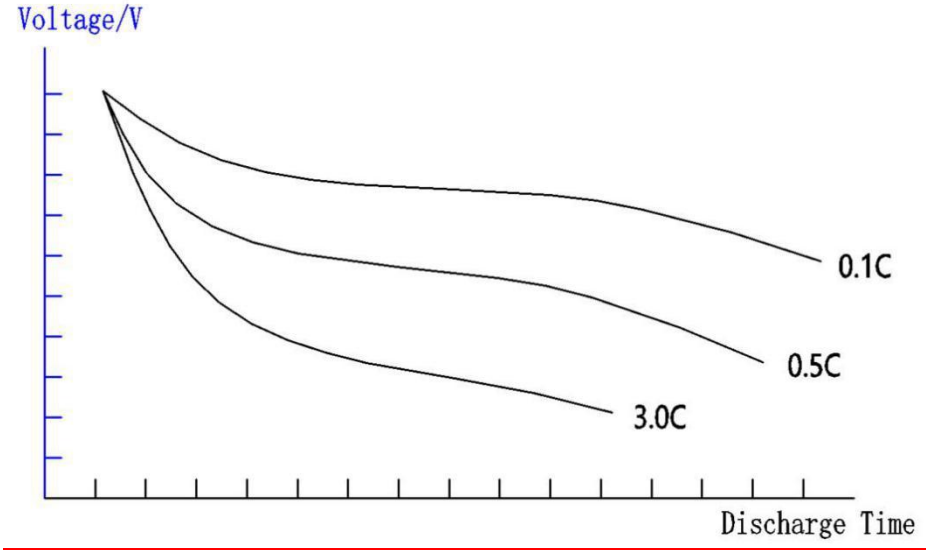
At present, the commonly used test method is to measure the battery terminal voltage at ordinary times and carry out the checking discharge capacity test every year. We think that

1. The terminal voltage of battery under floating charge has no correspondence with the capacity. It is known that battery of poor performance may be measured for the qualified voltage under floating charge. So the terminal voltage under floating charge cannot truly reflect the battery performance.
2. Full capacity discharge test is still the most accurate and effective method to test the actual capacity of battery group.

   It is known that the capacity of a battery group equals that of the worst performing battery in the group. Therefore, the test of battery group can be changed to the test of the delayed battery. The capacity of the battery group can be tested by detecting the delayed battery and measuring its capacity.

Discharge the battery group at a specified constant current and monitor the voltage of each battery. When the voltage of any of the batteries falls to the cut-off voltage, the capacity released is the actual capacity of the battery group. This method can test for the true and accurate result.

In the meantime, it is known that the battery has the following discharge curve:



From the battery discharge curve, it can be seen that

1. The same discharge curve reflects the same battery performance. The characteristic curve of the same specification battery is the same for the same manufacturer, the same formula and the same production process (the discreteness in production is not consideredtemporarily).
2. The discharge curves of cells in the same group follow different discharge rates due to their different capacities. When the battery group is discharging, each cell has a different capacity but the same discharge current, so each is discharging at a different discharge rate. It is obvious that the discharge curves of different discharge rates are followed during discharging.

2.2 Constant Current Principle

The tester's discharge circuit adopts PWM + PID closed-loop control technology under the control of ARM (central processing unit), which enables the power circuit to work accurately under the set discharge current. For example, during constant current discharge, when battery voltage starts to decline, the ARM controller receives the reduced current value through the feedback current sensor, and then acquires the increased value of the needed controlled power loop through a certain rate and mode of calculation. This adjustment process repeats itself to ultimately achieve the effect of real-time adjustment. This is the principle of constant current discharge. According to this principle, constant power is similarly adjusted, except that in addition to the current value the voltage value is required.

2.3 Charging Principle

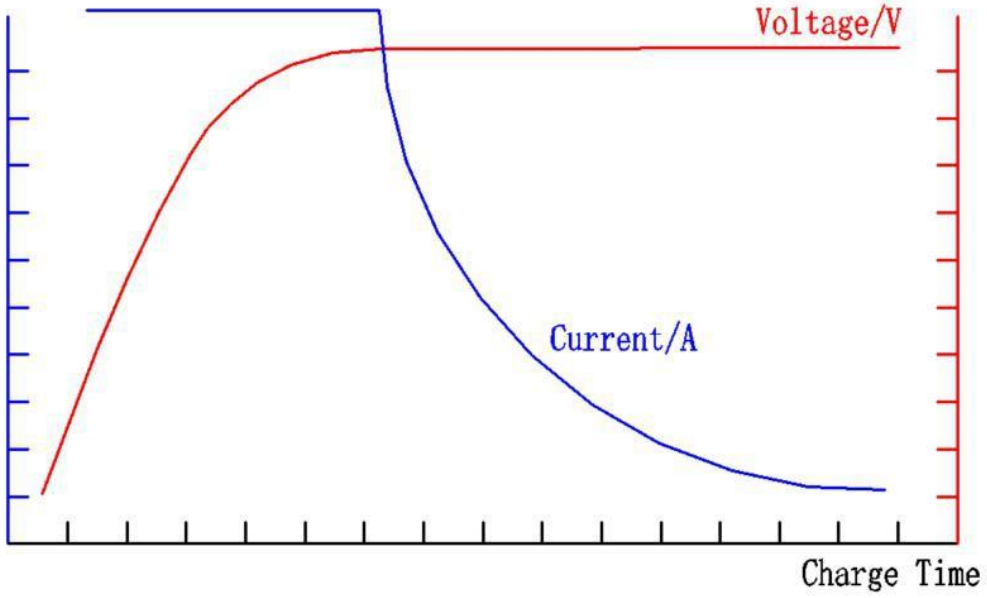
Floating charge and equalized charge: both are the battery charging modes.

1. Working principle of floating charge: when the battery is fully charged, the charger will not stop, but provide a constant floating charge voltage and small floating charge current supply to the battery. As a result, once the charger stops, the battery will naturally release energy, so small UPS usually adopts the floating mode by the floating charge method to balance such natural discharge.
2. Working principle of equalized charge: if the battery is charged with fixed current in fixed time, the charging is faster. This is the charging mode often used by professional maintainers

to maintain the battery, and it also helps activate the battery's chemical properties.

The intelligent charging instrument produced by the company has the function of automatically changing floating charge and equalized charge according to the working state of the battery, which can give full play to the advantages of both floating charge and equalized charge to realize quick charging and prolong the battery life.

The following is the curve of battery voltage and current variation during charging:

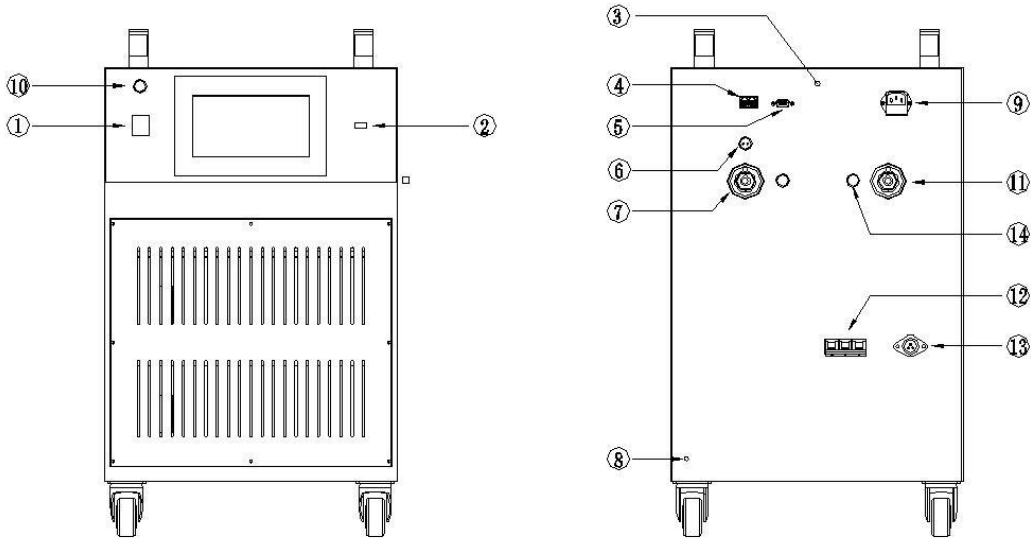


charging time

3. Equipment Dimensions, Weight, Interface and Packing Instructions

3.1 Equipment Panel Interface

As shown below:



1: Power Switch
2: USB
3: Antenna
4: Collection box
5: RS485
6: External current sensor
7: Group Postive
8: Gounding
9: Power AC220V
11: Group Negtive
12: Charge Switch
13: Charge Power AC380V
14: Group Voltage

4. Quick Start Steps

4.1 Standalone Discharge Test

Step 1: Connect the tester AC220V working power cord (black plug cord), and turn on the power to ensure normal power supply.

Step 2: Plug the high-current wire quick connector in the quick socket of the tester respectively (red for positive and black for negative).

Step 3: Connect the voltage test wire to the total voltage test port of the tester respectively (red for positive and black for negative).

Step 4: Connect the test clip of the high-current wire to the battery group (red for positive and black for negative). DO NOT connect the positive and negative poles in the wrong way. In case of wrong connection, there will be buzzer alarm sound and text warning on the display screen: battery poles connection reversed!

Step 5: Switch on the discharge air breaker on the front panel. If it cannot be switched on, the reason is one of the following:

1. Battery poles connection reversed;
2. The connected voltage of the battery group exceeds the standby rated voltage range (the voltage of the battery group is too low or too high); or
3. The tester working power supply is not switched on.

Step 6: Switch the screen to the "System Setting" page and set as follows:

[Parallel] set as "Off"

[Master/slave] not settable

[Slave address] not settable

[Wireless band] set to the corresponding band, such as "Band 1", according to the band setting of cell module

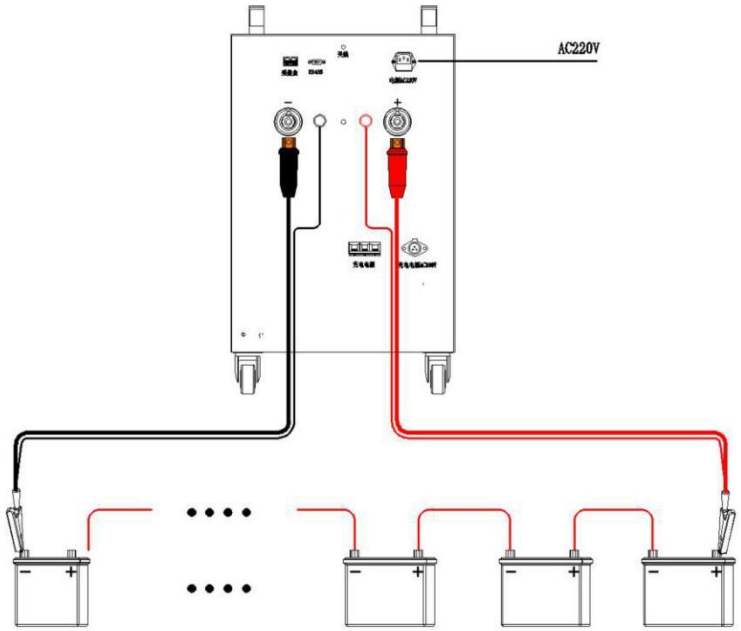
[Remote control] set as "Off"

[Language] set to "Chinese"

Step 7: Go back to the Main Page, click [Charge/Discharge Test] and then [Discharge Test], and the "Test Template" options will pop up. After modifying according to the actual parameters of the battery group, click [OK] to enter the discharge test page.

Step 8: On the "Discharge Test" page, fill in according to actual needs these parameters, i.e., [Ah LIMIT/Ah], [TIME LIMIT/HM], [CELL L LIMIT/V], [GROUP L LIMIT/V], [CURRENT SET/A] and [DIS MODE].

