20-Channel Lithium Battery Charge/Discharge&Equalization Repair Instrument User Manual

1.Product introduction

The HT-ED10AC20 is a 20-channel capacity testing and maintenance instrument. Each channel is suitable for batteries with voltages ranging from 1 to 5V, including ternary lithium, lithium iron phosphate, lithium titanate, nickel-metal-hydride, and nickel-cadmium batteries. The current and voltage accuracy of the device is ±1%. It is equipped with functions such as battery capacity testing, battery balancing, pulse charging, and cycling. Moreover, the host computer software can be used to control the battery working steps. It features high precision, strong timeliness, simple operation and practical reliability. We are capable of providing comprehensive battery testing and maintenance services for battery manufacturers and users.

2.1 Product features

① Each channel is equipped with a dedicated processor to ensure that capacity calculation, timing, voltage and current control reach a perfect level.

② Multiple capacity testing methods can be freely chosen to meet the needs and applications of different scenarios.

③ The host computer supports a maximum of 9999 cycles of charge and discharge, and the operation is simple and intelligent

④ Real-time display of the battery's working status and parameters such as voltage, current and capacity

⑤ It adopts full-channel isolation technology. Each channel can freely set different battery charging and discharging parameters, or the same charging and discharging parameters can be set to achieve a balanced battery pack effect

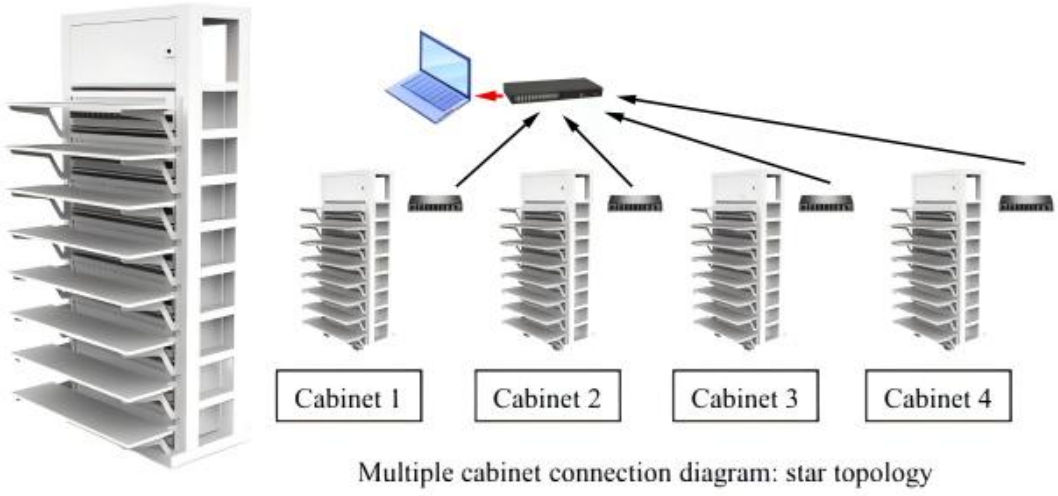
⑥ It can achieve the function of group matching. The test results can be matched according to the custom standards and marked and displayed on the device

⑦ All battery types such as 18650, 26650, pouch cells and block cells are fully compatible for installation

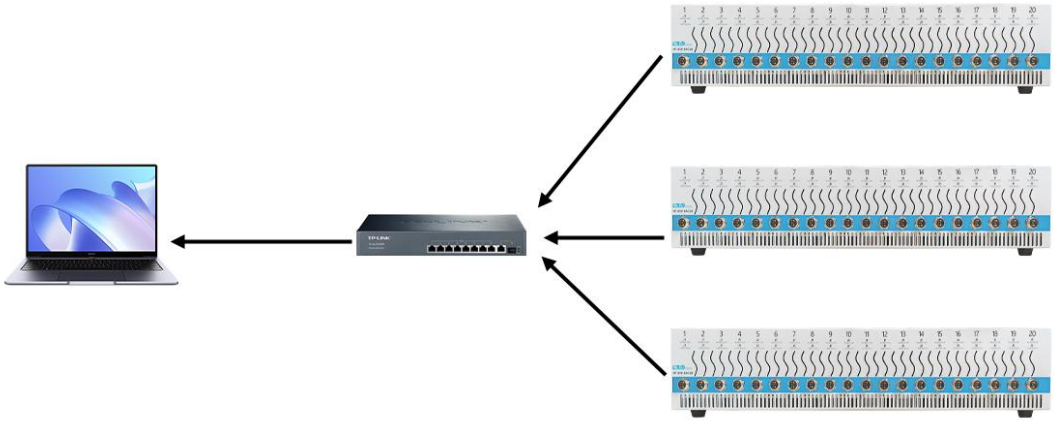
⑧ The color of the test status pane can be customized. When there are a large number of tests, it is easy to visually inspect the detection status of all devices.

2.2 System Application Scenarios

Materials: Several Battery Repair Instruments, several cabinets, network cables, network switches, and computers. A single device forms a tower test cabinet, and several cabinets form a test cluster.



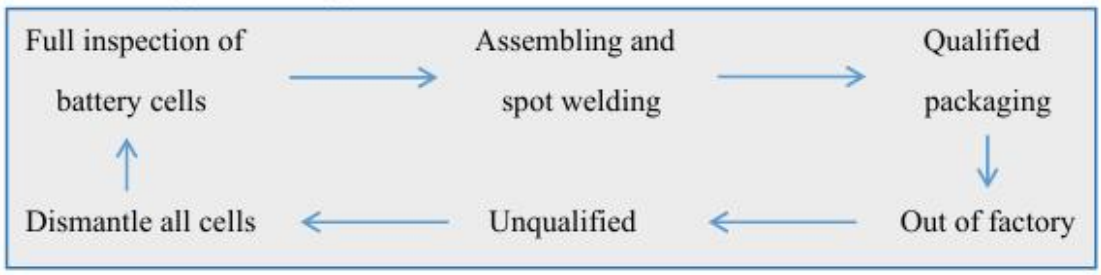
Multiple cabinet connection diagram: star topology



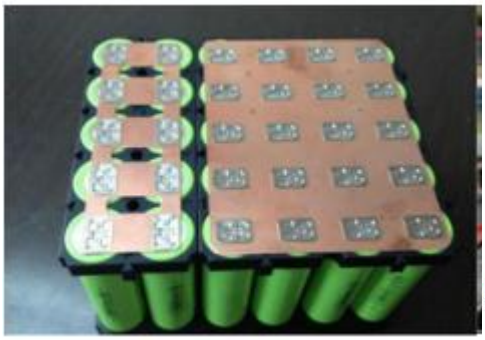
2.3 For Battery Assembly Manufacturer Materials:

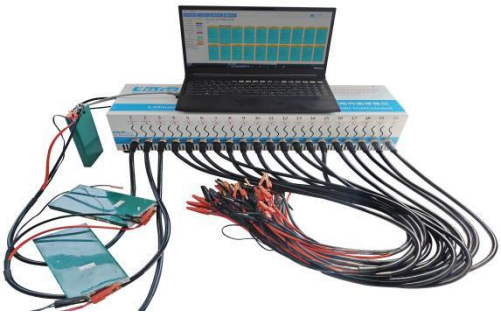
Several Battery Repair Instruments, several cabinets, network cables, network switches, computers. In the traditional production process, when the whole set of batteries is tested poorly, it is difficult to pinpoint which specific cell is defective. The entire set of batteries needs to be disassembled and the production process restarted. However, this is time-consuming and will also cause some damage to the re-spot welding of the good cells.

