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## **I. Product Overview**

Traditionally DC bridge is widely used to measure DC resistance of transformer coil and contact resistance of high voltage breaker in power system. But the test current of this kind of bridge is only mA level that it is difficult to detect many defects. The ZXHL-600A Contact Resistance Tester is designed according to the latest electric power implementation standard, combines high-frequency switching power supply technology with digital circuit technology. suitable for the measurement of the circuit resistance of the switch control equipment. The instrument can output 100A, 200A, 400A, and 600A current. It can directly measure the contact resistance in the case of current 100A, or directly measure the contact resistance in the case of current 600A, the final test results are displayed in figures. The instrument is accurate in measurement and stable in performance. It is in line with the requirements of the maintenance of high voltage switch in the power and power supply departments and the resistance test of the high voltage switch plant.

## **II. Function**

ZXHL-600A contact resistance tester is suitable for high precision measurement of high voltage switch contact resistance (loop resistance), also suitable for other occasions requiring large current and micro resistance measurement.

## **III. Features**

1. Large current : sustainable output test current from a constant current

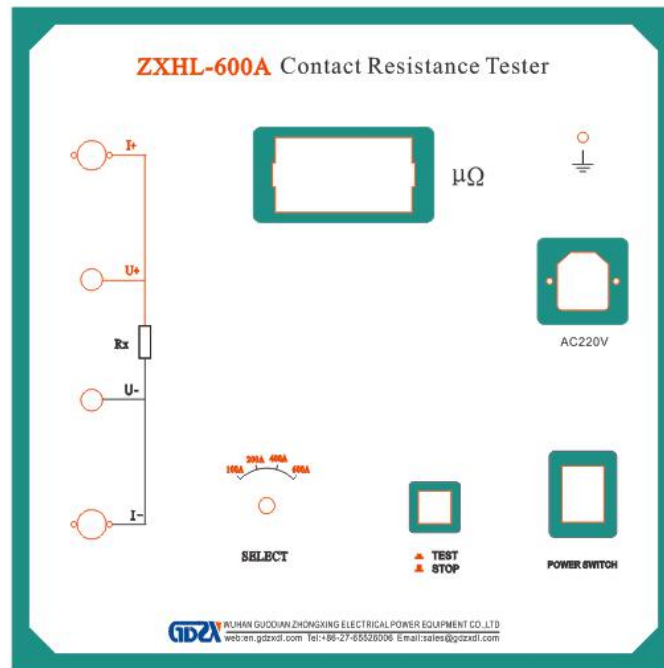
source, which overcome the malpractice of instantaneous current of the impulse type power, can effectively break through the oxide film of the switch contact, get accurate test results.

2. High stability: under strong interference, the last number of display can be stabilized within  $\pm 1$  word range, steady reading and good reproducibility.
3. Long service life: use high precision resistance to eliminates the effect from ambient temperature.
4. Easy to use: small in volume, light in weight.

#### IV. Parameters

Measurement range	1~1999.9 $\mu\Omega$
Resolution	1 $\mu\Omega$
Test current (customized)	DC 100A、200A、400A、600A
Accuracy	0.50%
Continuous working time	100A:600S,200A:60S,400A:10S,600A:10S
Display	Three and a half digital LED display
Power supply	AC220V $\pm$ 10% 50Hz
Service conditions	Temperature -10 $^{\circ}$ C~40 $^{\circ}$ C, humidity: $\leq$ 80%RH
Dimension	350 $\times$ 350 $\times$ 510mm
Weight	30Kg(not including accessories)

#### V. Panel



1.LED screen	2.AC220V power supply	3.Power switch
4.Current gear	5.Test/Stop	6. I-
7. U-	8. U+	9. I+
10.GND		

## VI. Working principle

The ZXHL-600A circuit resistance tester adopts current and voltage method, that is, four line test technique, please see diagram in Figure 2

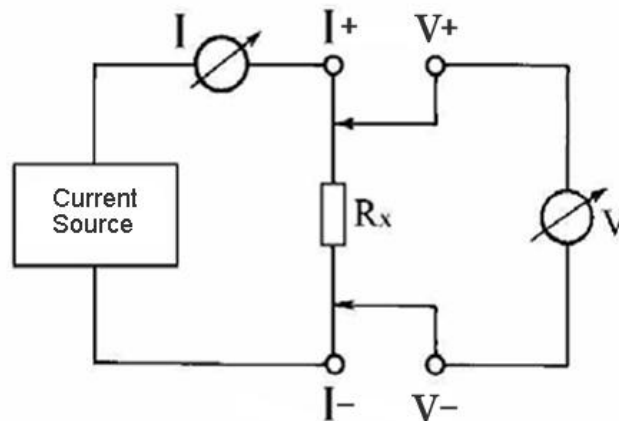


Figure 2 Test schematic diagram

The current source passes through I+ & I- terminals, supplies the measured resistance  $R_x$  with current. Current read by ammeter I, V+ and V- read out by voltmeter V. Through the measurement of I and V, the resistance value of the measured resistance can be calculated.

