

# **VK2072**

## **Turns Ratio & Winding Resistance Tester**

### **User Manual**

Wuhan Lvnengde Precision Testing Technology Co., Ltd

# **Statement**

## **Copyright Statement**

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## **Version**

Ver1.00

Dear users,

Thank you for choosing our testing products. I hope this manual may provide all necessary information and avail you in using them.

Please read this manual carefully before officially using this product for safe and correct use of it. You are always welcome to contact our sales or technical staff if you have any doubt about any content in this manual, or if you are in need of any business consultation or technical support. You can rest assured that we will serve you wholeheartedly until your satisfaction. Please keep it properly after reading it in case of future use.

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# 1 Overview

As transformer is the core equipment in electric power system, its long-term reliable operation is of high significance to the stability and reliability of the whole system.

At present, distribution transformer DC resistance tests, transformer ratio group tests are must-test items of transformer interruption maintenance. To complete the above detection and operation, the transformer DC resistance tester, transformer ratio group tester, loop resistance tester need to be prepared. The Two instruments should be carried for every test. For they're five independent instruments, each instrument is equipped with specified test wires, which requires separate testing and frequently changing wiring connection, thus wasting a lot of manpower, materials and time.

Our company has innovatively developed the 2 in 1 distribution transformer test system (DC resistance + transformation ratio) powered by large capacity lithium battery. To complete the above two tests, only one set of instrument is needed without frequent connection and disconnection of the testing wires.

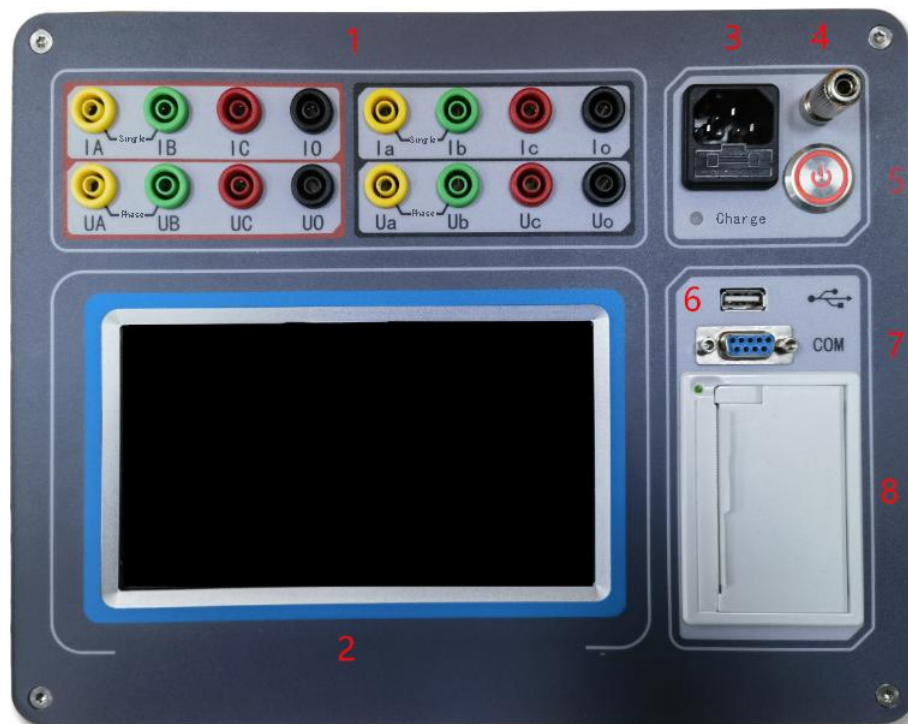
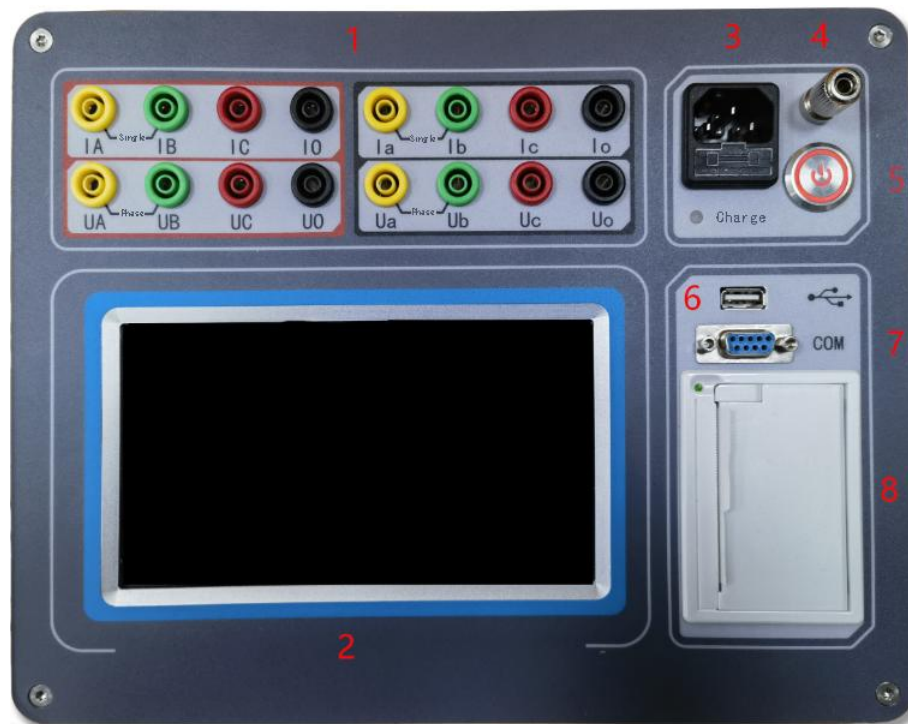
## 2 Main Functional Features