2.4 Traditional production process:



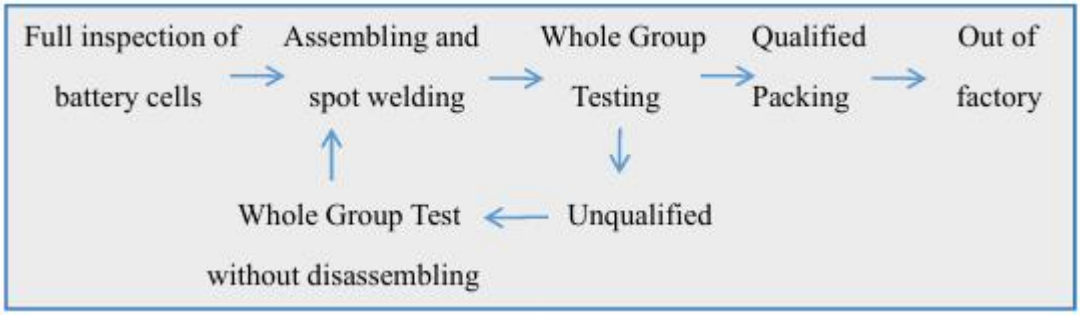
The isolation detection technology of the Battery Repair Instrument can directly conduct charge and discharge tests on the cells of the entire battery pack without disassembling the battery pack, find out the bad cells, and replace them accurately to improve maintenance efficiency without disassembly. Test the entire battery pack as shown below:







2.5 Improved production process:



In the full battery inspection process, this equipment can perform customized inspections according to any manufacturer's standards. For example, constant power discharge, constant resistance discharge, constant current discharge. Single constant current charging, single constant voltage charging, constant current and constant voltage charging. The charge and discharge voltage can be customized, the charge and discharge time can be limited, the charge and discharge capacity can be limited, and the conversion conditions can be defined. After the customized process test is completed, the test results can also be automatically filtered, and the cells that meet the filtering criteria can be marked with an indicator light reminder on the device.

2.6 For Battery Pack Wholesaler Materials:

Battery Repair Instrument, computer. Battery dealers will also encounter defective batteries for repair during the battery sales process. If they encounter defective batteries, they usually have to return www.heltec-energy.com Chengdu Heltec Energy Technology Co., Ltd them to the manufacturer for analysis and judgment. Using the isolation detection technology of our Battery

Repair Instrument, you can determine the location of the defective battery cells before replacing them without disassembling the battery cells; you can even perform several charge and discharge cycles on the unbalanced battery pack to balance the power and have the battery pack returned to its normal equilibrium state.

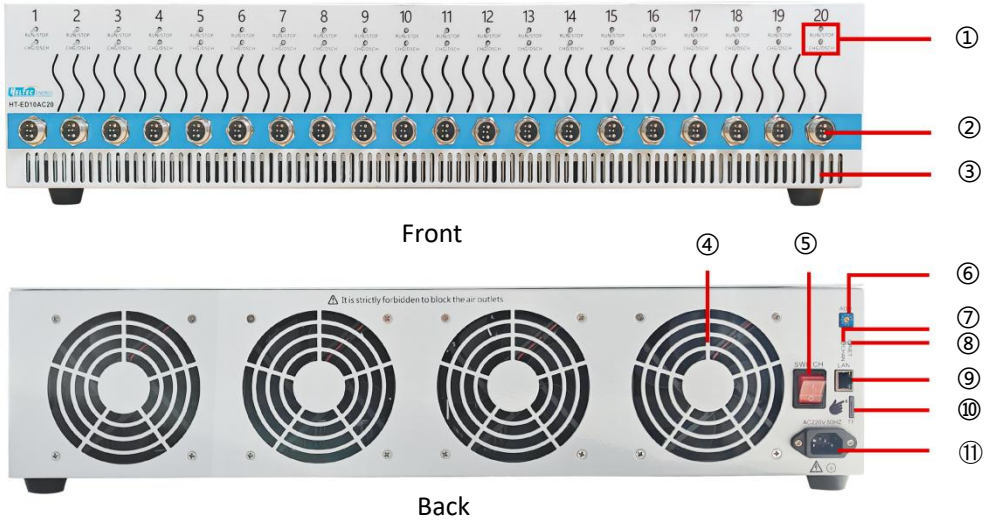
3.Product parameters of capacity tester

Product Model	HT-ED10AC20
Testing Voltage	Single Channel 1-5V
Number of Channels	20
Max Charging Current	10A
Max Discharging Current	10A
Input Power	Standby power: 80w, full-load power: 1500w
Measurement Voltage Accuracy	±0.02V
Measurement Current Accuracy	±0.02A
Measurement Battery Type	Lithium-ion battery
Voltage Balancing Function	Yes

Product application scope:

It is widely applied in the fields of battery testing and maintenance, and is suitable for application scenarios such as consumer electronics repair, quality inspection, fault diagnosis, and aging testing.

4. Product appearance schematic



①	②	③	④	⑤	⑥
Status display light	Battery connection line output interface	Radiator air intake	Fan air outlet	Main power switch	Device serial number setting
⑦	⑧	⑨	⑩	⑪	
Communication indicator light	Network indicator light	LAN transmission interface	TF card jack	Power connection socket	

The serial number sets the relationship between gears and the number of devices

Set the Rotary encoder switch	0	1	2	3	4	5	6	7	8	9
Equipment number	1	2	3	4	5	6	7	8	9	10

The status and meaning of signal lights

Signal light	Status	Meaning
Channel indicator light	Continuous flashing	Internal sampling is normal
Channel indicator light	Intermittent flashes	Poor connection of the data bus
Network indicator light	Flash once per second	Sample data upload
Network indicator light	The light is not on	There is no data upload or setting error

5. Equipment connection and software installation instructions

5.1 Note before use

1. Please maintain the ambient temperature and humidity when using the equipment.

2.The air inlet at the rear of the equipment must not be blocked and there should be a ventilation space of more than 5CM.

3. The air outlets on both sides of the equipment need to be kept unobstructed to ensure a ventilation space of more than 5CM. There is an air inlet at the top of the equipment. It is necessary to ensure that the air inlet at the bottom is unobstructed and not blocked by debris.

5.2 Preparations for connecting and using the equipment：

Step 1: Connect the AC 220V socket to the power input socket of the device, and turn on the power switch. After observing the initialization display of the indicator light on the front of the entire machine, it will eventually show the stop state.

