

HZ-3110B

Transformer DC Resistance Tester



Dear user:

Thank you for choosing HZ-3110B Transformer DC Resistance Tester.

We hope that this instrument can make your work easier and more enjoyable, so that you can get the feeling of office automation in the test and analysis work.

Before using the instrument, please read this manual, and operate and maintain the instrument according to the manual to prolong its service life. "Just a light press, the test will be completed automatically" is the operating characteristics of this instrument.

If you are satisfied with this instrument, please tell your colleagues; if you are not satisfied with this instrument, please call (0312) 6775656 to tell you to serve you at all times-Baoding Huazheng Electric Manufacturing Co., Ltd., our company will definitely make you satisfied !

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I. Overview

Transformer DC resistance is a mandatory test item in transformer manufacturing, including semi-finished and finished product factory tests, installation, maintenance, tap changer modifications, commissioning tests, and preventative tests by the power sector. It effectively checks for manufacturing defects and potential operational hazards such as material selection, welding quality, inter-turn short circuits, loose connections, missing strands, and broken wires. To meet the need for rapid DC resistance measurement of transformers, our company has developed a new generation of DC resistance testers leveraging our technological advantages. This instrument uses new power supply technology and features small size, light weight, and high output current. For on-load tap-changing transformers, it allows direct tap adjustment without discharging, significantly reducing working time. For large-capacity transformers, the instrument can also use a magnetizing method to quickly and accurately measure the DC resistance of the windings. After the DC resistance test, the instrument's built-in demagnetizing function can reduce residual magnetism in the transformer, minimizing the need for subsequent processing.

The entire instrument is controlled by a microcontroller, automatically performing self-testing, data processing, and display functions. It also features automatic discharge and audible discharge alarm indication. This instrument provides stable and highly accurate test data, is easy to operate, and has comprehensive protection functions, making it an ideal device for on-site measurement of the DC resistance of transformer windings and high-power inductors.

II . Functional Features

Intelligent interconnection and convenient data management : In addition to supporting traditional USB data transmission, it also adds Bluetooth , RS232 and RS485 communication functions, which can realize wireless connection and remote control with mobile APP, computer, console and other devices , greatly improving work efficiency.

High-performance power supply technology enables fast and accurate measurements : the maximum output voltage is 24V, supports multiple current ranges, and can

automatically select the optimal range according to the load; combined with the magnetic auxiliary measurement method, it significantly improves the speed and accuracy of high resistance measurement; it can directly switch the on-load tap changer in DC resistance measurement mode, and the instrument automatically refreshes the data.

Multiple safety protections for greater peace of mind : To ensure the safety of operators and equipment, a multi-layered protection system has been constructed. Core protection functions include back EMF surge protection, automatic discharge, AC380V incorrect connection protection , and input power overvoltage protection ; coupled with audible alarms and clear discharge indicators, this effectively prevents equipment damage and personal injury risks caused by misoperation or sudden changes in the external environment, making the testing process safer.

User-friendly design, intuitive and efficient operation : 7-inch high-brightness color touchscreen, clearly visible even in strong light, supports Chinese and English switching; convenient touch input, graphical interface design, intuitive, efficient, and easy to understand; equipped with arbitrary temperature conversion function, built-in mini printer, and can translate printing results into Chinese.

Massive data storage : Built-in perpetual calendar and power-off storage, capable of saving 60,000 sets of data for easy access at any time, while also supporting export via USB flash drive and wireless Bluetooth .

Integrated design with powerful functions : It integrates magnetization measurement and demagnetization functions, and demagnetization after measurement can significantly reduce residual magnetism; the whole machine is controlled by a high-speed single-chip microcomputer, which is small in size, has a large output current, good repeatability, and strong anti-interference ability.

