

PS-ZD20T Three Phase DC Resistance Tester

DC Resistance Tester

User Manual

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I. General

DC resistance of transformer is the essential item to be tested in semi-finished product, finished product delivery test, installation, handover test and preventive test by electric power department, and is effective to help find manufacturing defects such as materials selection for transformer coil, welding, looseness on connection, strand breaking, wire breaking and so on, as well as hidden dangers after operation. To satisfy the requirement for quick measurement of DC resistance of transformer, our Company has developed PS-ZD20T three phase DC resistance tester aiming at YN connection winding. The tester can fulfill functions such as simultaneous energization on three phases, independent current sampling, voltage sampling, as well as simultaneous measurement and display of three-phase resistance value and three-phase unbalance rate, thus can significantly reduce test time for DC resistance of transformer, solve the problem of long test duration for DC resistance of each tapped winding of electric power transformer. It requires only 1/3 of the time required by traditional method.

II. Safety Measures

1. Please be sure to read this manual carefully before use of this instrument.
2. Operator of this instrument shall possess common sense on use of general electric equipment or instrument.
3. This instrument can be used both indoors and outdoors with the requirement of avoiding places with rain, etchant gas, excessive dust, high temperature, direct sunshine and so on.
4. Avoid violent vibration of instrument.
5. Repair, maintenance and adjustment on instrument shall be carried out by professional personnel.
6. After test, be sure to wait until the discharging alarm stops before turning off the power and then dismantle test wire.
7. If no-load regulating transformer is measured, wait until the discharging alarm noise stops and then switch the gear.
8. During the test, it is prohibited to move test clip and power supply line.

III. Performance Features

1. The instrument has big current output and can select current automatically; convenient for operation.
2. Three-channel measurement, real time collection, simultaneous measuring of three resistance values and calculating three-phase resistance unbalance degree.
3. Not only able to measure three phases simultaneously, but also able to measure with single channel as traditional method; possessing temperature conversion function, convenient for use.
4. Possessing perfect protective circuit which is highly reliable.
5. Built-in calendar clock, 500 sets of data storage, retrieval and printing function.
6. Be able to set printing information such as phase sequence and tapping position of resistance.
7. Industrial plastic shell case with light weight; convenient for carrying.
8. Possessing audio discharging alarm with clear discharging indication to reduce misoperation.

IV. Technical Indicators

1. Output current: select current automatically (maximum 20 A)
2. Range ability: 0-100 Ω
3. Accuracy: $\pm (0.2\% + 2 \text{ 个字})$
4. Minimum resolution: 0.1 $\mu\Omega$
5. Working temperature: -20-40°C
6. Ambient humidity: $\leq 80\%RH$, no condensation
7. Altitude: ≤ 1000 meters
8. Working power supply: AC220 V $\pm 10\%$, 60 Hz ± 1 Hz
9. Volume: L 400 mm * W 340 mm * H 195 mm
10. Net weight: 8 kg

