KvTester
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ZC-203C

Transformer Turns Ratio Tester

User Manual V2.0



❖KVTESTER ELECTRONICS TECHNOLOGY CO., LTD.❖

Dear Customers,

Thank you for purchasing our ZC-203C Transformer Turns Ratio 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 one year from the date 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.

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I. Overview

The National Electric Power Department's Preventive Test Procedures requires periodic turns ratio or voltage ratio tests, including semi-finished and finished products in the production process, transformers before operation and during operation in the power system. The traditional variable ratio bridge operation is cumbersome, the reading is not intuitive, and the necessary conversion is required, and the test result only reflects the one-phase transformation ratio. The instrument overcomes the shortcomings of the traditional variable ratio bridge test, and completes the three-phase ratio test at one time, and the test speed is fast and the accuracy is high, which greatly improves the test efficiency.

II. Security measures

1. Please read this operation manual carefully before using this instrument.
2. This instrument can be used indoors and outdoors, but should avoid rain, corrosive gas and excessive dust.
3. The instrument should avoid severe vibration.
4. The maintenance, care and adjustment of the instrument should be carried out by professionals.
5. The yellow, green and red of the test clamps are not connected to a, b and c of the transformer respectively.
6. Do not connect the high and low voltage cables.
7. Use only the yellow and green clips when measuring single-phase transformers. The red test clip should be left floating.

III. Performance characteristics

1. the test range is wide, up to 10,000.
2. the test speed is fast, complete the single phase test in 10 seconds.
3. z-shaped connection transformer test.
4. with blind measurement ratio, group test, tap position test function.
5. no power down clock and date display, data storage function (can store 50 sets of test data).
6. high and low voltage reverse connection protection.

7. transformer short circuit, turn-to-turn short circuit protection.

8. thermal printer output function, fast, silent.

9. small size and light weight.

IV. Technical indicator

1. Range: 0.9~10000

2. Accuracy: 0.1%±2 words (below 500);

   0.2%±2 words (500~2000);

   0.3%±2 words (2000~4000);

   0.5% ± 2 words (4000 or more).

3. Resolution: minimum 0.0001.

4. the output voltage: 160v/10v (automatic selection).

5. working power: AC220V ± 10%, 50/60Hz.

6. the use of temperature: –10 ° C ~ 40 ° C.

7. relative humidity: ≤ 80%, no condensation

V. Panel introduction

The panel of the instrument is shown below:



figure 1

Switch / socket: the whole machine power input port and instrument switch, connected to 220V, 50/60Hz power supply, socket with insurance.

Display: 240 × 128 dot matrix LCD with led backlight, display operation menu and test results.

Brightness: Adjust the contrast of the display.

button:

F1, **F2**: according to the interface prompts, different functions are indicated during the operation of the instrument.

Reset : Press this button to reset the machine and return to the initial state.

OK: Please refer to: VI. Interface introduction and operation method.

Return: Please refer to: VI. Interface introduction and operation method.

↑: Move the cursor up to operate according to the display prompt during the use of the instrument.

↓: Move the cursor down to operate according to the display prompt during the use of the instrument.

←: Move the cursor to the left to operate according to the display prompt during the use of the instrument.

→: Move the cursor to the right to follow the display prompts during the use of the instrument.

⏚ Instrument grounding post for instrument grounding to protect the user's personal safety and protect the instrument.

Printer: Print test results.

L-V port: The test lines of yellow, green and red are connected to the low-voltage a, b and c three-phase terminals of the transformer.

H-V port: The test lines of yellow, green and red are connected to the high-voltage a, b and c three-phase terminals of the transformer.

