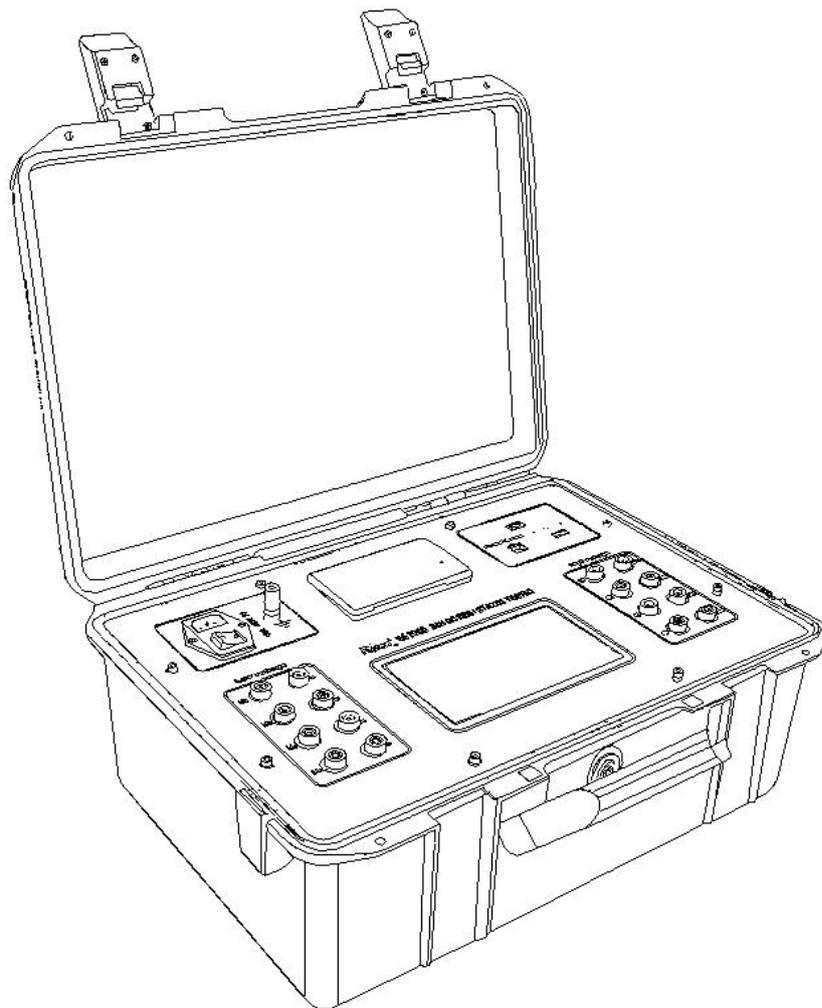


# 3CH DC RESISTANCE TESTER

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ES3080

**USER MANUAL**

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## I .Safety Rules and Precautions

Thank you for purchasing the company's three-channel DC resistance tester . Before you use the instrument for the first time, in order to avoid possible electric shock or personal injury, please be sure to read and strictly abide by the safety rules and precautions listed in this manual. .

- ✧ This instrument is designed, produced and inspected according to IEC61010 safety specifications.
- ✧ Be sure to read this manual carefully before using this instrument.
- ✧ In any case, special attention should be paid to safety when using this instrument.
- ✧ Pay attention to the text and symbols on the label of the instrument body.
- ✧ Before use, make sure that the meter and accessories are in good condition, and the insulation layer of the meter and test wire is not damaged, exposed, or broken before use.
- ✧ Before measuring, make sure that the connecting plugs of the wires are tightly inserted into the instrument interface.
- ✧ When measuring, do not shake the test lead or suddenly disconnect or short circuit, so as not to affect the normal measurement.
- ✧ During the measurement, it is strictly forbidden to touch the bare conductor and the circuit being measured.
- ✧ Since the input and output terminals, test posts, etc. may be under voltage, electrical sparks may be generated when plugging and unplugging test leads and power sockets!
- ✧ Do not measure in flammable places , sparks may cause an explosion.
- ✧ When the instrument is in use, when the casing or test wire is broken and the metal is exposed, please stop using it.
- ✧ Do not place and store the meter for a long time in places with high temperature and humidity, condensation and direct sunlight.
- ✧ Please do not turn the machine on and off frequently, it needs a buffer time of 5~10 seconds to switch on and off.
- ✧ Please use it in a 220V/50Hz power supply environment. If you use a power strip to extend the power supply, make sure that the current of the strip plug is greater than 10 A.

be usable.

- ✧ Pay attention to the measurement range and operating environment specified by this instrument. The use, disassembly, calibration and maintenance of this instrument must be performed by authorized personnel.
- ✧
- ✧ Due to the reasons of this instrument, if it is dangerous to continue to use it, stop using it immediately, and seal it up immediately and handle it by an authorized organization.
- ✧ safety warning”” sign in the instrument and manual , users must strictly follow the contents of this manual for safe operation.

## II .Introduction

**ES3080 three -channel DC resistance tester, also** known as power frequency grounding resistance tester, grounding resistance meter, etc., is a commonly used instrument for testing commonly used instruments for measuring grounding resistance. It adopts new frequency conversion AC power supply, dual-frequency measurement technology, large touchable color screen and microprocessor technology to meet the requirements of two-wire, three-wire and four-wire test impedance, and can measure soil resistivity, step voltage, distributed potential, touch voltage , current phase angle and other parameters. It is suitable for telecommunications, electric power, meteorology, computer room, oil field, power distribution lines, tower transmission lines, gas stations, factory grounding grids, lightning rods, etc. It meets the standards of power substations and lightning protection devices. The instrument test is accurate, fast, simple, stable and reliable.

