According to the development of the battery industry, this product is developed for the testing and high-speed sorting of low-resistance and large-scale lithium battery packs. The unit of internal resistance is generally mΩ. Batteries with large internal resistance will have large internal power consumption and serious heat generation during charging and discharging, which will cause accelerated aging and attenuation of lithium-ion batteries, and also limit application of large rate charge and discharge. The smaller the internal resistance, the longer lifespan and better rate performance of lithium ions. By measuring the internal resistance, good and bad batteries and matched batteries can be screened. When assembling battery pack, it is necessary to screen and match the cell capacity, internal resistance and voltage. The performance of the battery pack follows the "barrel" principle, and the performance depends on the worst battery cell.

HT-RTO1

High Precision Intelligent Lithium Battery Pack

Internal Resistance Test Analyzer

Manual Instruction

Thank you for choosing series product. These products are designed to make your work more convenient, safe and efficient. Such that you might become familiar with all the operations of the tester, an instruction manual has been included. Please read before operation.

Please store this manual in a safe location for both current and future reference.

Overview:

1. This instrument adopts the high-performance single-crystal microcomputer chip imported from ST Microelectronics, combined with the American "Microchip" high-resolution A/D conversion chip as the measurement control core, and the precise 1.000KHZ AC positive current synthesized by the phase-locked loop is used as measurement signal source apply on the tested element. The generated weak voltage drop signal is processed by high-precision operational amplifier, and the corresponding internal resistance value is analyzed by intelligent digital filter. Finally, it is displayed on large screen dot matrix LCD.
2. The instrument has the advantages of high precision, automatic file selection, automatic polarity discrimination, fast measurement and wide measurement range.
3. The instrument can measure the voltage and internal resistance of the battery (pack) at the same time. Because of the Kelvin type four-wire test probe, it can better avoid the superimposed interference of the measurement contact resistance and wire resistance, realize the excellent anti-external interference performance, so as to obtain more accurate measurement results.
4. The instrument has the function of serial communication with PC, and can realize the numerical analysis of multiple measurements with the help of PC.
5. The instrument is suitable for accurate measurement of AC internal resistance of various battery packs (0 ~ 100V), especially for low internal resistance of high-capacity power batteries.
6. The instrument is suitable for battery pack research and development, production engineering, and battery screening in quality engineering.

Product distinctive features

- Microchip Technology high-resolution 18-bit AD conversion chip to ensure accurate easurement;
- Double 5-digit display, the highest resolution value of measurement is 0.1μΩ/0.1mv, Fine and high precision;
- Automatic multi-unit switching, covering a wide range of measurement needs;
- Automatic polarity judgment and display, no need to distinguish battery polarity;
- Balanced input Kelvin four-wire measuring probe, high anti-interference structure;
- 1KHZ AC current measurement method, high accuracy;
- Suitable for various battery/pack measurements below 100V;
- Equipped with computer serial connection terminal, expanded instrument measurement and analysis function;

Test parameter range

Power Supply	AC110V/AC220V
Supply Current	50ma~100ma
Measurement Parameter	① ACR ② DCV
Measuring range	R:0~200Ω V:0~±100VDC
Resolution:	0.001mΩ 0.001V

Precision	R: ±0.5% V: ±0.5%
Test Pace	5 times /S
Range	Automatic Switching
Measuring Input	Balance System
Measuring Probes	LCR Kelvin 4-wire clamp

Attention

When measuring the internal resistance of the battery, pay attention to whether the positive and negative electrodes of the battery have dirt or oxide layers. The positive and negative electrodes of the battery must be rubbed with fine sandpaper to expose the metallic luster. When using supporting test fixture or test clamp, pay attention to whether the contact is good, otherwise the measured internal resistance value will be too large or the measured value will be different each time.

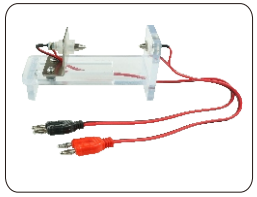
Precautions for use

1. During the measurement process, do not use a mobile phone near the instrument to prevent the radio frequency signal radiation of the mobile phone from interfering with the instrument and causing errors in work;
2. When the instrument is measuring, it should be far away from the high-frequency switching power supply that is being used nearby;
3. The instrument cannot enter the mist and must be used in a dry environment, otherwise the measurement value will be inaccurate;
4. The limit input voltage of the input terminal tested by this product is 100V, and it is strictly forbidden to test the battery pack exceeding 100V;
5. During the test, keep the test clips parallel to reduce the influence of eddy current and improve the test accuracy;
6. When connecting to the computer, you must open the instrument serial port settings before connecting to the computer.