Wide voltage input and AC/DC dual source compatibility: In terms of power supply adaptability , the input power supply supports dual-mode power supply of 110 ~ 240VAC or 155 ~ 340VDC, which is compatible with global power grids and DC panels of substations. With a wide frequency design of 47 ~ 63Hz, it ensures stable operation under voltage fluctuations.

III. Main Technical Specifications

project	Technical specifications and parameters	Remark
Test current	10A, 5A, 1A, 200mA, 40mA, <20mA	
Measurement range	0.5mΩ~0.8Ω 10A 1mΩ ~ 2Ω 5A 5mΩ ~ 10Ω 1A 100mΩ ~ 50Ω 200mA 1Ω~ 25 0Ω 40mA 100Ω~100KΩ <20mA	
minimum resolution	0.1μΩ	
Accuracy	±(0.2%+2 characters)	The resistance display has 5 significant digits .
show	7-inch touchscreen color LCD	
Data storage	60000 groups	
Work environment	Ambient temperature: -20 °C to 50 °C Relative humidity: <90%RH, no condensation	
power supply	110 ~ 240 VAC , 47 ~ 63Hz or 155 ~ 340VDC	Fuse 2A
Maximum power consumption	250 W	
External dimensions	360*290*170 (mm)	
weight	Main unit : 6 kg; Cable box: 4 kg	

IV. Panel Structure



Front panel diagram

Power switch: AC220V power socket (with fuse) and instrument power switch.

Grounding post: The grounding point for the instrument's outer casing, ensuring safety.

The instrument must be reliably grounded.

I+, I- : Current output terminal, I+ is positive current output, I- is negative current output.

V+, V- : Voltage sampling terminals, V+ for positive voltage sampling, V- for negative voltage sampling.

RS232 Universal serial interface, which allows the instrument to be controlled by a computer .

RS485 : Universal Serial Interface, which allows for computer control of instruments .

USB External USB flash drive used to store measurement data. Do not remove the USB flash drive during the storage process.

Printer: Prints the measurement results.

Touchscreen: Displays operation menus, clock, measurement data, etc.

V. Instrument Operation Instructions

The boot screen is shown in Figure 1:

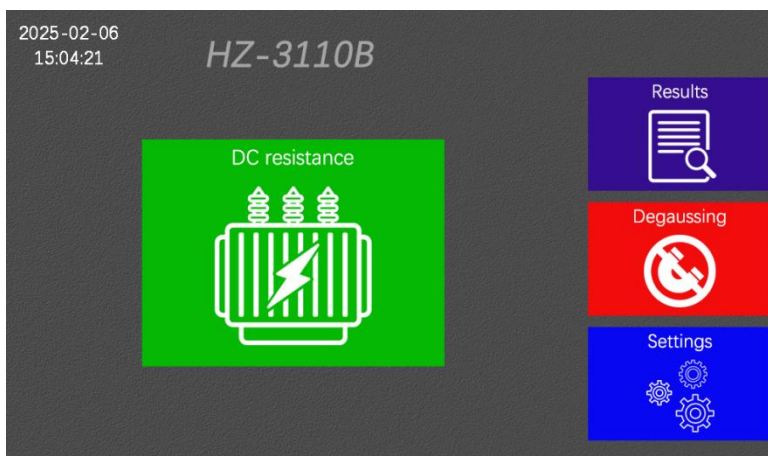


Figure 1

Click " DC Resistance Measurement " to enter the following interface, as shown in Figure 2.