Step 2: Set the device numbers 1 to 16 on the rear panel of the device (in the single-machine version device connection, one computer is allowed to connect 8 HT-ED10AC20 devices). When multiple devices are used simultaneously, the device numbers must be set to be different from each other. Table 1. Relationship between Setting Gear and Device Number Under normal circumstances of the device, The "Link/Run" LED flashes continuously; The "Link/UP" LED flashes. Error extinguished;

5.3 Software installation and connection

Step 1: Find the installation software and open it.

Step 2: You can choose the installation location. Please do not install the C drive. For some systems without an installation location, the default selection is the D drive.

Step 3: After installation is complete, open the first Run to select the network (when the network firewall is normally enabled). Please be sure to check the public network.

Step 4: Click "Connect". In the window that appears, select the device you need to connect to. After it turns blue, click "Connect Device". A window for "IP Settings" will show up. Just click "OK" by default.

5.4 Notes

1. If it is installed on the C drive, it will cause errors when entering the username and password or adding the processing step plan. The solution is to run it as an administrator. If it doesn't work, please reinstall it on another drive.

2. If the public network is not selected during the first run, it may cause the connection status to always show as "connected" when connecting devices.
Solution: ① Disable the public network firewall; ② Modify the network connection mode for software operation. If it cannot be modified, reset the default value of the firewall. Restart the software and check the network connection again.

5.5 Battery connection

1. The HT-ED10AC20 device supports batteries with a voltage within 5V and a capacity within 100AH.
Physically, it supports the connection of 18650、 26650 lithium iron phosphate batteries、No. 5 nickel-metal-hydride batteries、 pouch batteries、block batteries、large single cells and other types of batteries.

2. The minimum height of the probe can be adjusted to 32mm and the maximum height to 130mm

3. Adjust the height of the lower fixture for nickel-metal hydride battery No. 5, 18650 lithium battery, 26650 lithium iron phosphate, and refer to the scales on both sides to make the adjustment.
Note: After installing the battery, it is necessary to check whether the battery's electrode plates are in full and good contact with the probe housing. Only when the middle needle is in contact during the test will there be current.

4. 3.7V 240mAh pouch battery, 3.2V/10Ah lithium iron phosphate pouch battery. Install the output cable provided randomly, and connect the battery to the alligator clip or flat clip according to the positive and negative terminals.
Note: The output line is made by a four-wire sampling connection method to ensure sampling accuracy. After the alligator clip or flat clip is properly connected to the battery's electrode sheet,

it is necessary to check whether the alligator clip or flat clip on the signal sampling side is in reliable contact.

6.Software usage

Software Installation and Connection:

Step 1: Locate and open the installation software.

Step 2: Select the installation location. Do not install on the C drive. Some systems without installation location options default to the D drive.

Step 3: After installation completes, launch the software for the first time to select your network (with the network firewall enabled). Ensure you select “Public Network.”

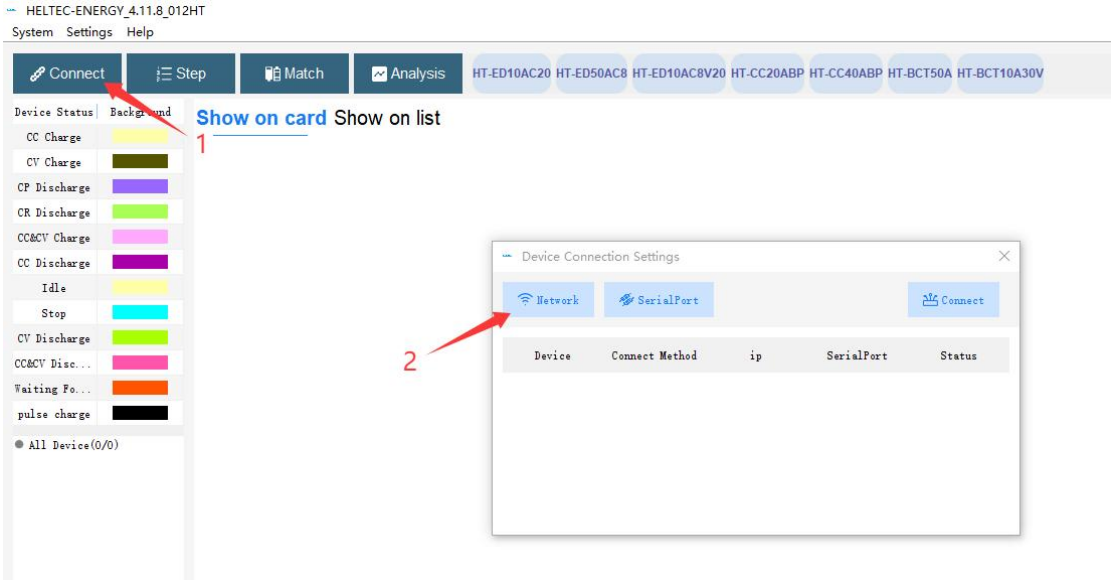
Step 4: Click Connect. In the pop-up window, select the target device. Once it turns blue, click Connect Device. An “IP Configured” window will appear; simply click OK to accept the default settings.

Important Notes: 1. Installation on Drive C may cause errors when entering username/password or adding step plans. Solution: Run as Administrator. If unsuccessful, reinstall on another drive. 2. If “Public Network” was not selected during initial launch, the device may remain in a perpetual “Connecting...” state. Solutions: ① Disable the public network firewall; ② Modify the software's network connection settings. If modification fails, reset the firewall to default settings and restart the software to re-select the network connection.

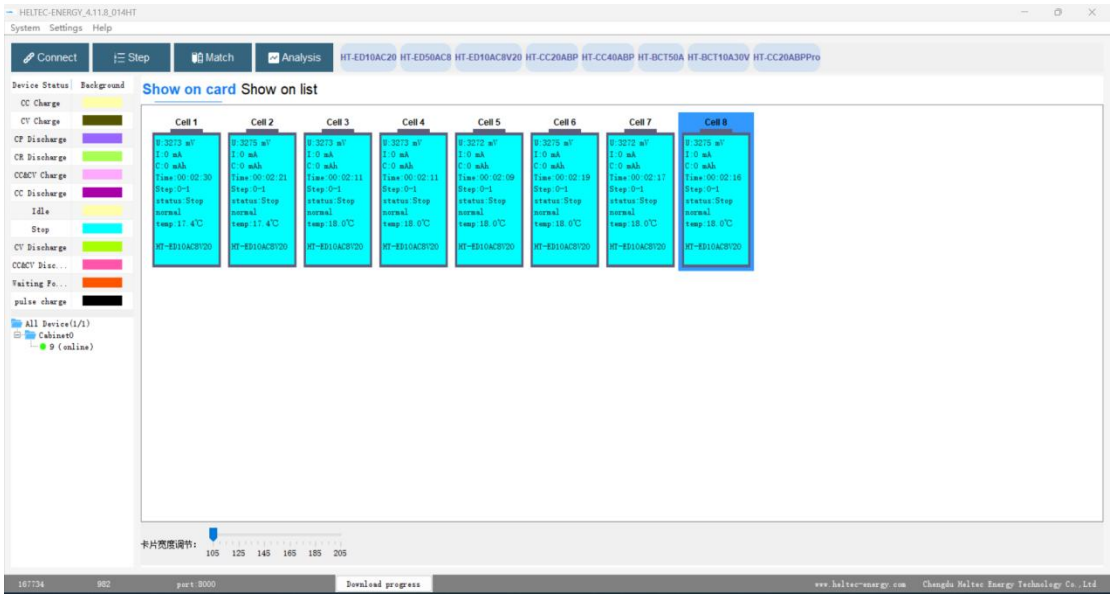
You may download the host computer software via the QR code or contact customer service for the software link.