Packaging list

HT-RT01 Tester x1

LCR Kelvin 4-wire clamp x1



Test fixture x1

USB data cable x1

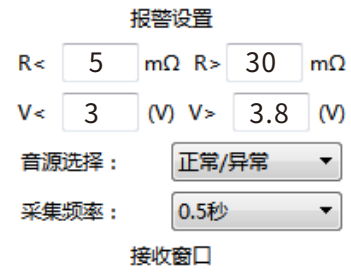
Power supply cord x1

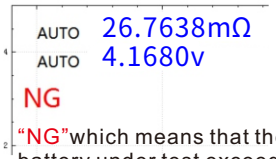
Manual x1

⑤ The test resistance and voltage range values can be set, and the batteries can be filtered in batches by setting the values to better assemble the battery pack.

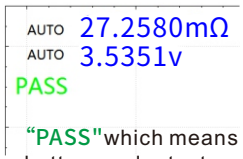
Example:

Suppose we want to filter out lithium batteries with an internal resistance value of 5-30 milliohms and voltage value of 3-3.8 volts. You can set the parameters and acquisition frequency as shown on the right. If the parameter values are all within the set value, the computer screen will display: "PASS", which means that the battery under test meets the set value and is qualified. Otherwise, "NG" will be displayed, which means that the battery under test exceeds the set value and fails.



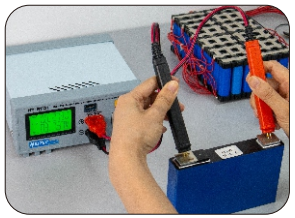


"NG"which means that the battery under test exceeds the set value and fails.

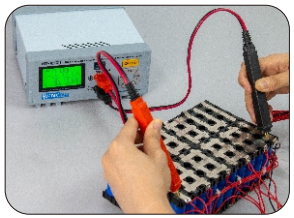


"PASS"which means that the battery under test meets the set value and is qualified.

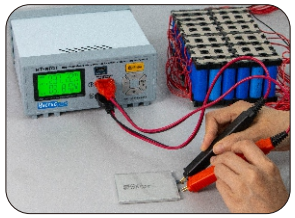
Example of test scope



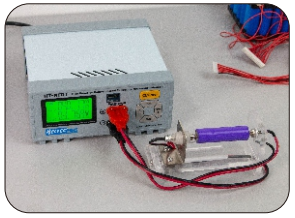
Measure the lithium iron phosphate battery:
IR:0.273mΩ,
V:3.737V.



Measure the 20S 48V 18650 battery pack:
IR:0.4942Ω,
V:36.906V.



Measure the battery of Iphone:
IR:37.22mΩ,
V:3.81V.

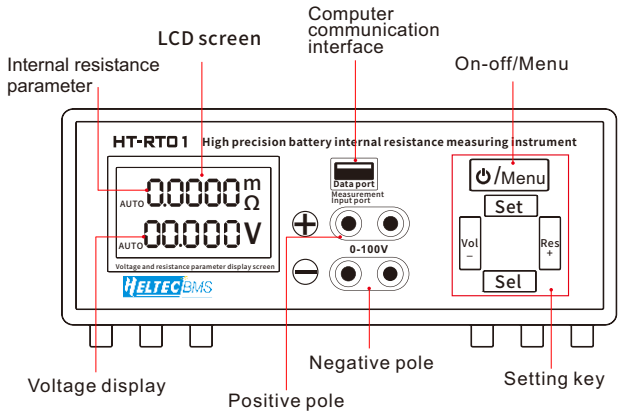


Measure the 18650 battery:
IR:40.17mΩ,
V:3.789V.

Measure the Photovoltaic panel

Measure the electric car batteries

Product diagram



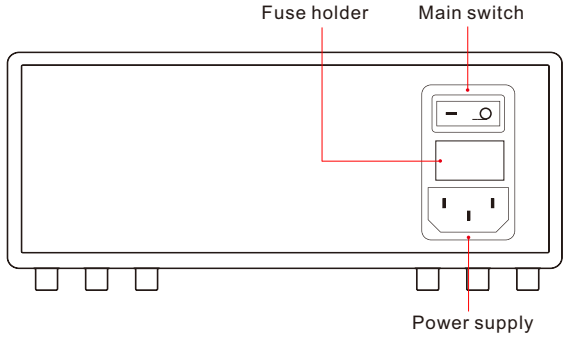
/Menu : Power ON/OFF /Menu selection;

Set : "SET" Key, Calibration status is "Toggle key";

Sel : Menu "Selection" key;

Vol : Voltage gear toggle key,SET status is "Reduce" key;

Res : Electric resistance gear toggle key,SET status is "Increase" key;



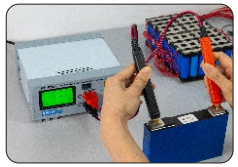
Scope of use

1. It can measure internal resistance and voltage of ternary lithium, lithium iron phosphate, lead acid, lithium ion, lithium polymer, alkaline, dry battery, nickel-metal hydride, nickel-cadmium, and button batteries, etc. Quickly screen and match all kinds of batteries and detect battery performance.
2. R&D and quality testing for manufacturers of lithium batteries, nickel batteries, polymer soft-pack lithium batteries and battery packs. Purchased batteries quality and maintenance testing for stores.

