
Handheld Transformer Ratio Group Tester

User Manual



Dear Customers,

Thank you for purchasing our Handheld Transformer Ratio Group Tester. Before you use the product for the first time, please carefully read this Manual which can help you skillfully use the Tester.



Our aim is to improve our products continuously, so that the product you use may be a little bit different from the Manual. In case of any changes, we will inform you in the attached sheets! Thanks for your understanding. If anything is unclear, please contact the After-Sale Service Department in our company, and we will certainly meet your requirements.



Since the I/O terminal, testing column and *etc.* may carry voltage, electric spark may be produced when you insert and unplug the test lead, power socket and *etc.*. Please do be careful of electric shock and avoid hazards. Pay attention to your personal safety!

Prudent Warranty

For the products manufactured by our Company, if the defects appear within 3 months from the date of delivery, we can provide the replacement; if the defects appear within one year from the data of delivery, we can provide free services and repairs; if the defects appear more than one year after delivery, we can provide life-long paid maintenance services.

◆ Safety Requirements

Please carefully read the following safety precautions so as to avoid personal injury and prevent the product or any other products connected thereto from being damaged. In order to avoid the possible dangers, the product can only operate within a specified range.

Only the qualified technicians can implement the maintenance.

— Prevent Fire or Personal Injury

Use appropriate power cables. Only the dedicated power cables which conform to the specifications of the product can be used.

Correct connection and disconnection. When the test lead is connected to the charged terminal, please don't connect or disconnect the test lead at will.

Earth the product. In addition to be earthed using the power line, the earthing rod on the shell of this product must also be earthed. In order to prevent electric shock, the earthing conductor must be connected to the ground. Before the connection to the input or output terminal of the product, please make sure that the product has been properly earthed.

Pay attention to the rated values of all terminals. In order to prevent fire or electric shock, please pay attention to all the rated values and marks of the product. Before the connection, please read this Manual so as to gain more insight into the information on rated values.

Never operate the product without an instrument cover. If the cover or panel has been removed, never operate the product.

Use appropriate fuses. Use the fuses of the type and rated value specified for the product.

Avoid touching the exposed circuits or charged metal. When the product is electrified, never touch the exposed contacts or parts.

In case of suspected failure, never operate the product. If you suspect the product is damaged, please contact the maintenance personnel for examination and never operate the product.

Never operate the product in a humid environment.

Never operate the product in an explosive environment.

Keep the surface of the product clean and dry.

— Safety Terminology

Warning: Warning messages indicate the conditions or practices that may cause loss of life or personal injury.

Caution: Caution messages indicate the conditions or practices that may cause the damages to the product or other properties.

Contents

I . Functional characteristics	7
II .Specifications	8
III. Working principle	9
IV.Structural appearance	10
1.Instrument appearance	10
2. Keyboard Description	11
V . LCD interface	12
1. Main menu interface	12
2. Parameter setting screen	13
3. Single-phase transformer ratio test	14
4. Three phase transformation ratio test	15
5. History Data	16
6. System settings	17
VI. Wiring method	17
VII. Battery maintenance and charging	19
VIII. Note	19
IX. After-sale service	19

Preface

According to IEC and relevant national standards, transformer ratio group tests, PT ratio tests, and polarity tests are very important testing items during power production, user handover, and maintenance tests. This can effectively supervise the quality of transformers, PT and other products during their delivery and use, prevent inter turn short circuits, open circuits, connection errors, internal faults or contact faults of the voltage regulating switch. Our company independently develops, develops and produces a multi-functional handheld fully automatic ratio tester, which has the characteristics of completely following the user's on-site usage requirements, simple operation, complete functions, and stable and reliable data.

The instrument adopts True color LCD, full Chinese graphical operation interface, LCD display interface with Chinese prompt information and multi parameter display, and friendly man-machine conversation interface. The fully touchable conductive silicone keyboard operation mode has a good operating feel and is easy to learn. The instrument is equipped with a large capacity power failure memory that does not lose data. It can save on-site calibration data and can expand to store up to 1000 sets of on-site calibration results. It can provide backend microcomputer management software, which can transfer the results to a computer through a USB flash drive, produce reports, and achieve microcomputer management.