VI. Interface introduction and operation method

1.boot

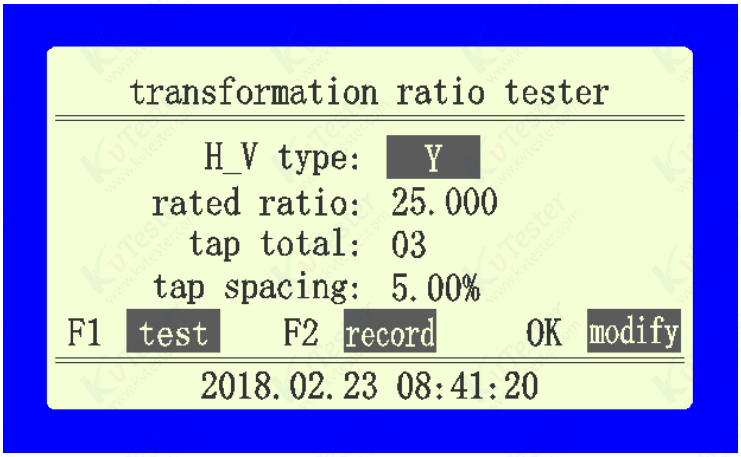
(This instrument is strictly prohibited to use the generator to provide AC power, otherwise the measurement data may be inaccurate.) Plug in the power cord, connect to the ac220v mains, press

the instrument switch "I" to turn on the instrument.

After the instrument is turned on, the screen displays as shown below:

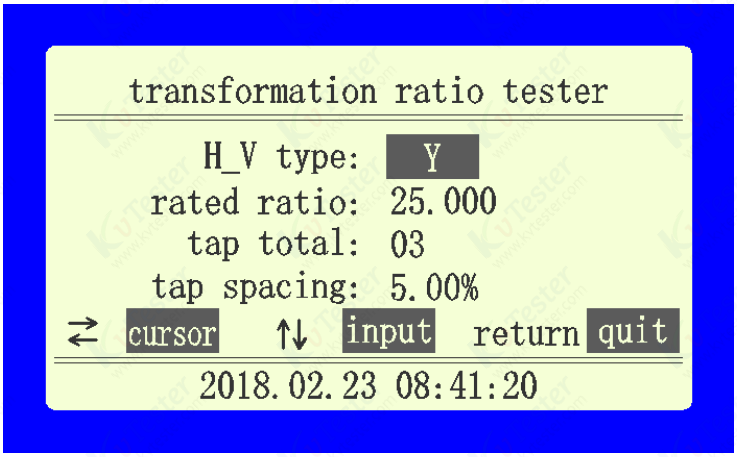


After that, the initial interface is displayed as shown below:



2. parameter modification

If you need to modify the parameters, you can press **OK** to enter the parameter modification interface, as shown below:



Press ← or →, the cursor can move around each parameter, and the cursor can be moved to

the parameter that needs to be changed.

Press ↑ or ↓ button, the state of the above picture can change the high voltage mode. The selection items include “Y”, “D”, “single”, “Z”, which can be selected cyclically, select “single”, and the measurement can be measured. Phase transformer or pt; the cursor can change the size of the number when it is in other positions; press the return key to exit the modification after the modification is completed.

3. single-phase transformer or PT transformer measurement

The yellow and green clamps of the high-voltage cable are connected to the terminals on the high-voltage side of the transformer under test.

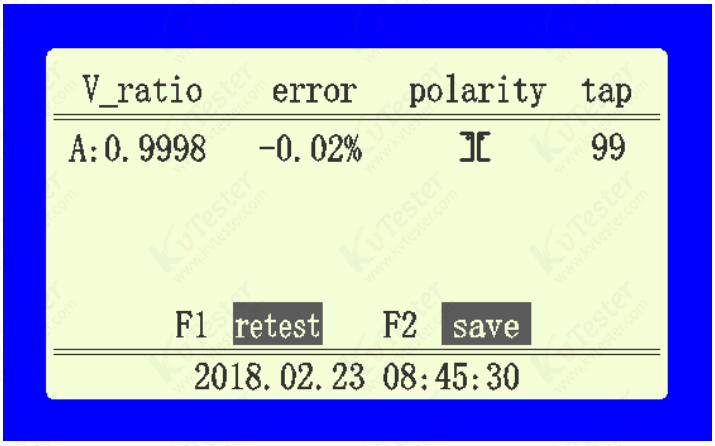
The yellow and green clamps of the low-voltage cable are connected to the terminals on the low-voltage side of the transformer under test.

As shown below.



