

# **Operation Manual**

# **Transformer LV Short-circuit Impedance Tester**

# JYW6300



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Ensure to carefully read the operation manual prior to use the instrument, it is sole responsibility of customer to secure safety.

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The manual is subject to change without notice.

### I. Overview

**JYW6300** transformer LV short-circuit impedance tester (hereinafter referred to as instrument) is mainly applicable to LV load impedance testing in delivery, heavy repair, pre-test and handover test of  $\geq$ 35KV main power transformers (single-phase or three-phase).

LV short-circuit impedance measurement is a basic item among conventional test items and is used to compare the short-circuit impedance value measured before and after short-circuit current impact on a transformer. According to the variation degree, the winding deformation degree can be estimated preliminarily. The variation between the LV short-circuit impedance after short-circuit current impact on a transformer and the initially tested LV short-circuit impedance shall not exceed 2%.

LV short-circuit impedance test is the most direct method for checking for deformation of the winding of a transformer after it suffers from short circuit current impact during operation or mechanical force impact during transportation and installation. LV short-circuit impedance test is of much significance to judging whether the transformer can be put into operation and is also one of bases for judging whether the transformer needs inspection under disassembled condition.

#### **II.** Safety Measures

- 1. Be sure to carefully read the operation manual before using the instrument.
- 2. The instrument operator shall have general knowledge about the use of general electrical equipment or instruments.
- 3. The instrument shall be reliably grounded during use in order to ensure the safety of the instrument and operators. The ground wire shall be firstly well connected before test; the ground wire shall be finally removed after work completion.
- 4. The instrument has high output voltage, so pay attention to safety and avoid electric shock.
- 5. The instrument can be used both indoors and outdoors. However, be sure to avoid using it in severe environments with rain, or corrosive gas, etc.
- 6. Repair, maintenance and adjustment of the instrument shall be performed by professional personnel.
- 7. The instrument shall avoid violent vibration.
- 8. Repair, maintenance and adjustment of the instrument shall be performed by professional personnel.
- 9. The connection position of the instrument panel with the test line shall be tightened without being loosened.
- 10. The yellow, green and red of the test line clamp are corresponding with A, B and C of the transformer respectively during wiring.
- 11. Only yellow and green line clamps are used during single-phase measurement.
- 12. Check for wiring error after wiring completion. In the event of any anomaly during test, immediately turn off the power and check wiring.

#### **III. Performance Characteristics**

- 1. The instrument can measure the short-circuit impedance, short-circuit reactance, and three-phase impedance voltage of a transformer.
- 2. The interface uses the intelligent touch mode and operation is simple and convenient.
- 3. The instrument uses 220V single-phase LV power supply.
- 4. Wiring operation is simple and convenient. Three-phase measurement can be completed automatically with one connection and one start, and the measurement result can be displayed directly.

- 5. The test power supply can choose internal power supply and external power supply: the internal power supply is the instrument's operating power, and the external power supply can be inputted by a voltage regulator.
- 6. When using the internal power supply, the instrument automatically controls the output voltage and current without any external auxiliary equipment.
- 7. Non-power-off clock and date display. 50 sets of data can be stored in the instrument; after power failure, the data are not lost.
- 8. Large-screen color LCD; clear and readable data; printed with a thermal printer; RS485 communication interface and US disk interface
- 9. The instrument has reverse HV and LV protection function and transformer short circuit and turn-to-turn short circuit protection function and is protected from wrong connection of 380V power supply.

### **IV.** Specifications

- 1) Voltage measuring range: AC 10~400V
- 2) Current measuring range: AC 0.1~20A
- 3) Measuring accuracy: voltage:  $\pm 0.2\% \pm 2$  bytes

Current: 0.2%±2 bytes

Power: 0.5%±2 bytes

- 4) Working power supply: AC220V±10%, 50/60 Hz
- 5) Working temperature: -20°C~40°C
- 6). Relative humidity: ≤80%RH, no dewing
- 7) Volume: length 360mm× width 280mm× height 160mm
- 8) Weight: 12kg

#### V. Instrument Operation and Function Introduction

The panel of JYW6300 transformer LV short-circuit impedance tester is shown in Figure 1:



Figure 1 Panel

Instructions on components:

- 1. Touch LCD screen: used to operate the menu and display test results.
- 2. Protective ground pole: the binding post terminal shall be reliably grounded before use in order to ensure the safety of operators and normal working of the instrument.
- 3. Power socket: it is the power input port of the whole instrument and is connected with 220V, 50/60Hz power supply; there is a fuse in the socket. The instrument shall use 5A fuse.
- 4. Test power transfer switch: used to choose internal 220V power supply or external power supply from the voltage regulator as the test power supply.
- 5. Test power output switch
- 6. Connecting terminal
- 7. Printer: front paper change type Chinese printer, used to print test results.
- 8. USB interface: used to export test records into USB devices.
- 9. RS485 communication interface: used to connect PC for convenience of remote control via PC.

#### VI. Test and Operation Method

1. Welding method

Single-phase measurement: connect Ua, Ia and Ub, Ib of the instrument panel to terminals A and B of the transformer respectively using the test lines supplied with the instrument (Figure 2).



Figure 2 Wiring diagram of single-phase test

Three-phase measurement: connect Ua, Ia, Ub, Ib and Uc, Ic of the instrument panel to terminals A, B and C of the transformer respectively using the test lines supplied with the instrument (Figure 3).



Figure 3 Wiring diagram of three-phase test

In case of using an external power supply, connect it onto the external input terminal of the instrument panel.

The LV side of the transformer is completely shorted using a sufficiently coarse conductor. The section area of the short circuit line shall be able to bear the LV side rated current and ensure good contact so as to reduce additional errors.

The ground terminal of the instrument shall be grounded reliably.

2. Description of Instrument Startup Interface

After turning on the instrument power, the startup picture is displayed for 2s; at this time, the instrument is being initialized, as shown in Figure 4.



Figure 4

#### 3. Main menu

After self-check completion, the instrument will automatically enter the main menu, as shown in Figure 5.





The main menu mainly consists of five parts: test operation option area, time display area, prompt message display area, historical record retrieval button, etc.

#### *A)* <u>*Test operation option area:*</u>

- <Three-phase impedance test>: the instrument enters three-phase impedance test state.
- <Single-phase impedance test>: the instrument enters single-phase impedance test state.
- <Zero-sequence impedance test>: the instrument enters zero-sequence impedance test state.

#### B) <u>Time display area:</u>

Display the current perpetual calendar information, its format: 2015-01-20 10:20:48.Click "Time" here to enter the time modification menu, where the current perpetual calendar time is modified.

#### C) <u>Prompt message area:</u>

The prompt message shown on the current interface is the baud rate of RS485 communication interface.

#### E) Historical record retrieval button:

Click the historical record retrieval button to enter the historical record interface, for convenience of viewing relevant test records.

#### 4. Three-phase impedance test

Click the "three-phase impedance test" button to enter the three-phase parameter setting interface (shown in Figure 6).





After parameter setting completion, press the "Enter" button to start measurement and enter the data measurement interface (as shown in Figure 7).

In case of using internal power supply, the power supply mode is selected as "Internal"; here the test mode is selected as "Automatic", and the instrument will complete three-phase test. If the test mode is selected as "Manual", press the "Test" button after data stabilization to complete measurement and then enter the test of the next phase.

In case of using external power supply, the power supply mode is selected as "External", and the test mode is selected as "Manual".

Here the real time voltage, current and power are displayed. After both the voltage and current are within the measuring range of the instrument by adjusting the external power supply, press the "Test" button to complete measurement and then enter the test of the next phase.





#### 5. Single-phase impedance test

Click the "single-phase impedance test" button to enter the single-phase parameter setting interface (shown in Figure 8).





After parameter setting completion, press the "Enter" button to start measurement and enter the data measurement interface (as shown in Figure 9).

In case of using internal power supply, the power supply mode is selected as "Internal"; here the test mode is selected as "Automatic", and the instrument will complete the test. If the test mode is selected as "Manual", press the "Test" button after data stabilization to complete measurement.

In case of using external power supply, the power supply mode is selected as "External", and the test mode is

selected as "Manual".

Here the real time voltage, current and power are displayed. After both the voltage and current are within the measuring range of the instrument by adjusting the external power supply, press the "Test" button to complete measurement.