The instrument adopts an engineering plastic casing independently designed and manufactured by our company, with a beautiful and practical appearance. Convenient on-site testing operation.

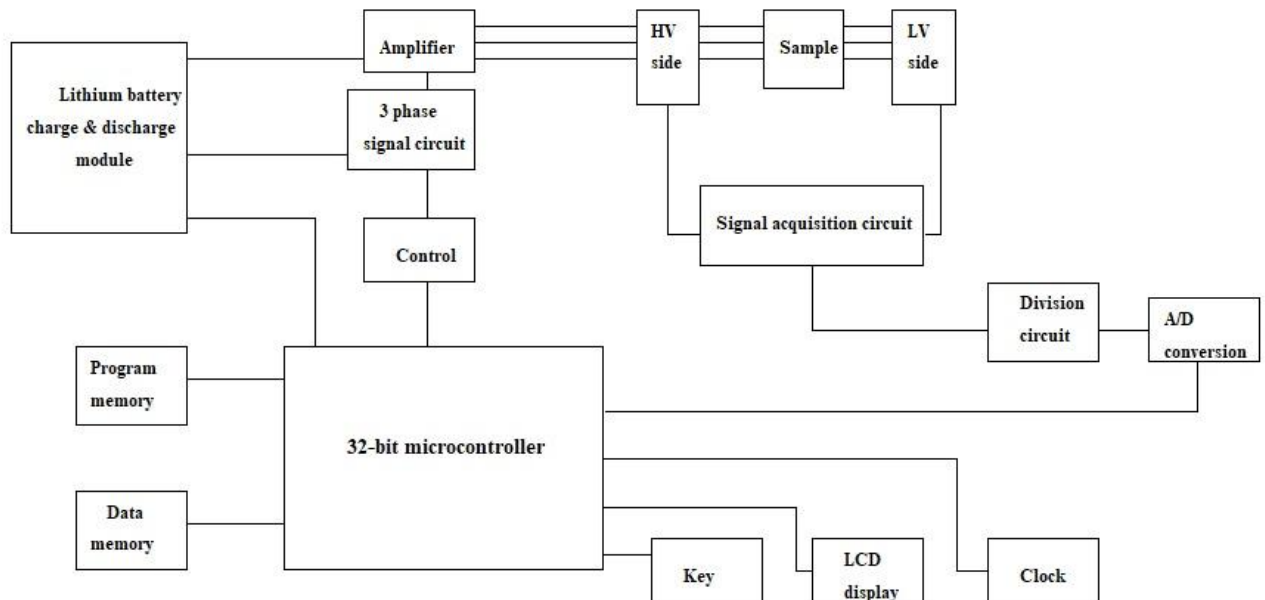
I .Functional characteristics

1. Self powered: Powered by lithium batteries, it is very convenient for on-site testing without the need for additional power supply.
2. Powerful: It can measure the transformation ratio polarity of PT and the transformation ratio group of transformer. It can measure the polarity/group of single-phase and three-phase, and complete the measurement of AB, BC, CA three-phase transformation ratio, group, error, tapping position, tapping value and other parameters in one go. It can automatically identify the group number.
3. Tapping test: It can quickly measure the transformation ratio and transformation ratio error at each tapping switch position. The rated transformation ratio only needs to be input once, and the transformation ratio error at each tapping position can be calculated without repeated input.
4. At the same time, it has two functions: turn ratio measurement and operating voltage ratio measurement. The operating ratio can more accurately reflect the actual value of the voltage ratio of the transformer and PT in actual operation.
5. Good vibration resistance: The use of military connectors enhances vibration resistance.
6. Adopting a 3.5-inch high-definition true color LCD screen, the display data effect and vector image effect are intuitive and delicate.
7. The test source used in this instrument is a standard sine digital source that is digitally synthesized, with a distortion of less than 0.1% and is not affected by mains power.
8. Internally equipped with high capacity lithium-ion rechargeable batteries, on-site testing can be completed without any power supply. One full charge can perform more than 800 consecutive measurements.
9. Small size, light weight, and easy to carry.
10. The instrument has three versions of software: Chinese, English, and Chinese English.