Test Object

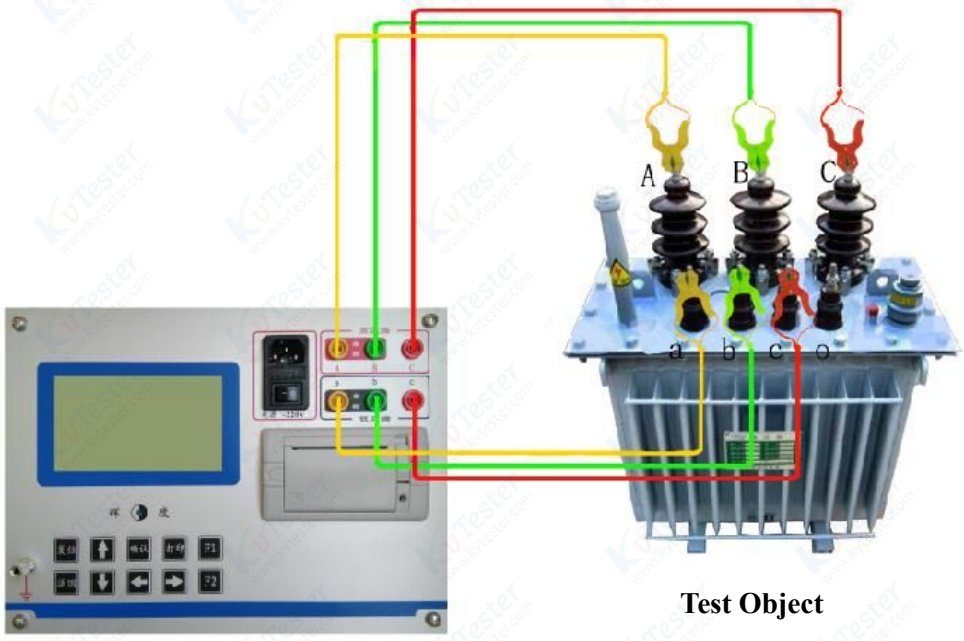
At this point, press the OK to modify the parameters, the high-voltage mode selects “Single”, and the others are modified according to the actual values. After the parameter modification is completed, press the **return** key to exit the modification interface. After confirming that the wiring is correct, press the **F1** key to test and display “Testing”. The test result will be displayed later, as shown in the figure below. (In this manual, the test results are only examples, and the actual values vary according to the actual situation on site):



At this point, you can press **F1** to retest, press **F2** to save, and press the **Print** button to print the test result.

4. Measurement of three-phase transformer

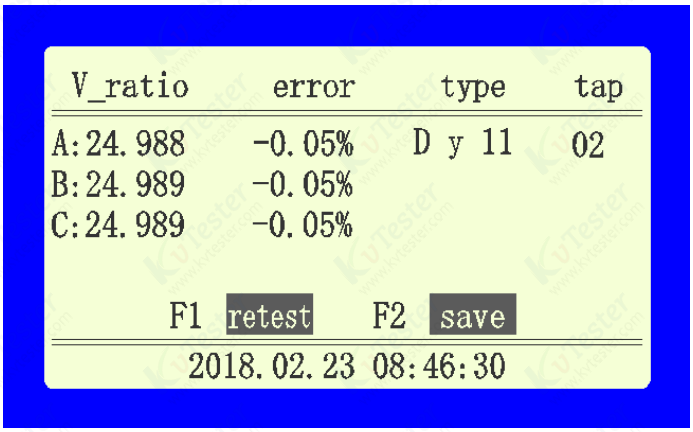
The yellow, green and red clamps of the high-voltage end cable are respectively connected with the three-phase high-voltage A, B and C of the transformer under test; the yellow, green and red clamps of the low-voltage end cable are respectively connected with the low voltage of the transformer under test. The low-voltage a, b, c three-phase corresponding connection, as shown below:



Test Object

Note: For the neutral point in the connection group, the neutral point is not connected, and the measurement data is displayed in the connection group without neutral point (for example: DYn11, the measurement result is: DY11).

