HT-CC20ABP
Lead-acid/Lithium Battery Pack Capacity Tester
User Manual

1. Product Introduction

The HT-CC20ABP battery capacity tester is a battery testing device that integrates high-precision capacity series discharge detection and high-precision charging functions. It can test Ni-Cd batteries, lithium battery packs, lead-acid batteries, or other batteries within the voltage range of 9-99V. It is suitable for electric vehicle dealers and battery manufacturers to test battery performance, with functions such as testing battery capacity, battery charge and discharge cycles, and setting work steps on the host computer. It can accurately collect battery voltage signals in real time, store them, and process data. It features high precision, strong timeliness, simple operation, and practical reliability.

2. Product Features

① Automatically collect and analyze the voltage of the battery, and continuously output a constant current or power.
② Software control can be achieved by connecting to the host computer on the computer, enabling convenient and efficient work.
③ The current is adjustable, and the peak discharge current can reach 20A.
④ The battery features reverse polarity protection for both positive and negative terminals, ensuring battery safety.
⑤ A simplified operation interface that displays voltage, capacity, current, etc. in real time, supporting both Chinese and English languages.
⑥ Powerful PC software functions: Provides functions such as data management, exporting, analysis, and report statistics.

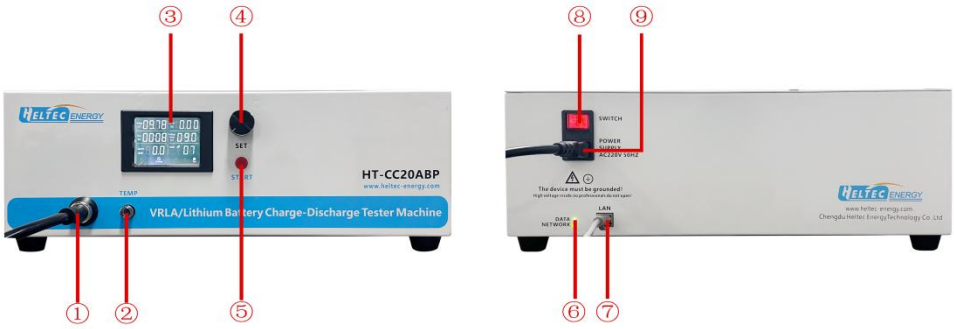
***Product application range:**
It is suitable for various electric vehicle dealers and battery manufacturers to test the performance of batteries, including lead-acid batteries in electric bicycles, laptop batteries, radios, and other small and medium-sized electronic products.



3. Product Parameters

Model	HT-CC20ABP
Scope of Application	Lead-acid/lithium/Ni-Cd or other batteries within 9-99V
Charging range	9-99V, continuously adjustable in 0.1V increments, 0.5-10A, adjustable in 0.1A increments
Discharge range	9-99V, continuously adjustable in 0.1V increments; 9V-21V: 05-10A, adjustable in 0.1A increments; 21-99V: 0.5-20A, adjustable in 0.1A increments
operation step	Charge/discharge/rest/cycle (up to 99 times)
Upper Computer communication	systems above WIN XP, supports both Chinese and English
protection function	Battery reverse polarity protection
measuring error	Voltage ±0.05V, current ±0.03A (accuracy guarantee period is within one year from the date of purchase)
Attention	It is prohibited to test batteries with voltage exceeding 99V
Equipment power supply	AC220V 50HZ
Dimensions & Weight	Length 60cm, width 57cm, height 27cm, net weight 15Kg Preset cycle end charging capacity: 0-99AH (setting 0 indicates no preset)

4. Product Appearance Schematic Diagram



Front Back

①The positive and negative terminals of the battery must not be connected reversely

② Temperature sensing line interface

③ Display screen: Displays various parameters such as current, voltage, capacity, and time

④ Switch/Set button: Rotate to switch working modes, press to set parameters

⑤ Start/Stop Button: Press to start, press again while running to pause (any operation must be paused first when in running state)

⑥ Status indicator light

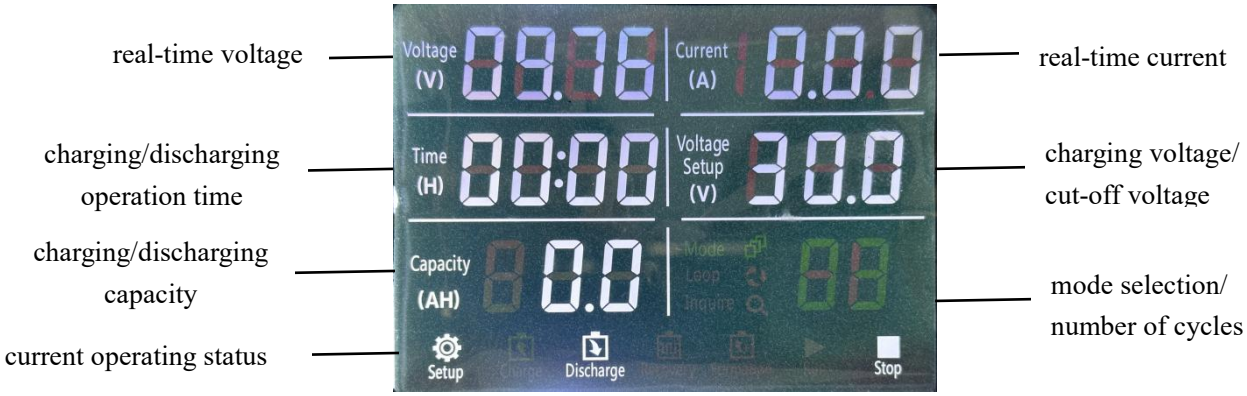
⑦ Data transmission interface

⑧ Main power switch

⑨ Power input interface

5. Operation Of Instruments And Software

If the device is turned on, rotate the button to adjust the mode, and you can set the parameters：



It features 7 working modes：

Mode	Mode description
00	Historical cycle data query mode
01	Capacity testing
02	Standard charging
03	Start with discharge and end with charge, with a cycle count of 1-50 times
04	Start with charging and end with charging, with a cycle count of 1-50 times
05	Start with discharge and end with discharge, with a cycle count of 1-50 times
06	Start with charging and end with discharging, with a cycle count of 1-50 times
07	Networking mode (automatically changes to this mode when the device is started by the computer)

1) **Mode selection:** After powering on, you need to press the setting button first. The mode selection bar in the right lower corner will light up. Rotate it to 01 for discharge mode, 02 for charging mode, and 03, 04, 05, 06, 07 for cycle mode. The instrument will automatically enter 07 mode when the communication cable is connected to the host computer. Rotate it to 00 for history query mode.