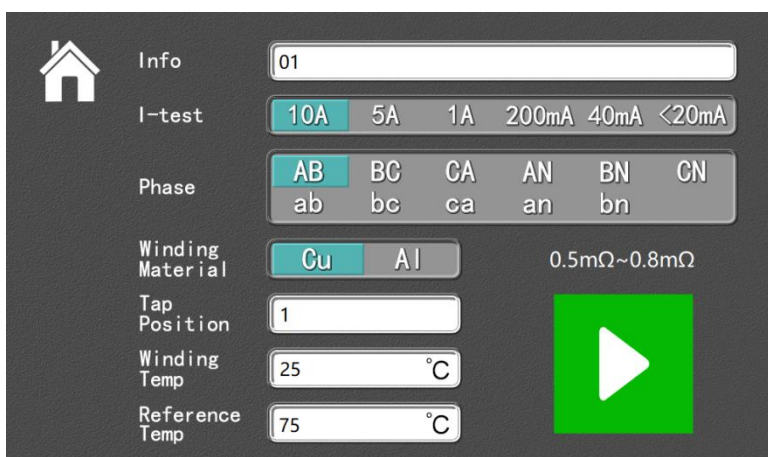


Figure 2

Sample code : Click the white box to the right of the sample code to edit the sample name (maximum 20 characters).

Test current : Click the current 10A, 5A, 1A, 200mA, 40mA, <20mA button to switch and select the test current to use.

Phase testing : Click the phase selection buttons AB, BC, CA, AN , BN , CN , ab, bc, ca, an , bn , cn to switch between them. This is for recording purposes only.

Winding material: Click the copper or aluminum button to switch between them, used for temperature conversion of test results.

Tap position: Clicking the white box to the right of the tap position allows you to set the location of the tap switch; this is for record-keeping purposes only.

Winding temperature : Click the white box to the right of the winding temperature setting

to set the temperature, which is used for temperature conversion of test results.

Converted Temperature : Click the white box to the right of Converted Temperature to set the temperature, which is used for temperature conversion of test results.



: Start Measurement Button. After setting all parameters, click this button to start the test.



Return to the main interface.

Press “  ” to enter the DC resistance test interface, as shown in Figure 3.

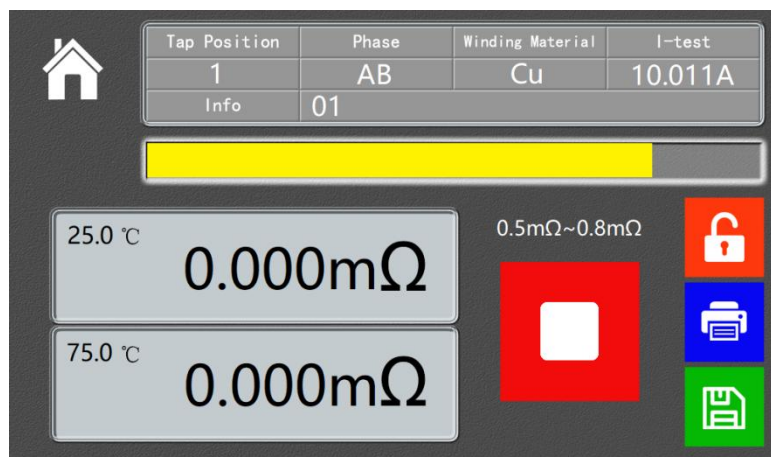


Figure 3

Charging: The progress bar is showing yellow. (Figure 3)

Measurement complete: The progress bar turns green, displaying the measurement result. (Figure 4)

Warning: The instrument is still outputting current at this time, and the measurement results are being updated continuously (do not disconnect the wires at this time).

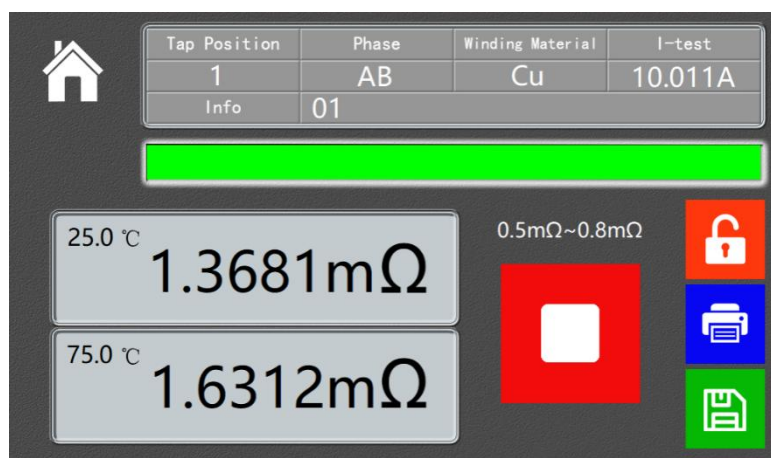


Figure 4

 "Stop Measurement" button to end the test. The instrument power supply will stop outputting current, accompanied by a discharge alarm sound.

