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ZC-302-200S (200A)

Portable Contact Resistance Tester

User Manual V2.0



❖KVTESTER ELECTRONICS TECHNOLOGY CO., LTD.❖

Dear Customers,

Thank you for purchasing our ZC-302-200S Portable Contact Resistance Tester. Before you use the product for the first time, please carefully read this Manual which can help you skillfully use the Tester.



Our aim is to improve our products continuously, so that the product you use may be a little bit different from the Manual. In case of any changes, we will inform you in the attached sheets! Thanks for your understanding. If anything is unclear, please contact the After-Sale Service Department in our company, and we will certainly meet your requirements.



Since the I/O terminal, testing column and etc. may carry voltage, electric spark may be produced when you insert and unplug the test lead, power socket and etc.. Please do be careful of electric shock and avoid hazards. Pay attention to your personal safety!

Prudent Warranty

For the products manufactured by our Company, if the defects appear within one year from the date of delivery, we can provide free services and repairs; if the defects appear more than one year after delivery, we can provide life-long paid maintenance services.

◆ Safety Requirements

Please carefully read the following safety precautions so as to avoid personal injury and prevent the product or any other products connected thereto from being damaged. In order to avoid the possible dangers, the product can only operate within a specified range.

Only the qualified technicians can implement the maintenance.

Please carefully read the user manual before using the instrument. Do not operate this equipment unless users are completely familiar with the user manual and the instrument.

Strictly abide by the safety rules and precautions listed in this manual.

- Under any circumstances, pay attention to safety when using this instrument.
- Please use the leads and accessories of the instrument that complies with IEC61010-031(2002) standard.
- Before use, make sure the instrument and accessories are in good condition, and there is no damage, exposure or disconnection of the instrument and the insulation layer of the test leads. Please stop using the instrument when the housing or test leads are exposed due to breakage.
- Make sure the resistance under test DE-energizes before testing.
- It is forbidden to touch the resistance and circuit under test.
- Make sure the test leads are tightly connected to the instrument and the object under test.
- Stop using the instrument if the housing or test leads are exposed due to breakage.
- Do not touch the ports or the exposed metal parts of the terminals to avoid electric shock.
- Pay attention to the text and icons on the panel and back panel of the instrument.
- Do not use the instrument in hazardous atmospheres with high temperatures and humidity. Do not store it under direct sunlight or in condensed fields.
- Only authorized personnel can disassemble, repair the instrument, and conduct regular

maintenance.

- It is prohibited to test in flammable and hazardous locations.
- Maintain the device regularly to keep it clean. It is not allowed to wipe with corrosive agents and rough objects.
- Put the instrument in a dry, ventilated place without corrosive gas.
- In case of not using the meter for a long time, please charge the battery every 2 months.
- Use only the power adapter and battery pack provided by the manufacturer with a specific safety rating.
- Stop using the instrument immediately in case of any danger will be caused by continuing to use it. Please securely pack the equipment and send it to an authorized organization for disposal.

The user must follow the instructions and dangerous warnings to perform a safe operation. The icon  is an extremely dangerous warning.

— Safety Terminology

Warning: Warning messages indicate the conditions or practices that may cause loss of life or personal injury.

Caution: Caution messages indicate the conditions or practices that may cause the damages to the product or other properties.

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I. Introduction

Contact Resistance Tester is an ideal device to inspect low resistance with high accuracy and precision.

Application:

Contact resistance test on MV/HV switches and circuit breaker;

Resistance test on bus bars, cables and conductors;

Testing the condition of metallic welding;

Feature:

1. High Resolution:0.01 μ Ω
2. Wide current measurement range from 5A to 220A
3. Standard resistor to conduct accuracy test
4. Handheld device, rugged and easy-to-operate
5. High stability with open circuit and overheating protection