Step 9: After clicking "Start", the discharge starts. The waveforms of present actual voltage and current are displayed in the waveform chart.



Schematic diagram of discharge operation wiring

4.2 Standalone Charging Test

Step 1: Connect the tester AC220V working power cord (black plug cord), and turn on the power to ensure normal power supply.

Step 2: Plug the high-current wire quick connector in the quick socket of the tester respectively (red for positive and black for negative).

Step 3: Connect the voltage test wire to the total voltage test port of the tester respectively (red for positive and black for negative).

Step 4: Connect the test clip of the high-current wire to the battery group (red for positive and black for negative). DO NOT connect the positive and negative poles in the wrong way. In case of wrong connection, there will be buzzer alarm sound and text warning on the display screen: battery poles connection reversed!

Step 5: Connect the power supply line (AC220V or AC380V) of the UPS. Please refer to the case label on the charging power port for the voltage class. DO NOT connect wrong voltage.

Step 6: Switch on the charge power supply air breaker on the rear panel.

Step 7: Switch the screen to the "System Setting" page and set as follows:

[Parallel] set as "Off"

[Master/slave] not settable

[Slave address] not settable

[Wireless band] set to the corresponding band, such as "Band 1", according to the band setting of cell module

[Remote control] set as "Off"

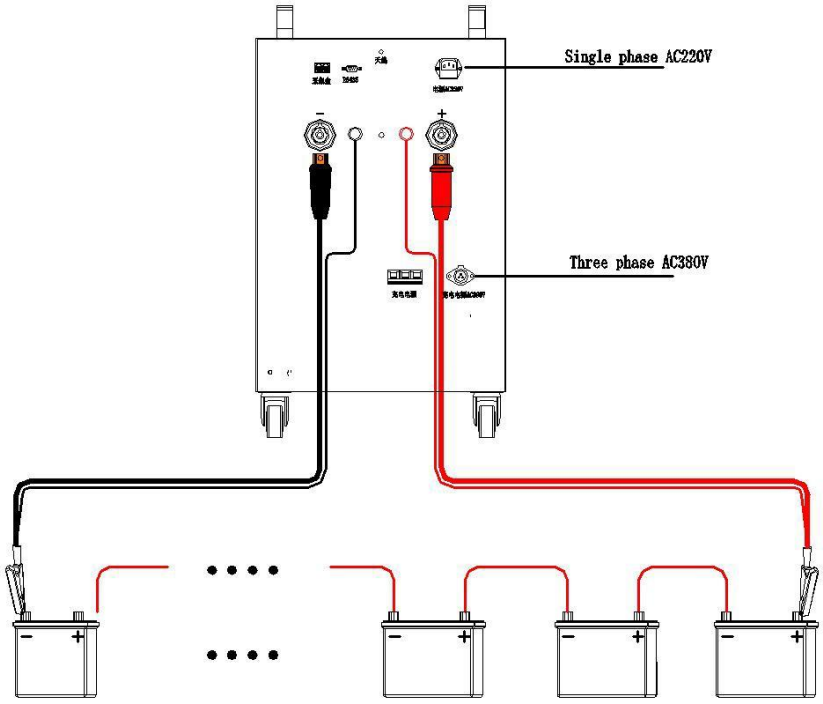
[Language] set to "Chinese"

Step 8: Go back to the Main Page, click [Charge/Discharge Test] and then [Charge Test], and the "Test Template" options will pop up. After modifying according to the actual parameters of the battery group, click [OK] to enter the discharge test page.

Step 9: On the "Discharge Test" page, fill in according to actual needs these parameters, i.e., [Ah LIMIT/Ah], [TIME LIMIT/HM], [CELL H LIMIT/V], [GROUP H LIMIT/V] and

[CURRENT SET/A].

Step 10: After clicking “Start”, the charge starts. The waveforms of present actual voltage and current are displayed in the waveform chart.



Schematic diagram of charge operation wiring

4.3 Standalone Activation Test

Step 1: Connect the tester AC220V working power cord (black plug cord), and turn on the power to ensure normal power supply.

Step 2: Plug the high-current wire quick connector in the quick socket of the tester respectively (red for positive and black for negative).

Step 3: Connect the voltage test wire to the total voltage test port of the tester respectively (red for positive and black for negative).

Step 4: Connect the test clip of the high-current wire to the battery group (red for positive and black for negative). DO NOT connect the positive and negative poles in the wrong way. In case of wrong connection, there will be buzzer alarm sound and text warning on the display screen: battery poles connection reversed!

Step 5: Connect the power supply line (AC220V or AC380V) of the UPS. Please refer to the case label on the charging power port for the voltage class. DO NOT connect wrong voltage.

Step 6: Close the charge power supply air switch on the rear panel.

Step 7: Switch on the discharge air breaker on the front panel. If it cannot be switched on, the reason is one of the following:

1. Battery poles connection reversed;
2. The connected voltage of the battery group exceeds the standby rated voltage range (the voltage of the batteries is too low or too high); or
3. The working power supply of the tester is not switched on.

Step 8: Switch the screen to the “System Setting” page and set as follows:

[Parallel] set as “Off”

[Master/slave] not settable

[Slave address] not settable

[Wireless band] set to the corresponding band, such as “Band 1”, according to the band setting of cell module

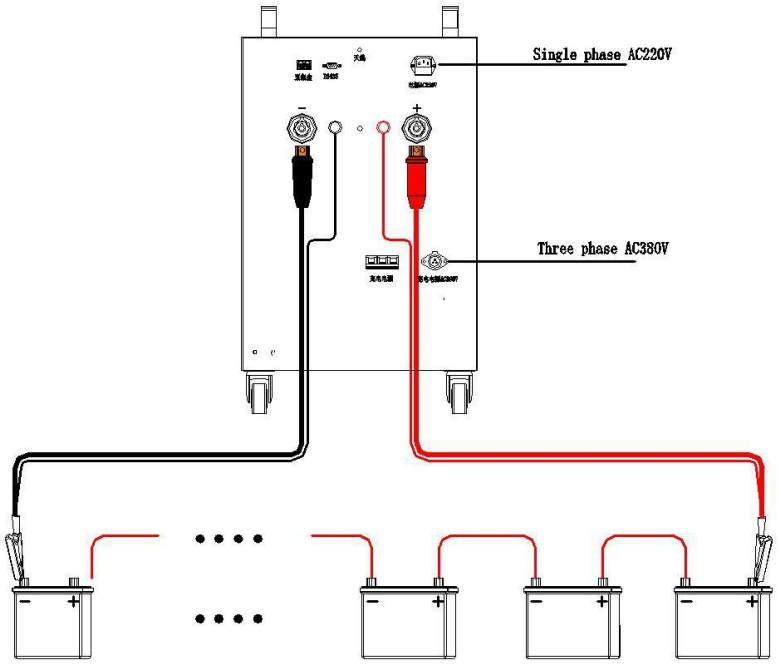
[Remote control] set as “Off”

[Language] set to “Chinese”

Step 9: Go back to the Main Page, click [Charge/Discharge Test] and then [Activation Test], and the “Test Template” options will pop up. After modifying according to the actual parameters of the battery group, click [OK] to enter the discharge test page.

Step 10: On the “Activation Test” page, fill in according to actual needs the discharge parameters (red) and the charge parameters (blue).

Step 11: After clicking “Start”, the activation starts. The first step in activation cycle is the discharge.



Schematic diagram of activation operation wiring

4.4 Installation and Connection of Cell Monitoring Module (model with cell monitoring function)

4.4.1 Specification of Cell Monitoring Module

Battery voltage range measurable by monitoring module: 1.3V-16V

Maximum number of batteries connected to a single module: 12

Maximum number of cell modules connected to a single tester: 25

Maximum number of monitored batteries for a single tester: 300

Number of frequency bands (maximum number of testers that can work simultaneously in the same area): 4 frequency bands

Communication mode: RF

Effective communication distance: 100m in open area, 50m indoors

Collection accuracy: ±0.05%

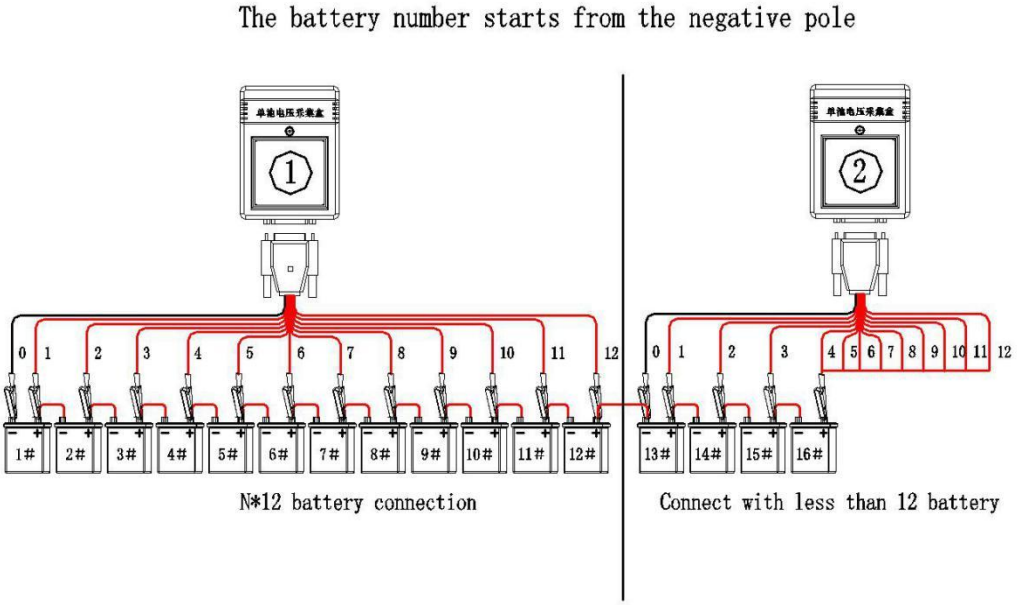
Collection resolution: 10mV

Collection rate: 200mS/ module

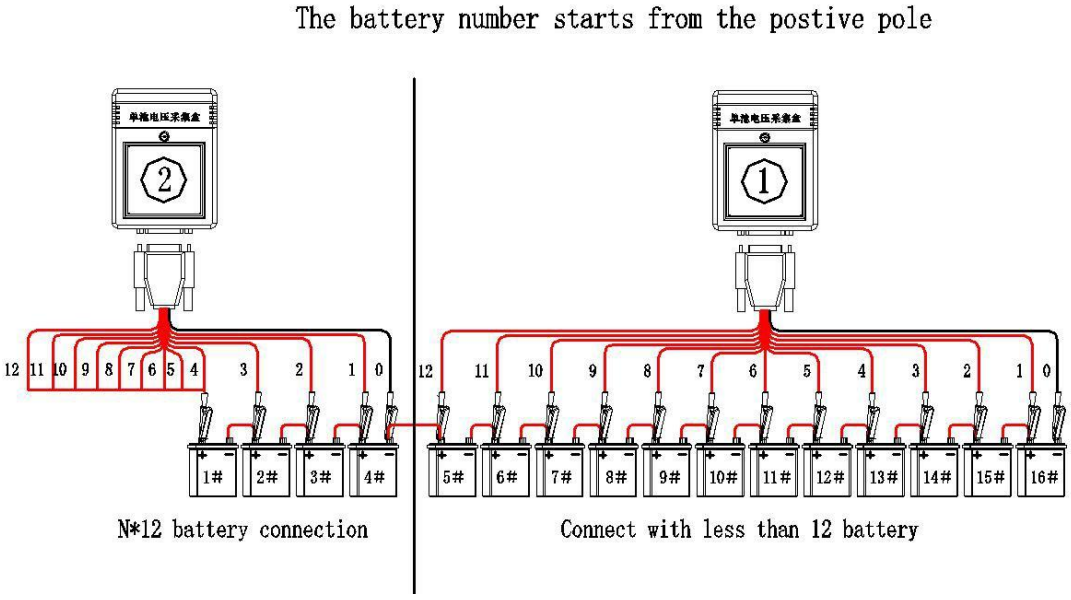
4.4.2 Cell Monitoring Box Connected to Battery Group

When the number of batteries is not an integer multiple of 12, please connect the first 12*N batteries by an integer multiple on the left side of the diagram below, and then connect the remaining batteries that are less than 12 by a non-integer multiple on the right side of the diagram below:

Note: Short connect the free test terminal to the last battery positive pole in case of no multiples, as shown in the diagram below.