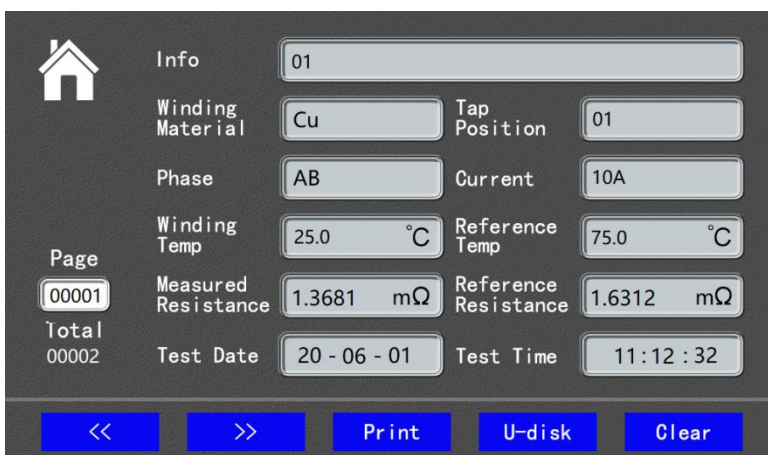
 The button can lock the current measurement result; it is currently in an unlocked state.

 The button can be pressed to unlock the measurement results; the result is currently locked.

 Save the measurement data. After saving, a pop-up window will prompt "Saving successful".

 Print the current measurement results.

Data Browse " in Figure 1 to enter the data query interface, as shown in Figure 5:



 Page 00001 Total 00002	Info	01			
	Winding Material	Cu	Tap Position	01	
	Phase	AB	Current	10A	
	Winding Temp	25.0 °C	Reference Temp	75.0 °C	
	Measured Resistance	1.3681 mΩ	Reference Resistance	1.6312 mΩ	
	Test Date	20 - 06 - 01	Test Time	11:12:32	
<< >> Print U-disk Clear					

Figure 5

 Turn left to view historical measurement data.

 Turn right to view historical measurement data.

 The "Clear Historical Data" button will appear in a pop-up window asking "Clear all data?". "√" indicates to perform the operation, and "X" indicates to cancel.

 The USB flash drive export button: After inserting a USB flash drive into the instrument, a "" symbol will be displayed in the middle of the left side of the screen, indicating that the USB flash drive is connected normally. After clicking the USB flash drive export button, the instrument will save the measurement data of the current page in

TXT format to the USB flash drive and pop up a window to prompt " Export to U-disk successfully ". Only then can you unplug the USB flash drive.

Print

Print the measurement data for the current page.

Page

00001

Click the white input box and enter the historical data page number to quickly jump to the specified data page.



Return to the boot screen.

Demagnetize " in Figure 1 to enter the demagnetization interface, as shown in Figure 6:

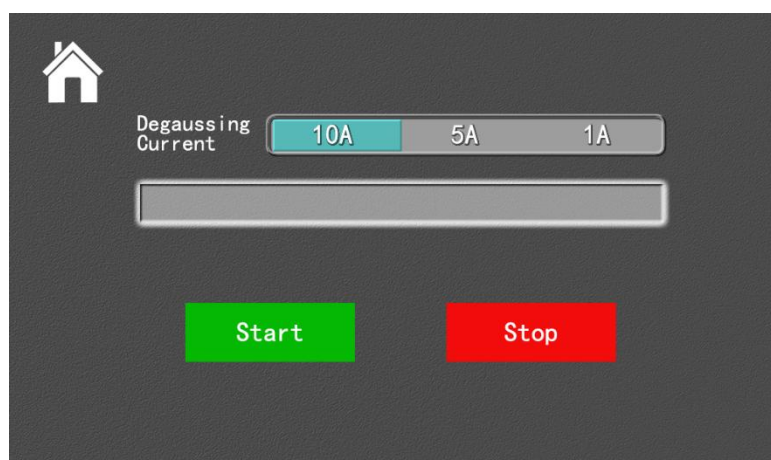


Figure 6

Demagnetizing current : Click the 10A, 5A, 1A current button to switch and select the demagnetizing current to use.

Start

Select the desired demagnetizing current setting and click the " **Start** " button to start automatic demagnetization. During demagnetization, the progress bar will be yellow, as shown in Figure 7. Once demagnetization is complete, the progress bar will turn green, and a pop-up window will display " Degaussing completed ".

Stop

Stop

Click " **Stop** " to end the demagnetization process, and a pop-up window will display " Degaussing terminated ".



Figure 7

System Settings " in Figure 1 to enter the system settings interface, as shown in Figure 8:

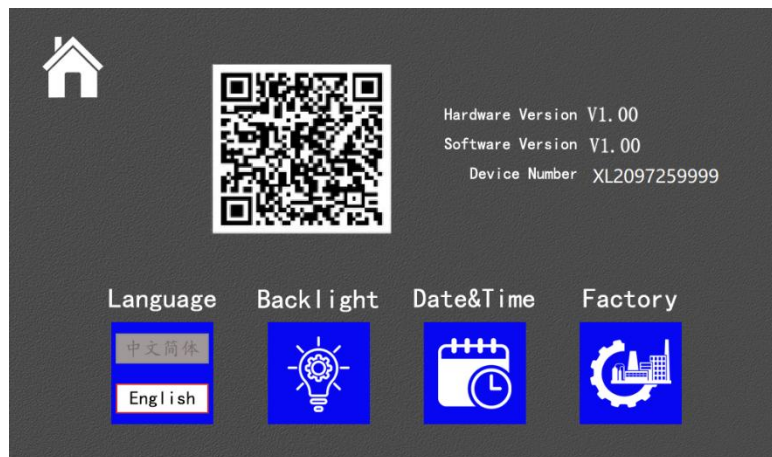


Figure 8

System Language: Click the " Simplified Chinese " or " English " button to switch between Chinese and English interfaces .

Brightness adjustment : The screen brightness can be adjusted according to the ambient environment.

Date and time: Can correct the current time.

Factory settings: This setting can only be configured by the manufacturer.



Return to the boot screen.

Click "Brightness Adjustment" in Figure 8 to enter the brightness adjustment interface, as shown in Figure 9:

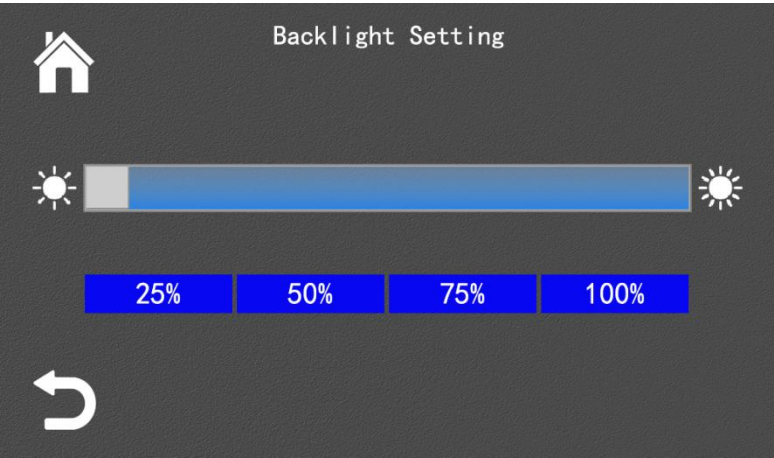


Figure 9

The screen brightness can be adjusted by moving the slider or pressing the percentage key, depending on the environment.

