

Dear Client,

Thank you for choosing our HTHL-100A Contact Resistor Tester. Please read this manual carefully before your initial use, and this manual will help you use our equipment skillfully.



There may be a little bit differences between the equipment you got for our trial to improve and perfect our products. You can find the changes in the appendix. Sorry for all the inconvenience caused to you. You can contact us if you have any doubts of our tester.



Voltage of terminals side may be Hazardous that would cause Electrical Discharge when you attach and detach test side. Be careful for risk of electric shock and personal injury.

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◆ **SERIOUS WARRANTY**

All products of our company carry a three-month limited warranty from the date of shipment. If any such product proves defective during this warranty period we will provide a replacement in exchange for the defective product without charge. In one year (including one year) the product will be maintained and repaired for free if it proves to be defective. Beyond one year, lifetime maintenance and repair with charge is available.

◆ **SAFETY REQUIREMENTS**

Please read the following safety precautions to avoid personal injury and to prevent this product or any other attached products being damaged. In order to avoid possible danger, this product can only be used within the scope of the provision.

Only qualified technician can carry out maintenance or repair work.

—To avoid fire hazard or personal injury

Use Proper Power Cord. Use only the product-specific power cord and the power cord must be in line with the specifications of the product.

Connect and Disconnect Correctly. When the testing wire is connected to the charged terminal, do not connect or disconnect to test wire at will.

Ground the Product. In addition to this product being grounded through the grounding conductor of the power cord, the grounding

column of the product shell must also be grounded. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, please do check that the product is properly grounded.

Pay Attention to the Ratings of All Terminals. In order to prevent the fire hazard or electric shock, please be care of all ratings of this product and labels. Before connecting this product, please read the product manual to acquire information about the ratings in further detail.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Touching Bare Wire and Conductor. When the product is charged, do not touch the bare connection point and parts.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in Explosive Atmosphere.

Keep the Surface of the Product Clean and Dry.

— **Security Terms**

Warning: Warning statements identify conditions or practices that could result in injury or loss of life.

Caution: Caution statements identify conditions or practices that could result in damage to this product or other property.

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I. Overview

Nowadays Power Systems usually use QJ44 type DC bridge arms to measure DC resistance and Loop resistance of high-voltage circuit breaker while the minimum of such kind of arms is 1mA which hardly find the decrease of cross-sectional area of transformers' conductive circuit conductor. The measurement of loop resistance of high voltage switchgear is affected by oxide between oil layer and static and dynamic contact port, so the resistance measures larger several times.

HTHL-100A Contact Resister Tester meet the criteria of the latest power system standards--DL/T845.4-2004. The tester bases on the combination of High-frequency switching power supply technology and digital circuit technology. It is suitable for measurement of loop resistance of Switching Control Equipment. Test current of the Tester is DC-100mA which is recommended in the national standards. The Tester can measure the loop resistance and display in the monitor. Its accuracy and stability meet most power systems' requirements in maintenance and loop resistance of high-voltage switches.

II. Functions

HTHL-100A Contact Resister Tester is suitable in high-precision

measurement of high-voltage switches' resistances. It also helps in measurement of equipments that have high current and micro resistivity.

III. Features

(1)High current: For latest technology of battery, the tester can output sequential high current which overcome the difficulties in instantaneous current of pulsed power. It can effectively Breakdown the oxide layer between the switches and then get more precise results.

(2)Strong anti-interference ability: the last number of test data showed in the LCD screen ranges ± 1 even in strong Interference situation.

(3)Long service life: all of the precise resistances used in the tester can reduce The temperature's impact on the measurement results and military connectors can enhance vibration resistance.

(4)Convenience: smaller and lighter.