- 2.1 With one wiring connection, DC resistance tests, transformation ratio tests.
- 2.2 DC resistance test function: For Yn type, Y type and  $\Delta$  type winding, it adopts three-phase automatic testing, and calculates the three-phase unbalance rate; The maximum output current is 20A, which can support the very low resistance tests of the low-voltage coil of distribution transformers.
- 2.3 Transformation ratio test function: It's equipped with three-phase, single-phase, Z-type transformer test function; PT/CT transformation ratio and polarity test function; blind test function.
- 2.4 With a variety of wired and wireless communication interfaces, it's convenient for the instrument to expand functions.
- 2.5 The instrument adopts embedded Linux operating system, which has high safety, smoothness, ease of use, etc.
- 2.6 The instrument adopts A7+M4 dual-core architecture, which not only satisfies the real-time measurement, but also the smooth operation.
- 2.7 With 7 inch industrial large screen display, fresh and simple display style design, full touch combined with jog dial operation, it creates comfortable and convenient human-computer interaction experience for you.
- 2.8 This instrument uses large capacity lithium battery to provide power and has a built-in charger.

### 3 Main Technical Indicators

DC Resistance Test	
Output Current	20A、10A、5A、1A、0.1A、 $\leq 10\text{mA}$
Measurement Range	Gear 20A $0.5\text{m}\Omega \sim 100\text{m}\Omega$ Gear 10A $1.0\text{m}\Omega \sim 300\text{m}\Omega$ Gear 5A $10\text{m}\Omega \sim 1.0\Omega$ Gear 1A $200\text{m}\Omega \sim 6.0\Omega$ Gear 0.1A $2.0\Omega \sim 60\Omega$ Gear $\leq 10\text{mA}$ $30\Omega \sim 50\text{k}\Omega$
Accuracy	$\pm(\text{reading} \times 0.2\% + 2)$
Transformation Ratio Test	
Measurement Range	0.9~10000
Accuracy	$\pm(\text{reading} \times 0.1\% + 2)(\leq 500)$ $\pm(\text{reading} \times 0.2\% + 2)(> 500, \leq 3000)$ $\pm(\text{reading} \times 0.3\% + 2)(> 3000)$
Resolution	0.9~9.9999(0.0001)    10~99.999(0.001) 100~999.99(0.01)    1000~9999.9(0.1) $\geq 10000(1)$
Use Conditions & Appearance	
Power Supply	Built-in lithium battery with capacity of 7.8AH.
Charging voltage	AC220V
Use temperature	$-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$
Relative Temperature	$\leq 90\%$ , non-condensing.
Weight/Dimension	6.5kg/318×280×204mm

## 4 Panel Description



- 
1. Wiring terminals for DC resistance tests and transformation ratio tests.  
Connect the high voltage side of the transformer with the high voltage terminal; Connect the low voltage side of the transformer with the low voltage terminal.