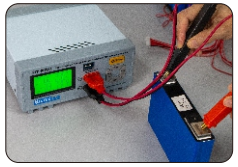
Product operation instructions

1.Connect to 110/220V power supply, connect the Kelvin four-wire and the clip to the corresponding red and black sockets, and turn on the main power switch.

2. Press the panel button "⏻/Menu" to turn on the device, and clamp the positive and negative poles of the battery under test by Kelvin four-wire clips. The screen will display the internal resistance and voltage value of the battery under test.



3.After the instrument is started, it will automatically default to the automatic gear selection mode, intelligently identify the battery/battery pack which under test, and in this mode does not require manual adjustment.



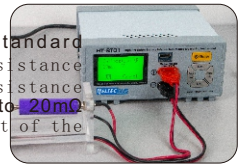
4.Automatic polarity discrimination:
When the positive (red) and negative (black) clips of the Kelvin four-wire clip do not correspond to the positive and negative polarities of the measured battery/battery pack, the tester will automatically recognize this situation and display voltage value as a negative number, there is a "-" minus sign before the voltage value, indicating that the test clip is inversely connected with the positive and negative poles of the identified battery / battery pack.

Function setting operation steps

1、Function switch

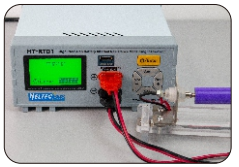
⏻/Menu Power ON/OFF /Menu selection.
Set "SET" Key. Calibration status is "Toggle key".
Sel Menu "Selection" key.
Vol Voltage gear toggle key,SET status is "Reduce" key.
Res + Electric resistance gear toggle key,SET status is "Increase" key.

2、How to calibrate the resistance



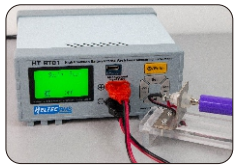
The calibration resistance needs to be connected to the standard resistance of 20mΩ, press the SET key, select the calibration resistance menu, press the Menu key "confirm" to enter the calibration resistance menu, press the "Res+" key to switch the measurement gear to 20mΩ gear, you can use Set key to adjust the value of the last digit of the displayed value (the third digit after the decimal point).

3、How to switch language(Chinese /English)



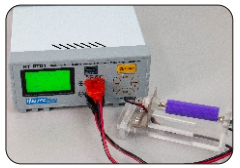
Press the Set key, select the switch language menu,press the Menu key to enter the setting interface, and press the Sel key to switch the language.Finally, press the Menu key to confirm.

4、How to connecting to the computer



Press the Set key, select the Serial port setting,press the Menu key to enter the setting interface, select ON and press the Menu key to confirm.That connect the tester and computer with the standard USB cable.

5、How to calibrate the voltage



Before calibrating the voltage, it is necessary to connect the battery with the actual voltage measured as a reference, press the Set key, select the calibration voltage menu, press the Menu key to enter the calibration voltage menu, and press the Res+ key to switch the measurement gear to 20V .At this time, the value of the last digit of the displayed value (ie, the third digit after the decimal point) can be adjusted through the Sel and Set keys, and the value of each adjustment is 0.002V.Press the Menu key to switch the measurement range to 100V. You can use the Sel and Set keys to adjust the value of the last second digit of the displayed value (ie, the second digit after the decimal point), and the value for each adjustment is 0.01V.

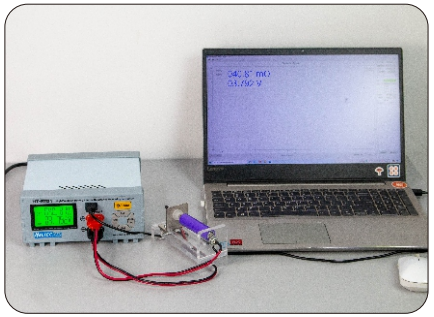
Steps for connecting to computer

Please contact HELTEC BMS to download the driver software and installation video firstly.

① After the boot screen is on, press the Set key to enter the menu option, press the Sel key to select the 7th item "Serial port setting" menu, then press the Menu key to enter the "Serial port setting", select "ON" by the selection key, and then press the Menu key to confirm. At this time, the tester serial port is opened, and the AUTO icon appears on the screen.

② Connect the tester and computer with the standard USB cable.

③ Open the installed test software.



④ Select COM1 for the detection port, press the mouse to open the serial port, and display the resistance and voltage of the battery under test in real time.