IV. Specifications

- 1、 Measurement range: $1 \sim 1999 \mu\Omega$
- 2、 Resolution: $1 \mu\Omega$
- 3、 Test current: DC 100A

- 4、Accuracy: 0.5% \pm 1d
- 5、display: current : Three and half-LED
 resistance : Three and half-LED
- 6、Power Supply: AC220V \pm 10% 50Hz
- 7、Work environment: Temperature : - 10 $^{\circ}$ C \sim 40 $^{\circ}$ C
 Humidity: \leq 80 %RH
- 8、Size: 390 \times 300 \times 150 mm³
- 9、Weight: 6kg (Accessories excluded)

V. Panel Layout

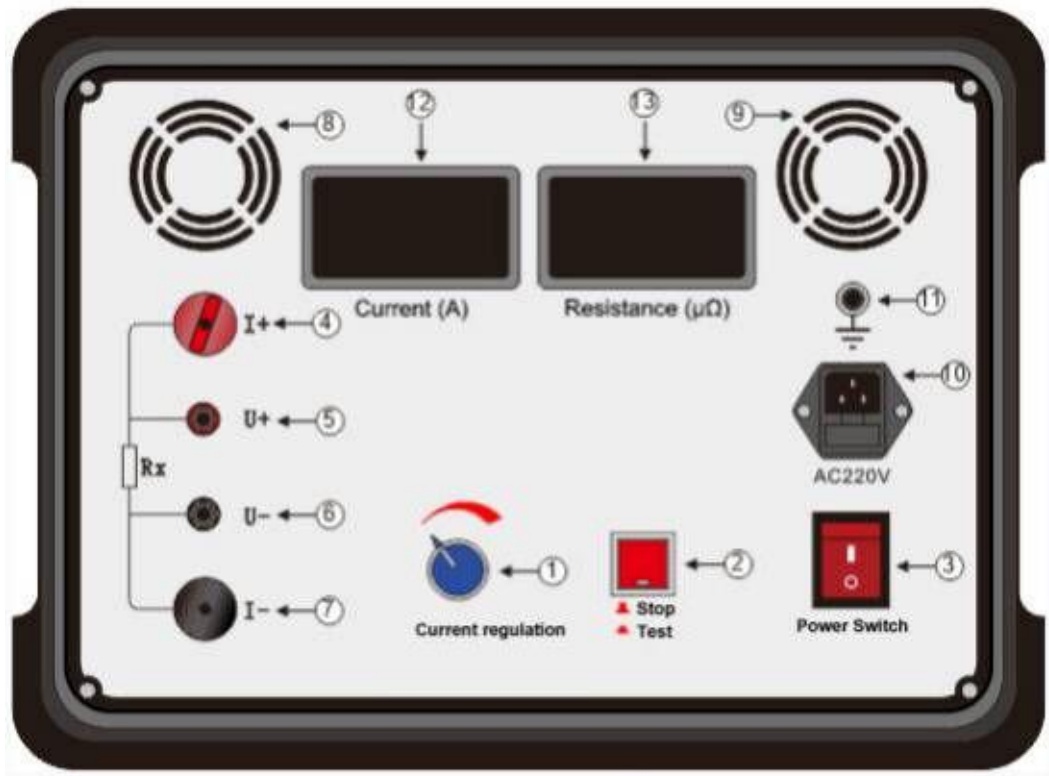


Figure 1 Panel Layout diagram

1、Current Regulator	2、Measure Switches	3、Power Switch
4、Current output I+	5、Measurement input U+	6、Measurement input U-
7、Current output I-	8、Vent	9、Vent
10、Jack	11、Ground	12、Current Display (A)
13、Resistance Display ($\mu\Omega$)		

VI. Measurement Principle

HTHL-100A Contact Resistor Tester bases on the Current and voltage testing theory that also names Four-line method testing technology. More details in Figure 2.

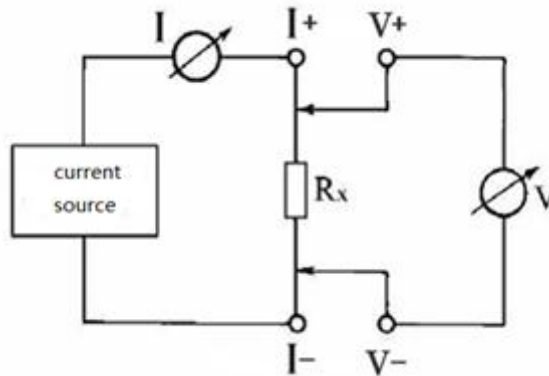


Figure 2 Test Schematic

The current goes through the I+, Rx and I-, Current value can be got from the Ammeter I, and the voltage between Rx is showed in the Voltmeter V. Then the resistance value can be calculated.

VII. Using the Tester

1、Wire as showed in the Figure 3.