1# battery shows the negative pole connection (starting from the negative pole)



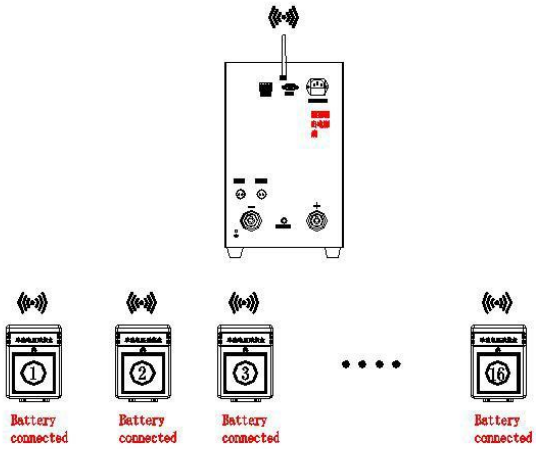
1# battery shows the positive pole connection (starting from the positive pole)

The module connection includes 12 red lines and 1 black line, which are put in order by length, with the black line clamped on the negative pole of the first battery and the others connected on the negative pole of the corresponding batteries so as to ensure connection in order. **(Note:**

Whether it starts from the positive or negative pole, it can only be connected by the way of No. 0 wire to the negative pole. The positive and negative order can be reversed in the display screen by software.)

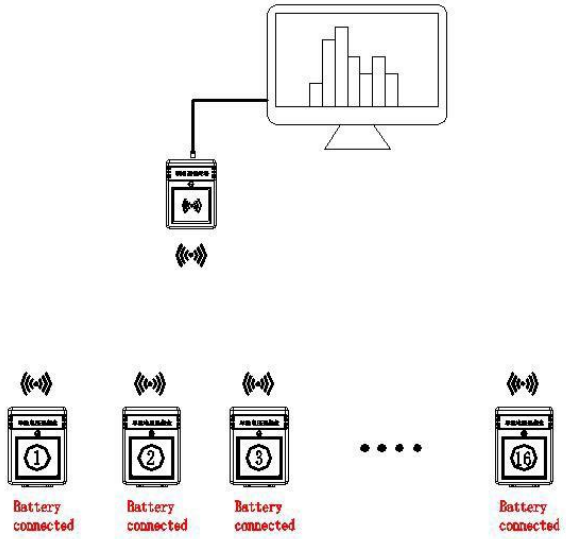
The module is compatible with battery of 2-12V voltage classes, and the power supply for the module is internal without external power supply required. If you need to measure battery of other voltage classes, please consult our technical personnel for customization.

4.4.3 Schematic diagram of communication between cell monitoring module and tester master



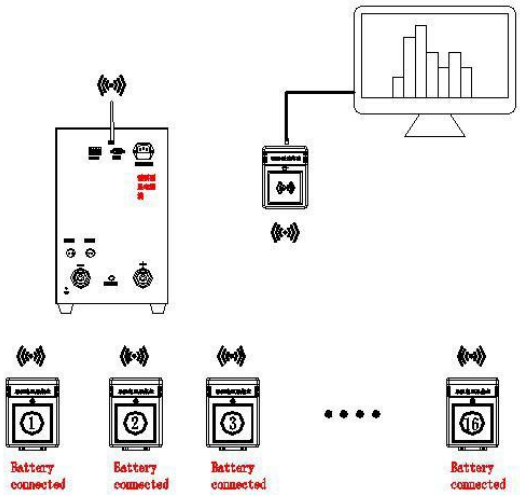
Schematic diagram of communication between single monitoring module and charging and discharging instrument host

4.4.4 Schematic diagram of communication between cell monitoring module and USB wireless terminal



Schematic diagram of communication between single monitoring module and USB wireless terminal

4.4.5 Schematic diagram of communication among cell monitoring module, tester master and USB wireless terminal



Schematic diagram of communication between single monitoring module and charging and discharging instrument host, USB wireless terminal and the three

4.4.6 Online Compensated Charging/Discharging

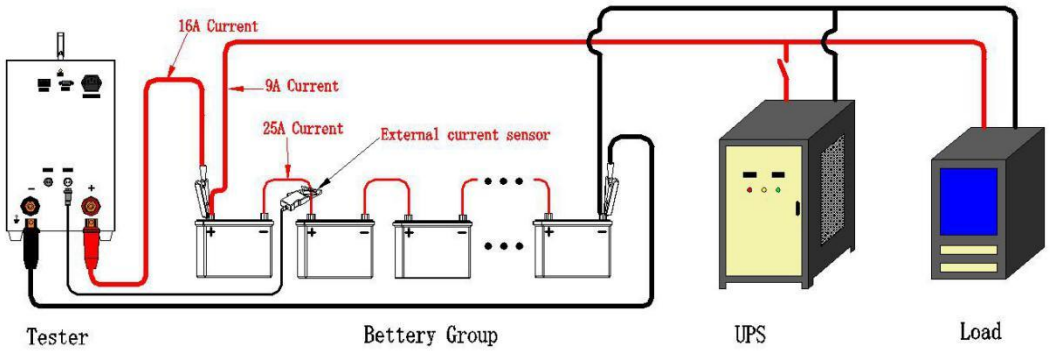
The conditions of online compensated discharge test are as follows:

1. The battery is not detached from the load;
2. The output of the UPS is disconnected;
3. Discharge current is greater than load current.

This test method is particularly suitable for occasions where there is only a single group of standby batteries and the batteries are not expected to be separated from the load during the test.

During the test, if there is an unexpected power failure, the battery can still be automatically switched to the load side for power supply, and the tester can automatically stop discharging because the actual current is greater than the set current.

Hall element current clamp is required for online compensated test. Wiring diagram is as follows:



Schematic diagram of online compensated discharge wiring

Working Principle:

Set the battery discharge current as the discharge current of the tester master, and the internal load will automatically decline according to the current value detected by the clamp current sensor, so as to ensure that the charge and discharge current/power of the battery equals that displayed by the tester.

Master displayed current (25A) = battery group charge and discharge current (25A) = master internal discharge (16A) + actual load current (9A). Since the actual load current during online discharge varies with the online voltage, the discharge current inside the master also automatically adjusts in order to ensure the battery group to discharge in the real constant current/constant power mode.

(Note: Please adjust the output voltage of the rectifier to 0 or turn it off during the online compensated discharge test, otherwise the discharge current will come from the output of the switching power supply. The other operations are the same as the checking discharge test.

4.4.7 Online Compensated Charging/Discharging

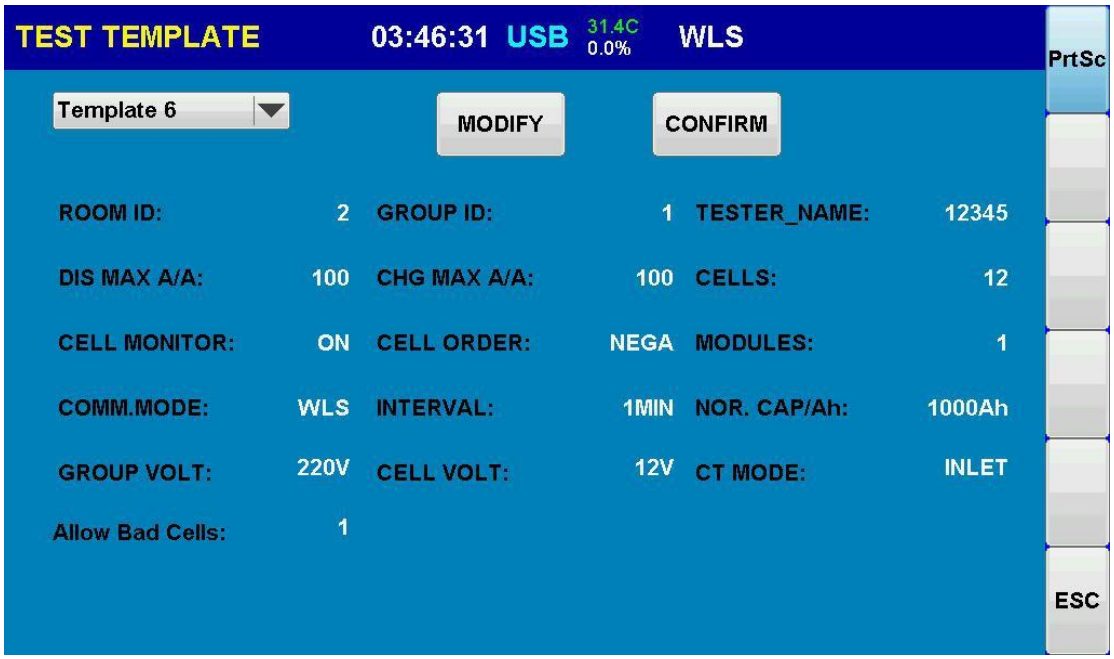
Load is not required to disconnect during charging, so all charging equipment can be considered as online, but the charge current must be greater than that consumed by the load, otherwise the current cannot be charged into the battery, and a part of the current of the load needs to be provided by the battery.

5. Interface Function Introduction

5.1 Test and Template Selection

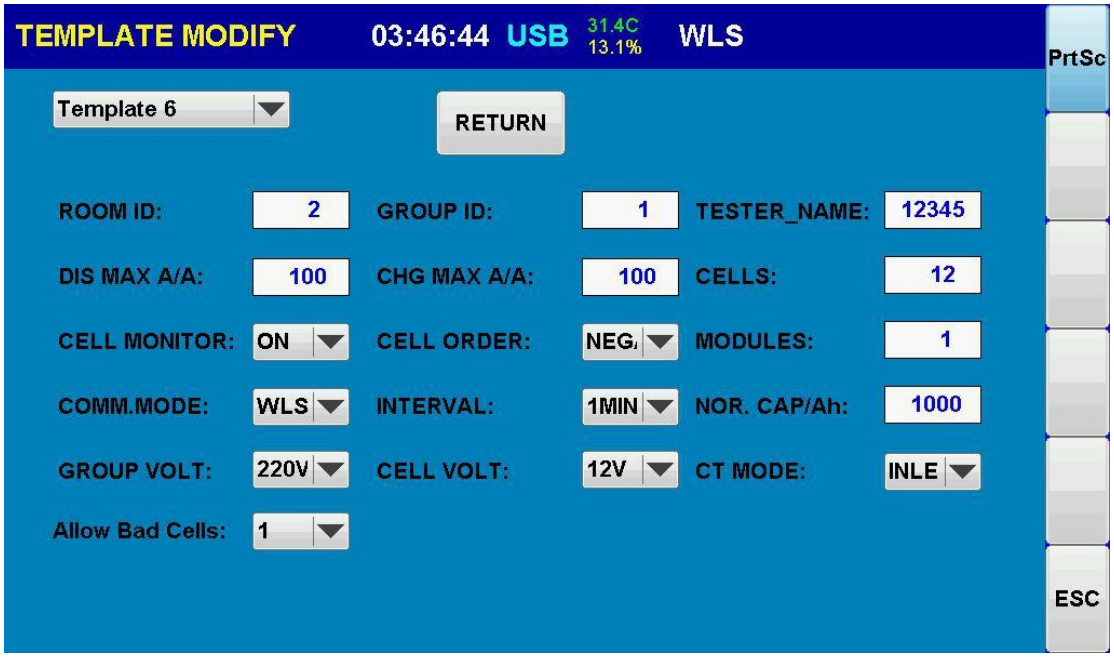
According to the test you need, click the icon to enter the test interface.