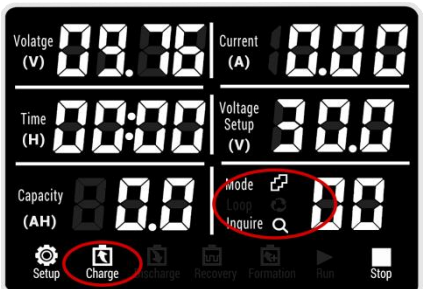


Indicator light description:

*Data indicator light:
Green light flashing - channel data exchange
The green light is constantly off - no channel data
*Network indicator light:
Red light flashing - No network cable connected
Green light flashing - network cable connected, software not connected
Green light is constantly on - software is connected

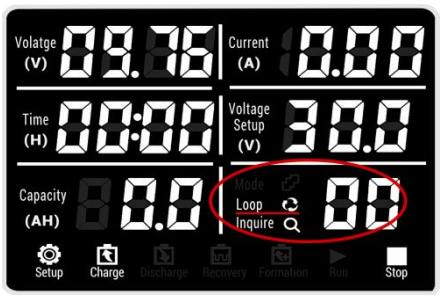
2) **Parameter setting:** After selecting the mode, it is necessary to set the parameters corresponding to each mode. If adjusting the discharge mode, press the setting knob to adjust the minimum discharge cut-off voltage value. After adjustment, continue to press the setting knob to adjust the discharge current value. After setting, press the setting knob again, and the current will display 0.00, indicating successful setting. Press the start button to start discharging. The charging mode is the opposite, requiring adjustment of the charging cut-off voltage value, charging current, and charging cut-off current. For the cycle mode, both the charging mode parameters and the discharge mode parameters need to be adjusted.

***Mode 00-Inquire**(The detailed steps refers to the inquire figure 1-5)



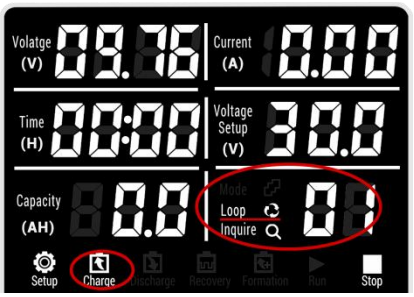
Press the black setting knob,the mode bar in the lower right flashes, rotate the black setting knob to set mode “00”, at this moment, the LCD displayed the data of last single charge or last single discharge.

Inquire Figure 1



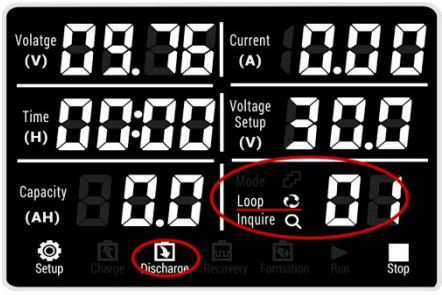
To inquire the data of last loop of charge-discharge, press the black setting knob, the mode bar in the lower right stop flash and the indicator light of loop number lights on.

Inquire Figure 2



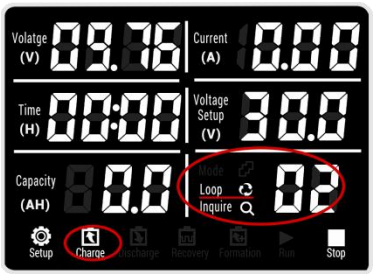
Rotate the black setting knob clockwise, the mode bar in the lower right display “01”, the screen displays the data of the first loop charge.

Inquire Figure 3



Continue rotate the black setting knob clockwise, the mode bar in the lower right displays “01”, the screen displays the data of the first loop discharge.

Inquire Figure 4



Continue rotate the black setting knob clockwise, the mode bar in the lower right displays “02”, the screen displays the data of second charge. For more loops, repeat rotating the black knob and so on.

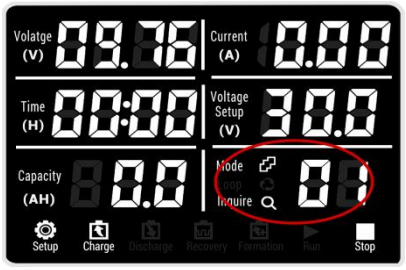
Inquire Figure 5

***Mode 01-Discharge**(The detailed steps refers to the discharge figure 1-4)

Discharging Current: 0.5-10A adjustable (9V-21V) ;0.5-20A adjustable (21V-99V)

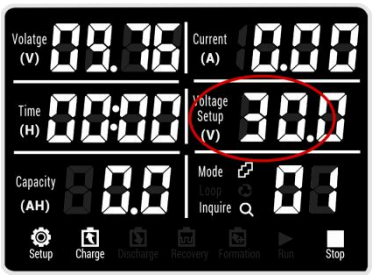
Discharging Stepping Current: 0.1A

Discharging Cut-off Voltage: 9-99V 0.1V Stepping



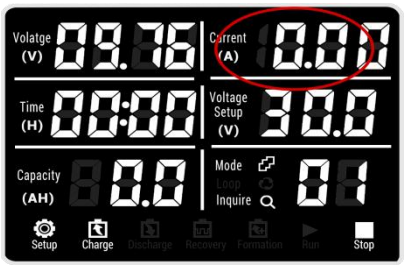
After power on, press the black setting knob and the mode selection bar in the bottom right flashes, rotate the black setting knob to set to mode “01”.

discharge Figure 1



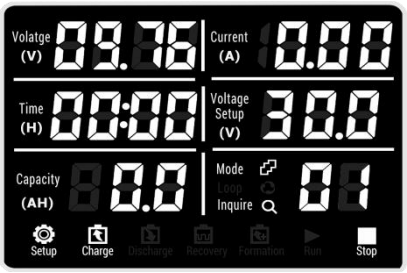
After the mode is set, continue to press the setting knob, the voltage setting bar flashes, rotating the black setting knob to set the minimum discharge cut-off voltage.

discharge Figure 2



After the voltage is set, continue to press the setting knob and the current bar flashes, rotating the black setting knob to set the discharge current.

discharge Figure 3



After the current is set, press the black settting knob again, all the setting bars stop flashing, and the current display “0.00”, the setting is completed. Press the red start knob to discharge. Judging whether the battery is good or bad according to the time of the battery discharging.

discharge Figure 4

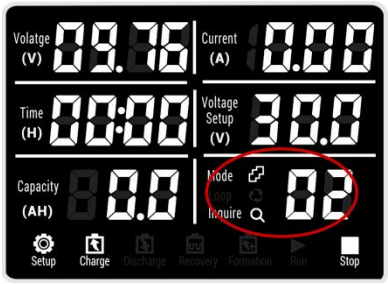
***Mode 02-Charging**(The detailed steps refers to the charge figure 1-5)

Charging stepping current: 0.1A

Charging cut-off current: 0.1-5A adjustable

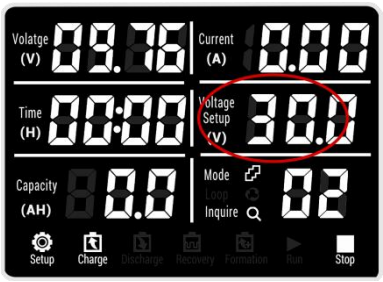
The max. voltage of charging test: 9-99V adjustable, 0.1V stepping

Charging current: 0.5-10A adjustable



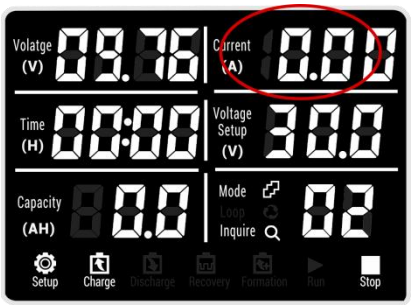
Press the black setting knob, the mode selection bar in the lower right flashes, rotate the black setting knob to set to mode “02”.