6.1 Main interface of the software

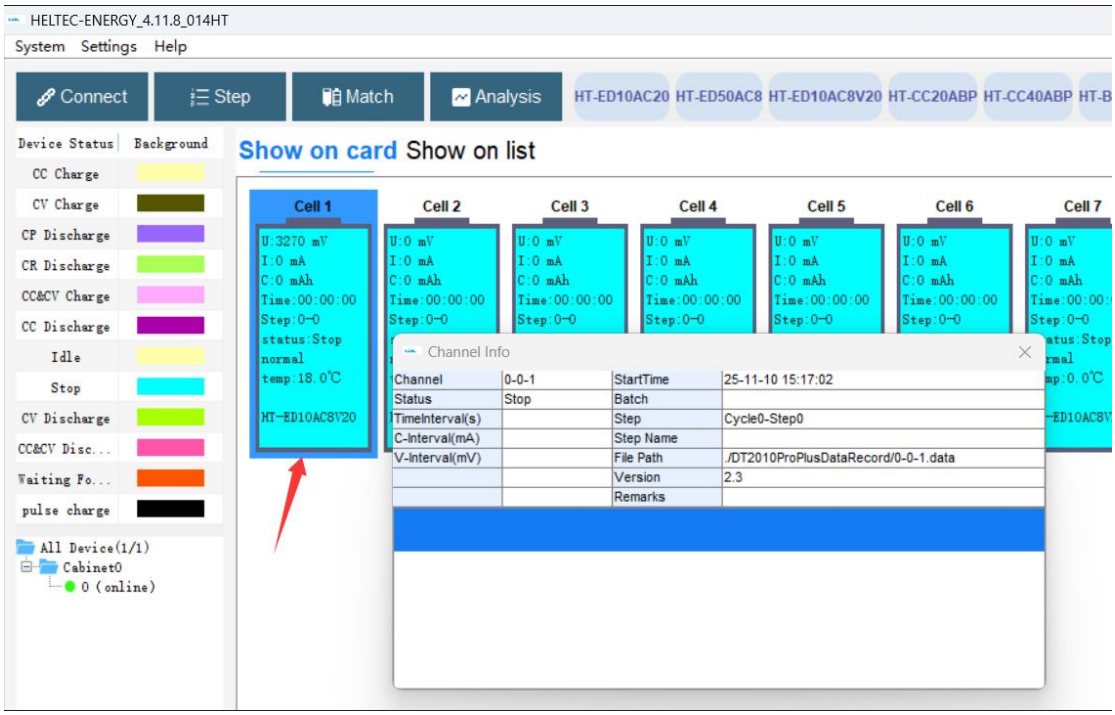
Note: If the software interface is in Chinese, go to the top-left corner, select "Settings" (设置), then click "Language Settings" (语言设置) to switch to English.



After installing the software, connect the instrument to the computer using a communication cable. Click the "Connect" button in the upper left corner of the interface, then click "Search". The ip address of the device will appear. Click "Connect" to control the instrument.

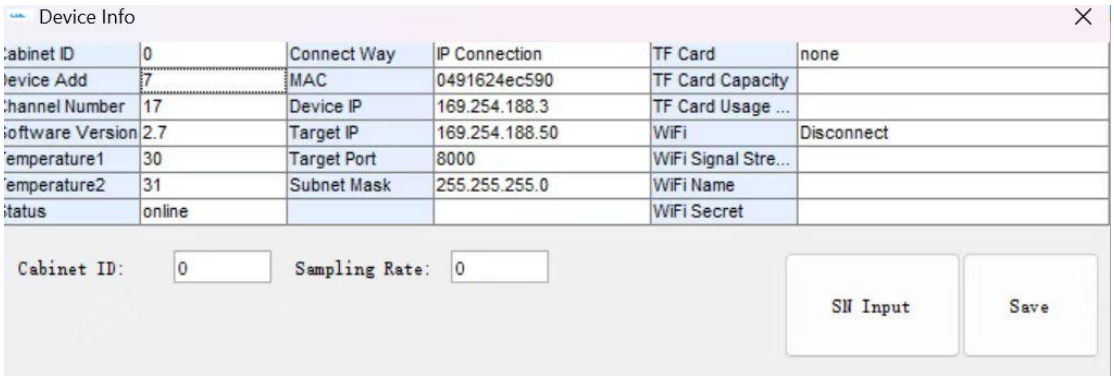


The device information displays the list of devices, which is used to indicate the connection status and connection number of the devices connected to the software. Double-clicking on a certain device will display the detailed Settings information of the device.

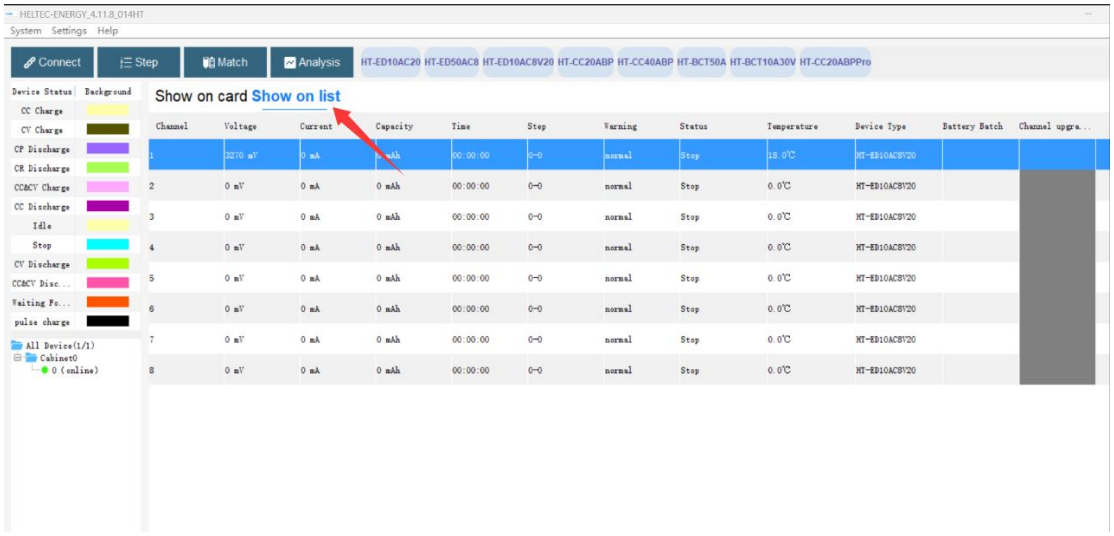


The cabinet number, equipment number and the number of equipment channels are the basic information of the equipment. Software version: It is the firmware version of the device. Connection method, IP, port, etc. : These indicate information such as the port and IP address where the device is connected to the computer. Temperature 1/2: This indicates the measurement values of the two temperature sensors inside the device. When the temperature exceeds 30℃, the fan automatically starts to dissipate heat. Status: The connection relationship between this device and the computer. Cabinet number: Set the cabinet number where the equipment is located to facilitate the arbitrary arrangement of cabinet sequence numbers when on-site wiring of

cabinet-type equipment. Sampling rate: It indicates the frequency at which the device uploads collected data.