V. System Introduction

Refer to Figure I for instrument panel

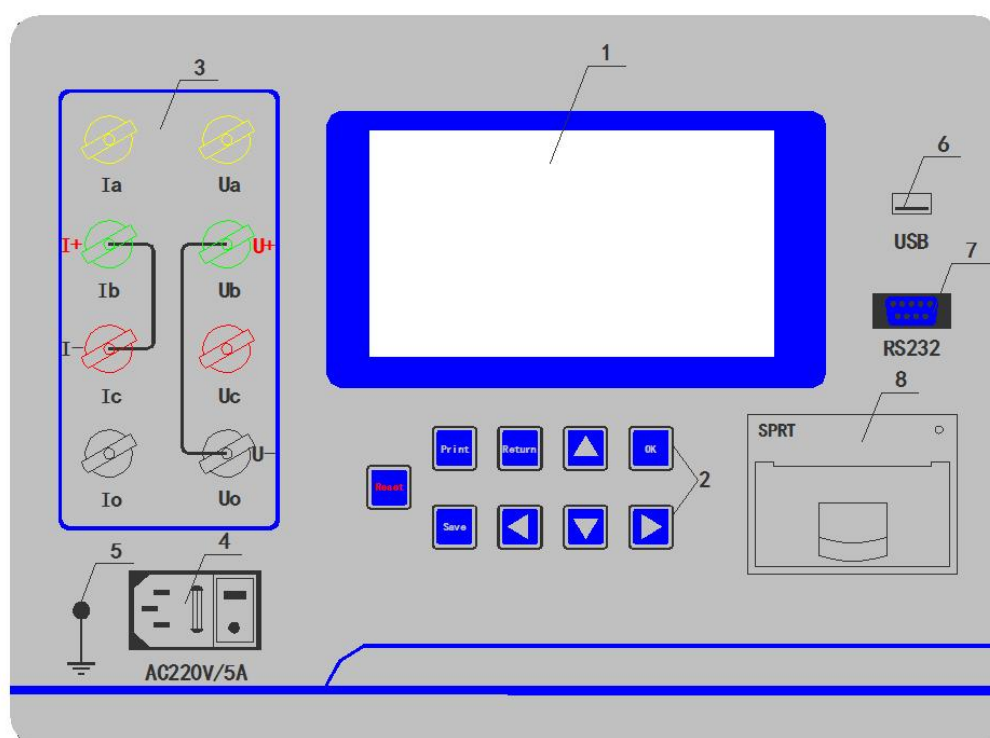


Figure I

1. **Displayer:** colorful lattice LCD, displaying menu, test data and records.
2. **Buttons:** used for operation for corresponding functions indicated on the LCD or return the whole machine back to the initial state of energization.
3. **Measuring current output terminal and voltage input terminal:** under three-channel

measurement mode, I_a , I_b , I_c , I_o are current output, input channels; U_a , U_b , U_c , U_o are voltage input channels. Under single-channel measurement mode, $I+$ and $I-$ are current output, input channels; $U+$ and $U-$ are voltage input channels.

4. Power switch, socket: including power switch of the whole machine, 220V AC power plug (with built-in 5A protective tube).

5. Earthing: earthing rod, for earthing of casing of the whole machine, belonging to protected field.

6. USB interface: interface between the instrument and U disk.

7. RS232 communication interface: communication interface between instrument and host computer.

8. Printer: printing information such as resistance value results and test current.

VI. Test and Wiring Method

1. Single-channel wiring: connect the test object via special cable to test binding post of this machine firmly and connect ground wire. Single-channel direct measuring wiring, being able to measure resistance between AO phases. Refer to Figure II.

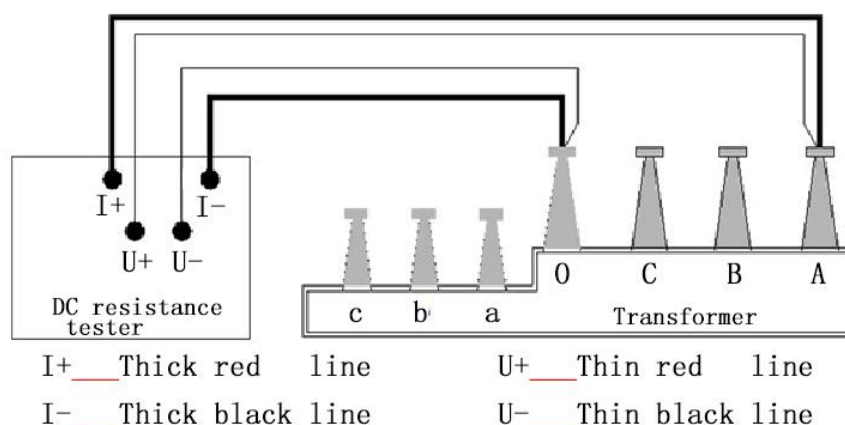


Figure II

2. Three-channel direct measuring wiring, as shown in Figure III, being able to measure resistances of the three phases: AO, BO and CO simultaneously. Refer to Figure III.