Charge Figure 1



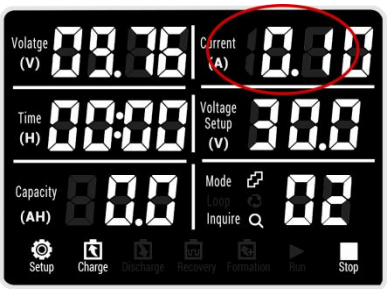
After the mode is set, continue to press the setting knob, the voltage setting bar flashes, and rotate the black setting knob to set the maximum charging voltage.

Charge Figure 2



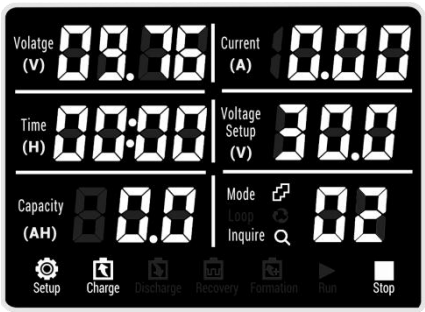
After the voltage is set, continue to press the setting knob, the current bar flashes, and rotate the black setting knob to set the charging current.

Charge Figure 3



After the current is set, press the black setting knob again, the current bar displays “0.10”, and rotate the black setting knob to set the charging cut-off current.

Charge Figure 4



After the charging cut-off current is set, press the black setting knob again, all the setting bar stop flashing, the current display “0.00”, the setting is completed. Press the red start knob to charging is completed.

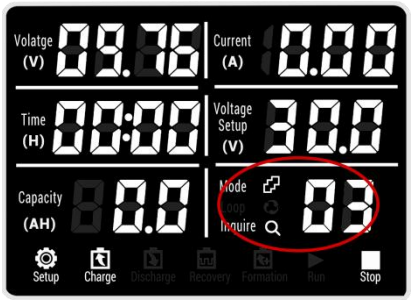
Charge Figure 5

***Mode 03-Loop**(The detailed steps refers to the loop figure 1 - 11)

Max loop index: 99

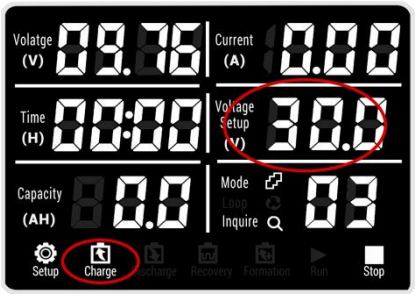
Loop idle interval: 0 - 20 mins adjustable

The preset charging capacity of the last loop: 0 - 99.9AH(If "0" is set, it means the charging capacity of last loop is not preset.)



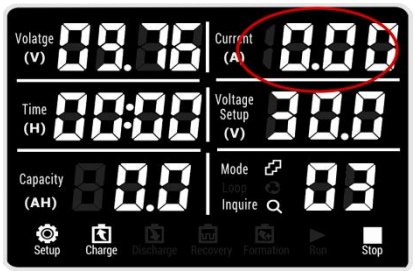
Press the black setting knob, the mode selection bar in the lower right flashes, rotate the black setting knob to set the mode to "03".

Loop Figure 1



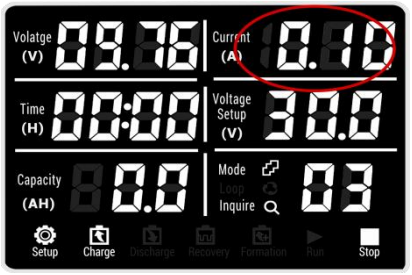
After the mode is set, continue to press the setting knob, the voltage bar flashes, rotate the black setting knob to set the max. charging voltage.

Loop Figure 2



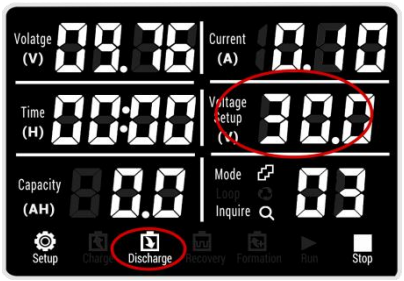
After the voltage is set, continue to press the setting knob, the current bar flashes, rotate the black setting knob to set charging current.

Loop Figure 3



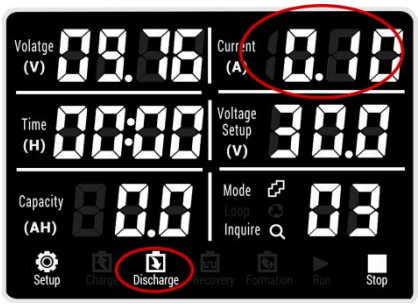
After the current is set, press the black setting knob again, the current bar displays “0.10”, rotate the black knob to set the charging cut-off current .

Loop Figure 4



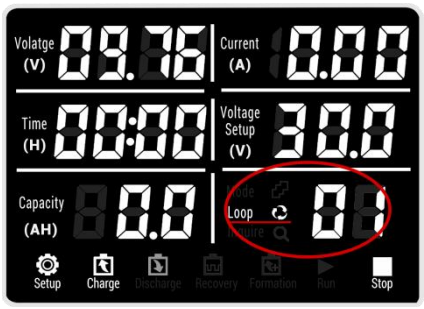
After the charging cut-off current is set, press the black setting knob again, the voltage setting bar flashes, rotate the black knob to set the min. discharge voltage.

Loop Figure 5



After the voltage is set, press the setting knob again, the current bar flashes, rotate the black knob to set the discharging current.

Loop Figure 6



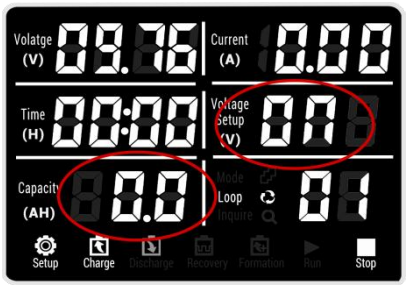
Press the black setting knob, the loop number bar in the lower right flashes, rotate the black setting knob to set the loop number of charge and discharge (1-99 times at option).

Loop Figure 7



After the loop number is set, continue to press the setting knob, the voltage setting bar display “OFF”, rotate the black setting knob to display "ON", "OFF" means the last loop end with charge.

Loop Figure 8



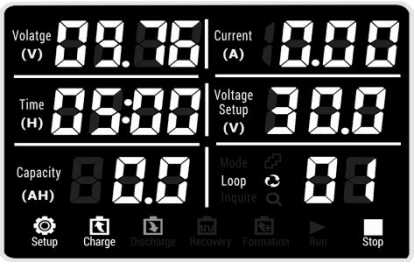
If the last loop select "ON", continue press the setting knob, the capacity bar flashes. Rotate the black setting knob to set the charging capacity of the last loop 0-99.9AH at option.