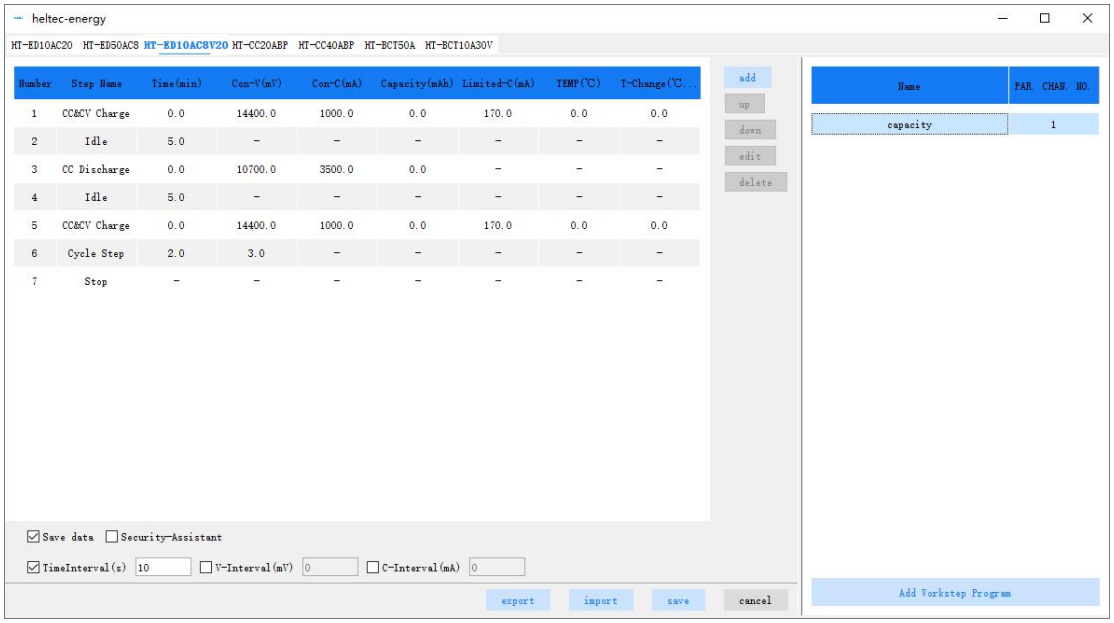


After selecting the list display, the status of the device is shown in a list format. All operation functions remain unaffected



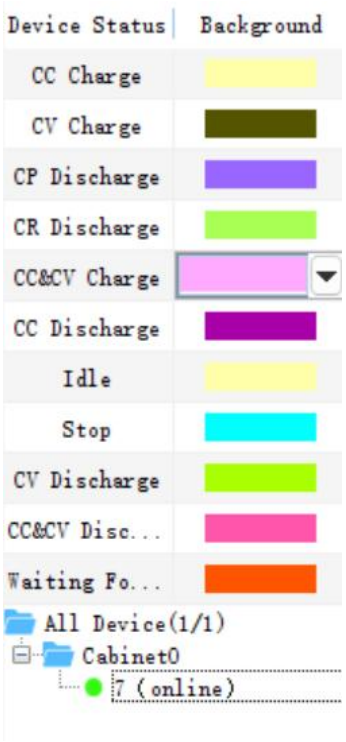
After a successful connection, the battery information will be displayed, including the current voltage, working current, test capacity, test time, work step number, working status, test status, temperature and equipment model.

Click the work step setting button in the upper left corner to enter the work step setting interface, and set the desired work steps according to the specific type of battery.



After the Settings are completed, click the Save button at the bottom of the middle of the page to save the work steps. After exiting, select one or several batteries for testing (to select multiple batteries, hold down the Ctr and then left-click the icon of the battery you want to select with the mouse). During the testing process, the working status of the battery can be determined by its color, or the curve change graph of the battery's operation can be viewed by right-clicking the battery icon. The battery data after the test can also be exported and saved for analysis and comparison, etc.

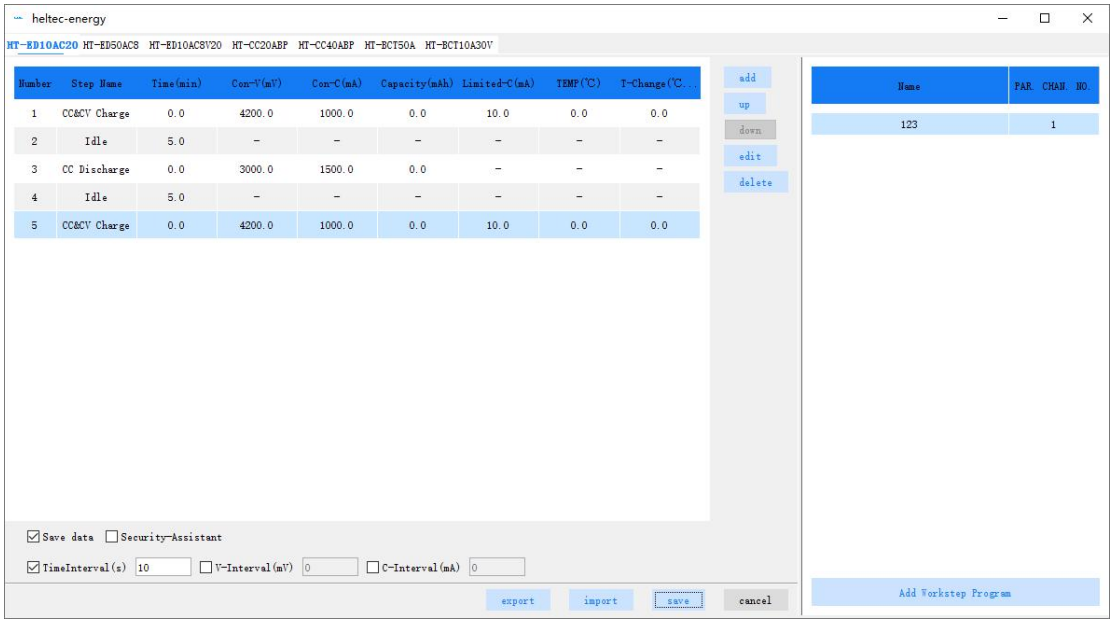
6.2 Status color setting



All the states supported by the device are displayed in color, which enables users to easily understand the current operating status or find the test channels for abnormal states when applying the device in large quantities.

