

Dear Client

Thank you for Purchasing our **HTHL-100B Micro Ohmmeter**.
Please read the manual in detail prior to first use, which will help you use the equipment skillfully.



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



The input/output terminals and the test column may bring voltage, when you plug/draw the test wire or power outlet, they will cause electric spark. PLEASE

CAUTION RISK OF ELECTRICAL SHOCK!

Company Address:

- ◆ T4, No. 41, High-tech 2 Road, East Lake High-tech Development Zone, Wuhan
- ◆ Sales Hotline: 86-27- 87457960
- ◆ After Service Hotline: 86-27- 87459656
- ◆ Fax: 86-27- 87803129
- ◆ E-mail: qiao@hvtest.cc
- ◆ Website: www.hvtest.cc

◆ **SERIOUS COMMITMENT**

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

◆ **SAFETY REQUIREMENTS**

Please read the following safety precautions carefully to avoid body injury and prevent the product or other relevant subassembly to damage. In order to avoid possible danger, this product can only be used within the prescribed scope.

Only qualified technician can carry out maintenance or repair work.

--To avoid fire and personal injury:

Use Proper Power Cord

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

Connect and Disconnect Correctly

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

Grounding

The product is grounded through the power wire; besides, the ground pole of the shell must be grounded. To prevent electric

shock, the grounding conductor must be connected to the ground.

Make sure the product has been grounded correctly before connecting with the input/output port.

Pay Attention to the Ratings of All Terminals

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

Do Not Operate without Covers

Do not operate this product when covers or panels removed.

Use Proper Fuse

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

Avoid Touching Bare Circuit and Charged Metal

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

Do Not Operate with Suspicious Failures

If you encounter operating failure, do not continue. Please contact with our maintenance staff.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in Explosive Atmospheres.

Ensure Product Surfaces Clean and Dry.

— **Security Terms**

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

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

Contents

1、 Overview.....	6
2、 Functions.....	7
3、 Features.....	7
4、 Specifictions.....	8
5、 Panel Layout.....	9
6、 Measurement Principle.....	10
7、 Operating Method.....	10
8、 Matters Needing Attention.....	12
9、 Fault Phenomenon And Elimination.....	12
10、 Packing List.....	14
Appendix 1: Basic knowledge of contact resistance. 错误！未定义书签。	
Appendix 2: Circuit Breaker Conductive Loop Resistance Standard Reference Value.....	错误！未定义书签。

1.Overview

At present, the measurement of contact resistance in the power system generally uses the conventional QJ44 type double-arm DC bridge, and the test current of this type of bridge is only mA level, it is difficult to find the defect of reducing the cross-sectional area of the loop conductor, and the contact of the high-voltage switch conductive loop is measured. In the case of resistance, the measured value is somewhat larger due to the influence of the oil film and the oxide layer between the contacts, and the contact resistance value cannot be truly reflected. To this end, the Ministry of Power Standard SD301-88 "AC 500KV power equipment handover and preventive test procedures" and the new "Power Equipment Preventive Test Procedures" to make the measurement current of the circuit breaker, isolation switch contact resistance is not less than DC 100A, To ensure accurate test results.

The instrument is designed according to the latest power standard DL/T845.4-2004 of the People's Republic of China, using high-frequency switching power supply technology and digital circuit technology. It is suitable for the measurement of the loop resistance of switch control devices. The test current is DC 100A and 200A recommended by national standards. The loop resistance can be measured directly at a current of 100A, or the loop resistance can be directly measured at a current of 200A. The

final test results are displayed numerically. The instrument has accurate measurement and stable performance, and meets the requirements of on-site high-voltage switch maintenance and high-voltage switch factory loop resistance test in power and power supply departments.

2.Function

The instrument is suitable for high-precision measurement of high-voltage switch contact resistance (loop resistance), and is also suitable for other applications requiring high current and micro-resistance measurement.