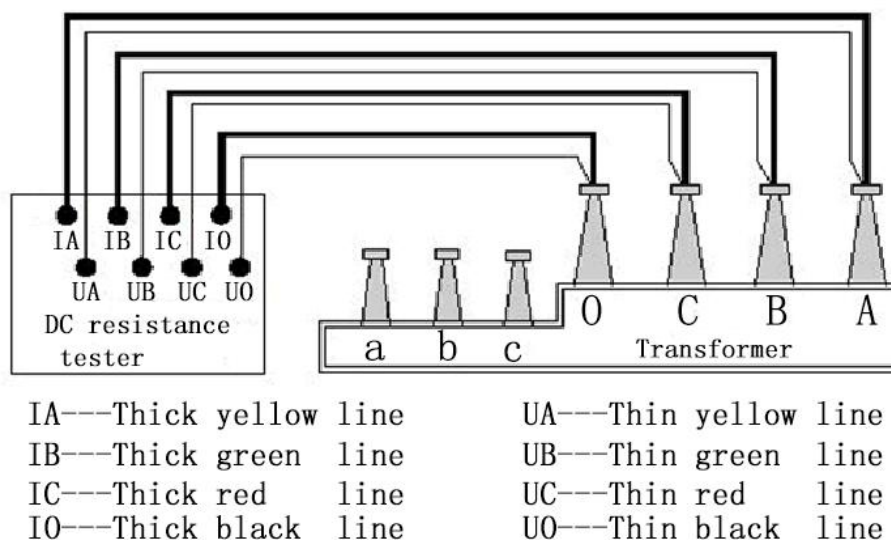


Figure III

VII. Instrument Operation Method

1. Main menu function operation:

1.1 Turn on power switch, start the LCD interface and then enter the main menu display interface, as shown in Figure IV. Press direction keys ('←', '→' or '↑', '↓') to move the cursor and select menu items. Select "simultaneous measurement of three phases" and press <OK> key, three-channel method is adopted to measure resistance of three-phase winding of transformer simultaneously; this measurement method is suitable for transformer winding in YN connection mode only. Select "single phase test" and press <OK> key, regular single-phase measurement method is adopted to measure resistance of the test object. Pay attention that instrument current channel under single measurement mode uses I+ and I- terminals while voltage channel uses U+ and U- terminals. Select "temperature setting" and press <OK> key, it is able to set test temperature of the test object during measurement and reference temperature converted from test result. Select "record inquiry" and press <OK> key to display test data records ever saved by the instrument. Select "time setting" and press <OK> key to modify currently displayed calendar and time. Select "communication parameter" and press <OK> key to set communication parameter between the instrument and host computer.

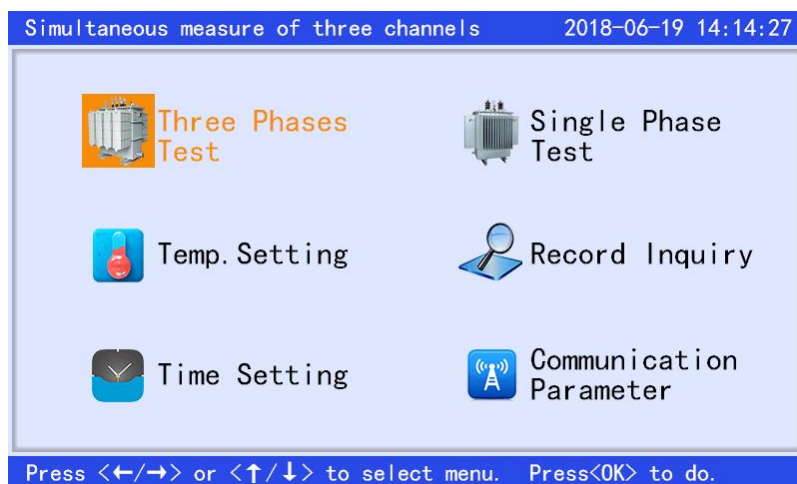


Figure IV

2. Instrument test operation:

2.1 As shown in the interface of Figure IV, when “Three Phases Test” is selected and implemented, the instrument adopts three-channel method to test resistances of windings of the three phases, as shown in Figure V.

Simultaneous measure of three channels(YN)			2018-06-19 16:15:14
Test Current: Charging...			Test Winding
Phase	Test Value	Converted Value	HV
A0			Current Tapping
B0			09
C0			Object Temp.
Maximum Unbalance Rate :			+025.0°C
Test Timing: 00:00:01			ConvertedTemp.
			+075.0°C
Press <Return> to exit. Press <←/→> to select parameter.			

Figure V

After the test current value is stabilized, calculate and display three-phase resistances and unbalance rate of three-phase resistances; meanwhile, display converted resistance value of the setting temperature, as shown in Figure VI.

Simultaneous measure of three channels(YN)			2018-06-19 16:15:14	
Test Current: 20.1A			Test Winding	HV
Phase	Test Value	Converted Value	Current Tapping	09
A0	2.855mΩ	3.404mΩ	Object Temp.	+025.0℃
B0	2.869mΩ	3.421mΩ	ConvertedTemp.	+075.0℃
C0	2.850mΩ	3.398mΩ		
Maximum Unbalance Rate: 0.23%				
Test Timing: 00:00:15				
Press <Return> to exit. Press <←/→> to select parameter.				