Before entering the test interface, the system automatically guides you to select template parameters according to the preset 6 template parameters, as shown in the table below:



If needed, you can click  to modify the relevant parameters in the corresponding module.

If not, click  to enter the corresponding test interface, as shown in the table below:



[ROOM ID]: Input according to the parameter of tested battery.

[GROUP ID]: Input according to the parameter of tested battery.

[TESTER_NAME]: Input according to the parameter of tested battery. This value will be part of the title of data recording file generated to tell which tester has carried out the test for the data file, or filled in the title of data file for other specific purpose.

[DIS MAX A/A]: The maximum value of the discharge current tested. If the current exceeds this value during the discharge process, the discharge will be cut off automatically and a prompt of "discharge current failure" will be reported.

[CHG MAX A/A]: The maximum value of the charge current tested. If the current exceeds this value during the charge process, the charging will be automatically cut off and a prompt of "charge current failure" will be reported.

[CELLS]: The total number of batteries connected to all cell monitoring boxes.

[CELL MONITOR]: Switch of cell monitoring function. When the value is 1, the cell voltage data is collected and displayed. When the value is 0, there is no display, and there is no such prompt as "cell voltage too low" if the cell voltage is 0.

[CELL ORDER]: There are two options, i.e., "starting from the positive pole" and "starting from the negative pole", respectively meaning that the position of 1# battery in the whole group is the total positive pole or the total negative pole.

[MODULES]: The total number of cell monitoring modules used. The number must be greater than or equal to the "CELLS"/12.

[COMM. MODE]: This option is generally set to "WLS" (wireless) mode.

[INTERVAL]: The interval between data recording storage. There are six options, "1min", "2min", "5min", "10min", "30min" and "60min". Note: the selected time interval is no greater than the measured duration/400 (maximum number of data recordings). For example, if test duration is 10h, the recording interval is 1min, then a total of 600 data recordings (10h*60min=600min) are generated in the whole test process, which exceeds the maximum 400, and thus the charge/discharge process will cut off in about 6 hours (400/60=6.67) in advance due to "recording files exceed the limit".

[NOR. CAP/Ah]: Select according to the rated group voltage of the tested battery.

[GROUP VOLT]: Select the rated voltage option for the tested battery group. The options are “12V”, “24V”, “36V”, “48V”, “72V”, “110V”, “220V”, “240V”, “380V”, “480V” and “600V”. DO NOT choose the wrong option as it will determine the maximum value of the waveform chart on the charge/discharge interface!

[CELL VOLT]: Select the rated voltage option for the tested battery group. The options are “2V”, “4V”, “6V” and “12V”.

[CT MODE]: Options of “Internal Current Sensor” and “External Current Sensor”. The “External Current Sensor” must be selected when the online charging and discharging function is used. Otherwise, it is the “Internal Current Sensor”. DO NOT choose the wrong option!

[Allow Bad Cells]: During the charge/discharge test, if the number of cells, the voltages of which are lower than the “minimum cell voltage”, exceeds this value, the charge and discharge tester will automatically stop discharging and report “low cell voltage”.

After modifying the corresponding template parameters, click 

to go back to the template option interface, and then click 

to enter the corresponding test interface.

5.2 Discharge Operation

Before the discharge test, please fill in the correct parameters and alarm termination test values according to the battery parameters in the actual operating conditions, so that the system can make appropriate judgments according to the parameters your input.

[Ah LIMIT/Ah]: If the discharged capacity is greater than the set value during the discharge process, the system will stop discharging and report the discharge capacity completed.

[TIME LIMIT/HM]: If the discharge duration is longer than the set value during the discharge, the system will stop discharging and report that the discharge time is out.

[CELL L LIMIT/V]: If the “Allow Bad Cells” in the test template is set to 1, and the minimum cell voltage is lower than this set value during the discharge process, the system will stop and report the cell voltage is low. If the “Allow Bad Cells” in the test template is greater than 1, for example 5, then the tester will automatically stop and report the cell voltage is low when the cells of voltage below this value is greater than or equal to 5.

[GROUP L LIMIT/V]: If the group voltage is lower than the set value during the discharge, the system will stop and report the group voltage is low.

[CURRENT SET/A]: The set discharge current when a constant current is discharged.

[POWER SET/W]: The set discharge power when discharging at constant power.

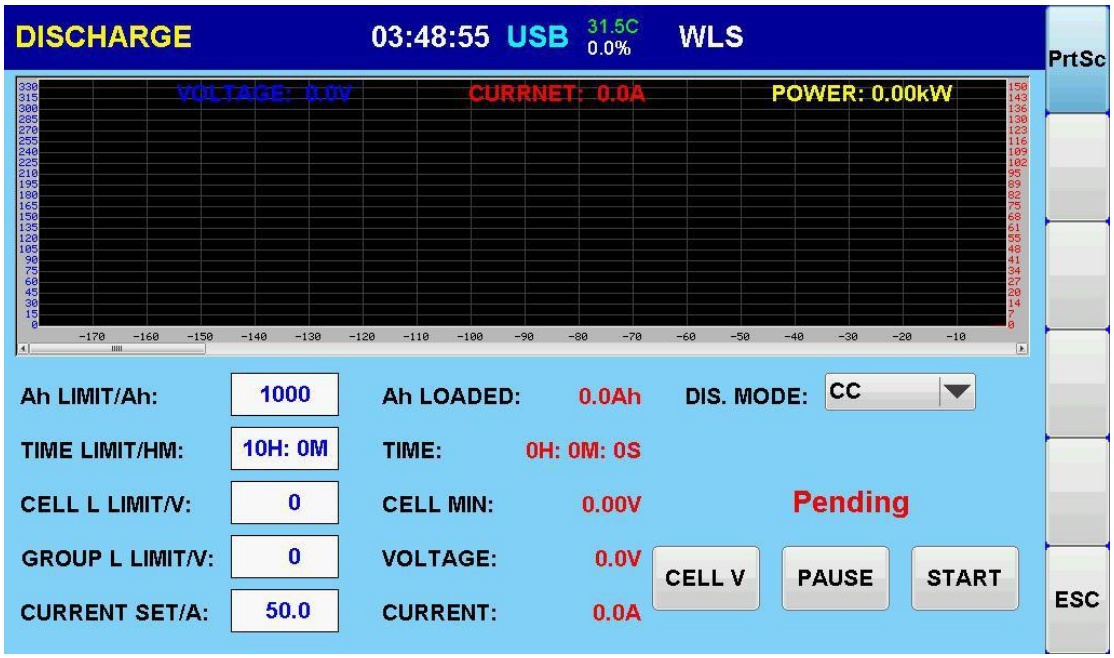
[CELL V]: Click this button to switch to the cell voltage display interface. Press “RETURN” in the lower right corner of the cell voltage display interface, and return to this page.

[PAUSE]: During the discharge process, the discharge process will pause and the data will stop recording when this button is pressed. Press this button again to return to the discharge process.

[START]: This button integrates the Start, Stop and Reset, and can prompt operation in real time. For example, this button will change to “Reset” in case of alarm; it will display “Start” when the tester stops; it will display “Stop” when the tester runs.

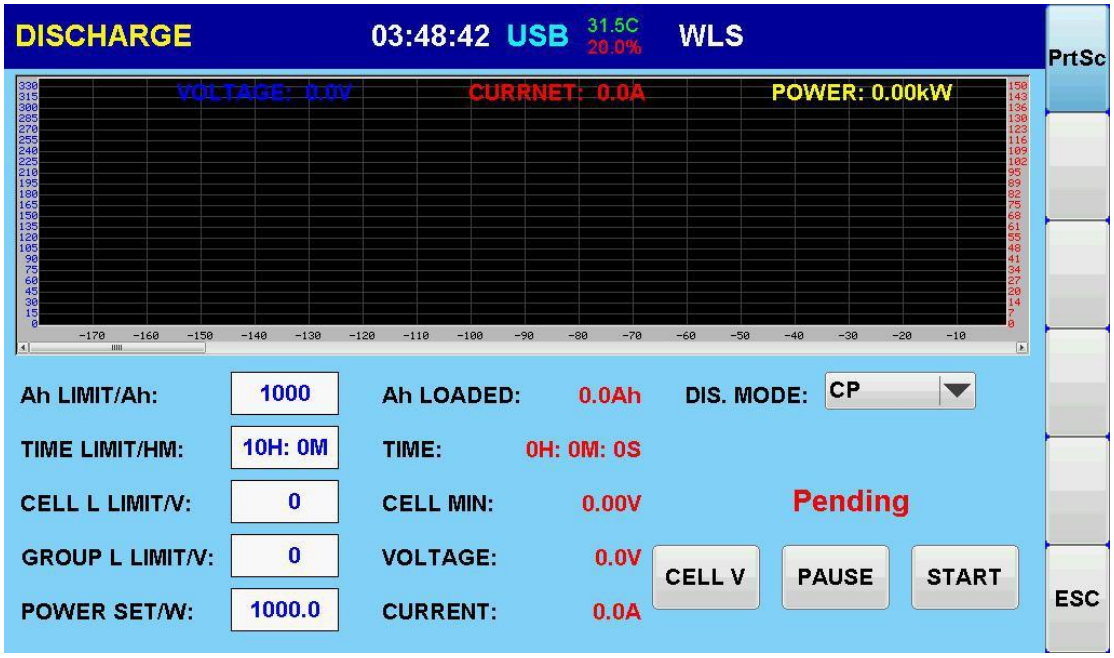
The tester’s discharge function has two discharge modes, i.e., “constant current” and “constant power”, which are respectively introduced as follows:

5.2.1 Constant Current Discharge Interface



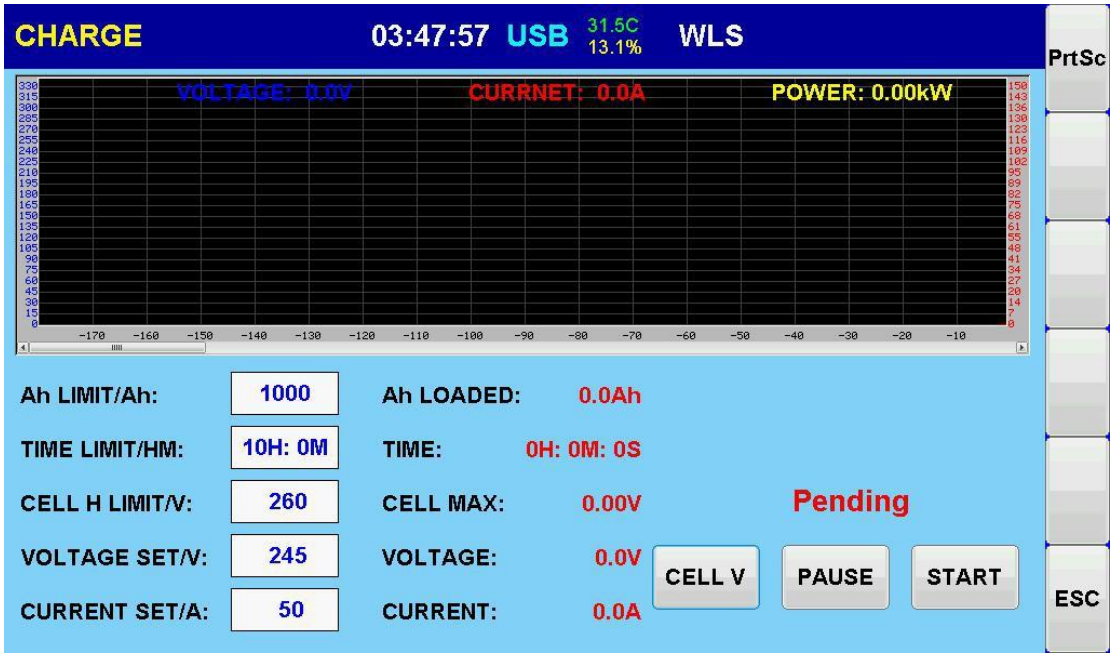
Note: When the discharge mode is changed to “constant current”, the discharge parameter setting is displayed as “CURRENT SET/A”.