The tester outputs an open-circuit rated voltage of 27 V and a maximum short-circuit current of 20 A. Microprocessor control and automatic dual-frequency technology can accurately measure and calculate the grounding impedance value under the 50Hz power frequency state under the strong interference state, and the large-screen display is clear at a glance. At the same time, 500 groups of data are stored, and the resistance measurement range is  $0.1 \mu\Omega \sim 5000\Omega$  . The measurement data can be printed by thermal printer , U disk and PC software can be exported .

The three-channel DC resistance tester consists of a host, test lines, etc., and has functions such as reading, viewing, saving, and printing historical data.

## III.Range and Accuracy

measure current	Measuring range	precision	Resolution
20A	0.0001~1.0000m $\Omega$	$\pm 0.2\%FS \pm 10dgt$	0.1 $\mu\Omega$
	1.001~10.000m $\Omega$	$\pm 0.2\%FS \pm 10dgt$	0.0 01m $\Omega$
	10.01~100.00m $\Omega$	$\pm 0.2\%FS \pm 10dgt$	0.01m $\Omega$
	100.1~1000.0m $\Omega$	$\pm 0.2\%FS \pm 10dgt$	0.1m $\Omega$
10A	0.0001~1.0000m $\Omega$	$\pm 0.2\%FS \pm 10dgt$	0.1 $\mu\Omega$

	1.001~10.000mΩ	±0.2%FS±10dgt	0.0 01mΩ
	10.01~100.00mΩ	±0.2%FS±10dgt	0.01mΩ
	100.1~1000.0mΩ	±0.2%FS±10dgt	0.1mΩ
5A	0.001~10.000mΩ	±0.2%FS±10dgt	0.001mΩ
	10.01~100.00mΩ	±0.2%FS±10dgt	0.01mΩ
	100.1~1000.0mΩ	±0.2%FS±10dgt	0.1mΩ
	1.001~5.000Ω	±0.2%FS±10dgt	0.001Ω
2A	0.001~10.000mΩ	±0.2%FS±10dgt	0.001mΩ
	10.01~100.00mΩ	±0.2%FS±10dgt	0.01mΩ
	100.1~1000.0mΩ	±0.2%FS±10dgt	0.1mΩ
	1.001~10.000Ω	±0.2%FS±10dgt	0.001Ω
0.5A	0.01~100.00mΩ	±0.2%FS±10dgt	0.01mΩ
	100.1~1000.0mΩ	±0.2%FS±10dgt	0.1mΩ
	1.001~10.000Ω	±0.2%FS±10dgt	0.0 01Ω
	10.01~50.00Ω	±0.2%FS±10dgt	0.01Ω
0.2A	10.01~100.00Ω	±0.2%FS±10dgt	0.01Ω
	100.1~1000.0Ω	±0.2 5 %FS±15dgt	0.1Ω
	1001~5000Ω	±0. 3 %FS± 20dgt	10h
<p>Temperature characteristics : plus test accuracy × 0.1/ °C within the operating temperature range . ( outside 18 °C to 28 °C )</p> <p>at 8 °C : ±0.2%FS±10dgt (basic accuracy) + 0.1 × 10 (temperature difference ) × (0.2 %FS + 10dgt )= ± 0.4 %FS ± 2 0dgt</p>			

#### IV. Technical indicators

<b>Function</b>	It is mainly used to measure the DC resistance of transformers, transformer winding resistance, grounding network connection continuity, wire resistance of cables, contact resistance of switches, connectors, relays, coils, motors, transformer winding resistances and metal riveting resistance, metal components Connection resistance test, low value resistance test, contact resistance test, etc.
<b>Resistance range</b>	0.1uΩ - 5000Ω _
<b>power supply</b>	AC 220V 10A (50Hz)
<b>Rated measuring power</b>	12 00W
<b>Backlight</b>	Adjustable backlight brightness
<b>measurement</b>	Four-wire test

<b>method</b>	
<b>Short circuit current output</b>	0.2 A, 0.5 A, 2 A, 5 A, 10 A , 20A ( 6 settings)
<b>Short circuit maximum current</b>	DC 20A ±10%
<b>No-load maximum voltage</b>	DC 27V ± 15 % _
<b>display screen</b>	7 -inch touch color screen
<b>Overload protection</b>	Have
<b>automatic discharge</b>	Have
<b>U disk interface</b>	Copy and save data
<b>USB interface</b>	With a USB interface , it can be connected to the host computer to view data
<b>Measurement instructions</b>	Measurement progress display, real-time measurement display
<b>Meter size</b>	Length, width and height: 400mm × 300mm ×210mm
<b>Test leads</b>	8 strips
<b>Print</b>	Built-in thermal printer
<b>Paper Specifications</b>	57*40mm
<b>data storage</b>	500 sets of measurement data storage
<b>Data access</b>	Have
<b>overflow display</b>	Over range overflow function: "OL" symbol display
<b>Power consumption</b>	Standby: ≤ 110W / Measurement: ≤ 15 00W
<b>quality</b>	Gauge: 7 kg
<b>Working temperature and humidity</b>	-10℃~40℃; below 80%rh
<b>Storage temperature and humidity</b>	-20℃~60℃; below 70%rh
<b>Insulation resistance</b>	10MΩ or more (500V between circuit and case)
<b>Pressure resistance</b>	AC 3700V/rms (between circuit and case)
<b>Electromagnetic properties</b>	IEC61010-4-3, radio frequency electromagnetic field≤1V/m
<b>Suitable for safety regulations</b>	IEC61010-1, IEC1010-2-31, IEC61557-1, 5, IEC60529 (IP54), pollution, etc. 2, CAT III 300V