Return to the boot screen.

Return to system settings interface.

Click "Date and Time" in Figure 8 to enter the time editing interface, as shown in Figure 10:

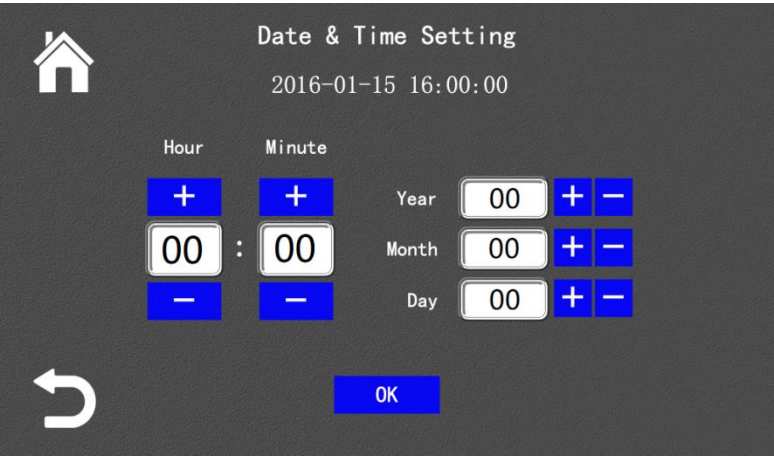


Figure 10

、: Set the date and time (or click the white box to enter directly).

Click "" to save the time settings.

Return to the boot screen.

Return to system settings interface.

VI. Testing And Operation Methods

A: Single-phase measurement method, see Figure 11 below:

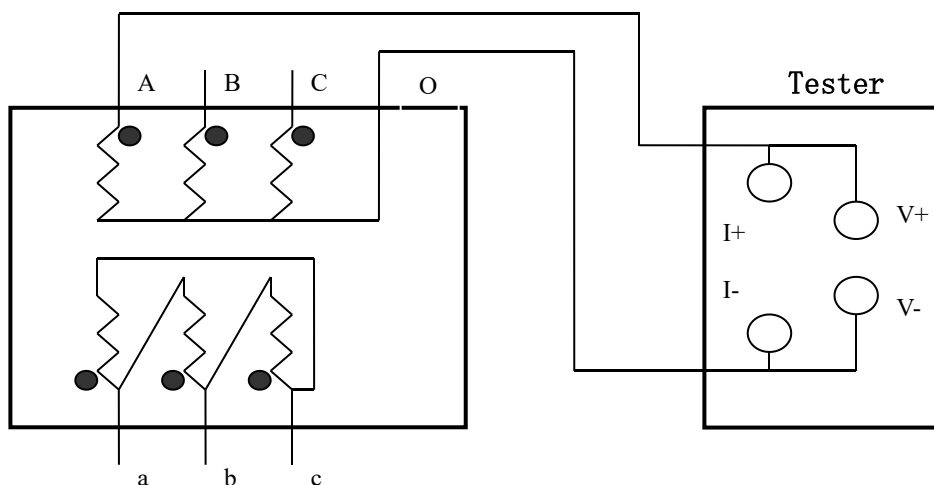


Figure 11

B. Wiring method using magnetization is shown in Figures 12-14 (applicable to Y (N)-d-11 connection group).

When measuring the low-voltage side of a large-capacity transformer, if the maximum current of the DC resistance tester is relatively small under existing conditions, or in order to speed up the measurement, the magnetic auxiliary method can be selected.