II. Specifications

1. Variable ratio measurement range: 0.8~10000.
2. Fast measurement speed: Complete three-phase testing within 1 minute.
3. Measurement accuracy: The measurement accuracy of high-voltage side voltage is 0.05%
4. Measurement accuracy of low-voltage side voltage 0.1%
5. Ratio measurement accuracy 0.1% (0.8-3000)
6. 0.2% (3000—10000)
7. Convenient to carry and suitable for field operations.
8. Weight: 1Kg

III. Working principle



IV. Structural appearance

The instrument consists of two parts: a main unit and accessories. The main unit is the core of the instrument, and all electrical parts are inside the main unit. The main unit adopts a handheld injection molding case, which is sturdy and durable. The accessories include testing wires and tools.

1. Instrument appearance



Instrument Appearance - Front View

The top part of the instrument is the ratio testing aviation plug, high-voltage side, and low-voltage side terminals. The upper part of the front is a color LCD screen, and the lower part is a standard 11 key control keyboard; On the lower side of the instrument, you can see the USB-A interface, charging interface, and MICRO-USB interface.

2. Keyboard Description

The keyboard has a total of 11 keys, namely: auxiliary function keys F1, F2, F3, F4, ↑, ↓, ←, →, MENU, EN, and power key.

The functions of each key are as follows:

↑, ↓, ←, → keys: cursor movement keys; Used to move the cursor in the main menu to point to a certain function menu, and press the confirm button to enter the corresponding function; Under the parameter setting function screen, the left and right keys are used to switch between the current options, and the up and down keys are used to change the values.

EN key; Under the main menu, press this key to display the menu subdirectory. Under the subdirectory, press this key to enter the selected function. In addition, when inputting certain parameters, start and end the input, and it is used to confirm that the set parameters are effective or to enter the selected screen.

MENU key: Return key. Pressing this key directly returns to the higher-level menu.

F1, F2, F3, F4: Auxiliary function keys, corresponding function software prompts in different interfaces.

Power button: Long press to achieve on/off function

V. LCD interface

The LCD display interface mainly consists of six screens, including the main menu and five sub function interfaces, which will be explained in detail below.

1. Main menu interface

The main menu is shown in Figure 3:



Figure 3. Main Menu

After turning on, the main menu will be displayed, as shown in Figure 3. The main menu has five functional options, including parameter settings, single-phase transformer ratio, three-phase transformer ratio, historical data, and system settings. Select through the ← and → keys, and press the EN key to enter the corresponding function interface; The top line of the screen displays status parameters, including time, as well as the voltage amplitude and remaining power of the internal battery, so that the operator can observe the battery status of the instrument at any time. When the battery is found to be low, it can be charged in a timely manner; The bottom line of the screen is a prompt bar, which provides simple operation prompts for users to operate correctly.

2. Parameter setting screen

When selecting the 'Parameter Setting' function, first enter the parameter setting screen, as shown in Figure 4.

In the parameter setting screen, it can be seen that the items to be set include: sample number, rated transformation ratio, total number of taps, equal tap level, high-voltage winding wiring type, low-voltage winding wiring type, etc. The bottom line of the display screen prompts the operator how to operate. In the interface shown in Figure 4, press the ← and → keys to move the cursor. After setting, press the 【 MENU 】 key to return; The meanings and functions of each parameter are as follows:

- Sample number: Refers to the number of the tested transformer, which can be entered in up to 8 digits.
- Rated transformation ratio: refers to the voltage variation ratio between the high-voltage side and the low-voltage side of the rated gear of the tested transformer
- Total number of tap changer positions: Refers to the total number of tap changer positions in a transformer
- Equal tap stage: The percentage of voltage adjusted for each stage of the transformer.
- High voltage winding: Set the wiring type of the transformer's high voltage winding.
- Low voltage winding: Set the wiring type of the transformer's low voltage winding