3.Features

1. Large current: Using the latest power technology, it can continuously output large current for a long time, overcomes the shortcomings of the pulsed power supply instantaneous current, can effectively penetrate the switch contact oxide film, and obtain good test results.

2. Strong anti-interference ability: Under severe interference conditions, the last bit of the LCD screen can be stable within ± 1 word range, the reading is stable and the repeatability is good.

3. Long service life: All high-precision resistors are used to

effectively eliminate the influence of ambient temperature on the measurement results. At the same time, the use of military connectors enhances the anti-vibration performance.

4. Easy to carry: small size and light weight.

4. Specifications

1. Measurement range: 1 ~ 1999 $\mu\Omega$
2. Discrimination: 1 $\mu\Omega$
2. Test current: DC 50A, 100A two-speed fixed output
3. Measurement accuracy: 0.5% \pm 1d
4. Working mode: continuous
5. Display mode: three and a half LCD
6. Working power supply: AC220V \pm 10% 50Hz
7. Ambient temperature: temperature - 10 ° C ~ 40 ° C humidity \leq 80 % RH
8. Volume: 300 (length) \times 290 (width) \times 220 (height) mm³
10. Quality: 6kg (without accessories)

5. Panel Layout

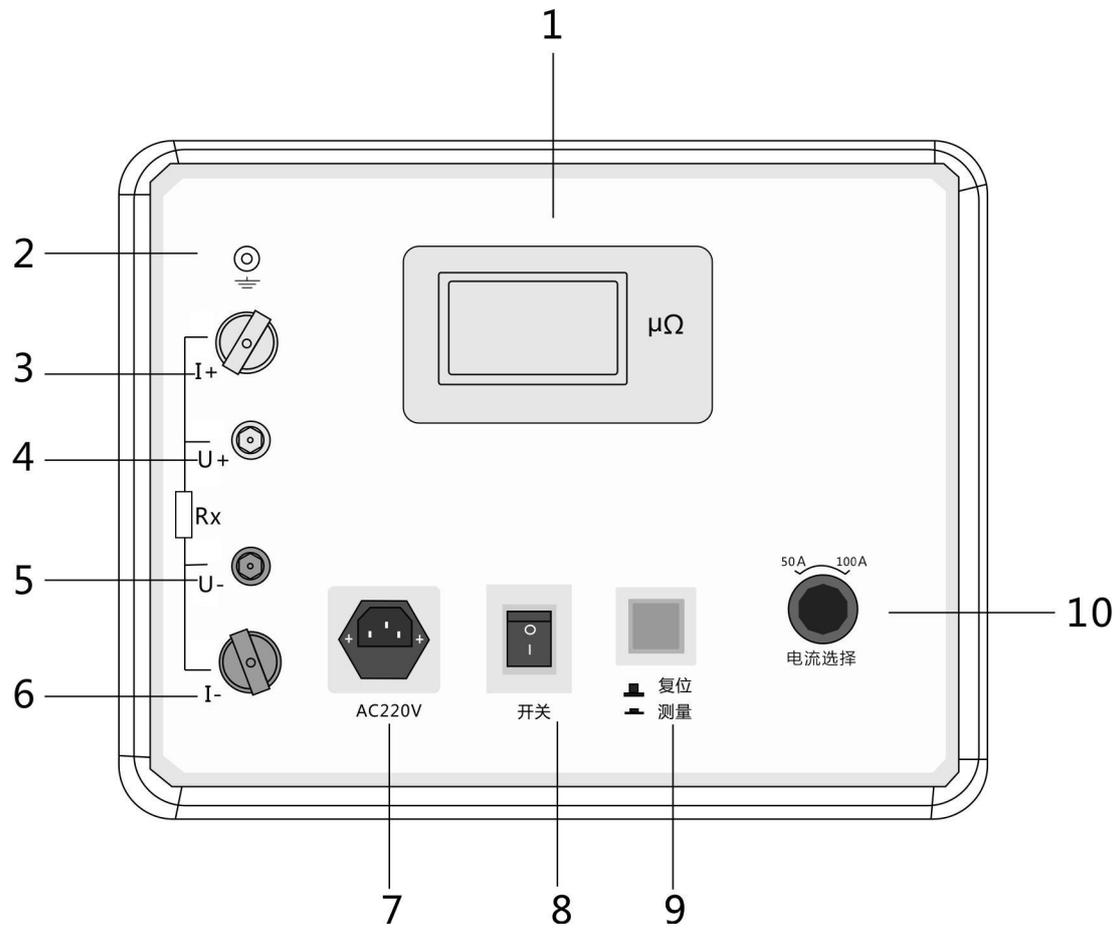


Figure 1 Panel structure

1. Resistance display 2. Grounding Rod 3. Current Output I
($\mu\Omega$) +
4. Measurement input 5. Measurement input 6. Current Output
input U+ U- I-
7. Power outlet 8. Power switch 9. Test button
10. Current Selection
Switch

6.Measurement Principle