## V. Instrument structure

1. printer

2. Ground terminal

3. switch

4. Low voltage test interface

5. USB interface

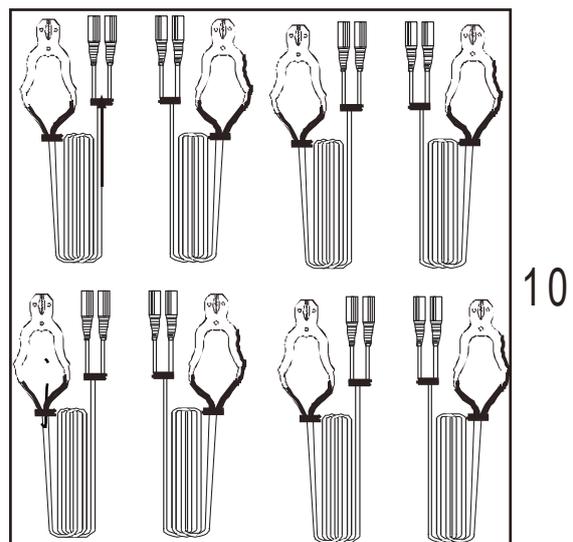
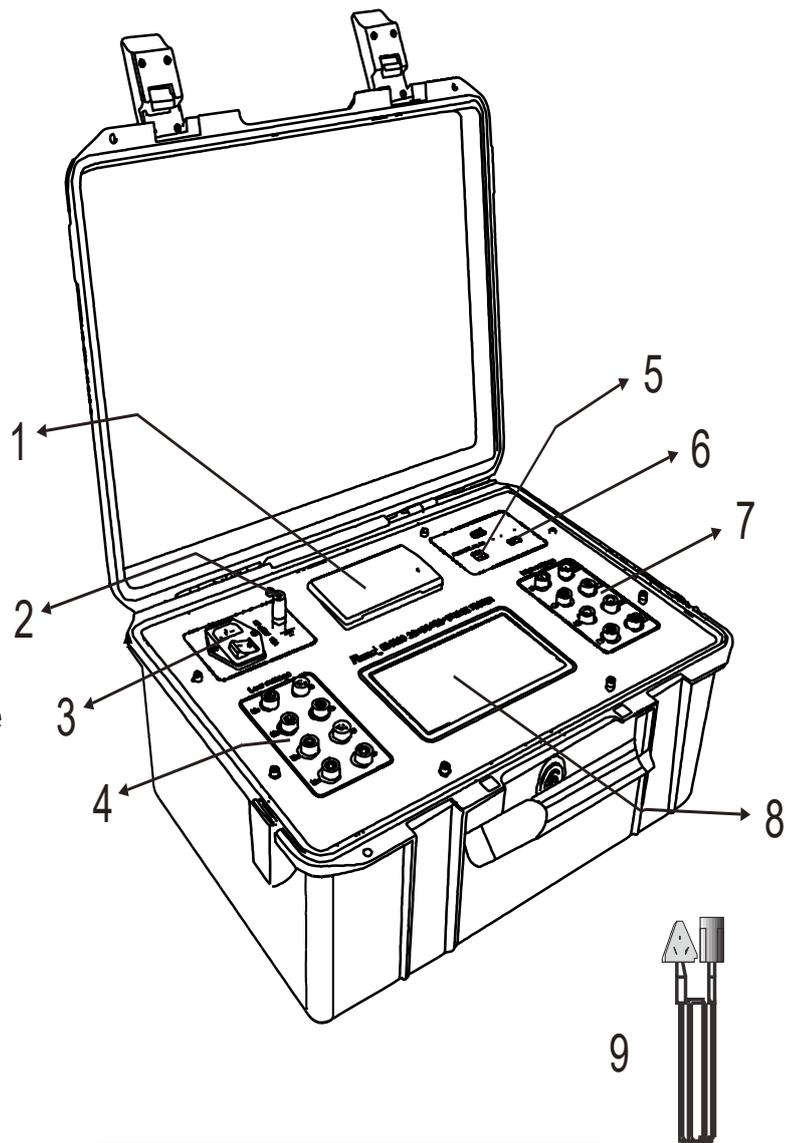
6. U disk interface

7. High voltage test interface

8. touch screen

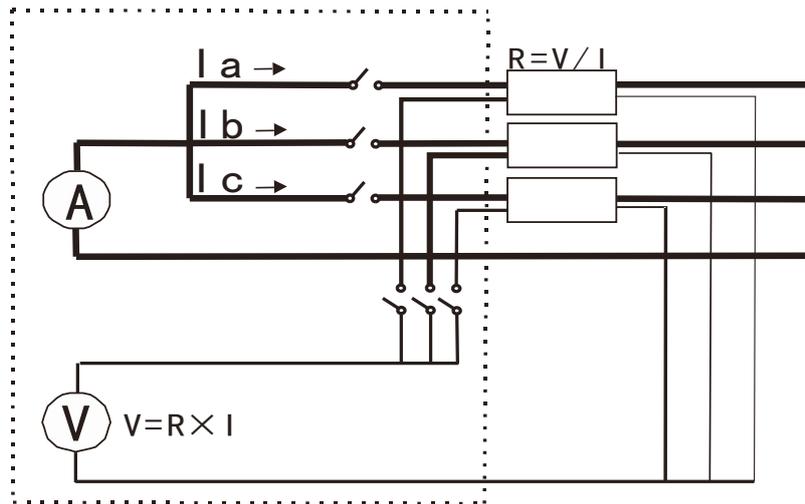
9. power cable

10. Test leads



## VI.Measurement principle

current source switches the output currents of phases a, b and c to the transformer to be tested one by one through the internal switch, and the voltage pole switches the phase a, b and c one by one through the internal switch to measure the voltage difference  $V$  of the test product , and calculates according to the formula  $R=V/I$  The DC resistance of the transformer, in order to ensure the measurement accuracy , the current pole and the voltage pole should be in contact with both ends of the test product independently , and the correct resistance value of the test product can be obtained without being affected by the wire resistance or contact resistance.