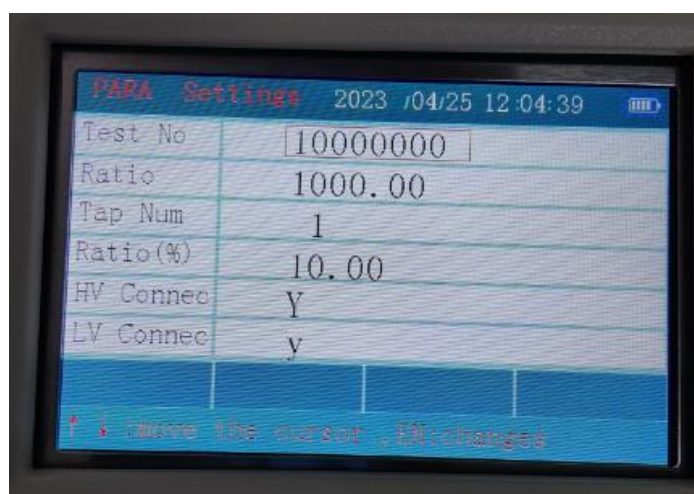


Figure 4. Parameter Settings

3. Single-phase transformer ratio test

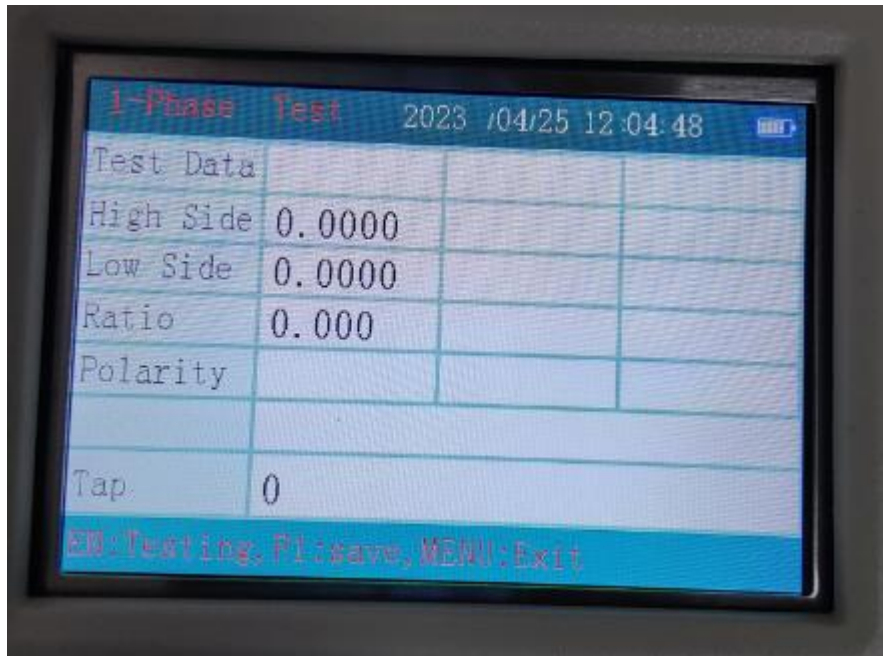


Figure 5. Single-phase transformer ratio test

Before conducting the single-phase transformer ratio test, you should first set the parameters, select the "Parameter Setting" option, and then press [EN] to enter the parameter setting screen for parameter setting. After setting the parameters, press the [MENU] button to return to the main interface and select the "single-phase transformer ratio" test option. Press the [EN] button to enter (as shown in Figure 5), and after the wiring is completed, press the [EN] button to start the automatic test. After the test is completed, the test results will be displayed. The screen display includes: high-voltage side voltage value, low-voltage side voltage value, transformer ratio, transformer ratio error value, group, and tapping. After the test is completed, press the [F1] key to save the test results. Press [MENU] to return and [EN] to retest.

Note: When testing PT ratio, group 0 represents homopolarity (plus polarity), and group 6 represents reverse polarity (minus polarity).

4. Three phase transformation ratio test

Before conducting the three-phase transformation ratio test, the parameters should be set first. Press [EN] to enter the parameter setting screen for parameter settings. After setting all parameters, press [MENU] to return to the main interface, and then select the "three-phase transformation ratio" test option. Press [EN] to enter the three-phase transformation ratio test interface (as shown in Figure 6).