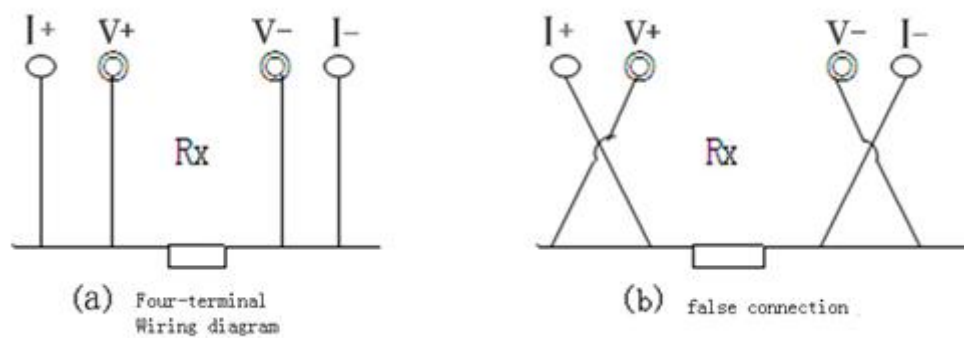


Figure 3 Four-terminal Wiring diagram

2 、 Loosening between panel and test lines should be forbidden.

3 、 You should use Four-terminal wiring method in which current lines places laterally.

4 、 After checking the connection of tester and test lines, Access to 220V AC and start the tester.

5、 Adjust “Current Regulator” knob to raise current to 100.0A and push “Measure Switches”. The resistance value displayed in the monitor is the value of loop resistance tested. Displaying 1 indicates loop resistance tested is beyond the range; if the testing current is Not 100.0A, for example I_0 and the resistance value showed is R_0 , the actual resistance is $R=100\times(R_0\div I_0)\mu\Omega$.

6、 After using the tester, please turn off the power switch and collect the test lines.

VIII. Problems and Solutions

Problems	Solutions
No respond after powering on	Check if AC power is on
	Check the power Cables
	Check if the Fuse is Blown out.
Displaying 0A during measurement	Check if "Reset/Test" button is pushed.
	Check if current output lines have poor contact.
Displaying actual current values but 0 resistance	Check if "Reset/Test " button is pushed
	Check if current output lines have poor contact
Displaying actual current values but resistance evidently larger or 1 (beyond range)	Check if resistance value is too large
	Check if current lines places laterally
	Check if current output lines have poor contact or the port connected to the test piece is oxidized.

IX. Notes

- 1、 Please read the manual carefully before using this tester.
- 2、 Please wire properly as recommended in this manual.
- 3、 This tester cannot measure resistance that is in a live circuit.
- 4 、 Ground should be connected during the use of this equipment.
- 5、 Arbitrary replacement of current lines is forbidden
- 6、 The tester should be put in ventilated, dry, cool and cleaning

place and pay attention to humid or erosive gas that may damage this equipment.

X. Accessories

1、 Host	1
2、 Test wire (high current wire 6m, 2pcs; high current pliers 2pcs; voltage test wire 6m, 2pcs).	1 set
3、 Earth lead	1
4、 Fuse (8A)	3
5、 Accessory bag	1
6、 Power cord	1
7、 User manual	1
8、 Inspection report	1
9、 Certification	1

Appendix A: Basics about Contact Resistance

1、 What is contact resistance?

Contact resistance is the Additional resistance because of the contact of static contact and dynamic contact.

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

Circuit breaker contact resistance is composed of shrink resistance and surface resistance of both static contact and dynamic contact.

3、 What are the reasons of circuit breaker contact's Quality failure?

— Contacts are burned because of Short.

— After breaker is tested, it is not put into operation for a long time, so the static contact is oxidized and the Surface Resistance becomes larger.

— Deformation of spring cause decrease of contact pressure because of long-term use.

— Mechanical wear because of long-term operation.

4、 What can affect contact resistance?

— Material properties: Resistivity, hardness, chemistry and mechanical strength

— Contact form: Point contact, line contact and area contact.

— Situations of area contact: When there is area contact, the resistance of oxide layer is larger than that of metal.

— Contact pressure.

— Roughness of contact area.

Appendix B: Reference to Resistance of conductive circuit breaker

Type	contact Resistance ($\mu\Omega$)	Type	Loop Resistance ($\mu\Omega$)
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