5.2.2 Constant Power Discharge Interface



Note: When the discharge mode is changed to “constant power”, the discharge parameter setting is displayed as “POWER SET/W”.

5.3 Charge Operation



[Ah LIMIT/Ah]: If the charged capacity is greater than the set value during the charge process, the system will stop charging and report the charge capacity completed.

[TIME LIMIT/HM]: If the charge duration is longer than the set value during the charge, the system will stop charging and report that the charge time is out.

[CELL H LIMIT/V]: If the “Allow Bad Cells” in the test template is set to 1, and the maximum cell voltage is higher than this set value during the charge process, the system will stop and report the cell voltage is high. If the “Allow Bad Cells” in the test template is greater than 1, for example 5, then the tester will automatically stop and report the cell voltage is high when the cells of voltage above this value is greater than or equal to 5.

[GROUP H LIMIT/V]: If the group voltage is higher than the set value during the charge, the system will stop and report the group voltage is high.

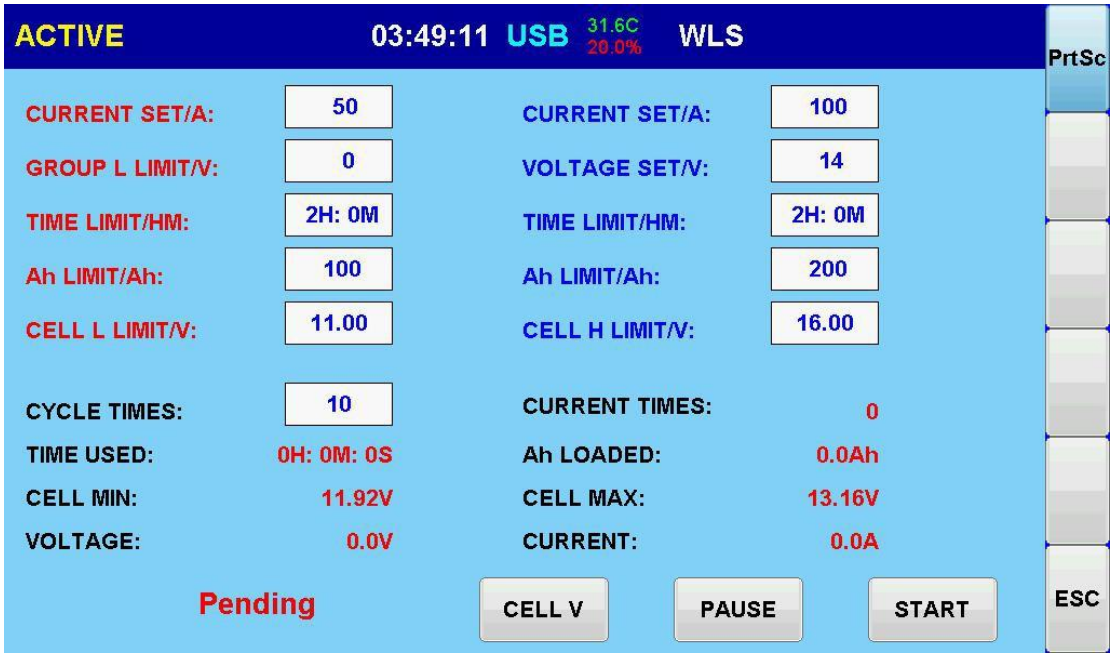
[CURRENT SET/A]: The set charge current during charging test.

[CELL VOLT]: Click this button to switch to the cell voltage display interface. Press “RETURN” in the lower right corner of the cell voltage display interface, and return to this page.

[PAUSE]: During the charge process, the charge process will pause and the data will stop recording when this button is pressed. Press this button again to return to the charge process.

[START]: This button integrates the Start, Stop and Reset, and can prompt operation in real time. For example, this button will change to “Reset” in case of alarm; it will display “Start” when the tester stops; it will display “Stop” when the tester runs.

5.4 Activation Operation



The activation operation integrates all functions of charging and discharging, so the parameter setting is consistent with charging and discharging respectively, without further introduction here. Instead, the activation principle and working process are explained:

Due to the cell itself and different external conditions, the cell voltages of battery group in use are imbalanced, and the capacities stored are not equal. Therefore, in the entire charging and discharging process of battery group, some cells are over-charged or over-discharged, which greatly reduces the service life of batteries. As a result, the active substances, mainly the negative active substance, fail in vulcanization and seriously fade in capacity, and thus it is necessary to carry out several high-current charging and discharging to activate these vulcanized active substances. This process is called activation.

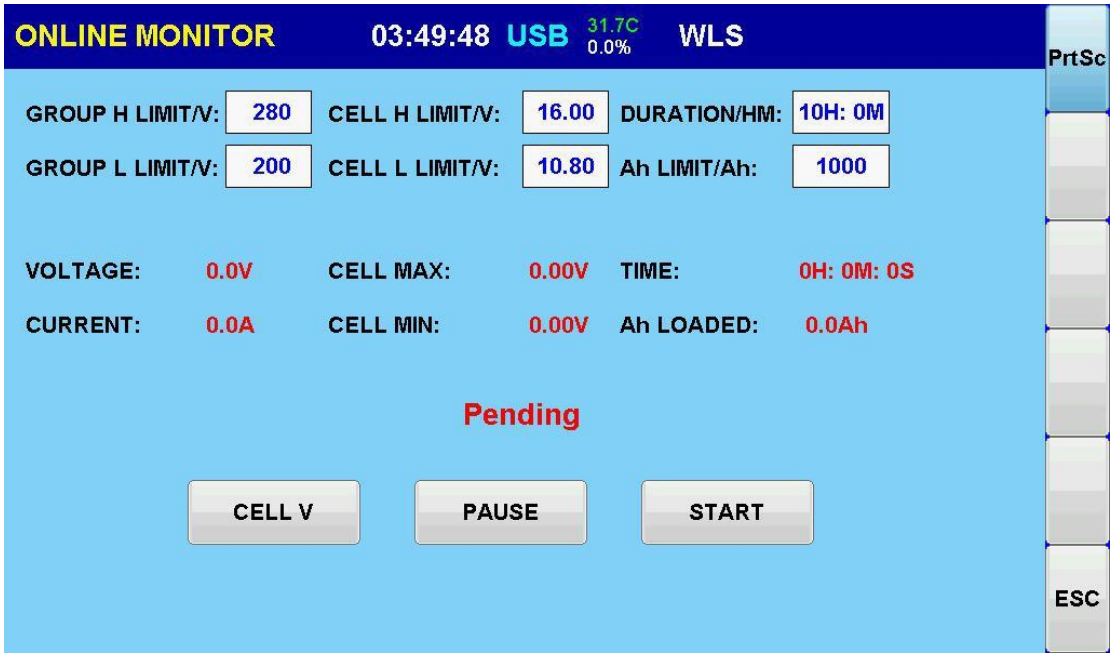
For the tester itself, activation is actually a process of discharge-charge cycles, i.e., discharging first, charging, then discharging again... finally charging.

[CYCLE TIMES]: A discharging and a charging is called a cycle. Cycle times are the discharge-charge times.

[TIME USED]: The length of time the current has been consumed (discharging) or the current has been injected (charging) during a single charging or discharging process.

[Ah LOADED]: The ampere hours consumed (discharged) or injected (charged) during a single charging or discharging process.

5.5 Online Monitoring Operation

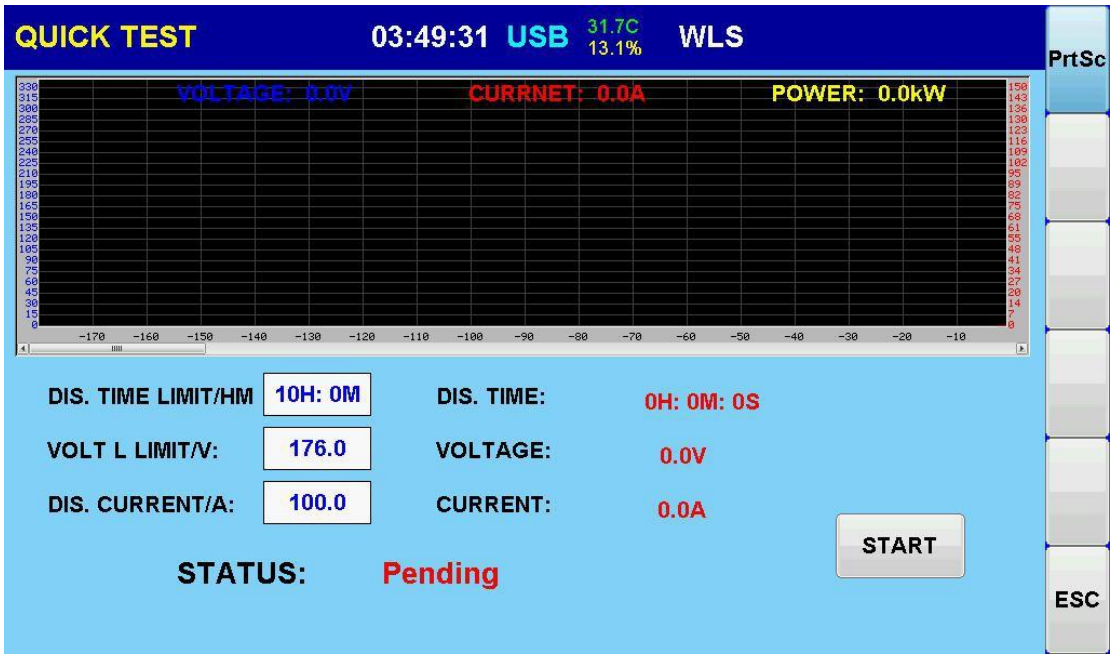


In many cases, the actual carrying capacity of a loaded battery group has to be verified, that is, it only requires to monitor the cell voltage, total voltage and total current without an actual charging and discharging test conducted on the battery group, where the online monitoring function can be used.

In this interface, a total of 6 limit values can be set, namely [GROUP H LIMIT/V], [GROUP L LIMIT/V], [CELL H LIMIT/V], [CELL L LIMIT/V], [DURATION/HM] and [Ah LIMIT/Ah]. When any condition is met during the monitoring process, there will be a sound-light alarm.

During the online monitoring process, the corresponding data recording files will be generated just like in the charging/discharging process.