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  2. Capacitive touch screen.  
Display size: 7 inches; Resolution: 1024×600.

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  3. Lithium battery charging socket.  
Charge the instrument by plugging the three-core power cord of the instrument to connect the AC 220V main power supply. The fuse base and socket are integrated. The fuse specification is 250V/2A with size of  $\phi 5\text{mm} \times 20\text{mm}$ . Fuses of same specification should be used. When the indicator light is red, it indicates the instrument is being charged. When the indicator light is green, it indicates that the instrument finishes charging.

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  4. Grounding terminal.  
The instrument must be reliably grounded; Paint or rusts on the grounding site must be removed cleanly.

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  5. Power on/off button.  
Short press for 2 seconds to turn on the instrument; Long press for 3 seconds to turn off the instrument.

---

  6. USB interface  
External USB for storing test data; Don't unplug the USB during data storage.

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  7. External communication interface  
It can be used to connect an external PC for data transmission or an external specified module for function expansion.

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  8. Printer.  
Print test results.
- 



## 5 Instructions

### 5.1 Overview

The instrument integrates several different test functions. By selecting different function entrances, we can set parameters for each test function and carry out these tests separately. The whole operation and testing processes are simple and convenient.

Common icons and buttons are as follows:



	Go back to last interface
	Show wiring connection way

## 5.2 INSTRUCTIONS ON PRINTER

The printer's button and its indicator light are integrated. After the printer is powered on, the indicator light will be on all the time under normal conditions and it'll flash when printing paper is used up. Press button once and paper will be fed.

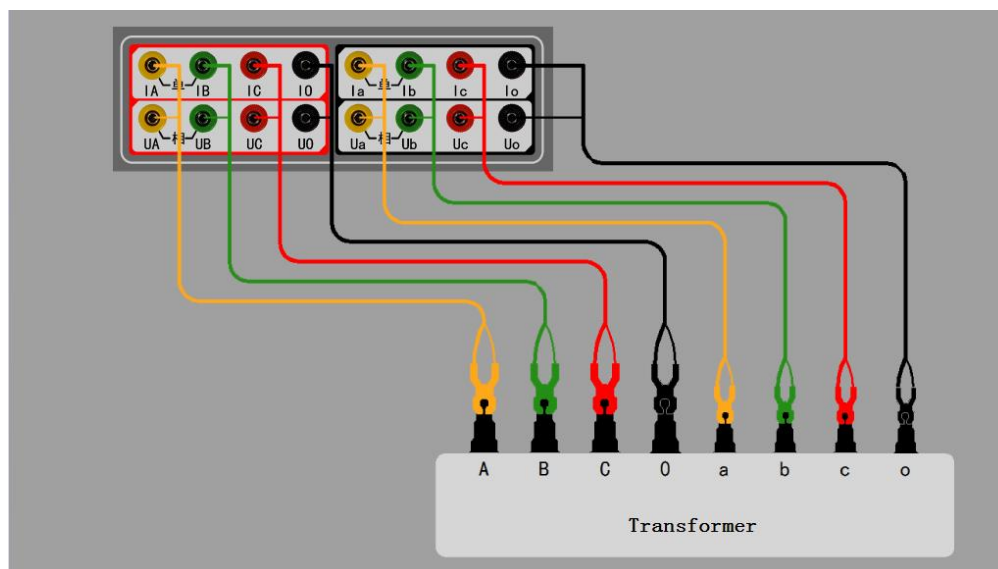
Printer self-check: Press the button and at the same time, power on the printer. Then the self-check report will be printed out.