The dotted line is the inside of the meter

The magnetization method is to generate a magnetic field for the high winding output current to the low winding. With the help of the excitation ampere turns of the high voltage winding, the winding inductance is greatly reduced by passing a small current, so as to shorten the measurement time and achieve the purpose of fast measurement.

## VII.How to operate

### 1. Switch operation

	Do not turn on and off frequently, and the interval between switching on and off should be 5~10s, otherwise the instrument may be damaged.
	power supply current of the socket must be greater than 10 A before it can be used.

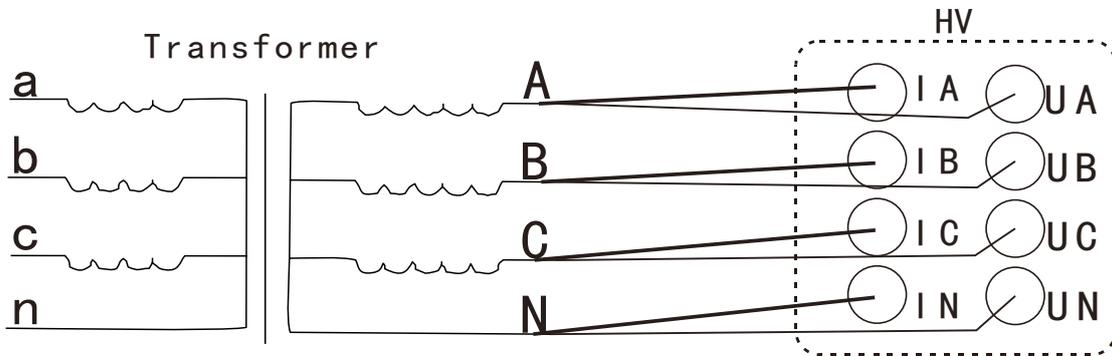
Connect the power cord, connect to the AC 220V/50Hz power supply, and turn on the switch button to the "—" position.

In the power-on state, press the button to the "o" position to shut down.

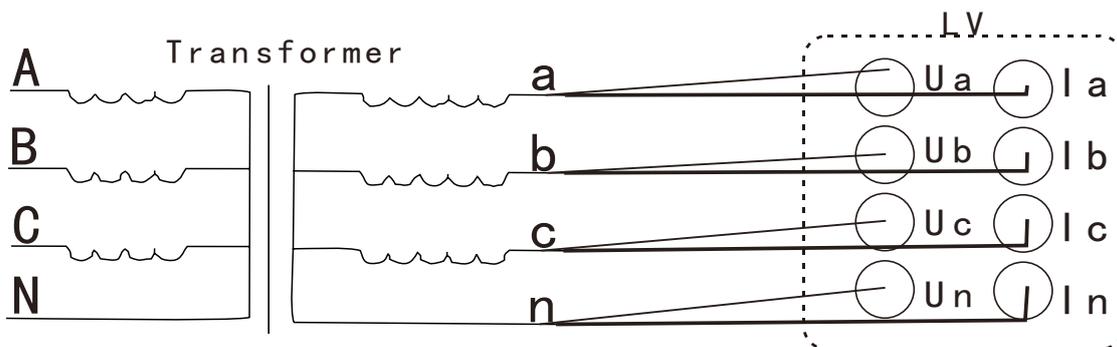
## 2. Wiring method

	<p>When extending the test line, the measurement line requirements: the cross-sectional area of the copper core of the current line is <math>\geq 2.5 \text{ mm}^2</math></p> <p>The cross-sectional area of the copper core of the voltage line is greater than or equal to <math>1.0 \text{ mm}^2</math></p>
	<p>When measuring the no-load voltage regulating transformer, be sure to switch gears after the discharge indication stops. During the test, it is forbidden to move the test clips and power supply lines.</p>

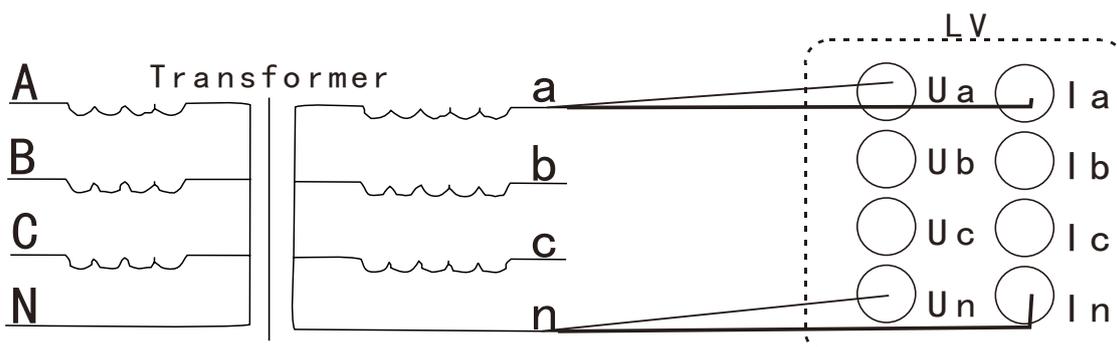
Wiring: Connect the test product to the terminal of the instrument firmly through the special test wire, and ground the ground wire reliably. The specific wiring is shown in the following figure: ( Ia, Ib, Ic, In - current pole; Ua, Ub, Uc, Un - Voltage pole ; thick test lead is connected to current pole, thin test lead is connected to voltage pole )