II. Technical Parameters

Function	Contact resistance tests of high-voltage switches and circuit breakers; connection resistance tests of metallic welding components; circuit resistance tests of conductors; precise low resistance tests.	
Power	Built-in 12.6V 9000mAh rechargeable lithium battery	
Measurement Method	4-wire measurement	
Charger	12.6V/2A	
Display	5.6-inch industrial LCD with high-brightness color	
Test Interface	I+, I-, U+, U-	
Output Current	≤5A, 10A, 30A, 50A, 80A, 100A, 200A 220A	
	Step Current: 2.5A, up to 87 current gears.	
Measurement Range	≤5A ：	1μΩ~3500mΩ
	10A ：	0.1μΩ~200mΩ
	30A：	0.1μΩ~20mΩ
	50A：	0.01μΩ~15mΩ
	80A：	0.01μΩ~10mΩ
	100A：	0.01μΩ~5mΩ
	200A ：	0.01μΩ~600uΩ (S453)
	220A ：	0.01μΩ~500uΩ (S453)
Resolution	0.01μΩ	
Accuracy	30A~220A ±(reading*0.1%+measurement range*0.2%+1μΩ) 10A or less than 5A ±(reading*0.5%+measurement range*0.2%+10μΩ)	
Measurement Time	≤100A： fast mode(recommend) 10s, 20s, 30s, 40s, 50s, 60s ＞100A： fast mode	
Printer	Optional, press the print button to print the test results	
Data Storage	After the completion of the test, the data is automatically and cyclically saved with up to 999 sets of data stored.	
Size of the instrument	L188mm×W85mm×H312mm	
Size of Outer Package	Appro L550mm×W420mm×H215mm	
Weight	Weight of the instrument: appro 2.2kg	
	Total Weight: appro 9.3kg	

Test Leads	Standard Length: 3m (5m is optional)
	Connecting the test leads to the current port and voltage port with a resistance of less than 10mΩ
Data Delete	Select Format Memory in the setting interface to delete all data
Data Query	Enter the Data Query interface, press the up, down, left, or right keys to browse the stored data
Automatic shut-down	The battery will automatically shut down if no operation within 15 minutes after power on
Battery Voltage	When the symbol“ 0% ”is displayed on the upper right corner of the instrument, it means that the battery power is exhausted, and it will automatically shut down. Please charge it in time.
Backlight	High, medium, and low brightness
Working Current	The current is 230mA in a non-test state
	The current can be set in the test state
Circuit Protection	Open circuit protection, overheat protection
Temperature Protection	By temperature monitoring
Working Temperature and Humidity	-10℃～50℃；below 90%RH，no condensation
Storage Temperature and Humidity	-10℃～60℃；below 70%RH
Charging Voltage	12.6V
Safety Standard	IEC61010-1, CAT III 600V、Pollution Level 2, JJG724-1991 Verification Regulation of DC Digital Ohmmeter, JJG166-1993 Verification Regulation of DC Resistors, DL/T967-2005Verification regulation of loop resistance tester and DC resistance high-speed tester.

III. Product Structure







1. Cooling Fan
2. Charging Port
3. U+ Binding Post
4. I+Binding Post
5. I- Binding Post
6. U- Binding Post
7. Printing Key
8. Power ON/OFF
9. Up, Down, Left, Right and Enter Key
10. TEST Key
11. Return Key
12. Screen
13. Handle

IV. Operation Instruction

Basic Operation

⚠	When using this instrument, carry out under good weather conditions. It is forbidden to use it in the conditions of rain, snow, fog and high air humidity to avoid danger.
	Only trained and authorized personnel can operate the instrument, and the operator must strictly abide by the safety rules.
	The user should charge the meter in time, at least once every 2 months, otherwise, it will cause irreversible damage to the battery if it is not charged when there is a serious power loss, shorten the service life of the battery, and affect the normal use of the meter.

Power ON/OFF

When powered by the meter's built-in batter, press the Power ON/OFF " ⏻ " key for 0.5 seconds to start the instrument, and enter the Test Mode; Press and hold the " ⏻ " key to switch it off.

Enter the test interface by default after booting， press the Return Key " ↩ " to the Menu. After about 15 minutes of no operation, the meter will automatically shut down. When the battery is low， it will indicate the icon " Low ". The meter will automatically shut down. Please charge it in time.

Test Mode



Main Menu

When the power is on, press the Return Key “ ” to the Menu, including three options: Test, Record Query, and System Setting.



System Setting

Press the “◄” key or “►” key to select the system setting, and then press the enter key “↵” to enter the system setting interface, including Chinese and English Switching, Brightness Setting, Time Setting, Factory Setting, Format Memory, and Info.



Chinese and English Language: Press the “↵” key to switch between Chinese and English modes.

Brightness Setting: Press the "↵" key to switch between high, medium, and low brightness.

Time Setting: Press the "↵" key to enter the date and time setting, press the "◄" or "►" key to move the cursor, and press the "▲" or "▼" key to change the date, and then press "↵" key to enter.



Factory Setting: Press the "↵" key to enter the factory setting. Please contact the manufacturer for technical support to use this function.