## VII. Operation Method

1. Wiring connection as per Figure 3

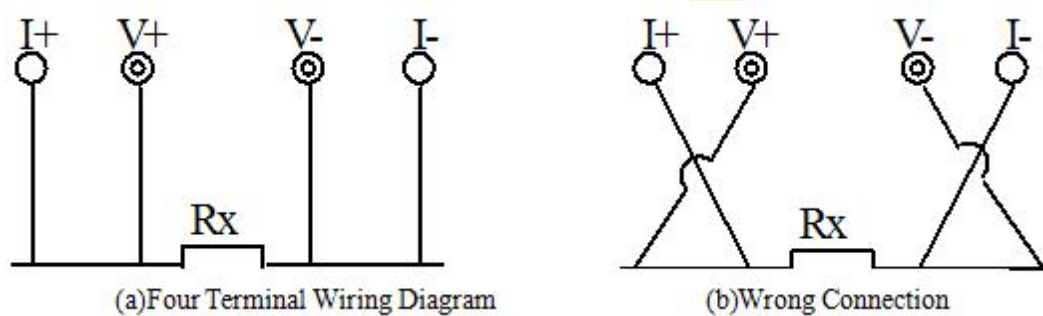


Figure 3 Four terminals Wiring Diagram

2. Test line should be tight connected with Instrument panel, no loose.
3. Test in accordance with the four terminal connection method, that is, the current line should be clamped outside, the voltage line inside of the test object, and current and voltage polarity is the same
4. After check above, plug in 220V AC power source, turn on the power switch, to open the instrument.
5. Rotate the "current selection" knob to select the current, press "Test" key, The screen will display the tested contact resistance. If the display is "1", it means it is out of range.
6. After the measurement, turn off the power switch, put back the test lines into the accessory package.

## VIII. Fault phenomenon and troubleshooting

Fault phenomenon	Troubleshooting
No response after boot, LCD screen no display	Check if there is AC power supply
	Check power supply cable
	Check the fuses within the base, fuse blown or not
Resistance display value is 0	Check if press down "Test" button
	Check the current output line is not connected, whether the bad contact
	Check if "current selection" button is selected correctly
Resistance value is significantly large or display is 1 (over-range)	Check if the measured resistance is too large
	Check if the voltage input line is connected to the inside of the current output line
	Check the voltage output line is not connected, the test piece connector is oxidized

## IX. matters needing attention

- ◆ Please read the instructions carefully before using the instrument.
- ◆ Please follow the instructions on wiring connection.
- ◆ Do not test contact resistance in the live circuit.
- ◆ The instrument must be reliably grounded during the use.
- ◆ Current line users are not free to replace.
- ◆ When not in use the instrument should be placed in ventilated, dry, cool, clean place, isolated from moisture, corrosion-resistant gas.

## X. After sales Service

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Customers who purchased our company's products enjoys the following

- ◆ Instrument from the date of sale within one month, if any quality problems, our company make free replacement, but users can not disassemble themselves. improper use by user such as wrong plug power, water, mechanical apparent damage is not in the scope of this situation.
- ◆ Instrument within a year, maintenance free of charge.
- ◆ The instrument from the date of sale more than one year, the company is responsible for long-term maintenance, materials fee to charge appropriately
- ◆ When Instrument fails, it should be checked by full-time maintenance personnel or returned back to company to repair, do not open the instrument yourself, otherwise our company would not take the responsibility.

## **XI. Packing List**

1. Main Tester	1 pcs
2. Fuse (15A)	2 pcs
3. Test line	1 set
4. Ground line	1 set
5. AC power supply cable	1 pcs
6. Manual	1 copy
7. Certificate/Warranty card	1 copy
8. Test report	1 copy

## Appendix I

### Contact resistance Basics

1. What is the contact resistance?

Contact resistance is additional resistance generated when the static contact makes contact with the moving contact

2. The circuit breaker contact resistance consists of which parts?

It is composed of two parts: shrinking resistance and surface resistance in the contact section.

3. Why the circuit breaker contact resistance is unqualified?

- a. Contact burn when breaking a large short-circuit current.
- b. Poor institutional or not securely fixed, makes the travel changes, when there is serious over-stroke, there will be changes on contact pressure and contact area
- c. Long time no operation results in contact surface oxidation and larger surface resistance
- d. Long time running results in spring deformation and less contact pressure
- e. Mechanical wear after long-term operation of the mechanical parts
- f. For oil-minimum breaker, insulating oil acidic reaction may etch the contact surface. Or remained carbonaceous particles between the contacts after breaking the short-circuit current (due to oil impurity), enlarge contact resistance

4. Which factors are affecting the contact resistance?

- a. Material properties: hardness, chemical properties, mechanical strength and resistivity of the metal compound.
- b. Contact form: point contact, line contact, surface contact.
- c. Contact surface condition: When (silver exceptions) there is an oxide film on the contact surface , the oxide film resistance is much greater than the metal itself
- d. Contact pressure.
- e. The roughness of the contact surface.



## Appendix II

### Circuit breaker conductive contact resistance standard reference value

model	Each phase contact resistance ( $\mu\Omega$ )	model	Each phase contact 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