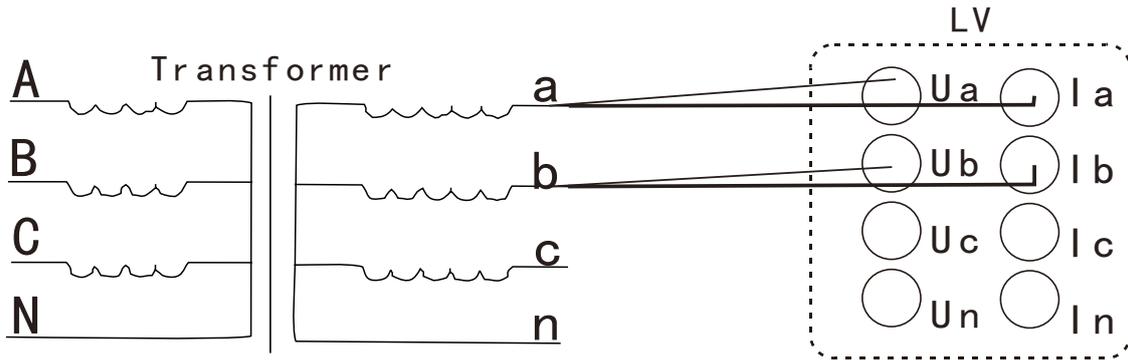
**Figure 7.1** Three-phase test wiring diagram of high voltage side



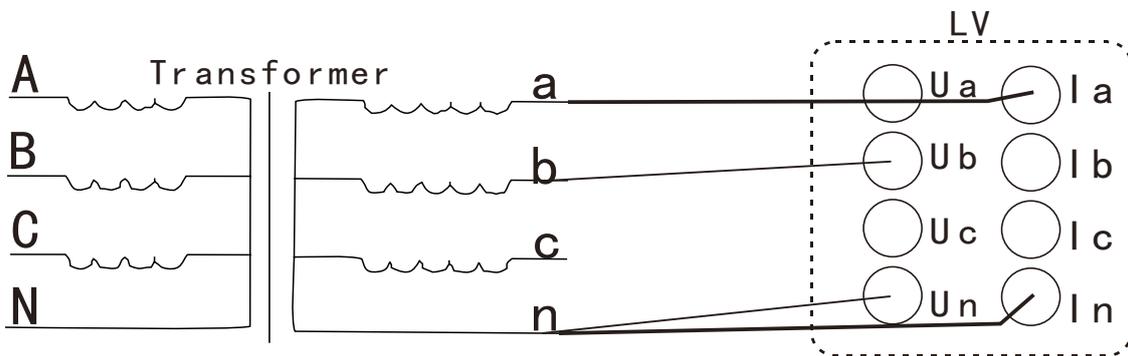
**Figure 7.2** Wiring diagram of three-phase test on low-voltage side



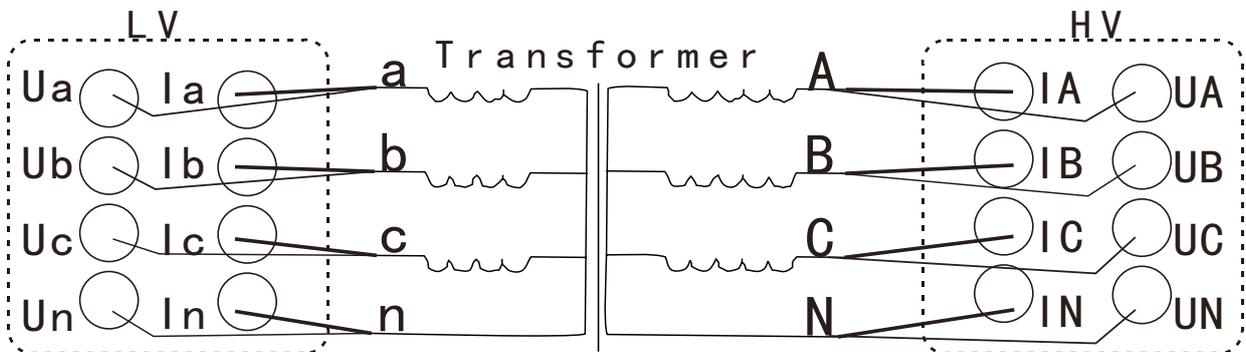
**Figure 7.3** Single-phase test wiring diagram



**Figure 7.4** Single-wire test wiring diagram



**Figure 7.5** Wiring diagram of neutral line test



**Figure 7.6** Wiring diagram of low-voltage magnetization three-phase test

Refer to Figure 7.3, Figure 7.4, Figure 7.5 and Figure 7.6 for the wiring diagram of low-voltage magnetic test single-phase, single-line, and zero-line test

### 3. Three - phase resistance test

Before starting the test, click on the main interface to enter the "parameter setting" interface, and set the temperature, conversion temperature and test material of the test process, as shown in Figure 7.7



Figure 7.7

- 1) Winding material: optional materials are: copper, aluminum, iron, gold, silver.
- 2) Winding temperature: refers to the current temperature of the winding.
- 3) Conversion temperature: The instrument automatically converts the test data to the input temperature of this item.

.....