Loop Figure 9



After the capacity charged of last loop is set, press the black setting knob again, time bar flashes. Rotate the black setting knob to set the loop step interval 0-20 mins at option.

Loop Figure 10



After the step interval is set, press the black setting knob again, all setting bar stop flash, the setting is completed. Press the red start button to start the charge-discharge loop.

Loop Figure 11

Note:

1) After the system completes the parameter Settings, it will automatically save the Settings. The

next time it starts up, there is no need to set them again. Just click the start button and it can run directly.

2) During the charging/discharging process, press the "Start" button to pause the operation, and then press the "Start" button again to continue the operation.

3) If the connecting cable comes off, the machine will stop running. Please make sure it is firmly connected.

4) The connecting wires are well connected. If the machine stops running unexpectedly, please press the red "Start" button for 5 seconds. The machine will immediately resume its previous operating state.

***Battery testing can also be conducted through the host computer software**

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.”

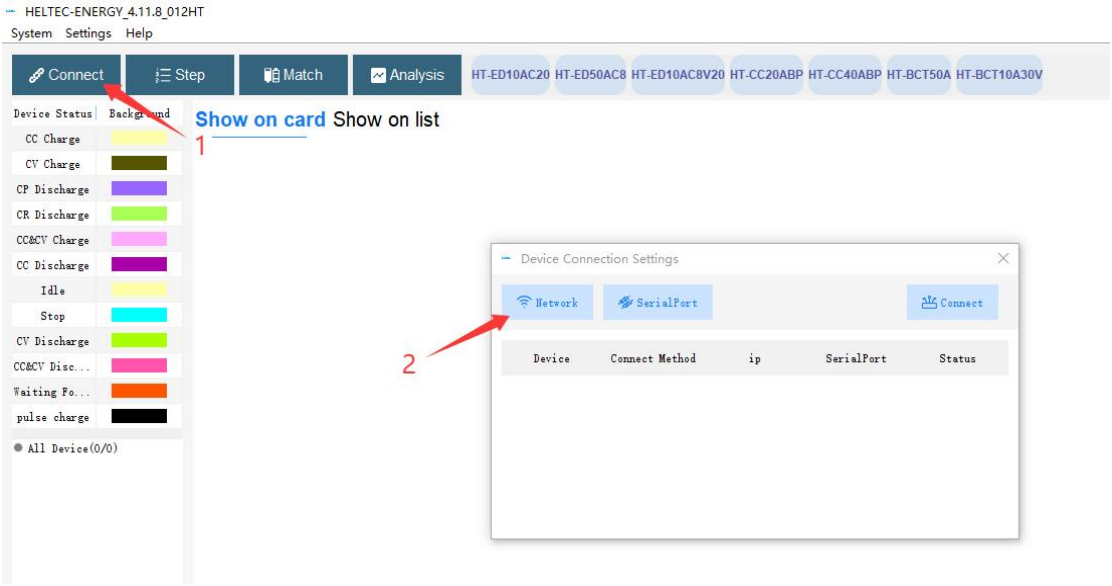
Step 4: Click Connect. In the pop-up window, select the target device. Once it turns blue, click Connect Device. An “IP Configured” window will appear; simply click OK to accept the default settings.

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.

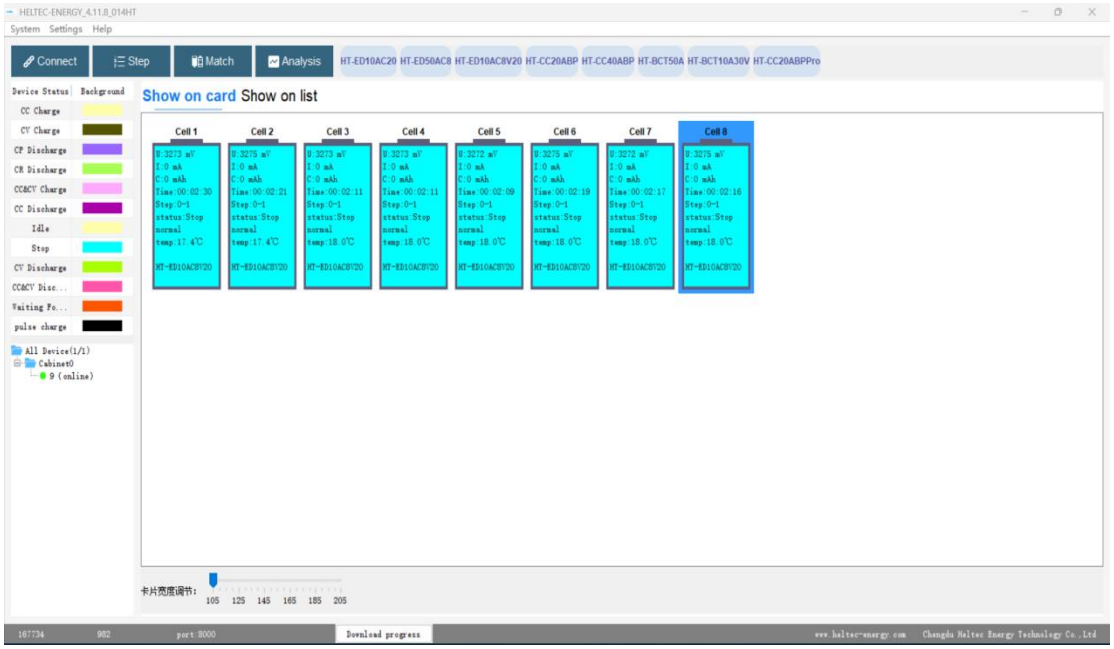
You may download the host computer software via the QR code or contact customer service for the software link.

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.