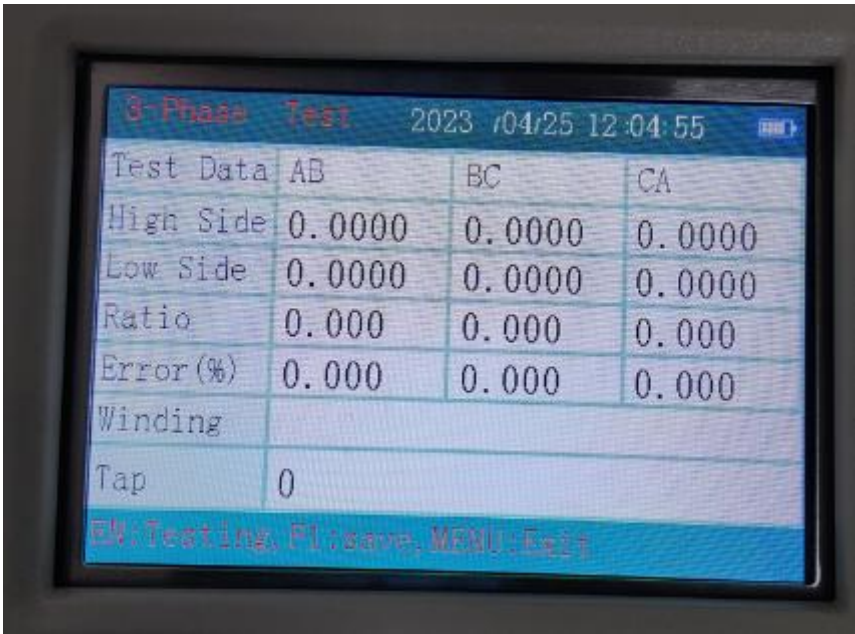


Figure 6. Three phase transformation ratio test

After the test is completed, the results will be displayed on the LCD screen, including: three-phase high-voltage side voltage value, three-phase low-voltage side voltage value, three-phase transformation ratio, three-phase transformation ratio error percentage, and judgment group. After the test is completed, press the [F1] key to save the test results. Press [MENU] to return and [EN] to retest.

5. History Data

After selecting "Historical Data" in the main menu, press the [EN] key to enter the "Historical Data" interface (as shown in Figure 7),

In this interface, you can query, delete, and export data to a USB drive.

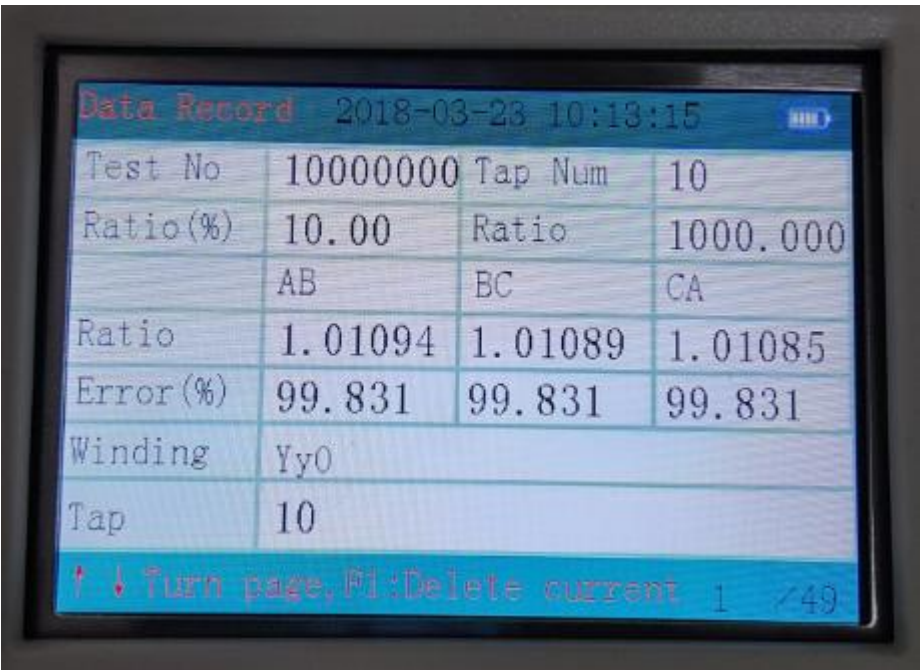


Figure 7. Historical Data

The status bar prompts how to operate by pressing the buttons. The [↑] and [↓] keys flip the page, the [F1] key deletes the current record, the [F2] key deletes all records, and the [F3] key exports the data to a USB drive. The [MENU] key returns to the main menu.