6.3 Work step Settings

Considerations must be made from the perspective of individual cells, including their type, capacity, nominal voltage, and other specifications. For example: A ternary lithium battery with a capacity of 3AH and a nominal voltage of 3.7V typically requires a charge/discharge current below half its capacity—1A is sufficient. The cut-off current should be 0.02 times the capacity, meaning 0.1A is sufficient. The maximum charging cut-off voltage is 4.2V, while the minimum discharging cut-off voltage is 3V. Note that after each charge or discharge cycle, allow sufficient time for the battery to cool down. If an initial measurement is inaccurate, repeat the process multiple times to ensure correct results.



Data storage conditions:

1. When you need to save the test data to your computer, please check this option; otherwise, the data will not be stored on your computer. There are three conditions to choose from for the storage rules.

2. Time interval: Set the minimum time interval for data saving. After the system exceeds this time, the software system will automatically store the data to the record file of each channel at regular intervals. This value should not be set too small to avoid frequent data actions causing the computer to run slowly.

3. Voltage interval: Set the voltage difference condition for data storage. If set to 100, it indicates that the system automatically stores data to the channel record file once when the voltage ranges from 3700mv to 3800mv. The storage action can also be triggered when the voltage ranges from 3700mv to 3600mv. This value should not be set too small to avoid frequent data actions causing the computer to run slowly.

4. Current interval: Set the current difference condition for data storage. If set to 100, it indicates that the system automatically stores data to the channel record file once when the current ranges from 500mA to 400mA. The storage action can also be triggered when the current ranges from 500mA to 600mA. This value should not be set too small to avoid frequent data actions causing the computer to run slowly.

Detailed work steps:

The work step can be set with multiple test work step schemes and save them with descriptive names for easy identification, such as "Panasonic 18650 Standard Test". Click on the new construction step plan to add a new plan. Right-click to delete or modify the name of the plan. The name will appear in the menu of the operation interface after it. For details, please refer to the equipment setup steps. Each work step scheme supports the storage and setting of up to 64 work steps. Work step editing can mix and edit the execution sequence of work steps. After the work step editing is completed, please add a stop work step at the end to make the device stop working

and avoid abnormalities.

Work step increase: Click "Add" to add one work step. After adding a working step, the corresponding execution parameters for the working step must be set; otherwise, incorrect parameters may pose a risk of damaging the battery.

Step modification: Click the edit button to reset the parameters in the selected step, or you can directly double-click the step to open it. Work step deletion: Click the Delete button to delete a selected work step.

Work step movement: Click the up or down button to move the selected work step.

Work step save: After editing the work step, you must click the save button to save the current work step to the software system.

Support steps:

1. Constant current charging: The maximum voltage limit, constant current, and voltage hysteresis must be set. It is designed for Ni-Cd (nickel-cadmium) batteries and is not applicable to lithium batteries.
2. Constant voltage charging: Constant voltage and maximum current must be set.
3. Constant power discharge: The cut-off voltage, maximum current, and analog power must be set.
4. Constant resistance discharge: The cut-off voltage, maximum current, and analog resistance must be set.
5. Loop Settings: Jump work steps (jump within valid work steps) and loop count (<64 times) must be set
6. Constant current and constant voltage charging: Constant voltage, constant current, and cut-off current must be set.
7. Constant current discharge: The cut-off voltage, constant current and capacity Settings must be set.
8. Idle: The working step time must be set
9. Stop: No parameters need to be set

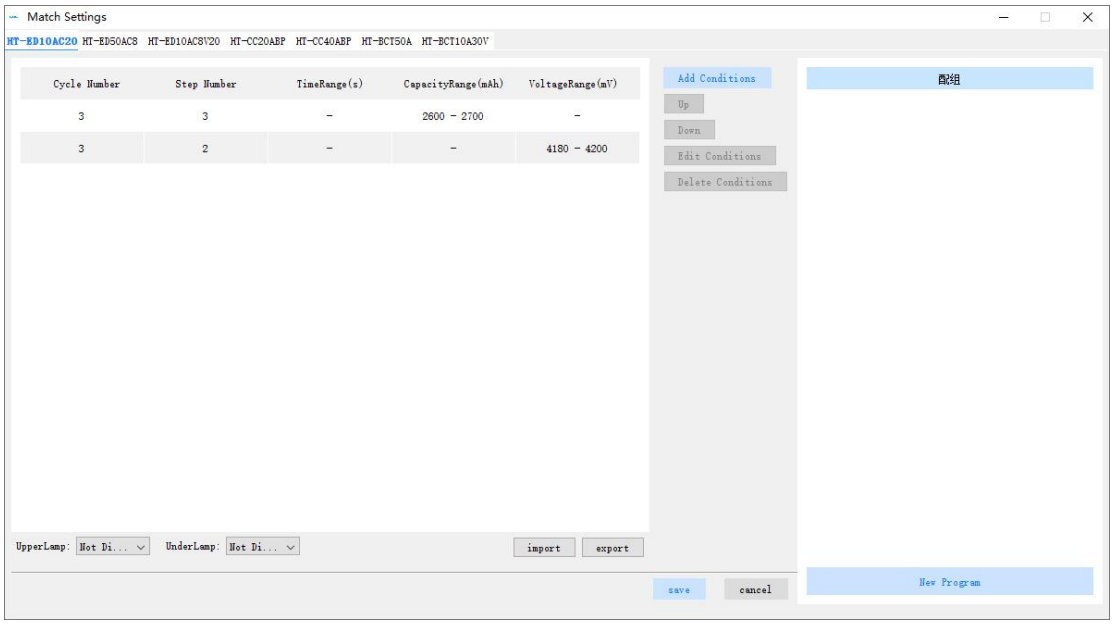
Matching criteria:

The matching scheme can set a set of qualified standards with multiple conditions. If all the conditions are met, they will be marked with a tick. For details, please refer to the 2.5 Quick Assembly diagram. The support for configuration conditions is based on capacity, time, and voltage results as judgment conditions. However, only one range of each condition can be filled in. It can support specifying the result of a certain work step as the judgment condition.

For example, the qualified standard for the 2650mAh nominal 18650 battery is (for detailed work steps, please refer to the work step setting diagram in 3.1) : Condition 1: The test capacity of the third work step (discharge) in the third cycle reaches 2600 to 2700mAh. Condition 2: The voltage (full and static) of the second working step in the third cycle is within the range of 4180 to

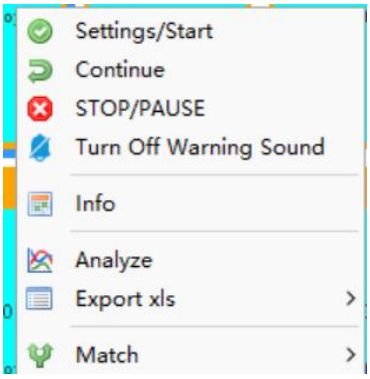
4200mV. The two conditions are concurrent.

Then the Settings should be as shown in the figure

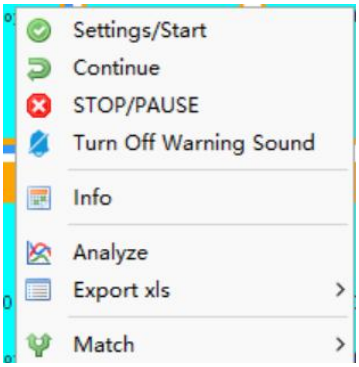


After the Settings are completed, you must click the Save button to save the configuration conditions.