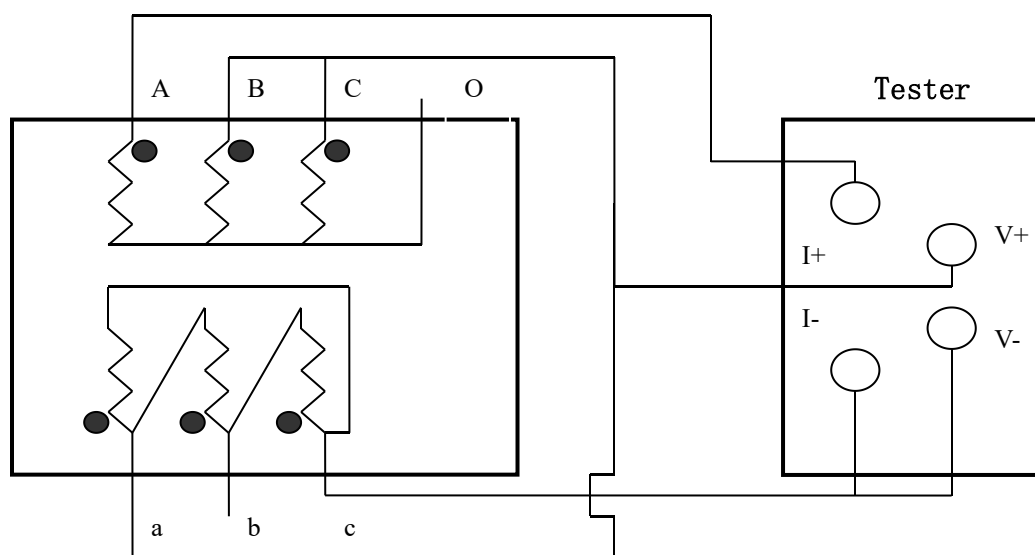


Figure 12 Wiring method for measuring low-voltage R_{ac}

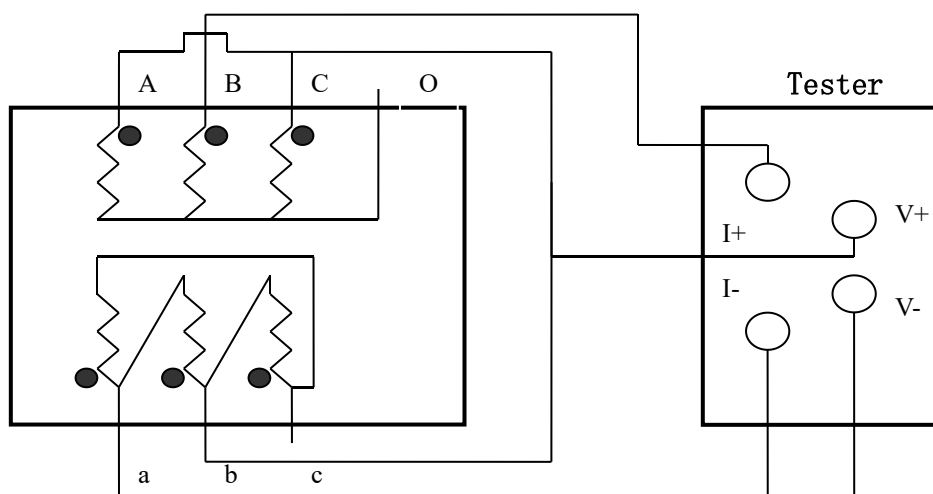


Figure 13 Wiring method for measuring low voltage Rba

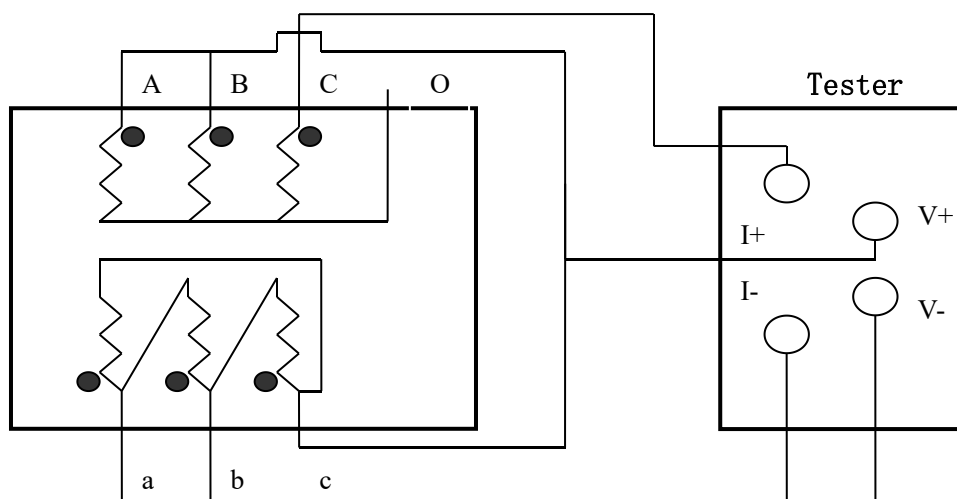


Figure 14 Wiring method for measuring low voltage Rcb

VII. Precautions

1. Preparations before operation

- (1) Power supply check: Before powering on, please confirm that the input power voltage of the instrument is correct to ensure that the instrument works normally.
- (2) Power off the equipment : Before the test, please ensure that the equipment under test is completely powered off and disconnected from other live equipment to ensure operational safety.
- (3) Grounding requirements : The housing must be reliably grounded during the test to prevent accidental electric shock.
- (4) Environmental cleanup : Do not pile up irrelevant items on or around the equipment

panel during the test, and keep the operating environment clean.

2. Measurement process specifications

(1) Winding treatment : During measurement, do not short-circuit or ground other untested windings to avoid affecting the transformer magnetization process, which may lead to a longer data stabilization time or inaccurate values.

(2) Tap switch operation : For no-load tap changer transformers, it is strictly forbidden to switch the tap switch during the measurement process, so as to avoid damaging the instrument or affecting the measurement results.

(3) Wiring treatment : When connecting the test clip to the transformer winding lead, it is necessary to clean the oxide film on the surface of the lead (formed due to long-term exposure to air). The oxide film can be broken by twisting the test clip to ensure a good connection and avoid unstable or inaccurate measurement results.