Format Memory: Press the "↵" key to enter Format Memory. When Popping up the dialog box "" indicating whether or not to delete. Press the "◄" or "►" key to move the cursor to choose YES or NO, and then press the "↵" key again to delete or not.



Test

By default, it will enter the test interface after booting, press the "◄" or "►" key to move the cursor to the position to be modified， and then press the "▲" or "▼" key to modify the parameter. Press and hold the "TEST" key for 2 seconds to start testing.

If the icon "⚠" flashes, it indicates that it is under test. When the data displays upon the completion of the test, start the next test. During the test, press the "TEST" key to interrupt the test in advance, so that it is convenient to start the next test.

Data Storage

Upon the completion of the test, it can automatically number and store the data, up to 999 sets.

Record Query

After booting, press the "↩" return key to the menu，press the "◄" or "►" key to move the cursor to Record Query，then press the "↵" key to Record Query. By default, it starts from the latest test value，press the "▲" or "▼" key to turn to the next page and the "◄" or "►" key to quickly turn the page.



Printing (printer is optional)

Print test data in real-time: after testing a set of valid data, if you need to print test data, press the "" key to print current test data.

Print stored data: In the record query interface, turn the page to the data page to be printed, and press the "" key to print the currently viewed data.

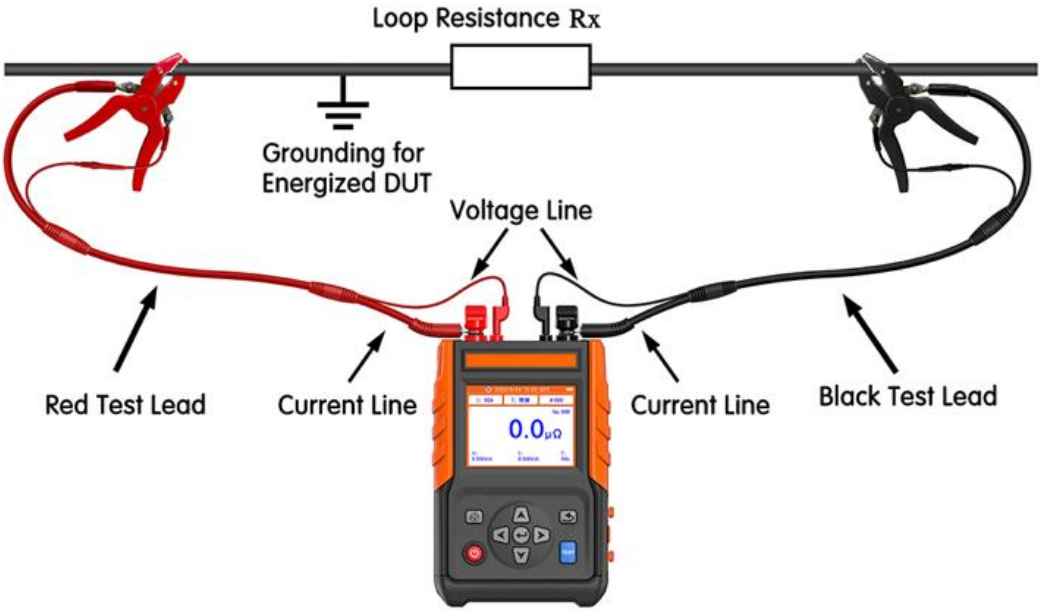
Test

⚠	**Before testing, check whether the product under test is powered off. If it is powered on, please open circuit and discharge.**
	When selecting the current, refer to the measurement range in the technical specification column, and do not set it over the range or under the range.When using the over-range current, since the current cannot reach the preset value, the stability of the test result is too poor even if the test is continued forcibly. When the current is under range, the current is too small. Under these circumstances, confirm the range and select the appropriate range for testing.

Connect the Micro-ohmmeter to the object under test

Clip the test leads to both ends of the object under test. Check whether there is an oxide layer on the surface where the sample is clamped. If there is, clean the oxide layer first before clamping, otherwise it will affect the test accuracy. Ensure the connection is firm and reliable to prevent the clamp from falling off during the test. Connect the test leads to the red and black terminals of the instrument according to the color.

In a charged environment, use a grounding wire to connect one end of the object under test or its grounding terminal to the ground, and connect the Ⅰ+, U+, Ⅰ-, U- terminals to the object under test by using the four-wire method as shown in the figure below



Important Note:

1. I +, I -: current terminals, U+, U-: voltage terminals.

The maximum input voltage is 2.0V.

The following is a description of the wiring steps.