The three-phase test is the measurement method for the YN-connected winding transformer. The wiring method is shown in Figure 7-1 or Figure 7-2 . After connecting the test line, click to enter the **three-phase resistance test** , and enter the interface for selecting measurement parameters as shown in Figure 7-8

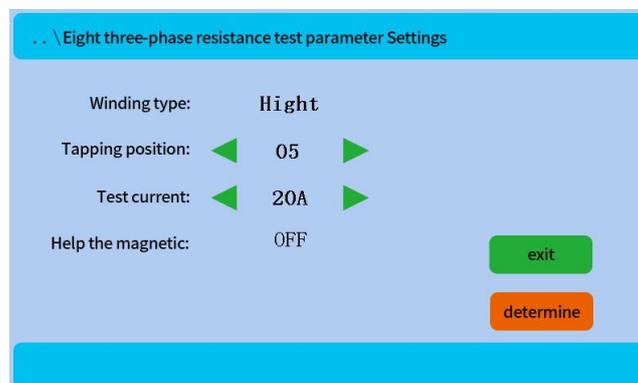


Figure 7.8

Press the "high voltage" font to switch the test high and low voltage windings , press the left and right arrows to set the tap position and test current

value, and press the "close" font to switch the switch of the magnetization measurement (the magnetization can only be turned on for the low voltage winding test , open The magnetization needs to be wired according to Figure 7.6 ), press "OK" to enter the resistance test interface as shown in Figure 7.9

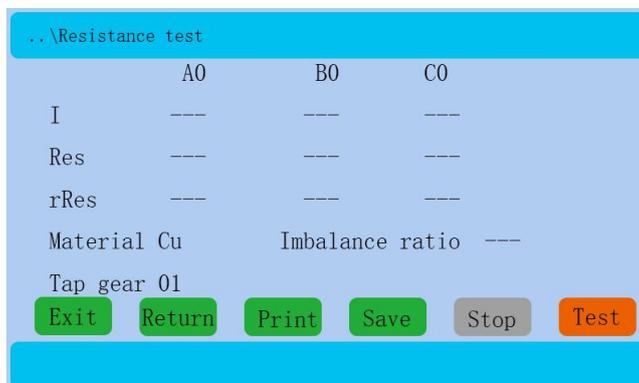


Figure 7.9

Press the "test button" to test, the test resistance will be displayed in real time during the test process, and the test resistance of the next phase will be switched if the output current and test resistance are stable , and the test phase will be discharged and degaussed after the test is completed . The screen displays the resistance, conversion resistance and current value in turn, and the unbalance rate is displayed after the test is completed .

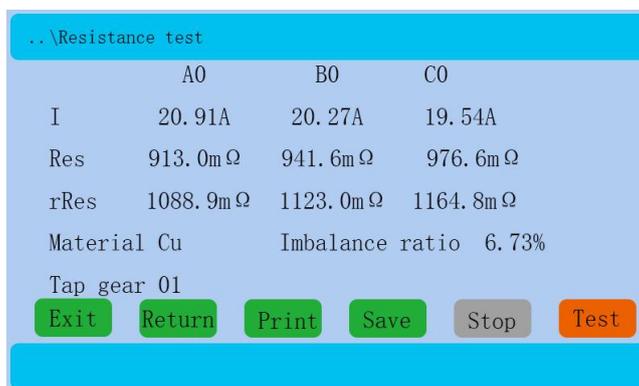


Figure 7.10

After the test is completed, you can press the " Save" button to store the test data, and press the "Exit" button to return to the main interface.

## 4. Single-phase resistance test

single-phase resistance test is shown in Figure 7.5. Enter the single-phase resistance test interface, and select the test parameters as shown in Figure 7.11. In this mode, there is one more parameter than the three- phase resistance test : "measure winding". This parameter is only for the convenience of the tester to mark the current test item as a certain winding, and press OK. Enter the test interface as shown in Figure 7.12

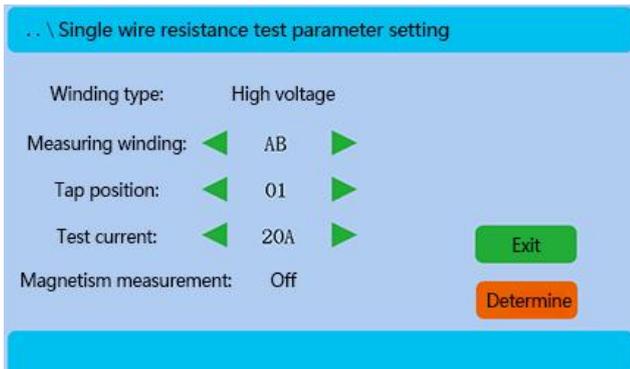


Figure 7.11

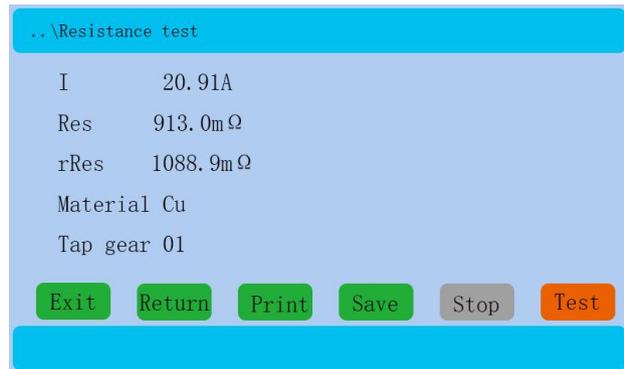


Figure 7.12

The operation method is the same as " **three-phase resistance test** ".

## 5. Single-wire resistance test

Single-line measurement is a measurement method for delta and Y-connected winding transformers. The wiring method is shown in Figure

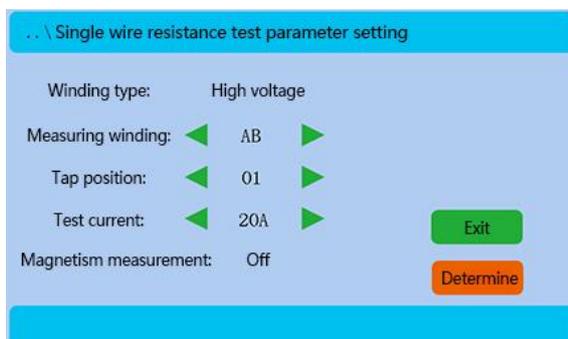


Figure 7.13

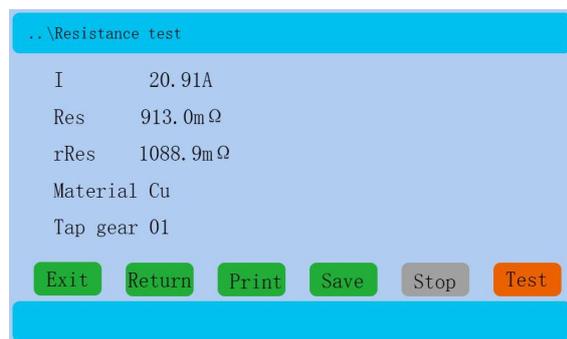


Figure 7.14

The operation method of single-wire resistance test is the same as " **single-phase resistance test** ".