5.6 Quick Test

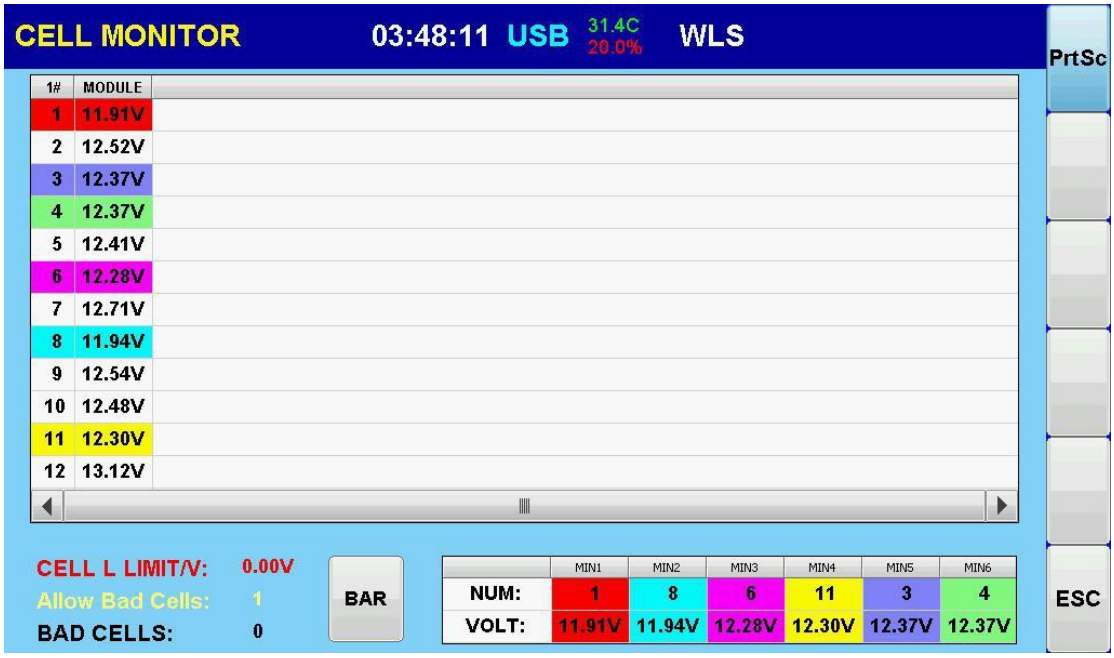


In many cases, users do not want to set too many parameters for discharge test. Then, they can enter the Quick Test interface by simply setting three simple parameters, namely [DIS. TIME LIMIT/HM], [VOLT L LIMIT/V] and [DIS. CURRENT/A], easy and convenient!

5.7 Cell Monitor

If you order a model with cell monitoring function, you can enter the cell monitoring page by clicking [CELL MONITOR] on the pages of "Main Page", "Charge Interface", "Discharge Interface", "Activation Interface" and "Online Monitoring". On this page is a default table display where you can check the cell module voltage value on the hidden part of the table by dragging the scroll bar below. Click [BAR] to switch to the page of "Cell Voltage Bar Chart", as shown below:

5.7.1 Cell Voltage Form Display



Cell Voltage Form Display (starting from negative pole)

In the form display page, the title bar of the form shows "1# module" to "N# module", respectively representing the address number of the corresponding module.

In the column of "N#", the voltage data of each channel of the module is displayed separately. The software has automatically calculated the battery order corresponding to the voltage of each channel according to the sequence of module address number.

The column of "MODULE" shows the voltage value corresponding to each channel, accurate to 0.01V. The data update rate of each channel is 0.2S*N (number of modules). For example, there are 10 modules, and the voltage of each channel is updated every 2 seconds.

[CELL L LIMIT/V]: The values here are consistent with the "CELL L LIMIT/V" at the discharge interface. If the "CELL MONITOR" page is switched from the charge interface, it will automatically change to [CELL H LIMIT/V].

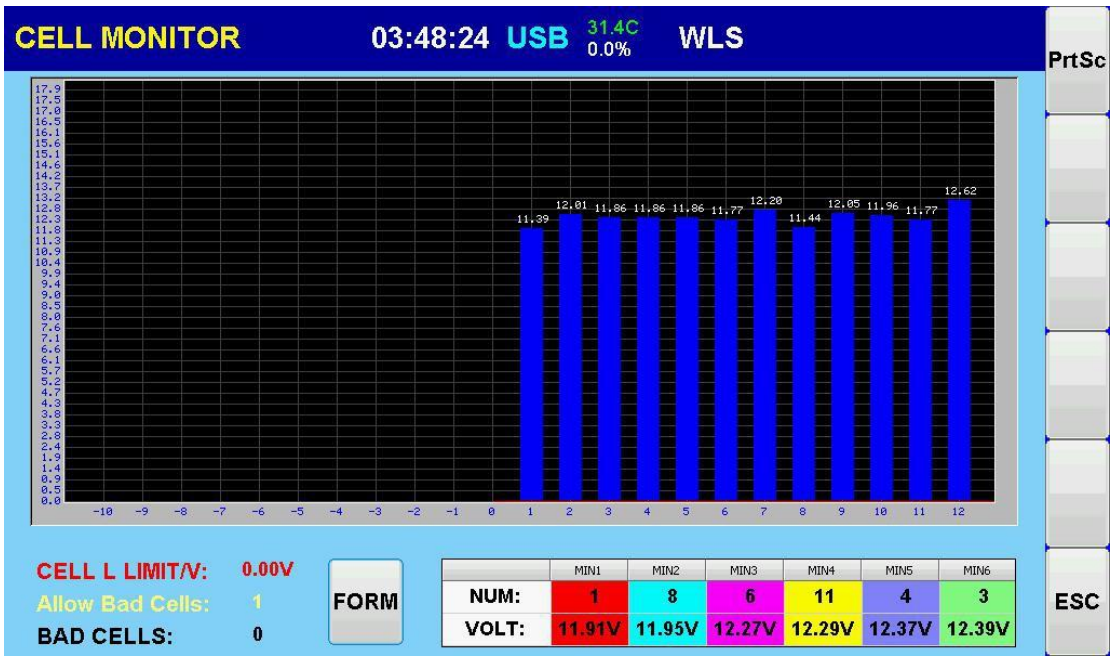
[Allow Bad Cells]: The value here is the same as that selected in "Allow Bad Cells".

[BAD CELLS]: The value here refers to the number of cells below the "CELL L LIMIT/V".

In the small table at the bottom, the number and voltage value of the lowest 6 cells are displayed, and the software has arranged them automatically according to the voltage. If "CELL MONITOR"

page is switched from the charging interface, it will automatically change to display the number and voltage values of up to 6 cells.

5.7.2 Cell Voltage Bar Chart Display

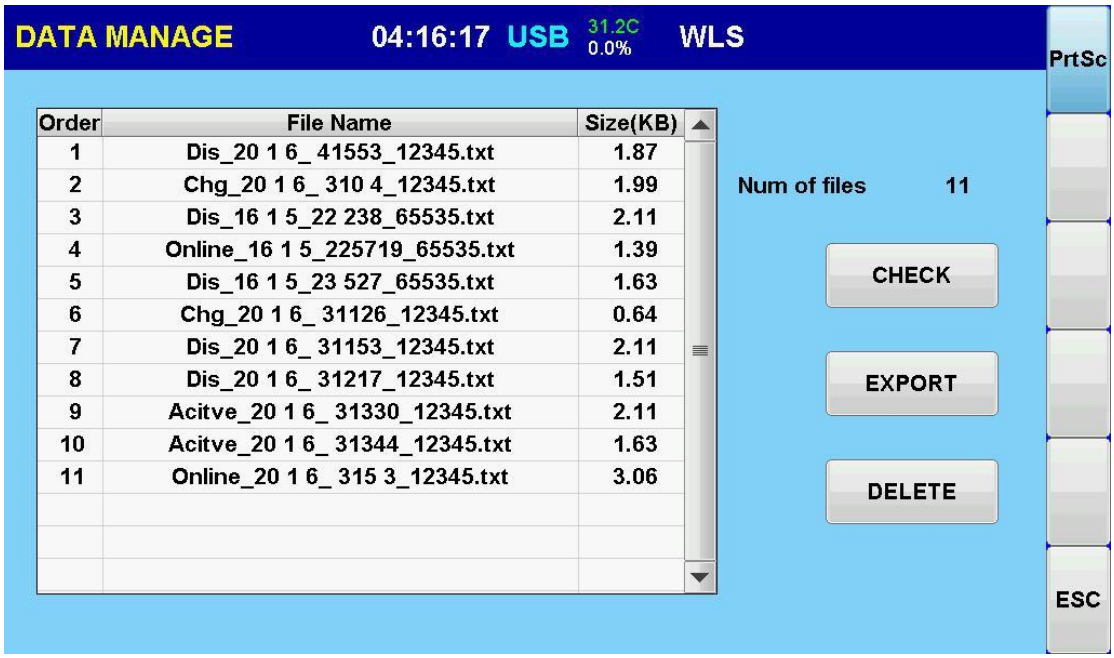


In the bar chart display page, the voltage of each cell is displayed in the form of a bar chart. When the number of cells is greater than 24, a scroll bar will automatically appear at the bottom of the bar chart. The voltage values of othercells beyond 24 can be shown by dragging the scroll bar.

At the top of each bar chart, the voltage value of the cell can be displayed separately, and it can automatically adjust its height according to the height of the bar chart.

[CELL L LIMIT/V], [Allow Bad Cells] and [BAD CELLS] are consistent with the contents and functions displayed in the form.

5.8 Data Management



Data management page is an important window interface where you can view, delete and export the automatically recorded data. First, select a data file in the left form, and then click the three buttons on the right to operate.

[Order]: The software can automatically generate a serial number for each data file according to the generated time, so that users can identify and find.

[File Name]: The name of each data file has a specific meaning, consisting of four parts - “test type” + “date (YY/MM/DD)” + “time (h/min/s)” + “tester name”. Each part is separated by an “_”.

The test types are:

Charging: “Chg”

Discharging: “Dis”

Activation: “Act”

Online monitoring: “Onl”

Note: The Quick Test feature does not have data recording function.

[Size (KB)]: The storage space taken up by each file in Kb.

[Num of files]: The number of all data files in the tester memory, up to 200 data files that can be managed.

[CHECK]: After selecting a data file on the left, open this data file by clicking this button to display all the recorded parameters. For details, please refer to the section [Data Check and View].

[EXPORT]: First, select a data file on the left, and save (cut) the selected data file to the root directory of USB flash drive by clicking this button. Then, the software will automatically delete the data file selected in the left form. If the USB flash drive is not recognized successfully, this operation will be cancelled automatically.

[DELETE]: Select a data file on the left, and click this button to delete it.

5.8.1 Data View

[File Name]: the name of the data file being viewed.