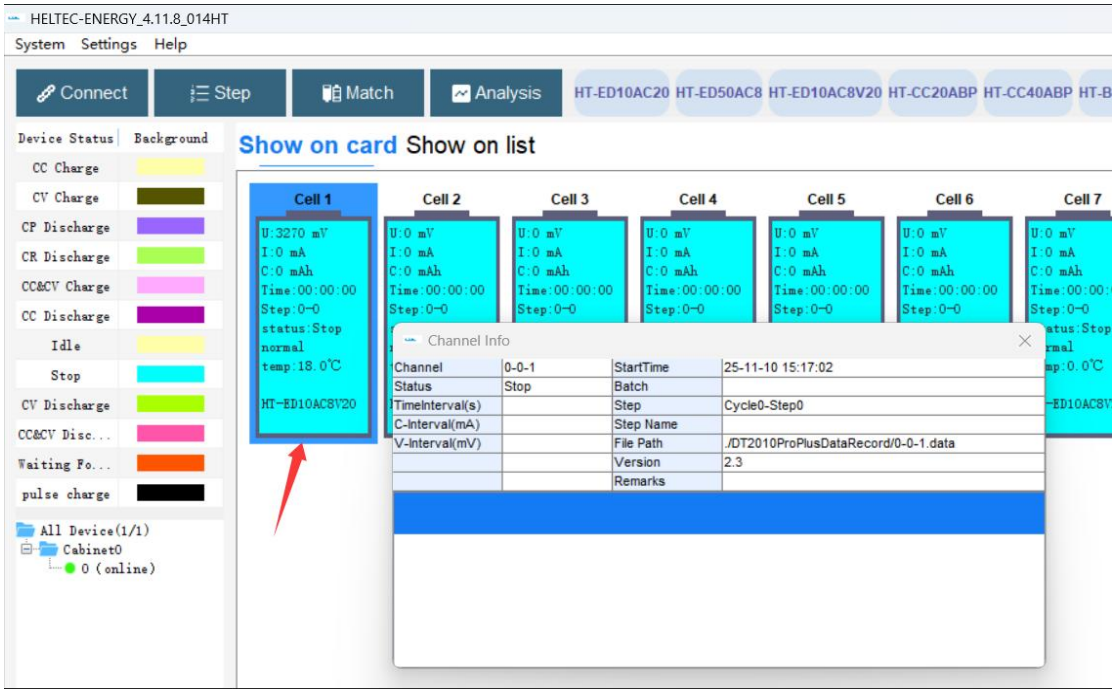
1) **Main software interface:** After installing the software, connect the instrument to the computer using a communication cable. Click the "Connect" button on the top left corner of the interface, then click "Search". The IP address of the device will appear. Click "Connect" to control the instrument.



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



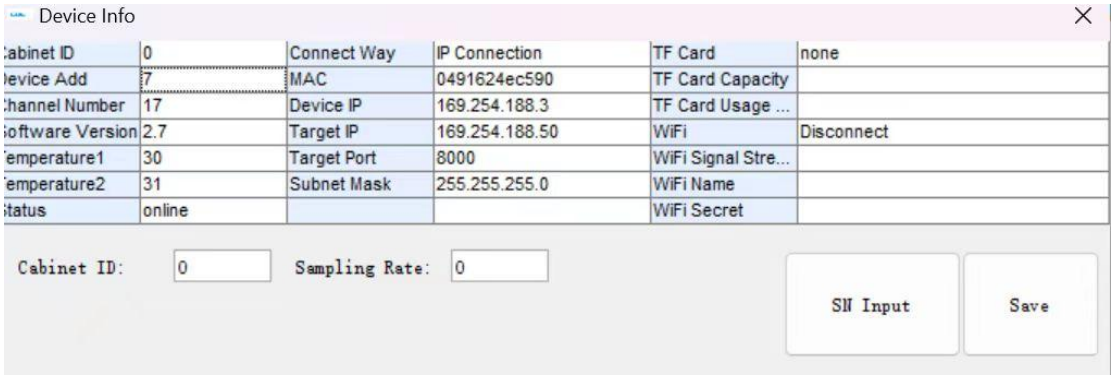
The device information displays a list of devices, indicating the connection status and connection number of the devices connected to the software; double-clicking on a device allows you to view detailed settings information for that device.



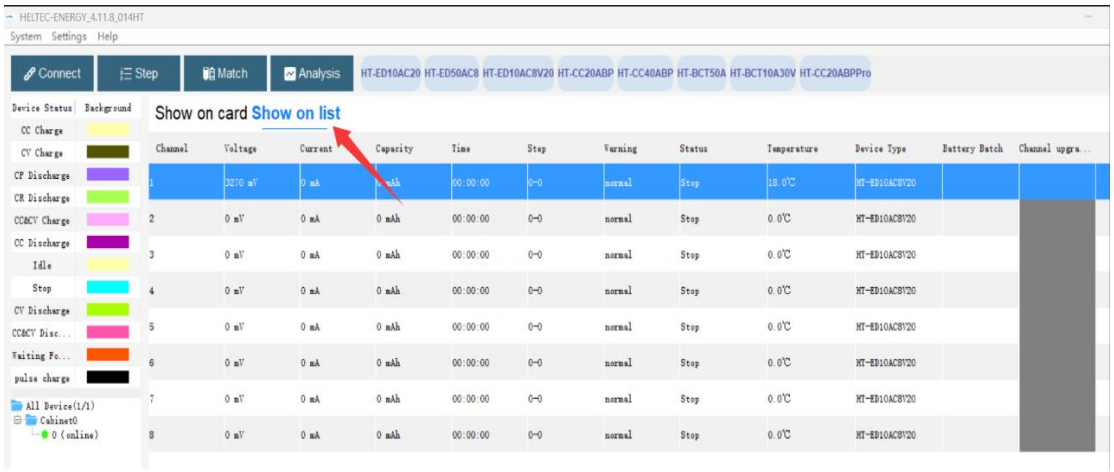
Cabinet number, equipment number, and equipment path number are the basic information of the equipment.

2) **Software version:** This refers to the firmware version of the device. Connection method, IP, port, etc.: This indicates information such as the port and IP address used for connecting the device to the computer. Temperature 1/2: This represents the readings from the two temperature sensors inside the device. When the temperature exceeds 30°C, the fan automatically operates for cooling. Status: This indicates the connection relationship between the device and the computer. Cabinet number: This sets the cabinet number where the device is located, facilitating the flexible

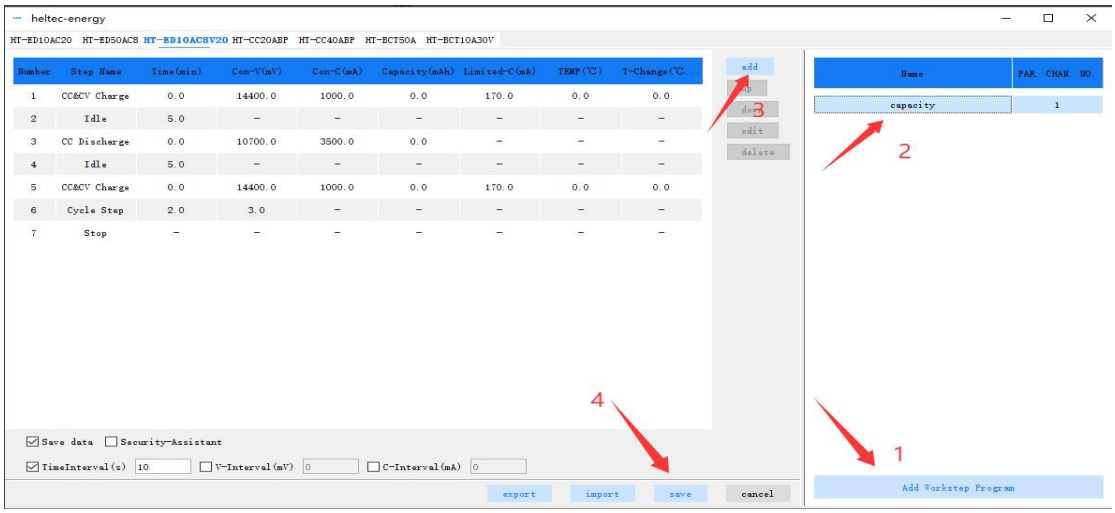
arrangement of cabinet sequence numbers during on-site wiring of cabinet-style devices. Sampling rate: This indicates the frequency at which the device uploads collected data.