6. Zero-sequence impedance test

Click the "zero-sequence impedance test" button to enter the single-phase parameter setting interface (shown in Figure 10).





After parameter setting completion, press the "Enter" button to start measurement and enter the data measurement interface (as shown in Figure 11).





#### 7. Historical record interface

Select the <Retrieval> button in the main menu to enter the historical record interface, as shown in Figure 12:





The instrument can save 50 sets of data, and each screen shows 5 sets of data directories, totaling 10 screens. You can scroll the screen via " $\uparrow$ "" $\downarrow$ "; meanwhile, the right blue progress bar indicates the current scroll position. When 50 sets of data are saved, the latest data will overwrite the oldest data. Each set of data can be deleted or exported to a USB device.

The directory consists of data type and data test time, for example: S 2015-01-20 10:20:38, where S indicates that the test data of this set are single-phase test data; in addition, if the test data are three-phase test data, it is T. The latter time indicates the data test time. Click the data on the directory to enter the specific data display picture.

The current data can be printed by pressing "Print" in the record view page.

### VII. Basic Operation

6.1 How to set the date and time

Click the time display area in the main menu interface to enter the time setting interface, as shown in Figure 13. The date and time can be set via the up and down keys.



bps:9

Figure 13

6.2 How to store data:

After testing a set of data, the instrument will automatically show the test result. Pressure the "Save" button to save data. After completion, the right upper corner of the instrument will indicate [Saving Completed].

6.3 How to read the stored data:

Press the "Retrieval" button in the main menu to enter the historical record interface. For details, see 6.6 Historical record interface.

6.4 How to print the test data:

After testing a set of data, the instrument will indicate [Test Completed]. Here press "Print" to print data (note: printing and saving operations are invalid and the instrument will not execute the corresponding command during test.)

6.5 How to delete the historical data:

Press the "Retrieval" button in the main menu to enter the historical record interface; here the stored record directory is displayed. Each record corresponds to a "Delete" key. You can delete the data via the right "Delete" key. In order to delete a set of data, you need to click the "Delete" key twice continuously. While clicking the "Delete" key firstly, the corresponding data directory will turn into red numbers. While clicking the "Delete" key again, the data will be deleted.

6.6 How to download the historical data into a USB disk:

You can export the data saved by the instrument to a U disk. When the interface is in historical record state, insert a U disk. Then the right upper corner of the screen will show the icon "U disk connection". After unplugging the

U disk, the icon "U disk connection" will disappear automatically. After the U disk is successfully connected, click the "Download" key corresponding with the data to be exported. Then the data are exported into the U disk, and the right upper corner of the screen indicates [Being Exported], as shown in Figure 14. After data export completion, the screen indicates [Export Completed].

6.7 How to replace the fuse

There is a fuse box below the power socket. The fuse can be replaced by pulling up the fuse box with a flat screwdriver. The fuse specification is 1A.

#### **VIII. Instrument Calibration**

7.1 Wiring (shown in Figure 14)



Figure 14

#### 7.2 Instrument operation

Turn the "Internal-External" switch to "External".

Turn on the "power output switch" (as shown in Figure 1).

- 7.3 Menu operation
- (1) Start the instrument, enter the main menu (shown in Figure 5), and select "single-phase short-circuit impedance test".
- (2) Enter the parameter setting menu (shown in Figure 8), and select the power supply mode as "External". Select the measurement mode as "Manual".
- (3) Press the "Test" button to enter test (shown in Figure 9). At this time, you can start the calibration device to calibrate the instrument.

# IX. Accompanied Accessories

Name	Qty.	Remarks
JYW6300 Principal Unit	1 unit	
Test cable	1 set	10m long, 1 yellow cable, 1 green cable, and 1 red cable
Three-core power line	1 piece	250V/10A
Ground wire	1 piece	2m
Operation Manual	1 copy	
Certificate of approval/ warranty card	1 piece	
Fuse	2 pieces	5A
Printing paper	1 piece	Thermosensitive
Packing list	1 piece	

## X. After-sales Service

Product shall be repaired and replaced free of charge in case of product quality problem in 24 months from purchase date, guarantee and technical service are provided for whole service life of the product. In case any abnormal condition or fault is found in the instrument, please contact the company in time so that we can organize most convenient treatment plan for you.