This instrument adopts the principle of current and voltage method, also known as four-wire method test technology. The block diagram of principle is shown in Figure 2.

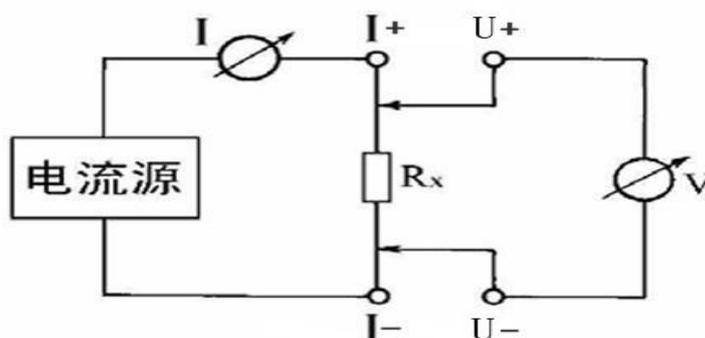
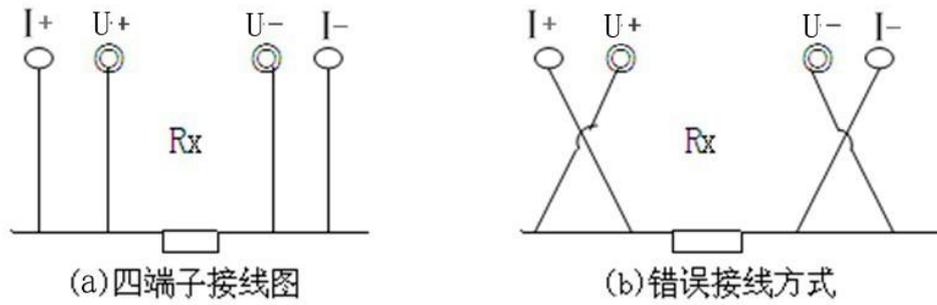


Fig. 2 Test schematic diagram

By the current source through the "I+, I-" two ports (also known as the I-port), to supply the measured resistance R_x current, the size of the current has ammeter I read out, R_x voltage drop "U+, U-" two ports (also known as V-port) take out, by the voltmeter V read out. Through the measurement of I and U, the resistance of the tested resistance can be calculated.

7.Operating Method

1. Connect according to the figure three wiring method.



4 terminal wiring diagram

Wrong wiring method

Fig. 3 and 4 terminal wiring diagram

2. The connection between the instrument panel and the test line should be tight and there should be no looseness.
3. It should be wired according to the four-terminal method, that is, the current line should be clamped on the outside of the test object, and the voltage line should be clamped inside the test object. The current and voltage must be the same polarity.
4. After checking and confirming the error, connect 220V AC, close the power switch, and the instrument enters the power-on state.
5. Adjust the "Current Selection" knob to select the current gear to be selected, and then press the "Measure" button. The resistance meter display value is the measured loop resistance value. If 1 is displayed, it indicates that the measured loop resistance value is out of range.