3. Safe operation after measurement

(1) Inductive load discharge : Do not disconnect the test leads immediately after measuring the inductive load. The output terminal of this instrument is equipped with a discharge circuit. After the test is stopped, the inductor will automatically discharge energy through the instrument. Please wait until the discharge indication is complete before disconnecting the test leads to prevent the inductor discharge from endangering personnel and equipment safety.

(2) Handling sudden power outages : If the power supply is suddenly interrupted during the measurement process, the machine will automatically start the discharge program. Please wait at least 30 seconds before disconnecting the wiring to ensure safety.

(3) Disconnecting the test leads : The test leads can only be disconnected after the discharge process is confirmed to be completed, in order to avoid the danger caused by residual charge.

4. Maintenance and Care

(1) Replacement of parts : When replacing fuses and parts, please be sure to use products of the same model as this instrument. For specific models, please refer to the technical specifications.

(2) Moisture and dirt prevention : This instrument needs to be protected from moisture and oil to extend its service life and maintain measurement accuracy.

5. General Safety Tips

(1) Please strictly follow the above procedures during the test to ensure the safety of personnel and equipment.

(2) If any abnormal situation occurs, please stop operating immediately and contact a professional for handling.

VIII. Packing List

No.	Item	Qty
1	Main engine	1
2	Power line	1
3	Fuse pipe	2
4	Red test line	1
5	Black test line	1
6	Print paper	1
7	Test sample (Standard resistance)	1
8	Serial port line	1
9	Ground lead	1