After saving is completed, when the device has finished testing the battery, right-click on all channels and select the corresponding configuration plan.



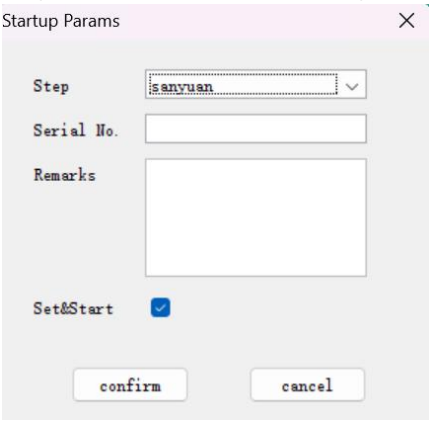
After the above configuration is completed, the configuration project file can be exported and saved. This file can be directly copied to other computers via a USB flash drive for import, which is convenient for one-time editing and use on multiple computers.



Right-click function:

1. Settings/Startup

Right-click Settings/Start is the option to select and start the work step. Before all channels are officially put into operation, it must be ensured that the work steps you need to run are included in the work step Settings. The setting method is detailed in the figure



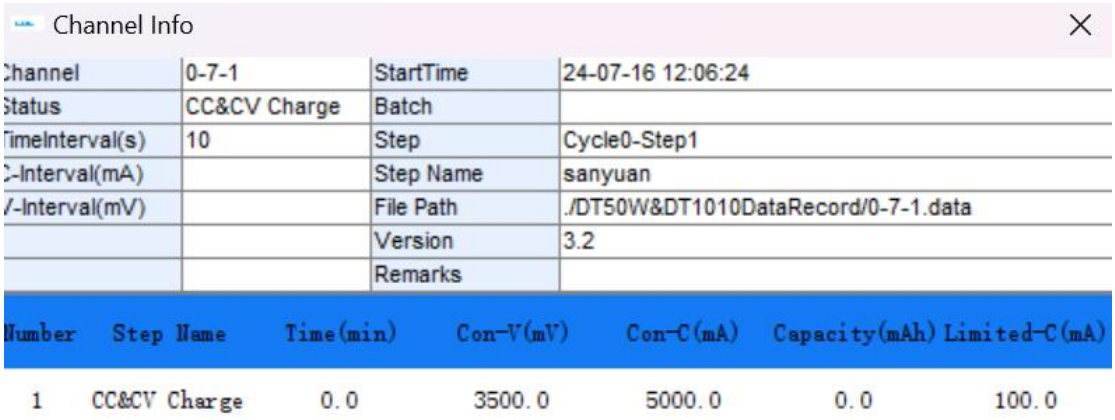
Select the name of the work step plan and click "OK". Battery batch number, remarks information: Here you can fill in some necessary test information for easy reference and identification..

2. Resume, stop

Recovery: When the battery is in the warning state or manual stop state and the recovery function is selected, the device will continue to run the next work step along the last stopped work step number. All previous information is saved in the computer. If there was no start-up step before or the machine was powered off and restarted, this function will be invalid. Clicking to resume operation will result in a 5A discharge.

Stop: If you want to temporarily halt the operation (if you need to leave the device unattended), you can click the Stop button to stop the operation. If you want to continue running, click the resume button.

3. Information


Channel Info

Channel	0-7-1	StartTime	24-07-16 12:06:24
Status	CC&CV Charge	Batch	
TimeInterval(s)	10	Step	Cycle0-Step1
C-Interval(mA)		Step Name	sanyuan
V-Interval(mV)		File Path	./DT50W&DT1010DataRecord/0-7-1.data
		Version	3.2
		Remarks	

Number	Step Name	Time(min)	Con-V(mV)	Con-C(mA)	Capacity(mAh)	Limited-C(mA)
1	CC&CV Charge	0.0	3500.0	5000.0	0.0	100.0

Right-click and select "Information" to view the detailed Settings of this channel. You can see the details of the currently set work steps and the currently running work steps.

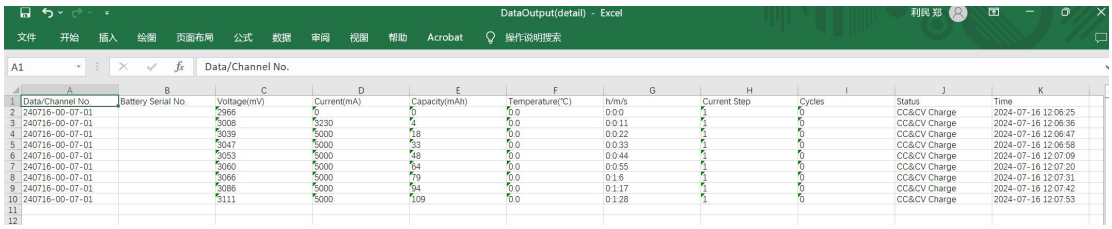
Channel: Represents the channel number of the currently displayed information.
Startup time: The time when the last work step of this channel was started.
Current status: The current operating status of this channel.
Work step and work step scheme name: Indicates the name and serial number of the work step currently being executed in this channel.
Time interval, voltage interval, and current interval: These represent the parameter Settings for saving data in this channel.
Data file path: It represents the absolute path of the data record file of this channel.
Firmware version: Note information: It represents the information entered when the work step Settings are issued.

4. Analysis

When a channel has been running for some time or has completed its operation, under normal circumstances, the test records from startup to the current stage have been recorded. After selecting the analysis function, the record file can be automatically retrieved and the data curve analyzer can be started. For curve analysis software, please refer to the Data Analysis section.