Clamp the two test clamps on both ends of the object under test, connect the I + and U+ terminals to the red test lead, and connect the I - and U- terminals to the black test lead. Insert the red and black thick connecting wire into the I+ and I- terminals, and the red and black thin spring bars of the test lead into the U+ and U- terminals of the meter.

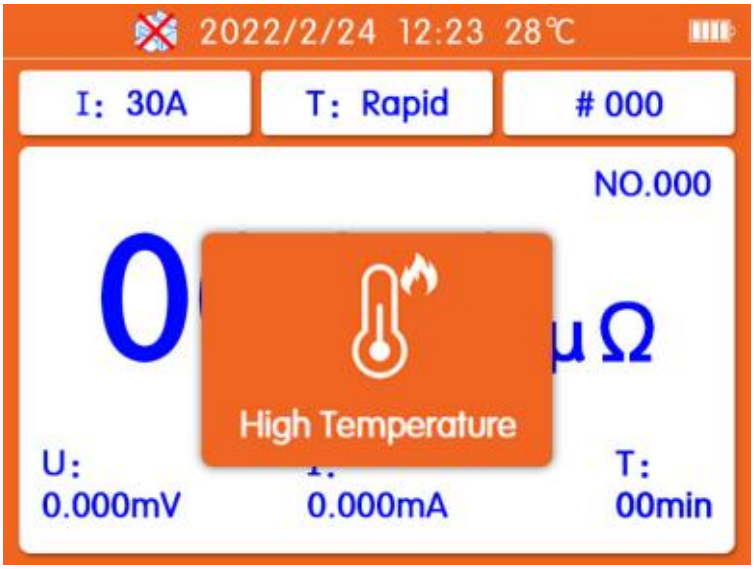
Note: Use the low-resistance test line matched with the instrument during the test. Tighten the current terminal, firmly insert the voltage terminal and securely clamp the test clip to reduce the lead resistance and save battery power.

2. If there is loose contact between I + and U+ or between I - and U-, the current cannot reach the set value, and then the meter will stop testing, indicating loose contact of test leads.



3. In a live environment, ensure that one end of the object under test is grounded, otherwise one end of U+ or U- should be grounded.

4. If use a large current above 100A for a long time to measure, it will cause the temperature of the instrument to rise. If you continue to test, it will display the measurement data, indicating the temperature is too high.



5. If use a large current above 100A for measurement for a long time, the interface keeps indicating overheating. In this case, if continue testing, it will trigger overheating protection mechanism and the device will stop outputting current. Therefore, after each continuous test under high current, cool the instrument for more than 10 minutes before the next testing.



6. Use a special lithium battery charger with a charging voltage of 12.6V. There is a charging indicator light on the charger, red light indicating charging and green light means fully charged. Use a 2A charger, the charging time is about 3 hours. If not use the meter for a long time, keep about 50% of the power reserve, charge, and discharge regularly. Check the battery power once a month, and charge in time when the power is low.

Test Operation

⚠	**When connecting the test clip and the ground lead, check the surface which may be covered with a layer of oxide film due to the contact end being exposed to the air for a long time. The oxide film may cause unstable or inaccurate test results, clean it when wiring, or twist the test clip several times to break the oxide film after it is connected to the terminal to ensure good contact.**
	During the test, if there is a sudden automatic shutdown, it may be caused by insufficient power. Connect the charger for charging or set the output current below 5A for emergency testing.

Before the test, first select the current gear from 5A (automatic), 10A, 30A, 50A, 80A, 100A, 200A to 220A, or adjust the output current,;

Select test time: fast (recommended), 10S, 20S, 30S, 40S, 50S, 60S (only supports fast mode when the current is above 100A);

Set sample number (000-999).

Operation Step

In the test interface， press the "◄" or "►" key to move the cursor to select Current Setting，Test Time and Sample No.， and press the "▲" or "▼" key to set the parameter. Incorrect parameters will affect the test results.

When setting the current gear, press "▲" or "▼" key to select the current value, press and hold the "▲" key to accumulate the current with the step current 2.5A. Press and hold the "▼" key, decrement the current with the step current 2.5A. Release the key to stop accumulating or decrementing the step value, please refer to the measurement range setting in the technical specifications, and set different current gears according to different power supply schemes and measured resistance values.

After setting, press and hold "TEST" key to start testing. When the test starts, it will display testing, and after finishing, it will display the tested resistance value. If the tested resistance exceeds the upper limit of the range, it will display OL.

If the test needs to be interrupted during the test， press the "↩" key.