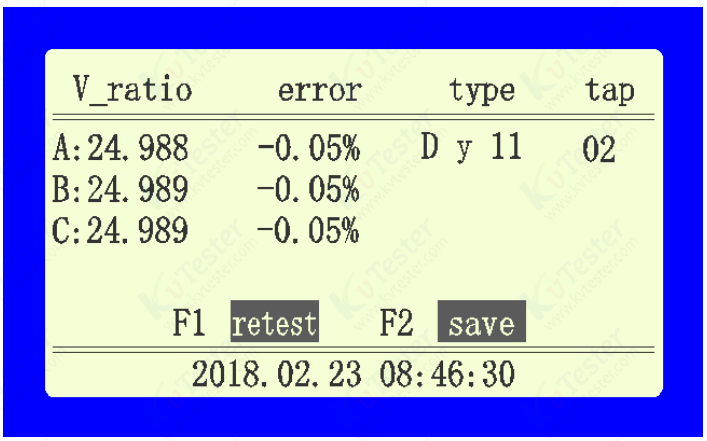
After connecting the clamps, after booting the initial interface, press the **OK** key to modify the parameters, select the correct high voltage mode, and modify other values according to the actual value. After the parameter modification is completed, press the **return** key to exit the modification interface. After confirming that the wiring is correct, press the **F1** key to test, it shows “Testing”, and the test result is displayed later, as shown below:



At this point, you can press **F1** to retest, press **F2** to save, and press the **Print** button to print the test result.

5. Nameplate guess instructions

If the nameplate parameters of the three-phase transformer are not clear, the instrument can accurately measure the transformer ratio and group number, but cannot accurately measure the connection type, tap position and other parameters. The specific operation and description are as follows: The high and low voltage windings are respectively connected to the high and low voltage port of the instrument in sequence, and the instrument is turned on. Select the **F1** test directly on the initial interface, and display “Testing”. The test results are shown in the following figure:

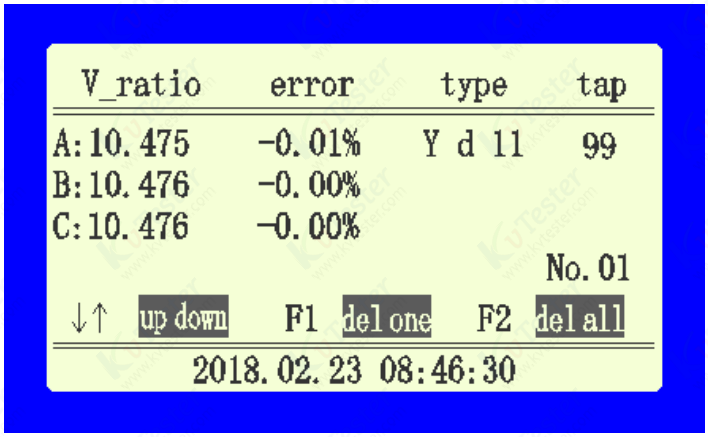


At this time, only the ratio value and the group number are accurate. Because other parameters are unclear, the accurate value cannot be set. Therefore, the displayed ratio, error, tap value, connection method, etc. are not accurate data. Can not be used as a reference. If you know the high voltage mode, you can measure the actual connection group.

6. store, access data

After the data test is completed, press **F2** to store the current test results.

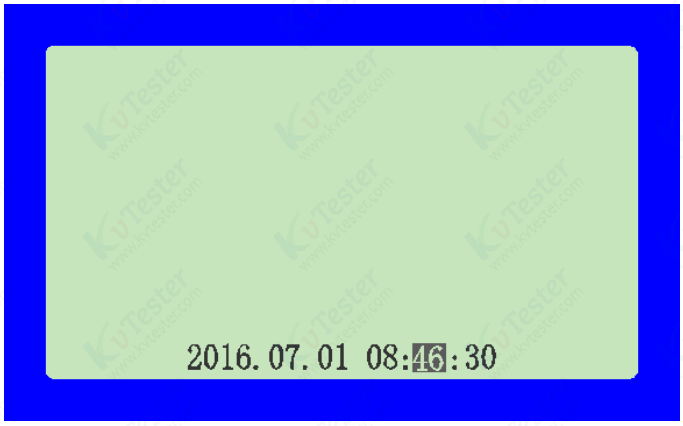
If you need to access the historical data stored in the instrument, press the **F2** key in the initial interface, the screen will display as shown below:



Press the ↑ or ↓ button to scroll through the pages, press the **Print** button to print the current data, press the **F1** button to clear the current record, and press the **F2** button to clear all the records.