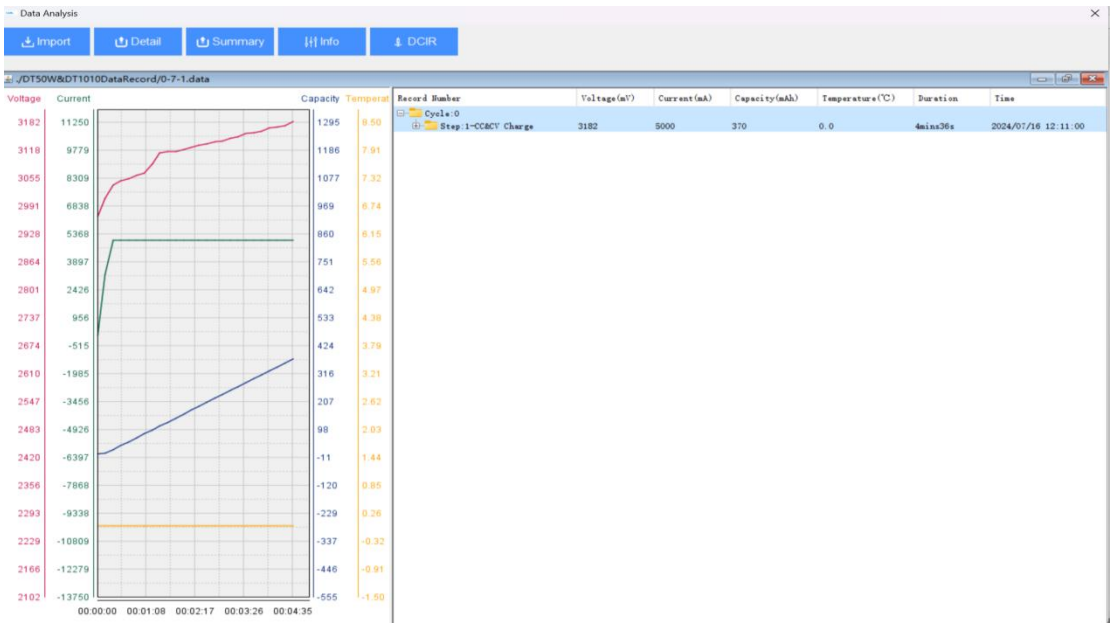
5. Export

Export the relevant data of the selected channel test in table form


DataOutput(detail) - Excel

Data/Channel No.	Battery Serial No.	Voltage(mV)	Current(mA)	Capacity(mAh)	Temperature(℃)	h/m/s	Current Step	Cycles	Status	Time
240716-00-07-01		2966	0	0	0.0	0:0:0	1	0	CC&CV Charge	2024-07-16 12:06:25
240716-00-07-01		3008	5230	4	0.0	0:0:11	1	0	CC&CV Charge	2024-07-16 12:06:36
240716-00-07-01		3039	5000	18	0.0	0:0:22	1	0	CC&CV Charge	2024-07-16 12:06:47
240716-00-07-01		3047	5000	33	0.0	0:0:33	1	0	CC&CV Charge	2024-07-16 12:06:58
240716-00-07-01		3053	5000	48	0.0	0:0:44	1	0	CC&CV Charge	2024-07-16 12:07:09
240716-00-07-01		3060	5000	64	0.0	0:0:55	1	0	CC&CV Charge	2024-07-16 12:07:20
240716-00-07-01		3066	5000	79	0.0	0:1:6	1	0	CC&CV Charge	2024-07-16 12:07:31
240716-00-07-01		3086	5000	94	0.0	0:1:17	1	0	CC&CV Charge	2024-07-16 12:07:42
240716-00-07-01		3111	5000	109	0.0	0:1:28	1	0	CC&CV Charge	2024-07-16 12:07:53

6. Data analysis



Supported functions of data analysis software:

Supports 3 Y-axes and a single timeline. All curves support panning (up/down, left/right) and zooming. Hold down a certain Y-axis with the left mouse button and move it up and down to pan the mouse up and down. Press and hold the left mouse button on the X-axis and move the mouse left and right to pan the curve left and right. Right-click and hold down a certain Y-axis, then move the mouse up and down to reach the amplitude of the curve. Right-click and hold the X-axis, then move the mouse left and right to zoom in on the time curve.

7. Data import

There are two ways to import data:

1. Right-click on the main menu bar, click the Analysis button, and the data will be automatically imported into the curve analysis software and opened.

2. After starting the analysis software, click the "Import Data" button to enter the data record folder under the installation directory of this program. Select the data record file you want to view, with the file extension format being *.dat

8. Data export

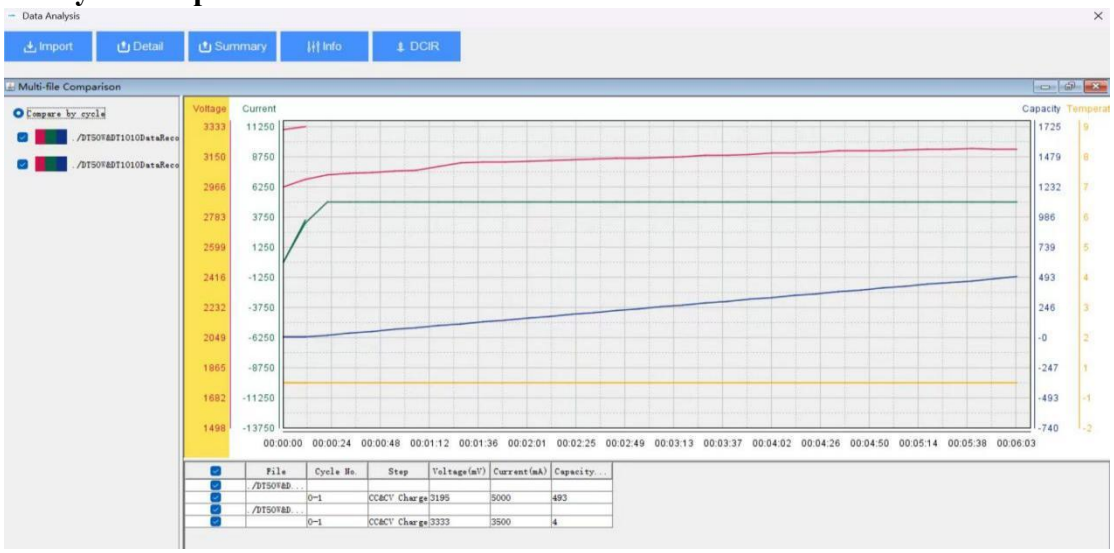
The data export function is used to output the imported data in the form of xls reports.

When in use, you must import the data record file you need to view and be able to view it in the window. After selecting the data saving function, the software prompts for the save location and the input of the save name. Tip: When you set the grouping parameters, if you are not sure about the exact work step number of the work step you want to specify, you can first test a complete set of data and export it as an xls table. In the table, look for the position you want to determine. After finding the corresponding work step, record the loop number and work step number. Just enter the cycle number and the work step number in the group configuration parameters.

9. Multi-curve comparison

Multi-curve comparison can compare the differences among multiple data record files or a single data file

10. Cycle comparison



Loop comparison is used to compare imported data based on the test differences from the start to the end of the loop.

11. Usage steps

Step 1: Set the data recording Settings, work step Settings, and assembly Settings for the battery you need to test, and save them.

Step 2: Select the cells you need to start testing. You can hold down the ctrl key to select multiple cells or hold down the shift key to select in batches.

Step 3: Right-click on a single cell that has been selected, choose "Set Steps", and select the steps you previously set. You can choose to start immediately after setting.

Step 4: The device emits a startup test prompt sound, and the software interface status changes. Double-click a running single cell to view the actual operation step status and data of the device.

Step 5: During the testing process, you can choose to stop or resume to pause or resume the test. Previously tested data will not be cleared. If startup is selected, the device will resume its operation steps.

Step 6: After the test is completed, you can use the grouping function for grouping or the analysis tool for data analysis.

Warranty Regulations

Warranty service period is 1 year.

The warranty service is limited to normal use: man-made damage, self-disassembly, modification and repair, use not in accordance with the instructions, and damage caused by external force majeure factors are not within the scope of free warranty.

Accessories such as test fixtures are consumables without warranty.

When you need warranty service, please contact your dealer for processing. If you cannot contact the dealer, you can contact our company by email or phone.

There are no after-sales service stations in other countries except China. If you need warranty service, please send the product to us for free repair, but you need to pay the freight for the round trip.