Recommended, good accuracy: Use the fast mode to save battery power. When selecting a fast mode or 10~50 seconds, press the "↩" to stop. This method can better overcome the influence of the instability of the thermal electromotive force of the circuit under test, and reduce power consumption and the temperature rise of the instrument.

100A Current

When using the 100A current, try not to choose a test time of 60 seconds, because it consumes a lot of power and the meter needs to cool for more than 10 minutes before starting this method again. Otherwise, the meter may cause overheating protection indicating the temperature is too high, and then it can not continue to test. If it is not necessary to measure for 60 seconds, press

the "" key to stop testing, it can also get accurate test data.

Connecting the Micro-ohmmeter to a Single Grounded Circuit Breaker

1. **Disconnect the circuit breaker**

Before using the micro-ohmmeter to test the high-voltage circuit breaker, ensure to disconnect the circuit breaker from the circuits on both sides, in strict accordance with national safety regulations.

2. Ground to PE

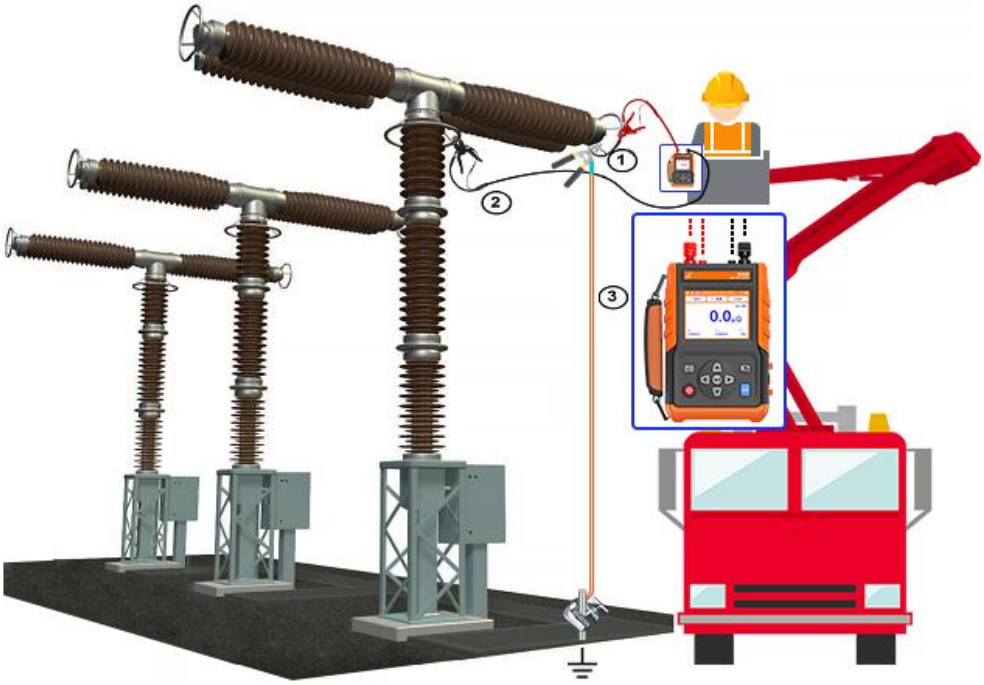
Check whether the circuit breaker is properly grounded to the protective earth (PE), and whether the circuit breaker is closed. When testing high-voltage circuit breakers, operator must comply with local safety regulations and wear protective equipment before testing.

3. Wiring Connection

Use the test leads equipped with the meter to connect lines. Connect the red test lead to the micro-ohmmeter and the bushing of the high-voltage circuit breaker close to the tester and the test equipment, and the black test lead to the micro-ohmmeter to the remote bushing on the other side of the circuit breaker.

Note: The ground cable will not affect the test results.

The connection method of the single grounded circuit breaker is shown in the figure below:



1. Red Test Lead （the thick wire is current lead、 the thin wire is the voltage lead）
2. Black Test Lead （the thick wire is current lead、 the thin wire is the voltage lead）
3. grounding wire