7.time setting

In the initial interface, press the **Return** button to enter the time modification interface, as shown below:



Move the cursor to the left or right to change the position of the cursor. Press the ↑ or ↓ button to modify the number. After completing the modification, press the **OK** key to exit and return to the initial interface.

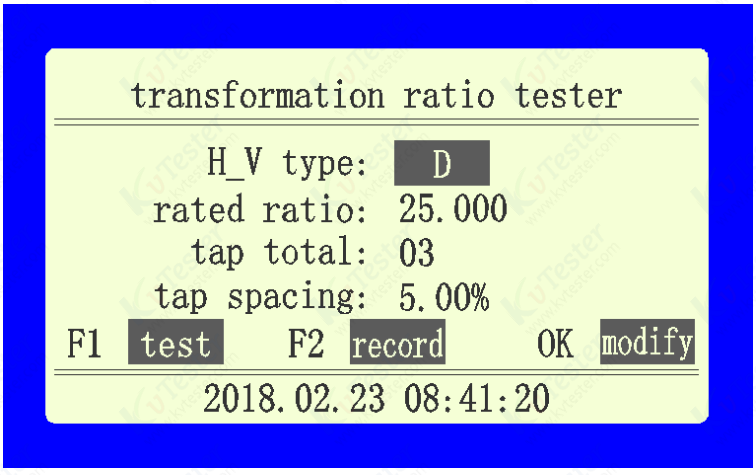
VII. Operation example

Wiring according to the three-phase transformer wiring method (please refer to the measurement of 6.4 three-phase transformer).

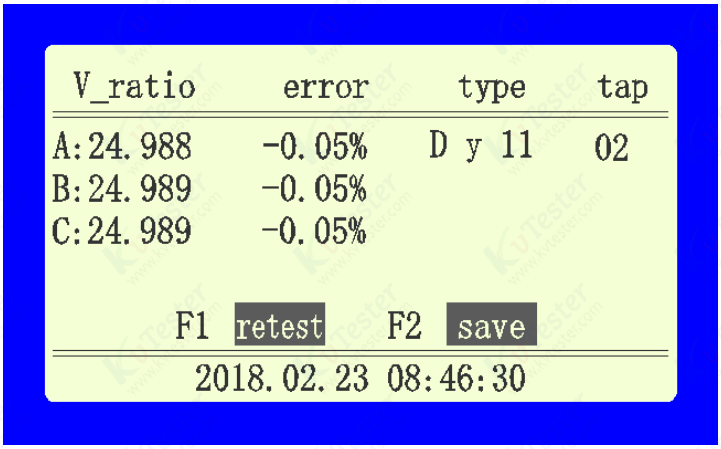
Start up, display the initial interface, at this time you can modify the parameters according to the data on the transformer nameplate. Press the **OK** key to enter the parameter modification interface:

- Modify the high voltage mode: the nameplate shows the connection group: dyn11,Then modify the high voltage mode to: D.
- Rated transformation ratio: (according to the middle position of the high pressure end: 2 tap) The high voltage value is 10000, the low voltage is 400, and the rated transformation ratio is calculated to be 10000/400=25.Input rated ratio 25;
- Total number of taps: The switch position shows three high voltage values of 10500-9500, so there are 3 taps;
- Tap spacing: (10500-10000) / 10000 = 5%.

After the input is complete, press the back key to return to the main menu, as shown below:



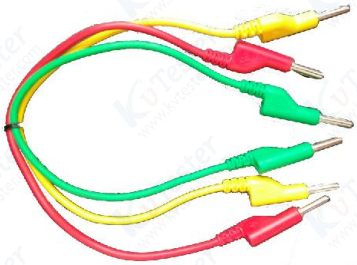
Press the **F1** key to start the measurement. The measurement results are shown in the figure below:



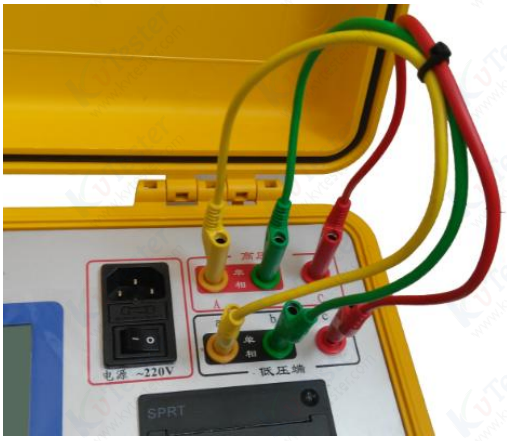
At this point, you can press **F1** to retest, **F2** stores the data, **Print** to print the data, and resets to return to the main menu.