Changing Printing paper: Pull out rotating handle and open cover. Load printing paper and pull out the paper a little (outside tearing teeth a little). Ensure that the paper is put neatly and the side with chemical (the smooth side) is upward. Close the cover. After the paper is held tightly by shaft, push the shaft into print head and push in the rotating handle to restore the original state.


## 5.3 CONNECTING TEST WIRES

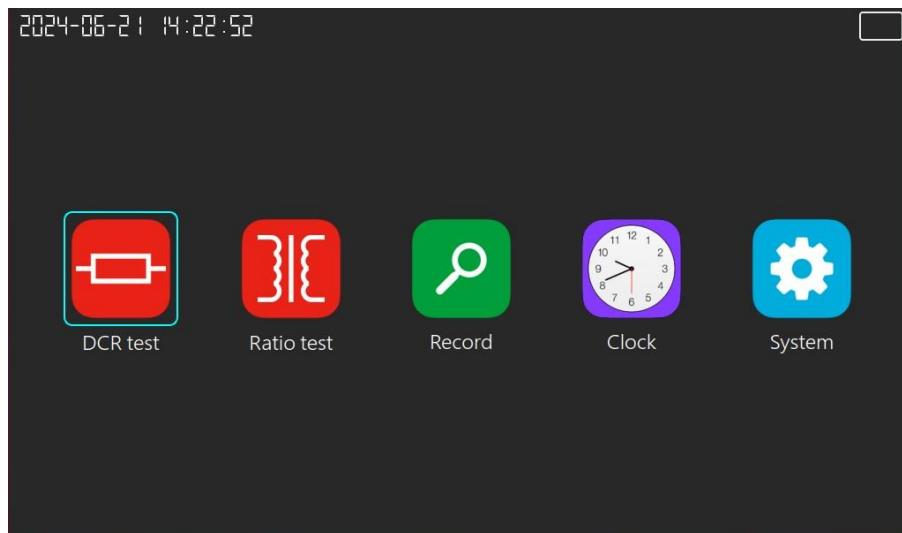
DC resistance tests and transformation ratio tests have same wiring connection, that is, the two tests can be done by one wiring connection:

Note: Use high-voltage A/B and low-voltage a/b terminals for transformation ratio single-phase tests; For all test items, the U/I terminals must be connected correspondingly at the same time during the tests.



## 5.4 USE INSTRUCTIONS

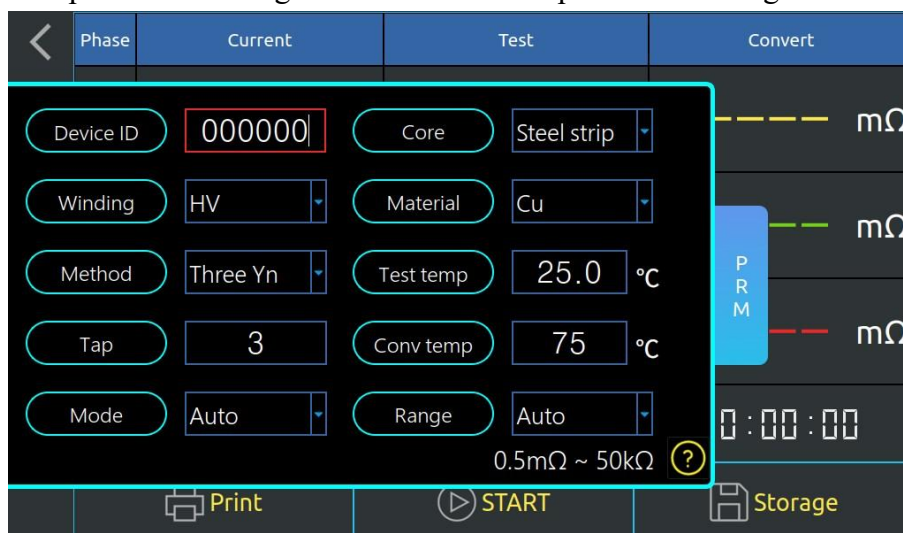
After connecting the test wires for the corresponding test items, short press  for 2seconds to turn on the power switch. After initialization, the instrument will enter the "Main Menu" screen.