6. After the measurement is completed, disconnect the power switch, and collect the test cable clamp and put it into the accessory bag.

8.Matters Needing Attention

1. Please read the instructions carefully before using the instrument.

2. Please follow the correct wiring method on the instruction manual.

3. This instrument must not test the loop resistance in the live loop.

4. The instrument must be reliably grounded during use.

5. The user of the current line must not be replaced at will.

6. When the instrument is not in use, it should be stored in a ventilated, dry, cool, clean place, pay attention to moisture and corrosion-proof gas.

9 Fault Phenomenon And Elimination

Fault phenomenon	Troubleshooting
No reaction after power-on,	Check for AC power supply
	Check power cable

no display on LCD screen	Check whether the fuse in the base of the fuse is blown
The resistance value is displayed at 0.	Check if the "test" key is pressed
	Check whether the current output line is well connected and not in good contact.
The resistance value is shown to be significantly larger or to be 1 (over range) during the test.	Check that the "Current Selection" key is selected correctly
	Check if the measured resistance is too large
	Check whether the voltage input line is connected to the inside of the current output line
	Check whether the voltage output line is connected properly and whether the tested joint is oxidized

10 Packing List

1、 Host	1
2、 Special test line (two high current lines 6m, two high current test clips, two voltage test lines 6m)	1
3、 Ground wire	1
4、 5A Fuse	3
5、 Accessory package	1
6、 AC220V Power Cord	1
7、 Instruction manual	1
8、 Certificate	1
9、 Inspection report	1

Appendix 1: Basic knowledge of contact resistance

1. What is contact resistance?

The contact resistance is an additional resistance that occurs when the stationary contact and the movable contact are in contact with each other.

2. What are the components of the circuit breaker contact resistance?

It consists of two parts: the shrinkage resistance and the surface

resistance of the contact part of the moving and static contacts.

3. What is the reason for the failure of the circuit breaker contact resistance?

- The contact burns out when a large short-circuit current is broken.

- Due to poorly adjusted mechanism, the stroke is not fixed, resulting in a change in stroke. When the overtravel is severely unqualified, the contact pressure or contact area changes.

- After the circuit breaker is commissioned and installed, it has not been put into operation for a long time, so that the surface of the moving and static contacts is oxidized and the contact surface resistance is increased.

- Long-term operation deforms the spring and reduces the contact pressure.

- Mechanical wear caused by long-term operation of the mechanical part.

- For oil-less circuit breakers, it may also be acidic due to the acid value of the insulating oil, eroding the contact surface. Or floating impurities in the oil, after the short-circuit current between the moving and static contacts. Residual particulate carbonaceous, metal powder, increases contact resistance.

4. Factors affecting contact resistance?

- Material properties: electrical resistivity, hardness, chemical properties, mechanical strength and electrical resistivity of metal compounds.

- Contact form: point contact, line contact, face contact.
- Contact surface condition: When the contact surface forms an oxide film (except for silver), the oxide film is much larger than the metal itself.
- Contact pressure.
- the roughness of the contact surface.

Appendix II: Circuit Breaker Conductive Loop Resistance Standard Reference Value

Model	Loop resistance per phase ($\mu\Omega$)	Model	Loop resistance per phase ($\mu\Omega$)
SN1-10	<95	DW1-60G	200
SN2-10G	75	SW1-110	700
SN4-10	50—60	SW2-110I	180
SN4-20	50—60	SW3-110	160
SN4-10G	20	SW4-110	300
SN4-20G	20	SW6-110	180—220
SN5-10	100	SW2-220	400
SN6-10	80	SW4-220	600
SN10-35	<75	SW6-220	<400
DW1-35	550	SW7-220	<190
DW1-60	500	KW1-220	400
DW3-110	1100—1300	KW2-220	170

DW2-110	800	KW3-220	110
KW1-110	150	KW4-220	130
KW3-110	45	DW2-220	1520
KV4-110A	60	DW3-220	1200
DW3-110G	1600—1800	SW6-330	>600