If the selection list is clicked and displayed, the status of the device will be listed out. All operational functions remain unaffected.



Click the "Step Settings" button in the top left corner to enter the step settings interface. First, create a new step by naming it. After creating it, click on the name of the newly created step to edit it. Then, click "Add Step" to set charging and discharging parameters, cycles, etc. Note that you need to set the desired working steps according to the specific type of battery.

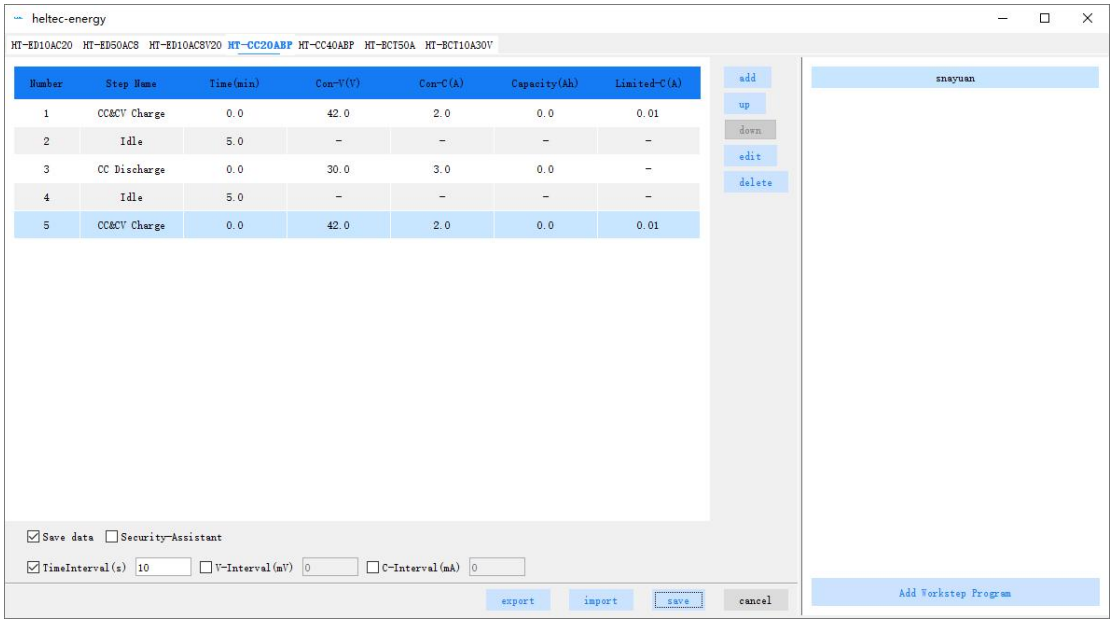


After setting, click the "Save" button at the bottom of the page to save the work steps. After exiting, select one or multiple batteries for testing. Click and select the battery, right-click and

choose "Start" to use the saved work steps (to select multiple batteries, hold down Ctrl and left-click on the battery icons you want to select consecutively). During the testing process, you can judge the working status of the battery by its color, or right-click on the battery icon to view the curve change graph of the battery's operation. The battery data after testing can also be exported and saved for analysis and comparison.

3) **Work step setting:** It is necessary to consider the battery pack as a whole, and set it according to the type, total number of cells in series, total voltage, and total capacity of the battery pack. For example, for a 10s lithium-ion battery pack with a total capacity of 10.4AH and a nominal voltage of 37V, the charging and discharging current should generally be less than half of the total capacity, which is 5A. The cut-off current should be calculated as the total capacity multiplied by 0.02, which is 0.2A. The maximum charging cut-off voltage is 42V, and the minimum discharging cut-off voltage is 30V. Note that after each charge or discharge, it is necessary to let the battery cool down for a period of time. If one measurement is not accurate, multiple measurements can be taken to ensure correctness.

Battery Type	Nominal voltage	Recommended Voltage Settings	Recommended Current Settings
ternary lithium battery	3.7V	Vmax：4.2V x Number of cells in series，Vmin：3V x Number of cells in series	Charge and discharge current：Total battery capacity x 0.5 Charge/Discharge Cut-off Current：Total battery capacity x 0.02
Lithium iron phosphate battery	3.2V	Vmax：3.65V x Number of cells in series，Vmin：2.7V x Number of cells in series	
Lead-acid battery	12V	Vmax：14.4V，Vmin：10.5V	



Multiple test step schemes can be set up for the work steps, and named descriptively for easy memory, such as "Panasonic 18650 Standard Test". Clicking "New Step Scheme" allows for the addition of a new scheme; right-clicking allows for the deletion or modification of the scheme name. This name will appear in the menu of the operation interface. See "Device Settings Work Steps" for details; each step scheme supports the storage and setting of up to 64 steps. The step editing allows for mixed editing of the step execution order. After completing the step editing, please add a stop step at the end to allow the device to stop working in case of anomalies.

Add Operation Step: Click "Add" to add an operation step; after adding an operation step, you must set the corresponding execution parameters for the operation step, otherwise incorrect parameters may pose a risk of damaging the battery.

Operation step modification: Click the "Edit" button to reset the parameters in the selected operation step, or double-click the step to open it directly. Operation step deletion: Click the "Delete" button to delete a selected operation step.

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

Save operation step: After editing the operation step, you must click the "Save" button to save the current operation step to the software system.

Supporting steps:

@Constant current charging: Maximum voltage limit, constant current, and voltage return difference must be set. It is designed for Ni-Cd batteries and is not suitable for lithium batteries;

@Constant Voltage Charging: Constant voltage and maximum current must be set;

@Constant power discharge: The cut-off voltage, maximum current, and simulated power must be set;

@Constant resistance discharge: The cut-off voltage, maximum current, and simulated resistance must be set;

@Loop Settings: Jump steps (jump within valid steps) and loop count (<64 times) must be set

@Constant current and constant voltage charging: Constant voltage, constant current, and cut-off current must be set;

@Constant current discharge: Cutoff voltage, constant current, and capacity settings must be set;

@Hold: The work step time must be set

@Stop: No need to set parameters

4) Data storage conditions:

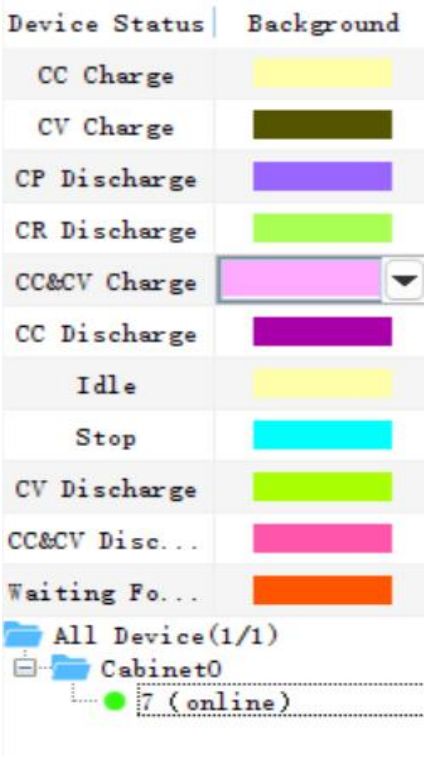
(1) When you need to save test data to your computer, please check this item; otherwise, the data will not be stored. There are 3 conditions to choose from for the computer storage rules.