Here, time and some status indicators are displayed on top bar. and some function options are displayed in middle. Click corresponding function option to enter its menu.

### 5.4.1 DC RESISTANCE TEST

After clicking the "Direct Resistance Test" option, click the parameter setting button to pop up the "Parameter Setting" screen. After the parameter setting is completed, click the parameter setting button to retract the parameter setting screen.







Device ID	Set the No. of the tested product.
Winding	Select tested winding. High voltage winding and middle voltage winding match high voltage terminals. Low voltage winding matches low voltage terminals.
Tap	Set the current tapping position of on-load tap changer
Method	Select tested phase. Single phase test and three phase test are available. “Three Yn” suitable for Y connection winding with neutral point. “Three Y/D” suitable for Y connection or Delta connection winding without neutral point.
Mode	You can choose between automatic and manual commutation.
Core	The iron core material can be selected as "electrical steel strip" or "amorphous alloy".
Material	You can choose copper or aluminum.
Test temp	Set the current test temperature.
Conv temp	Set conversion temperature
Range	Select gear of output current for tests.

**Note: During tests, if the instrument detects faults such as an open circuit in the power supply, a fault prompt box will pop up, an alarm will be triggered, and the tests will be stopped.**

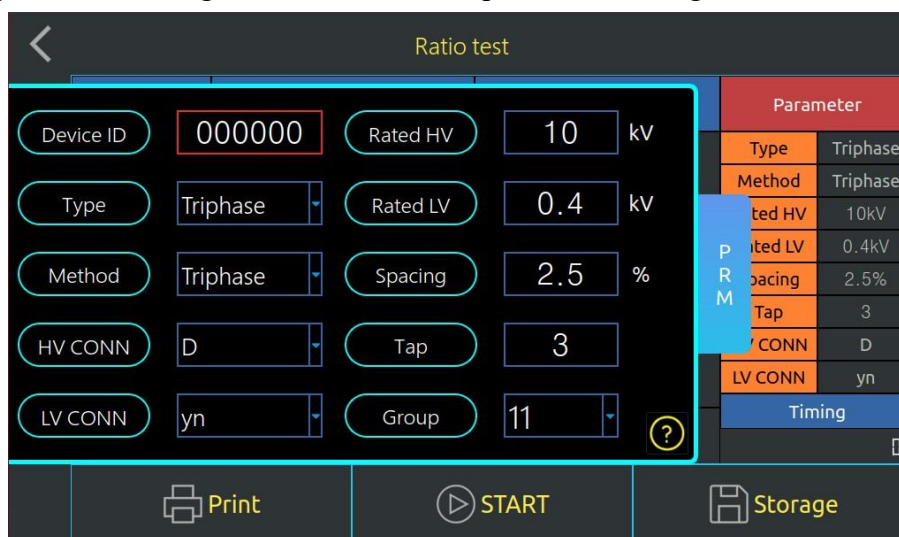
The following describes the “Three Yn” test interface. The operation of other test interfaces is similar.

		Phase	Current	Test	Convert
P R M	AO 	100.0 mA	30.52 Ω	36.39 Ω	
	BO 	100.0 mA	30.61 Ω	36.50 Ω	
	CO 	100.0 mA	30.61 Ω	36.47 Ω	
	Status:		0.301%	Timing:	00:00:22
Print		START		Storage	

Phase	It refers to the phase of the tested winding.
Current	It refers to gear of actual output currents of a given phase.
Test	The measured DC resistance value of the corresponding test phase.
Convert	It refers to the resistance value converted from the measured value according to settings.
Unbalance rate	The device automatically calculates the unbalance rate of 3 phases.
Timing	It refers to how long the test takes.
	Start testing
	Print the current test results through a panel printer
	Save the current test results to the instrument's local device or to the USB drive
	Click the left button of the screen. The parameter setting screen will be popped up. You can easily view the set test parameters and modify the current tap position parameters during tests.