Connect the Micro-ohmmeter to MV Circuit Breaker

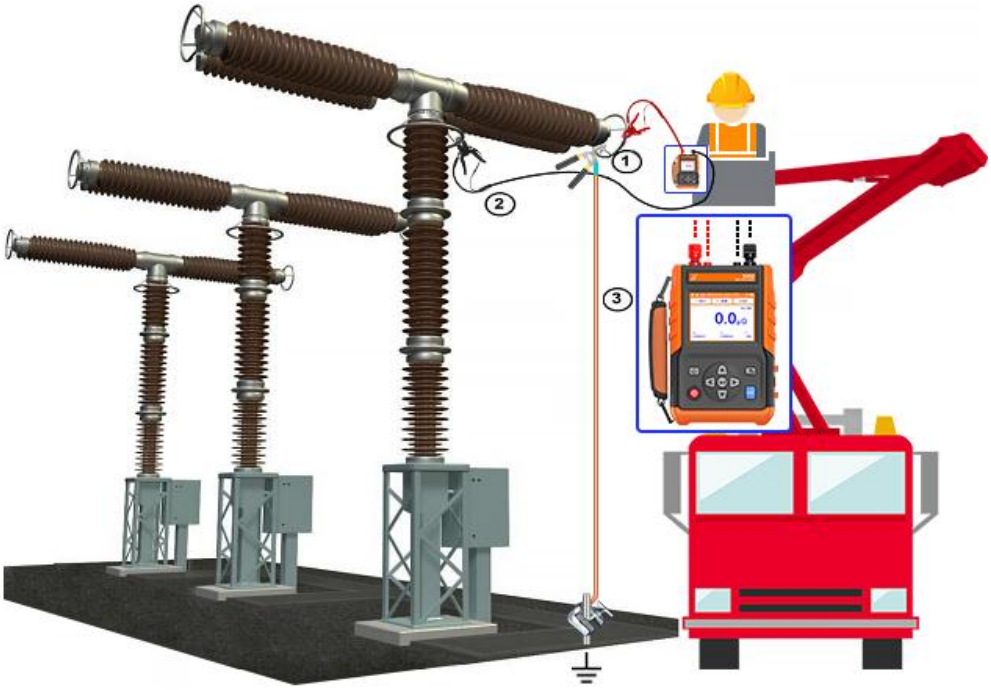
When measuring the MV circuit breaker, clamp the red test line clip to the handle of the circuit breaker, and the black test line clip to the other handle. The connection method is shown in the figure below:



Connect the micro-ohmmeter to the circuit breakers grounded at both ends (safer wiring connection method)

Before measuring the circuit breaker, connect the ground terminals at both ends of the circuit breaker with a ground cable. The connection method of the two-sided grounded circuit breaker is the same as that of the single-side grounded circuit breaker, but the measurement result of the two-sided grounding may show relatively small errors. The reason is that a small amount of current will flow through the tester when both sides are grounded, and the resistance of the ground loop will interfere, so the measurement result will show the sum of the test resistance and the resistance of the ground loop.

The connection method of the grounding circuit breaker on both sides is shown in the figure below:



1. Red Test Lead （the thick wire is current lead、 the thin wire is the voltage lead）
2. Black Test Lead （the thick wire is current lead、 the thin wire is the voltage lead）
3. grounding wire

Self-checking

The user can use the standard resistor equipped with the meter to perform self-checking for the instrument. If the resistance value tested by the meter is consistent with the standard resistance value, it means that the loop resistance test function of the meter is normal.

Protective Measure for the Instrument

High temperature protection;

Low battery power protection.

Battery Management

⚠	**If not use the instrument for a long time, charge the battery every 2 months.**
	When the battery voltage is too low, please charge it in time.
	Use the standard charger to charge.

1. The symbol “ 0% ” indicates that the battery level is low, and the instrument will automatically shut down soon.Use the charger to charge as soon as possible to maintain the battery. If the battery over-discharges, it may cause permanent damage to the battery.

2. Press the “⏻” key for 0.5 seconds to check whether the instrument can be turned on normally. If it still cannot be turned on normally, please contact the manufacturer.

3. If need to replace the battery, please contact the supplier.

V. Packing List

S/N	Name	Quantity
1	Tool Box	1 piece
2	Micro-ohmmeter	1 piece
3	Test Leads	1set, 3m black lead and 3m red lead
4	Self-test Resistor	1 piece
5	Printer (Optional)	1set, including a printer, charging line, printing paper and manual of the printer.
6	Charger	1 PC, 12.6V 2A
7	User Manual	1set, including User manual and Test Report

VI. After Sales Service

The tester can be repaired free of charge for any quality defects within one year from the date of delivery. But for quality problems caused by improper operation, or instrument damage caused by improper storage and transportation, our company will only provide the possible repair service, and will charge based on repair cost.

The lifetime repair and technical services will be provided on reasonable charges. For any abnormality or malfunction, please contact our company in time so that we can arrange the most convenient solution.

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