(2) Time Interval: Set the minimum time interval for data saving. After the system exceeds this time, the software system will automatically store data into the record file of each channel every time this interval elapses. This value should not be set too small, lest frequent data actions cause slow computer operation.

(3) Voltage interval: Set the voltage difference condition for data saving. If set to 100, it indicates that the system will automatically store data once in the channel record file when the voltage changes from 3700mv to 3800mv. If the voltage changes from 3700mv to 3600mv, the storage action can also be triggered. This value should not be set too small, to avoid frequent data actions that may slow down the computer.

(4) Current interval: Set the condition for current difference value for data storage. If set to 100, it indicates that the system will automatically store data once in the channel record file when the current changes from 500mA to 400mA. If the current changes from 500mA to 600mA, the storage action can also be triggered. This value should not be set too small, as frequent data actions may cause the computer to run slowly.

***Status color setting：**

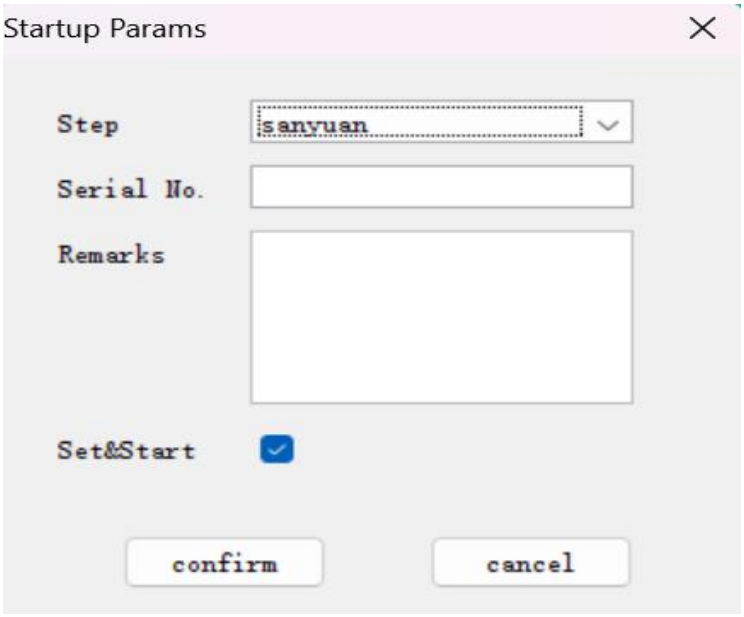


All the states supported by the device are displayed in color blocks, making it convenient for users to understand the current operating status or locate the test channel for abnormal states when applying the device in large quantities.

***Right mouse button function:**

1) Setup/Startup

Right-click Settings/Start is an option to select and start the work steps. Before all channels start operating formally, it is necessary to ensure that the work steps you need to run are included in the work step settings. The setting method is detailed in the figure：



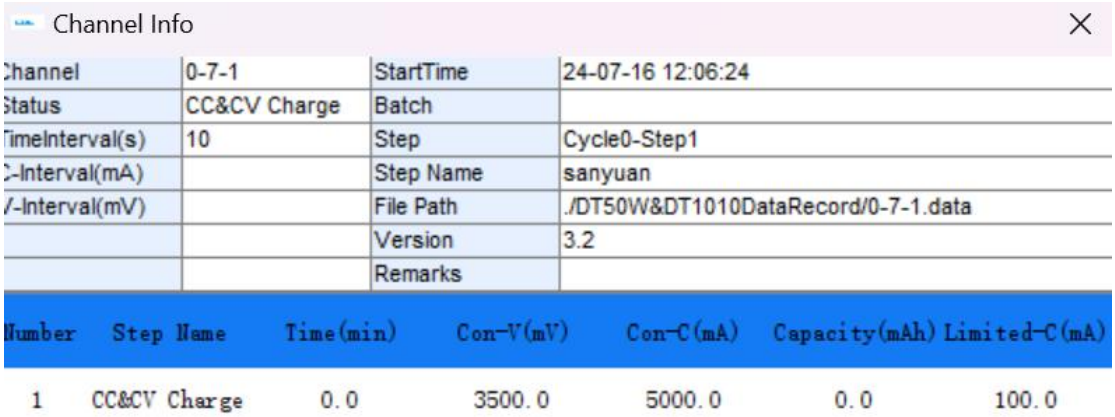
Select the name of the work step plan and click "OK"; battery batch number and remarks: You can fill in some necessary test information here for easy reference and identification.

2) Restore, stop

When restoring (when connected to the host computer): When in battery detachment warning state or manual stop state, selecting the restore function will cause the device to continue running the next step along the last stopped step number. Previous information is saved on the computer. If there was no previous start step, or if the machine was powered off and restarted, this function will be ineffective.

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

4) Information



Right-click on the information to view detailed setup information for this channel, including the currently set work step details and the work step currently in progress;

Channel: indicates the channel number of the currently displayed information.

Start time: The last time the work step of this channel was initiated.

Current status: The current operational status of the channel.

Work step and work step scheme name: indicates the name and serial number of the work step being executed in this channel.

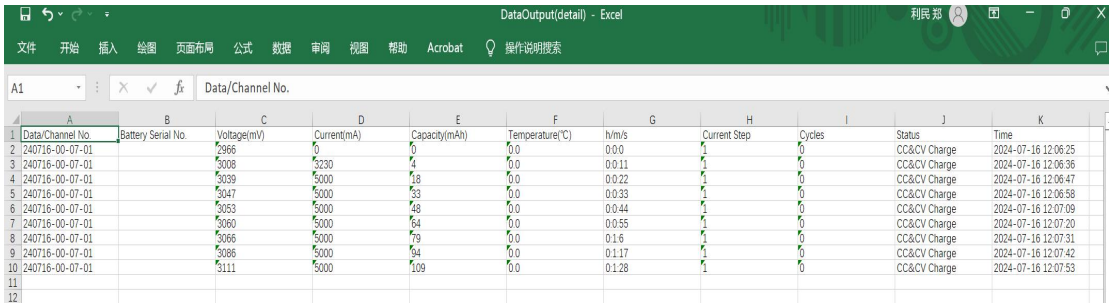
Time interval, voltage interval, current interval: These represent the parameter settings for saving data in this channel.

Data file path: indicates the absolute path of the data recording file for this channel.

Firmware version: Remarks: indicates the information entered when the work step settings are issued.