VIII. Instrument self-test

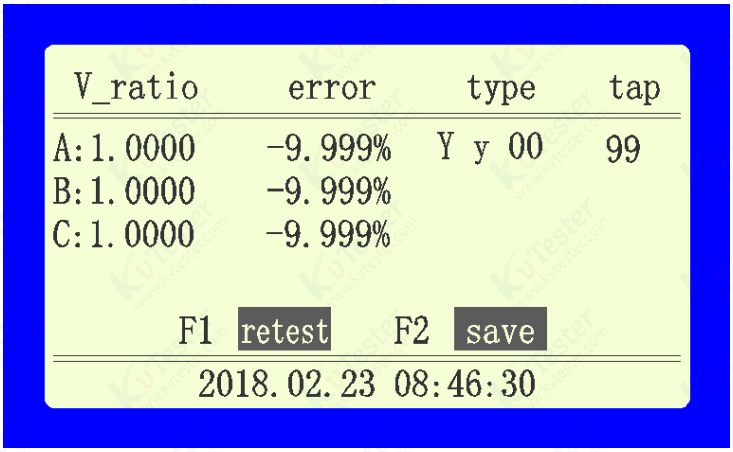
If the user suspects that the instrument is malfunctioning during use, or suspects that the test result is inaccurate, the instrument can be self-tested using the standard short wiring provided with the instrument. The standard is as follows:



Connect the standard shorting wire to the terminal of the instrument as shown below:



After power on, the high voltage mode displays: y, press **F1** to test, the test result shows the following picture:



The A/B/C three-phase data to the ratio is 1.0000±2‰, indicating that the instrument is in a normal state and can be used continuously.

Ⅸ. Complete set of instruments

Name	Quantity
Ratio Tester Host	1 pcs
Three-core power cable	1 pcs
Standardizer (short wiring)	1 set
Test Cable	1 set
Ground wire	1 pcs
Fuse 2A	2 pcs
printer paper	2 pcs

Ⅹ. Matters needing attention

1. The transformer with 19-speed on-load tap-changer, the 9, 10, 11 tap is the same value, the instrument should input 17 when inputting the tap type. At this time, after 12 taps, the instrument shows that the tap position is smaller than the actual position. 2.

2. The setting of the tap position of the instrument is designed according to the high voltage side voltage regulation. It is assumed that the 1 tap is the highest voltage gear. If the voltage reverse design or the tap changer is on the low voltage side of the transformer, the tap position and the actual tap are displayed. The position is inverted.

3. When the instrument adopts the AC power supply mode, it cannot be powered by the generator. Because the generator power supply is not a stable 50/60Hz sine wave, the instrument test results will be inaccurate.

4. This instrument is a conventional transformer ratio tester. It can not be tested for some special transformers (such as: Scott, reverse Scott, rectification, cvt, etc.).

XI. After-sales service

The tester will be repaired free of charge for any quality defects within one year from the date of delivery. But for quality problems caused by improper operation, or instrument damage caused by improper storage and transportation, our company will only provide the possible repair service, and will charge based on repair cost.

The lifetime repair and technical services will be provided on reasonable charges. For any abnormality or malfunction, please contact our company in time so that we can arrange the most convenient solution.

KVTESTER ELECTRONICS TECHNOLOGY CO.,LTD.

- Web site: WWW.KVTESTER.COM
- Address: No.120, Guanggu Road, East Lake New High-tech Development Zone, Wuhan, China
- Email: sales@kvtester.com
- Tel: 0086-27-81778799
- Fax: 0086-27-81778799
- Mobile: 0086-18302705967
- Whatsapp: 0086-18302705967