[TEST MODE]: the test types of data files being viewed, including discharge, charge, activation and online monitoring
[TESTER]: the parameter in the “Test Template” selected for the test process that generates this data file.
[ROOM ID]: the parameter in the “Test Template” selected for the test process that generates this data file.
[GROUP ID]: the parameter in the “Test Template” selected for the test process that generates this data file.
[GROUP VOLT/V]: the parameter in the “Test Template” selected for the test process that generates this data file.
[CELL VOLT/V]: the parameter in the “Test Template” selected for the test process that generates this data file.
[CELLS]: the parameter in the “Test Template” selected for the test process that generates this data file.
[MODULES]: the parameter in the “Test Template” selected for the test process that generates this data file.
[MONITOR]: the parameter in the “Test Template” selected for the test process that generates this data file.
[CELL ORDER]: the parameter in the “Test Template” selected for the test process that generates this data file.
[COMM. MODE]: the parameter in the “Test Template” selected for the test process that generates this data file.
[INTERVAL]: the parameter in the “Test Template” selected for the test process that generates this data file.
[NOR. CAP/Ah]: the parameter in the “Test Template” selected for the test process that generates this data file.
[DIS. MODE]: the parameter in the “Test Template” selected for the test process that generates this data file.
[DIS. MAX CURRENT/A]: the parameter in the “Test Template” selected for the test process that generates this data file.
[CHG. MAX CURRENT/A]: the parameter in the “Test Template” selected for the test process that generates this data file.
[CT MODE]: the parameter in the “Test Template” selected for the test process that generates this data file.
[PARALLEL]: the parameter in the “Test Template” selected for the test process that generates this data file.
[MASTER/SLAVE]: the parameter in the “Test Template” selected for the test process that generates this data file.
[SLAVE ADDRESS]: the parameter in the “Parameter Setting” interface selected for the test process that generates this data file.
[NUM OF SLAVE]: the parameter in the “Parameter Setting” interface selected for the test process that generates this data file
[WIRELESS BAND]: the parameter in the “Parameter Setting” interface selected for the test process that generates this data file

[Ah LIMIT/Ah]: the parameter in the interface of one of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[TIME LIMIT/HM]: the parameter in the interface of one of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[CELL L LIMIT/V]: the parameter in the interface of one of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[GROUP L LIMIT/V]: the parameter in the interface of one of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[CURRENT SET/A]: the parameter in the interface of one of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[BAD CELLS ALLOW]: the parameter in the "Test Template" selected by the test process that generates this data file.
[REMOTE]: the parameter in the interface of one of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[BAD CELLS]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[STOP VOLT]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[STOP CURRENT]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[CAP. DISED]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[TIME DISED]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[MIN CELL 1]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[MIN CELL 2]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[MIN CELL 3]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[MIN CELL 4]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[MIN CELL 5]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[MIN CELL 6]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[STOP RESON]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[Num Of Records]: the parameter upon stop of the test processes of charging/discharging/activation/online monitoring that generates this data file.
[Start Volt/V]: the first recorded parameter in the cell voltage data that generates this data file.
[Stop Volt/V]: the last recorded parameter in the cell voltage data that generates this data file.
[Resistance/mR]: the internal resistance value estimated from the recorded parameters.
[CURVE:] click this button to enter the "Data Curve" page.

5.8.1.1 Data Curve

[TOTAL VOLT/TOTAL CURRENT CURVE]: The chart shows the history of waveform curves of the total voltage and current. The check box below the chart can be checked or unchecked. The corresponding curve will be displayed when checked and hidden when unchecked.

The blue Y-axis on the left is the corresponding voltage value, and the red Y-axis on the right is the corresponding current value.

[MIN CELL VOLT CURVE]: The chart shows the history of waveform curves of the minimum 6 cell voltages. The check box below the chart can be checked or unchecked. The corresponding curve will be displayed when checked and hidden when unchecked.

[ZOOM OUT], [ZOOM IN], [LEFT] and [RIGHT]: arranged for the operation of each chart.

5.9 Product Specification

Click the “About” icon on the Main Page, and a “About” dialog box will pop up, in which the relevant specifications and parameters of the product will be displayed.

[Discharge Volt]: the voltage range that is applicable to the battery group in the discharge test. The voltage range of the tested battery group must be covered in this range, otherwise the discharge operation cannot be carried out.

[Charge Volt]: the voltage range that is applicable to the battery group in the charge test. The voltage range of the tested battery group must be covered in this range, otherwise the charge operation cannot be carried out.

[Discharge Current]: the current range set for discharge test. The set current beyond this current range will be forced to be the upper limit value, and the set current below this current range will be forced to be the lower limit value.

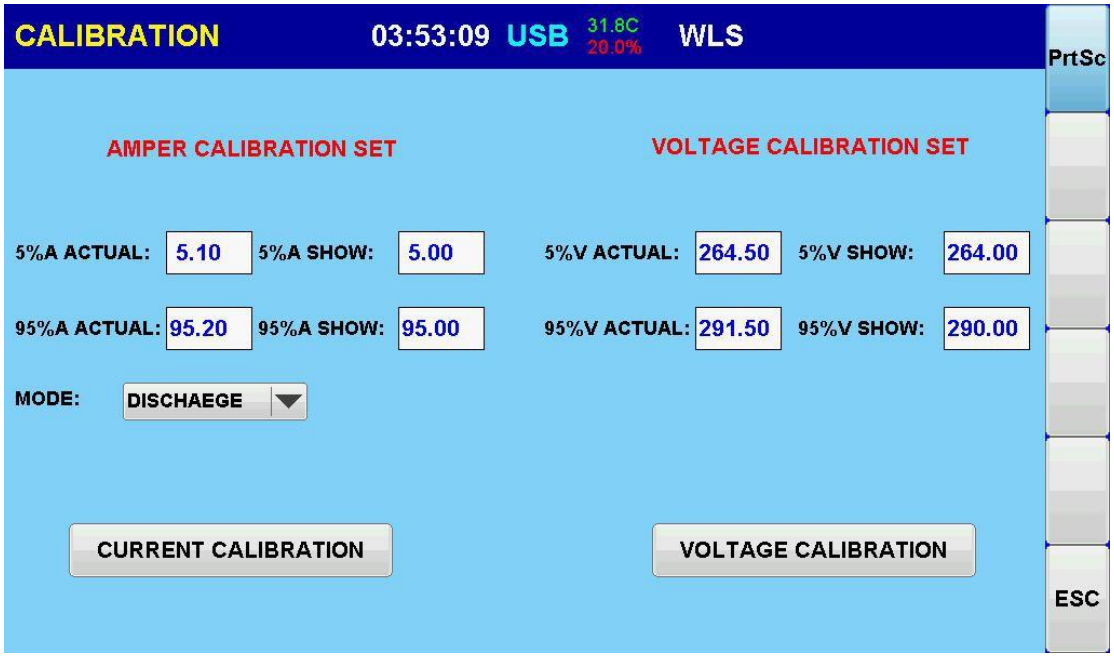
[Charge Current]: the current range set for charge test. The set current beyond this current range will be forced to be the upper limit value, and the set current below this current range will be forced to be the lower limit value.

5.10 Calibration

In many cases, the current sensor or voltage collector has a certain deviation due to the vibration during transportation or influence of environmental temperature and humidity, so the calibration is required.

After clicking the [CALIB] on the Main Page, enter the default password 13982 in the dialog box, and then click [OK] to enter the [CALIB] page.

Window of Enter Password



In the calibration page, 3 values, i.e., charge current, discharge current and voltage, can be calibrated respectively. Before the calibration, 4 parameters must be recorded in advance: actual value 5% and displayed value 5%; actual value 95% and displayed value 95%.

These 4 parameters must be recorded in the actual test process. Set the charging/discharging parameters of the tester to 5% and 95% respectively. (5% and 95% here are just rough figures, not necessarily accurate to the percentage, which the software will automatically identify and correct). Take 220V1000A tester for example: when the discharge current is set to 5A, record the reading (actual value) on the calibration meter (such as clamp meter), and then when the discharge current is 95A, record the reading (actual value) on the calibration meter (such as clamp meter).

[CURRENT CALIBRATION]: First select the calibration mode of charging or discharging, fill in the 4 values recorded previously, click [CURRENT CALIBRATION], click OK in the dialog box popped up to confirm, and then the calibration is completed. The dialog box and test interface will be automatically closed to return to the Main Page. The dialog box for confirmation is as follows:

5.11 System Setting

[PARALLEL]: When a single tester is unable to meet the needs of charging/discharging power, parallel test can be carried out. [PARALLEL] should be set “on” for parallel test, and “Off” for non-parallel state.

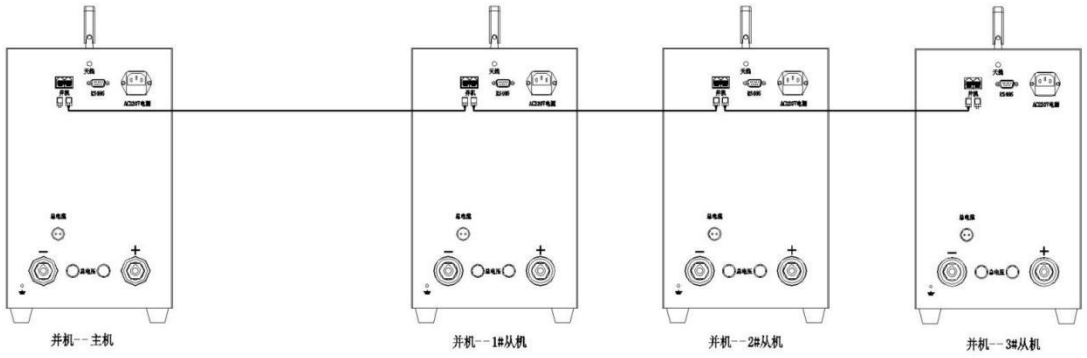
[MASTER/SLAVE]: The parallel operation has master mode and slave mode. In parallel operation, it is only required to set the relevant charge and discharge parameters of the master, set the slave’s [PARALLEL] “on”, and set [MASTER/SLAVE] as “Slave”. Then, fill in the slave address.

[SLAVE ADDRESS]: When the parallel operation is on and [MASTER/SLAVE] is set as “Master”, the “NUM OF SLAVE” is displayed here; when [MASTER/SLAVE] is set as the “Slave”, the “SLAVE ADDRESS” is displayed here from 1 up to 10.

[WIRELESS BAND]: set the communication band between the tester and the wireless cell module. Only the cell voltage collectors with the same band can communicate with the tester.

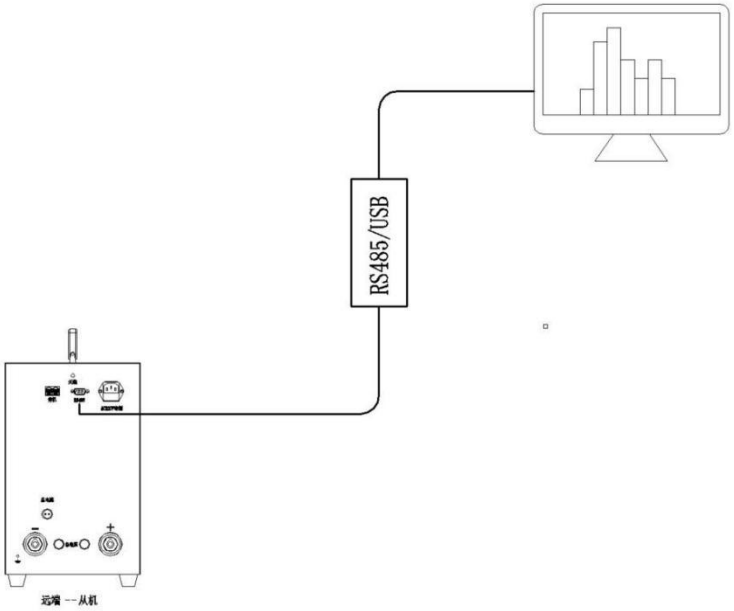
[REMOTE CONTROL]: The remote control function is needed when the remote upper computer, such as PLC, touch screen, PC upper computer software or similar configuration software, is used to control the charge and discharge. This function requires to connect with the tester RS485 interface, because wireless communication is unavailable.

[LANGUAGE]: When you need to switch the tester display language, you can select in this option. Currently, only Chinese and English are supported. It will take effect only after a restart.



Schematic Diagram of Parallel Operation

Note: For parallel control, the connecting interface requires a 6-pin crystal plug, which is optional. Please contact the sales staff when ordering.



Schematic Diagram of Remote Control Operation

Note: For remote control, the connecting interface is a DB9 socket with RS485 interface. Pin 1 of DB9 is A and Pin 2 is B.

5.12 Time Setting

When the time of the local system needs to be changed, click [Time Setting] in the [System Setting] interface, and the time setting dialog box will pop up. After the time drop-down list is set, click [OK] to validate immediately.

5.13 View Online Helpfile

Online helpfile is designed to facilitate a quick and easy view of the technical parameters and principle documents.

Click any of the 20 chapters, and the supporting information will pop up. Press RETURN to go back.