5) Export

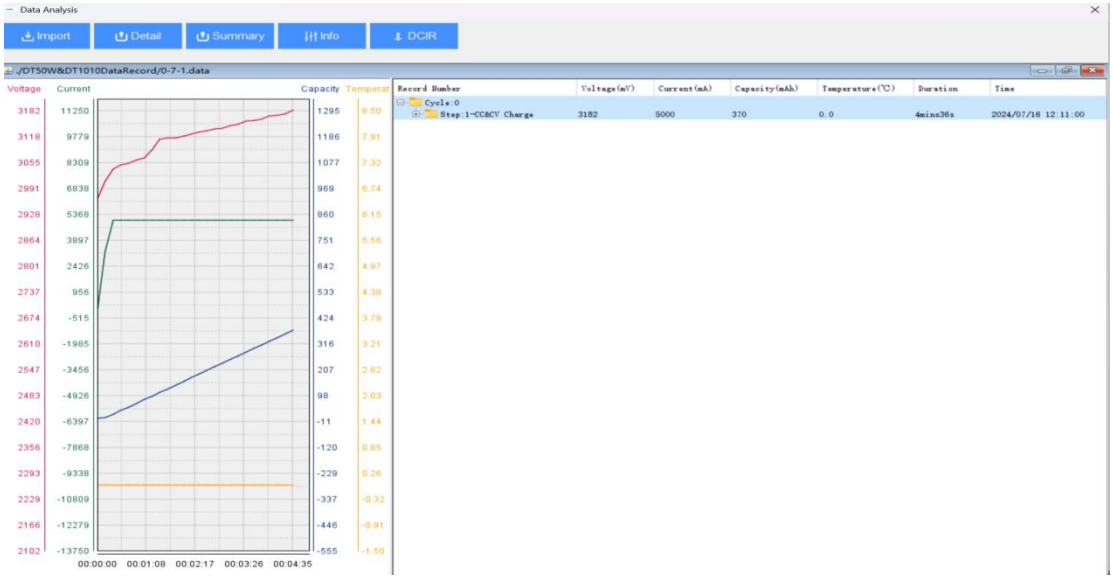
Export the relevant data of the selected channel test in a tabular format.



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	3230	1	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

When the channel has been running for a period of time or has completed running, the test records from startup to the present should have been recorded under normal circumstances. After selecting the analysis function, the record file can be automatically retrieved and the data curve analyzer can be launched. Please refer to the following for the curve analysis software.



Data analysis software support functions:

Support 3Y axes, single timeline; all curves support up-down and left-right panning, zooming in; left-click and hold on a Y axis to pan up and down by moving the mouse; left-click and hold on the X axis to pan left and right by moving the mouse; right-click and hold on a Y axis to pan the curve amplitude by moving the mouse; right-click and hold on the X axis to zoom in and out of the time curve by moving the mouse.

7) Data import:

There are two ways to import data:

First: Right-click on the main menu grid, click the "Analysis" button, and the data will be automatically imported into the curve analysis software, which will then be opened.

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

8) Data export

The data export function is used to output the imported data in the form of an XLS report.

When using the software, you must import the data record file you wish to view and ensure it can be viewed within the window. After selecting the "Save Data" function, the software will prompt for the save location and a save name. A tip: When setting the grouping parameters, if you are unsure about the exact step number of the step you want to specify, you can first test a complete set of data and export it as an xls table. Within the table, locate the position you wish to determine and note down the corresponding cycle number and step number. Simply input these values into the grouping parameters.

9) Multiple curve comparison

Multiple curve comparison allows for the comparison of differences between multiple data record files or a single data file.

10) Usage steps

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

Step 2: Select the cells you want to initiate the test on. You can hold down the Ctrl key to select multiple cells, or hold down the Shift key to select a batch of cells.

Step 3: Right-click on a selected cell, select "Set Operation Step", and choose the operation step you have previously set. You can choose to start immediately after setting.

Step 4: The device emits a startup test prompt tone, and the software interface status changes. By double-clicking a running single cell, you can view the actual operating step status and data of the device.

Step 5: During the testing process, you can choose to stop and resume to pause and resume the test. The previously tested data will not be cleared. If you choose to start, the device will start running the work steps again.

Step 6: After the test is completed, you can use the grouping function to perform grouping or utilize analysis tools for data analysis.

6. Attention

① (Not connected to the host computer) After completing parameter settings, the instrument will automatically save the settings. The next time it is started, there is no need to set it again; simply click the start button to run it directly.

②During the charging/discharging process, pressing the "Start" button can pause the operation, and then pressing the "Start" button again can resume the operation.

③ If the connecting cable falls off, the machine will stop running. Please ensure it is firmly connected.

④ The connecting wires are properly connected. If the machine stops running unexpectedly,

please press the red "Start" button for 5 seconds. The machine will immediately resume operation from where it left off.

7. General tips

①The effectiveness of capacity testing is related to both time and speed. Faster speed can lead to a decrease in capacity (Peukert effect). It is recommended to set a smaller discharge current value to improve testing accuracy.

② No capacity tester can test a damaged battery, and battery damage includes but is not limited to the following aspects: a. Increased internal resistance of the battery; b. Battery terminal voltage lower than the discharge cut-off voltage; c. Internal short circuit or open circuit of the battery

③ Please read the instruction manual of the instrument carefully, and if you have any questions or difficulties, please contact the customer service hotline immediately.

8. Safety instructions

Connect the battery with the correct polarity and maintain a good connection state.

Keep away from flammable and explosive materials that are being used, and store them in a cool and well-ventilated place. Do not block the air inlet and outlet.

Please store it properly and avoid violent actions such as collisions during use and transportation.

9. Common product problem and solutions

encounter problem	Reason	Solution
After the power is turned on, the display screen does not light up	1.Check if the power plug is properly connected to the socket 2.The fuse of the power outlet is blown 3.The fuse of the circuit board inside the instrument is blown 4.The connecting cable between the display screen and the motherboard is loose 5.The switching power supply is not working properly	1.Re-insert the power plug 2.Replace it with a 5A fuse 3.Replace it with a 1.5A fuse 4.Secure the connecting wires firmly 5.Return to the factory for repair or replacement of the motherboard
After the power is turned on, the display screen lights up, but it does not display any content	1.The connecting cable between the display screen and the motherboard is loose 2.The display screen is broken 3.Communication issue with circuit board	1.Secure the connecting wires firmly 2.Replace the display screen 3.Return to the factory for repair or replacement of the motherboard
Setting knob does not respond	1.The flat cable between the knob and the mainboard is	1.Reconnect the flat cable properly

	loose 2.The knob is pressed too tightly and too deeply, making it impossible to reset 3. The encoder is damaged	2. Pull it out and reinstall it 3. Replace the setting knob
The equipment is producing abnormal noise	1.There is a foreign object inside the fan 2.The equipment fan is damaged	1.Open the box and remove any foreign objects 2.It is recommended to replace the fan
No voltage display after connecting the battery	1.Poor contact of battery connection wire 2.The battery connection wire is damaged 3.The microcontroller cannot detect voltage	1.Check if it is plugged in tightly or connected properly 2.Reinsert or replace the connecting cable 3.Return to the factory for repair or replacement of the motherboard
The charging fails after the start button is pressed	1.The microcontroller cannot detect current or the switch power supply is damaged 2.Loose connecting wires 3.The start button is damaged	1.Return to the factory for repair or replacement of the motherboard 2.Tighten the connecting wire 3.Replace the start button

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.