## 6. Zero line resistance test

**zero line resistance test** is to test the DC resistance from the center point of the YN connection winding transformer to N. The wiring method is shown in Figure 7.5.

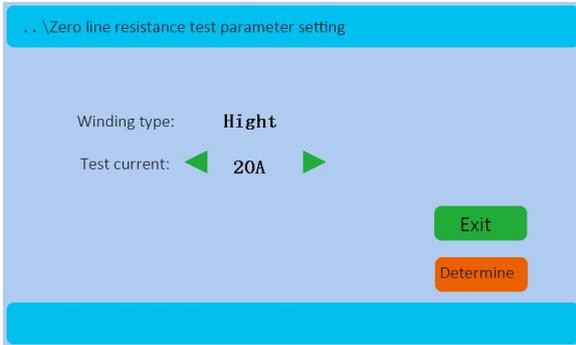


Figure 7.15

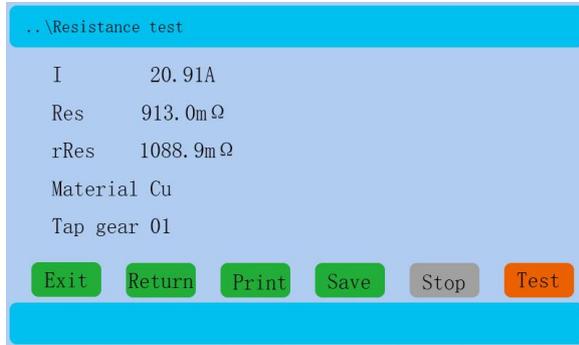


Figure 7.16

The operation method of zero-line resistance test is the same as that of " **single-phase resistance test** " .

## 7. Data query and deletion

Click " **Data Management** " on the home page to enter the data management page , and click " **Historical Data** " to enter data reading.

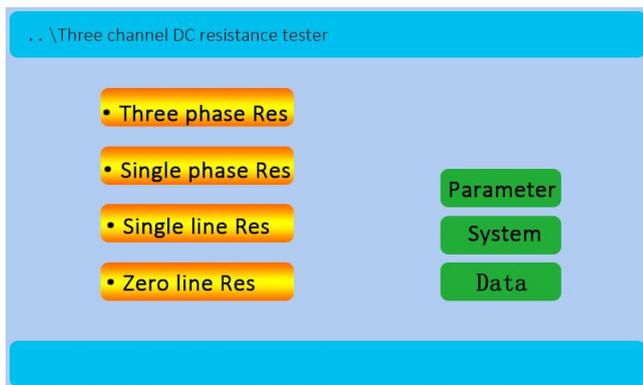


Figure 7.17

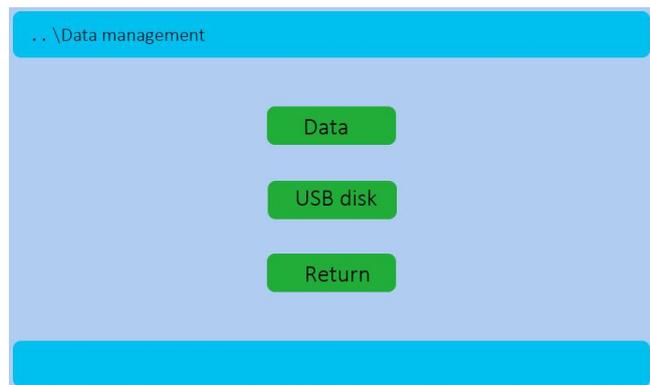


Figure 7.18

Click " **Previous** " and " **Next** " to turn pages up and down. Click the group number to be queried to display the data of the group.

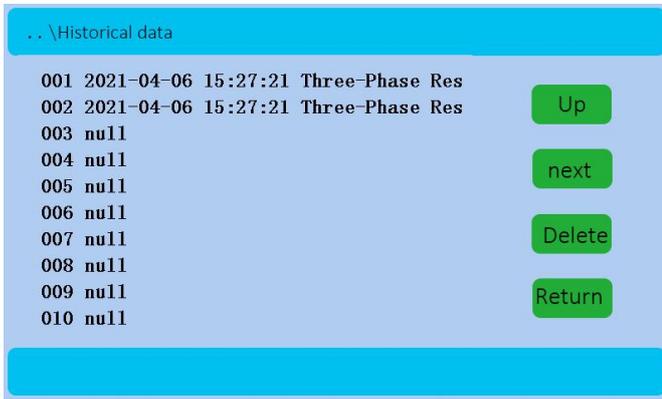


Figure 7.19

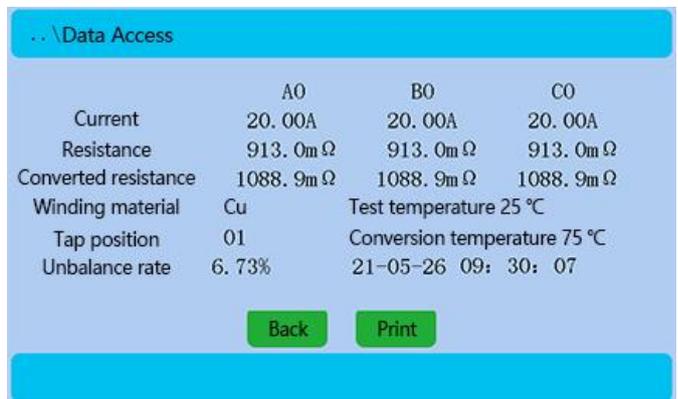


Figure 7.20

Click "Print" to print the data of the current page. Click "Delete" to enter the delete page, click "OK" on the delete page to delete all saved data, click "Cancel" to return.