5.14 Restart

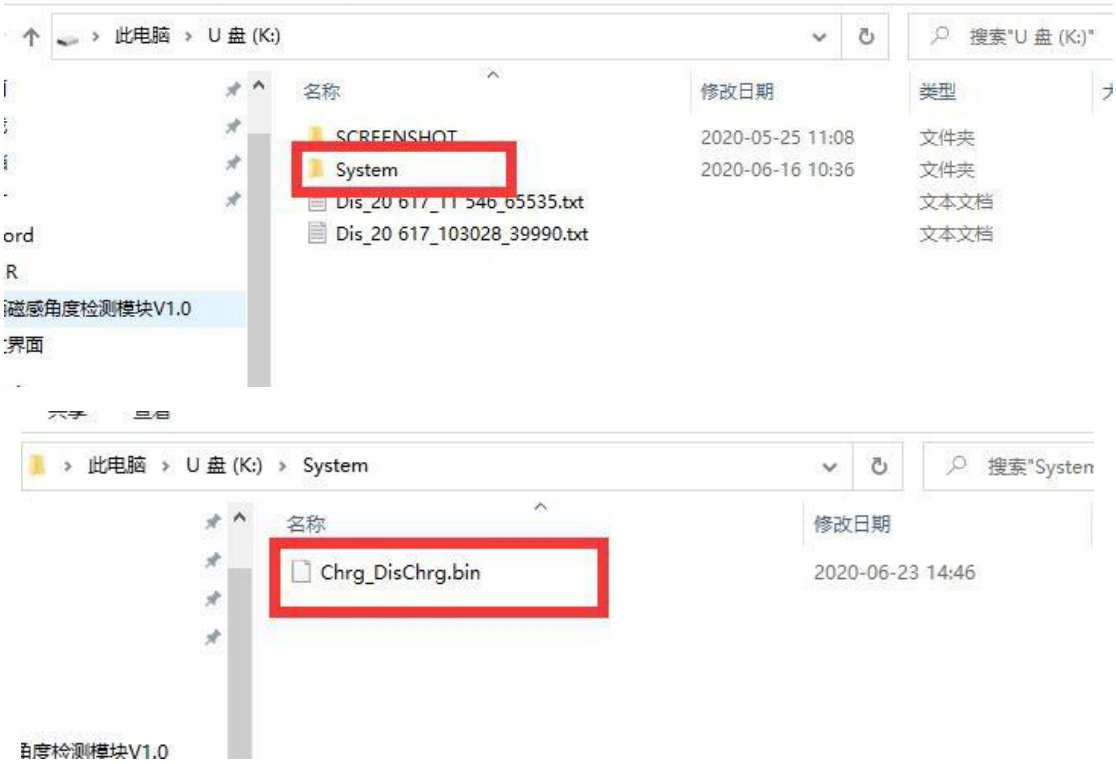
When the system language is changed or the system needs upgrading, the system can be restarted via the [Restart] button on the Main Page, or by switching off the working power and powering on again.

5.15 System Update via USB Flash Drive

When the system needs updating remotely, the local update file, called Chrg_DisChrg.bin, can be obtained from the manufacturer or supplier.

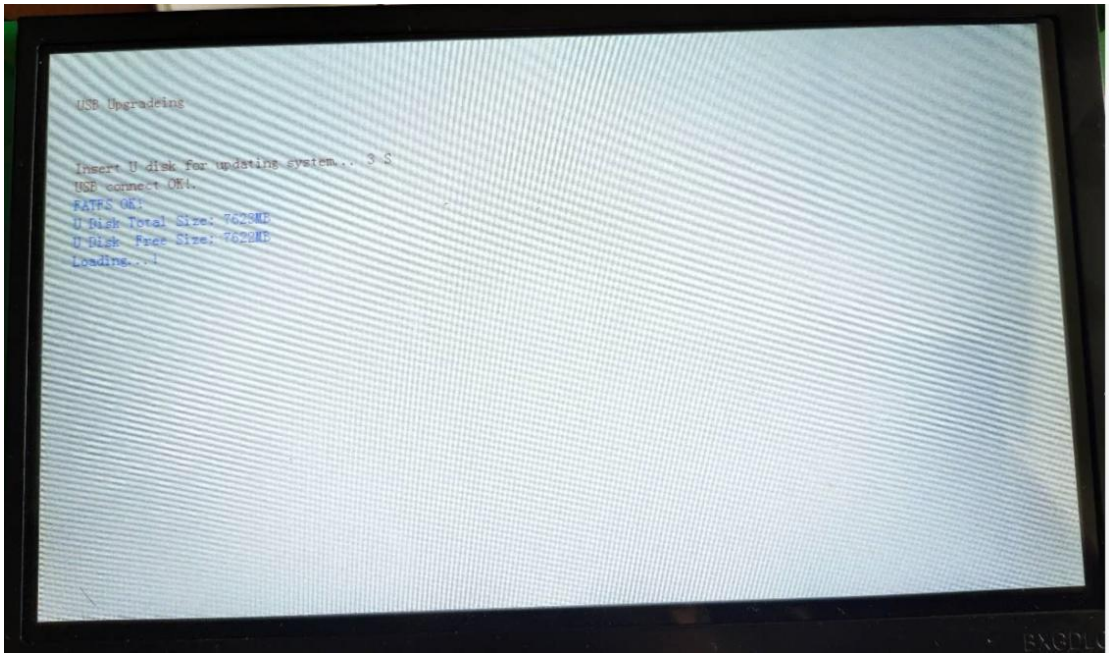
The update steps are as follows:

Step 1: Put the update file into the System folder of the USB flash drive as shown in the figure below:



Step 2: Insert the USB flash drive into the USB port in the tester front panel. Under normal conditions, the title bar will display the USB icon, which means the USB flash drive is recognized successfully.

Step 3: Click [Restart] on the Main Page, or re-power the tester, and it will automatically enter the update interface as shown in the figure below:



After the update is completed, it will automatically return to the Main Page. Then, the update file in the USB flash drive must be deleted, otherwise every time you insert the USB flash drive, the system will restart.

6. Remote Control Communication Protocol

Data received by tester master		
Byte address	Variable name	Range of values
0	Address	1-255
1	Command number	0x01
2	Test mode (charge or discharge)	0x00: standby 0x01: discharge 0x02: charge 0x03: activation
3	Total number of slaves	0-5
4	Backup	
5	Discharge mode (CC、CV、CP、CR)	0x00:CC 0x01:CV
6	Set the discharge value *10 high bytes (voltage, current, resistance, power)	
7	Set the discharge value *10 low bytes (voltage, current,resistance, power)	
8	Set the charging voltage *10 high bytes	
9	Set the charging voltage *10 low bytes	
10	Set the charging current *10 high bytes	
11	Set the charging current *10 low bytes	
12	The module number of the cell voltage that the remote side requires to check	0-24
13	CRC (0-11) high bytes	
14	CRC (0-11) low bytes	

Postback Data						
Byte address	Variable name	Range of values	Byte address	Variable name	Byte address	Variable name
0	Address		15	To query the high byte of channel 4 voltage data of cell module	30	To query the low byte of channel 11 voltage data of cell module
1	Command number	0x02	16	To query the low byte of channel 4 voltage data of cell module	31	To query the high byte of channel 12 voltage data of cell module
2	Test mode (charge or discharge)	0x00: standby 0x01: discharge 0x02: charge 0x03: activation	17	To query the high byte of channel 5 voltage data of cell module	32	To query the low byte of channel 12 voltage data of cell module
3	Test running state		18	To query the low byte of channel 5 voltage data of cell module	33	CRC (0-11) high bytes
4	Backup		19	To query the high byte of channel 6 voltage data of cell module	34	CRC (0-11) low bytes

5	Present voltage*10 high bytes		20	To query the low byte of channel 6 voltage data of cell module		
6	Present voltage *10 low bytes		21	To query the high byte of channel 7 voltage data of cell module		
7	Present current *10 high bytes		22	To query the low byte of channel 7 voltage data of cell module		
8	Present current *10 low bytes		23	To query the high byte of channel 8 voltage data of cell module		
9	To query the high byte of channel 1 voltage data of cell module		24	To query the low byte of channel 8 voltage data of cell module		
10	To query the low byte of channel 1 voltage data of cell module		25	To query the high byte of channel 9 voltage data of cell module		
11	To query the high byte of channel 2 voltage data of cell module		26	To query the low byte of channel 9 voltage data of cell module		
12	To query the low byte of channel 2 voltage data of cell module		27	To query the high byte of channel 10 voltage data of cell module		
13	To query the high byte of channel 3 voltage data of cell module		28	To query the low byte of channel 10 voltage data of cell module		
14	To query the low byte of channel 3 voltage data of cell module		29	To query the high byte of channel 11 voltage data of cell module		

7. Cell Module Address and Band Setting

The cell collection module uses the dial switch to set its frequency and band value.

When the frequency or band needs changing, remove the cell module, and plug in the battery wire plug after setting the dial position listed in the following table. Note: Frequency and band cannot be changed live, otherwise it will not take effect.

Address/dial number	1	2	3	4	5
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	0
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1

Frequency band	6	7
Band1	0	0
Band2	0	1
Band3	1	0
Band4	1	1

8. Common Failures and Troubleshooting Methods

No.	Failure	Troubleshooting Method
1	The discharge air breaker cannot be switched on.	The master working power is not turned on, or the battery voltage is beyond the rated range.
2	The tester keeps alarming after being connected to the high-current lead.	Check whether the positive and negative poles, and whether the voltage range are within the nameplate rated voltage range.
3	The cell voltages of a certain module are all 0.	1. Check and confirm whether the cell monitoring switch in the test template interface is "on". 2. Check and confirm whether the module communication mode in the test template interface is "WLS" (wireless). 3. The cell module address setting is out of range. 4. The band setting of the cell module is inconsistent with the master. 5. Wiring error of cell module. 6. The wiring of cell module falls off. 7. Multiple masters are set to the same band in the same area. 8. If the cell module is damaged, contact the after-sale technical personnel.
4	The cell voltage sequence does not correspond to the actual battery.	Check and confirm whether the battery order in the test template interface is consistent with the actual batteries wired.
5	The cell monitoring page shows that the number of cell voltages does not correspond to the actual voltages applied.	Check if the set values of "CELLS" and "MONITORING MODULES" on the test template page are correct.
6	"Discharge current failure" is displayed during discharge.	1. Check whether the discharge switch is on. 2. The current during discharge exceeds the maximum value set in the test template page.
7	"Overtemperature failure" is displayed during discharge.	1. Check that each cooling fan rotates normally. 2. Ensure that the working environment is well ventilated. 3. Ensure the inlet and outlet of the tester are not close to the wall or other equipment, keeping a distance of at least 1m. 4. The ambient temperature is too high, over 45℃, and the ventilation is poor.
8	The discharge current is normal during discharge, but the voltage does not drop.	Ensure the battery group is not disconnected from the charging system.
9	The total voltage cannot be collected by discharge.	The total voltage collection line is not wired, or is reversed, or there is a broken line in the collection wiring.

10	Prompt “Recording files exceed the maximum number” during charging/discharging.	The maximum records of a single file are 400, so do not set the intervals too short when the charge and discharge continues for a long time. For example, the discharge time is 10h (600min), and the interval is set as 1min (a total of 600 records required), this fault will be prompted in about 400min (6h40min). Set the interval to 2min.
11	After plugging in the USB flash drive, the system will be automatically updated every time it is powered on.	After updating the system via the USB flash drive, you must delete the update file in the USB flash drive, or you will automatically enter the automatic update program every time you plug it in.
12	Report “Memory storage failure” during discharge	SD card gets loose or fails. Please contact after-sales technical personnel for solution.
13	After the USB flash drive is plugged in, the title bar does not display “USB” prompt.	The USB flash drive has a file system in a wrong format, or is damaged. Please format the file system as FAT32.
14	The current shows no increase after the discharge starts, but the actual current keeps increasing.	Select the wrong internal and external current sensors in the test template page.