#### 5.4.2 TRANSFORMATION RATION TEST

After clicking on the "Ratio Test" option, click on the parameter setting button to pop up the "Parameter Setting" screen. After completing the parameter setting, click on the parameter setting button to retract the parameter setting screen.



Device ID	Set the No. of the tested product.
Type	Select the specific type of tested samples.
Method	Choose different testing methods.
HV CONN	Select the high-voltage connection method of tested samples.
LV CONN	Select the low-voltage connection method of tested samples.
Rated HV	Set the high-voltage rated value of tested samples, with the unit of kV.
Rated LX	Set the low-voltage rated value of tested samples, with the unit of kV.
Spacing	Set the tap spacing of tapping switches.
Tap	Set the rated tap position of tapping switches.
Group	Set the connection group of tested samples.

Ratio test					
P R M	Phase	Measured Ratio	Ratio Error(%)	Parameter	
	AB/ab	25.006	0.02	Type	Triphase
	BC/bc	25.009	0.03	Method	Triphase
	CA/ca	25.009	0.03	Rated HV	10kV
				Rated LV	0.4kV
				Spacing	2.5%
				Tap	3
	Group	Y-yn-0	Tap	2	
					Timing
					2023-03-18 15:30:21
	Print		START		Storage

### 5.4.3 RECORD QUERY

Press "Record Query" to enter "Record Query" interface.



You can query the storage data of each test type and filter data of a specified period by “Test Time”. After selecting the stored data, you can view the detailed records. Turn on the multiple selection switch and you’ll be able to select and delete multiple items together.

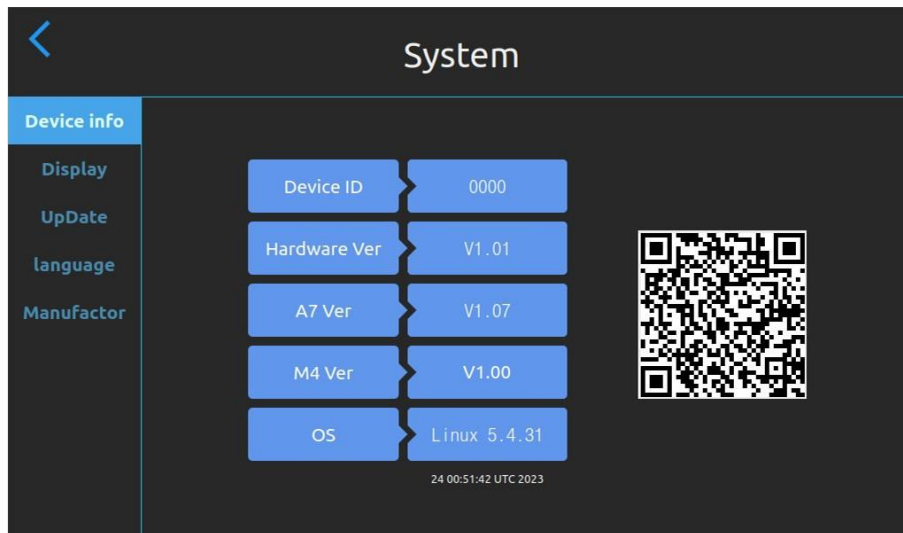
#### 5.4.4 CLOCK SETTING

Click “Clock Setting” to enter “Clock Setting” interface.



#### 5.4.5 SYSTEM SETTING

Click “System Setting” to enter “System Setting” interface.



Tester information and screen brightness can be accessed in this interface.

## 6 AFTER-SALES SERVICE

6.1 Product warranty forms are provided for the products of our company.

Please check and fill out the warranty form on the spot when ordering goods for delivery.

6.2 From the date of purchase, the maintenance fee will not be charged during the warranty period. After the warranty period, maintenance and commissioning will charge the appropriate fees.

6.3 Batteries are consumable products and are not covered under warranty.

6.4 One of the following conditions is not subject to warranty:

6.4.1 The user disassembles the instrument or alters the technological structure of the instrument.

6.4.2 Serious damage to the instrument due to user custody or improper use.

6.4.3 Damages due to other causes of users.