Figure 7.21

## 8. Data U disk backup

Insert the U disk, click "U disk backup" and then click "Confirm backup" to import historical data into the U disk

(The inserted U disk must be formatted as FAT32 bit format)



Figure 7.22



Figure 7.23

## 9. Backlight control

On the home page, click "System Settings" and "Brightness Settings" to enter the backlight brightness adjustment page, and directly drag the backlight entry bar to adjust the brightness. Click "Exit" to save and exit .



Figure 7.24

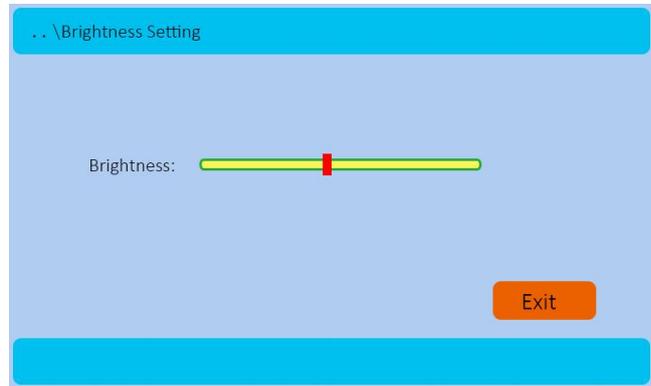


Figure 7.25

## 10. Time setting

Click "System Settings" and "Time Settings" on the home page to enter the system time setting page, and drag the time item up and down to adjust the time . Click "OK" to save and return.

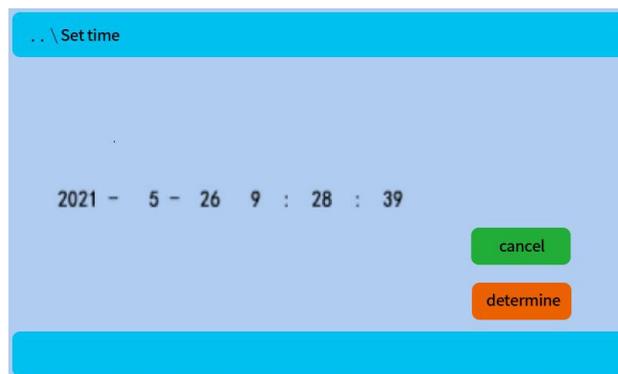


Figure 7.26

## 11. The use of magnetic aid method

The magnetic aid method is to inject current into the transformer through a set of auxiliary power sources to saturate its magnetic core quickly and achieve the purpose of rapid testing. There are "On" and "off" buttons for setting magnetic aid under each test setting page, as

shown in Figure 7.13. Click the button to display "On" to enable magnetic aid function during instrument testing. When the magnetic aid function is turned on, only the resistance of the low voltage end can be tested. The magnetic aid test corresponds to the test low voltage item and the high voltage section also needs to connect the same item to have the effect.

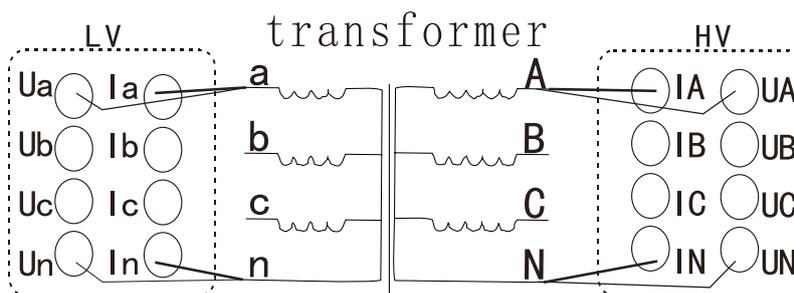


Figure 7.27

## VIII. Maintenance and Service

### 1. Instrument verification

	<p>The maximum output power of the instrument is about 1200W. When verifying, ensure that the power of the tested standard resistor is large enough, and cannot use ordinary low-power standard resistors or resistance boxes for testing.</p>
--	--

Recommended verification cycle: once a year.

### 2. Instrument calibration

The calibration cycle varies depending on the customer's usage conditions or environment, etc. It is recommended to determine the calibration cycle according to the customer's usage or environment, and entrust our company to perform regular calibration.

### 3. Frequently Asked Questions

Common faults/problems	Failure Analysis/Answer
Can't turn on	Check whether the power cord and interface are in firm contact
Large measurement error	Check the test leads for poor contact

<p>At the beginning of the test data shows "OL"</p>	<p>Due to the effect of the inductive current generated by the instrument, the test inductive reactance causes the induced current to form a relatively large inductive reactance.</p>
---	--

## IX.Packing List

<b>meter</b>	1 set
<b>Test Lead Bag</b>	1
<b>Three-plug power cord</b>	1
<b>test lead</b>	8 strips
<b>Manual, Warranty</b>	1 set

The contents of this user manual should not be used as a reason to use the product for a special purpose.

The company is not responsible for other losses caused by use.

The company reserves the right to modify the contents of the user manual. Subject to modification without further notice.