6. System settings

In the main interface, select "System Settings" and press [EN] to enter the "System Settings" interface, as shown in Figure 8.

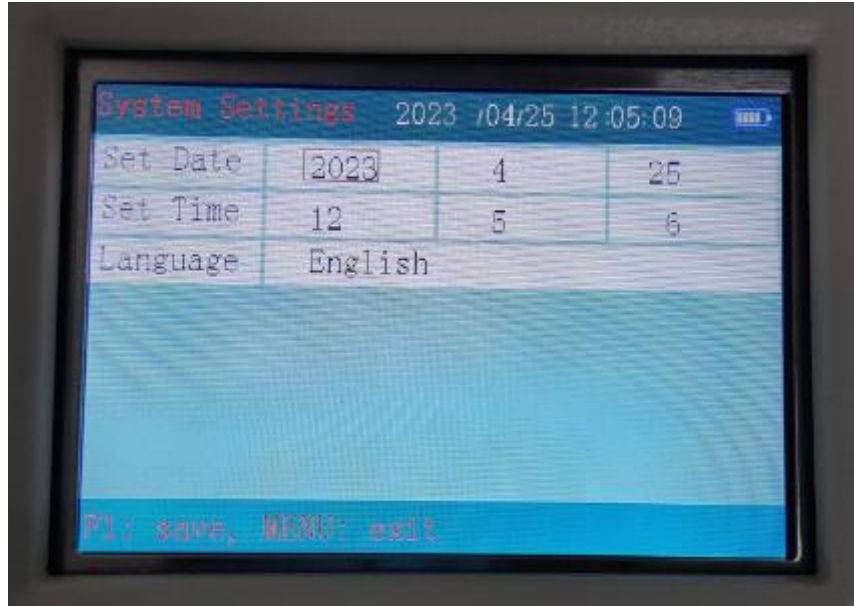


Figure 8. System Settings

The status bar prompts how to operate the cursor by pressing the buttons. Move the cursor with [←] and [→], change the value with [↑] and [↓], confirm the modification of the current time with [F1], and return to the main menu with [MENU].

VI. Wiring method

1. During three-phase measurement, the yellow, green, and red wires on the high voltage side of the instrument are connected to A, B, and C on the high voltage side of the transformer, and the yellow, green, and red wires on the low voltage side of the instrument are connected to A, B, and C on the low voltage side of the transformer. Only when the wiring is correct can the test be conducted. The wiring diagram is shown in the following figure:

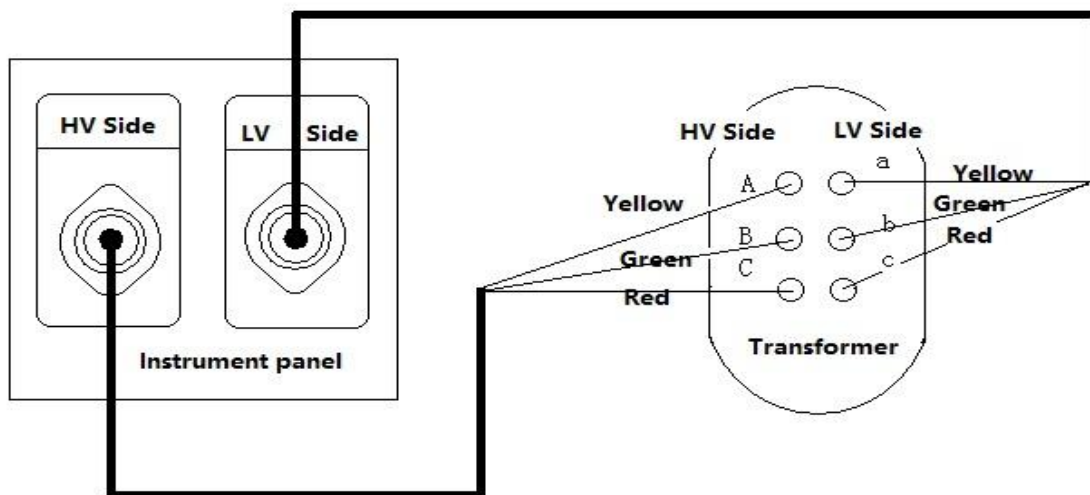


Figure 9. Test wiring of three-phase transformer

2. During single-phase measurement, the yellow and green wires on the high voltage side of the instrument are connected to A and N on the high voltage side of the single-phase transformer, and the yellow and green wires on the low voltage side of the instrument are connected to A and N on the low voltage side of the transformer. Only when the wiring is correct can the test be conducted. The wiring diagram is shown in the following figure:

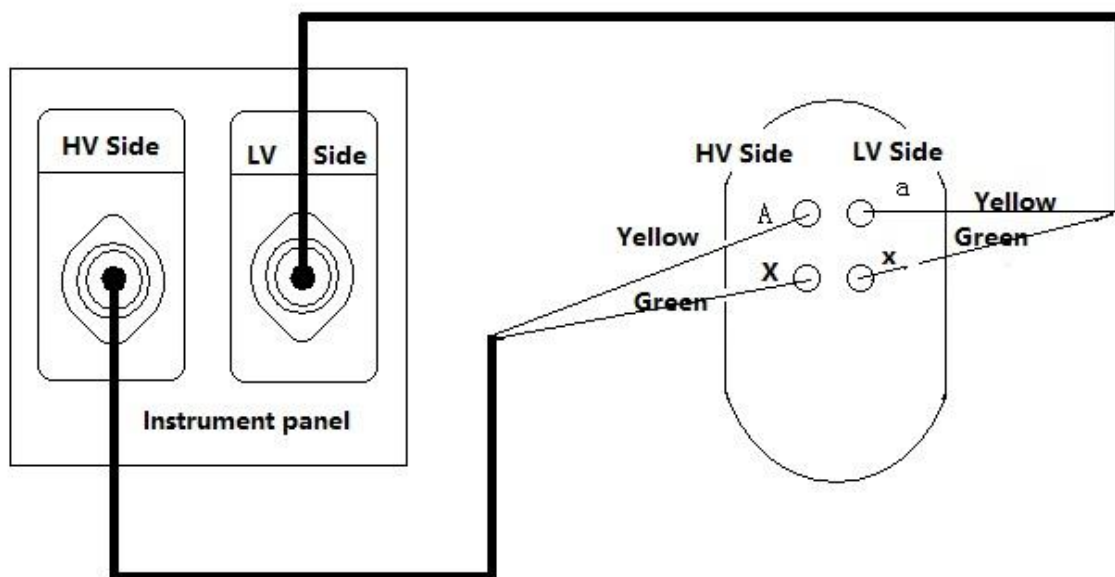


Figure 10. Test wiring of single-phase transformer

VII. Battery maintenance and charging

The instrument uses high-performance lithium-ion rechargeable batteries as its internal power supply. Operators cannot replace other types of batteries at will to avoid damage to the instrument due to incompatible levels.

The instrument must be charged in a timely manner to avoid deep battery discharge affecting battery life,

Under normal use, it is best to charge every day (preferably within a month if not in use for a long time) to avoid affecting usage and battery life. Each charging time should be at least 6 hours. Due to the internal charging protection function, the instrument can be continuously charged.

Every time the battery is removed from the instrument, the battery protection board inside the instrument automatically enters the protection state. After reinstalling the battery, it cannot work directly and needs to be powered up by a charger to remove the protection state before it can work normally.

VIII. Note

1. Before measuring, ensure that the tested equipment is in a power outage state and that all test terminals cannot be grounded.
2. The measurement wiring must be strictly operated according to the instructions, otherwise the consequences will be borne by oneself.
3. Before testing, it is important to carefully check whether the parameters set are correct.
4. It is best to use a grounded power socket when charging.
5. Do not work under excessive limits.
6. It is strictly prohibited to connect high and low voltage in reverse.

IX. After-sale service

Within one year from the date of purchase, the instrument shall be free of charge for repair or replacement due to product quality issues. Provide lifetime warranty and technical services. If any abnormalities or malfunctions are found in the instrument, please contact our company in a timely manner to arrange the most convenient solution for you.