Figure VI

2.2 When “single phase test” is selected and implemented in Figure IV, single-channel mode is adopted to test resistance of winding of single phase, as shown in Figure VII.

Single channel test		2018-06-19 15:14:13	
Test Current: Charging...		Test Winding	LV
Test Phase: A0		Test Phase	A0
Test Value		Current Tapping	09
Converted Value		Object Temp.	+025.0℃
Test Timing: 00:00:00		ConvertedTemp.	+075.0℃
Press <Return> to exit. Press <←/→> to select parameter.			

Figure VII

After the test current value is stabilized, calculate and display single phase resistance, meanwhile, display the converted resistance value of the setting temperature, as shown in Figure VIII.

Single channel test		2018-06-19 15:14:13	
Test Current: 20.1A		Test Winding HV	
Test Phase: A0		Test Phase A0	
Test Value	2.863mΩ	Current Tapping 09	
Converted Value	3.414mΩ	Object Temp. +025.0°C	
Test Timing: 00:00:07		ConvertedTemp. +075.0°C	
Press <Return> to exit. Press <←/→> to select parameter.			

Figure VIII

2.3 In the above mentioned ‘three-phase test’ (Figure VI) or “single-phase test” (Figure VIII) display interfaces, only after the instrument displays resistance values, saving and printing operations on test data are allowed. At this moment, press “SAVE” key to save currently displayed test results and information; press “print” key to print currently displayed test results and information. If it is required to modify the value of one setting parameter displayed, press ‘←’ or ‘→’ key to move the cursor to parameter required to be modified; press ‘↑’ or ‘↓’ key to modify the parameter. If it is required to repeat the test, press ‘OK’ key. During the retest, the current will maintain unchanged; the instrument replaces old data with new measurement data and re-displays measurement results. After the instrument starts to test, if it is required to quit the test state, press ‘Return’ key to quit and return to the main menu; pay attention that at this time the instrument will disconnect test current circuit; inductive test object will generate a discharge process thereof, during which the buzzer in the instrument will give out prompting sound. At this time, you need to wait the discharge process to stop and then dismantle the test wire.

3. Temperature setting operation:

In the interface as shown in Figure IV, when ‘temperature setting’ is selected and implemented, it will enter the temperature parameter setting interface as shown in Figure IX. This function can achieve setting of test object temperature and reference converted temperature before start of the test. These two temperature values are identical with temperature values displayed in three-phase test (Figures V and VI) and single-phase test (Figures VII and VIII). Press ‘←’ or ‘→’ key to move the cursor to the parameter required to be modified. Press ‘↑’ or ‘↓’ key to modify the selected parameter.

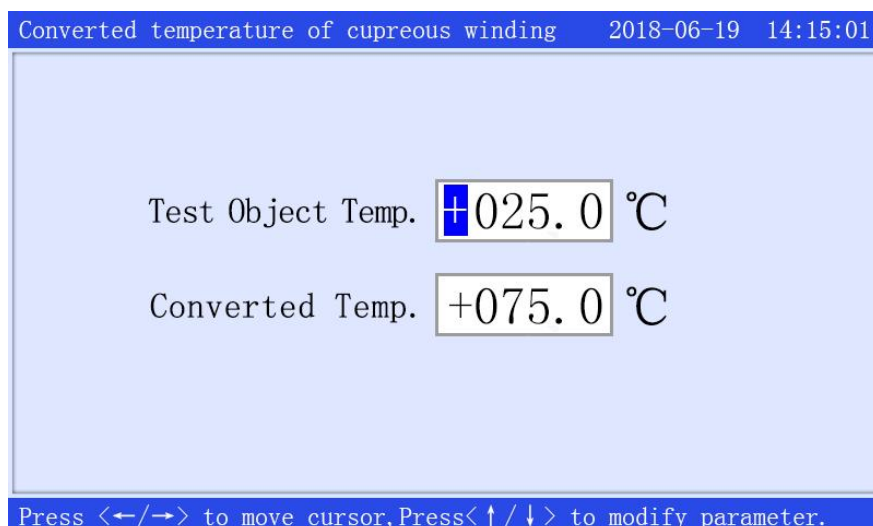


Figure IX

4. Data record inquiry:

Under the main menu in Figure IV, move the selected cursor to <record inquiry> and then press 'OK' key. If there is test data record at this time, display the saved record data, as shown in Figure X.

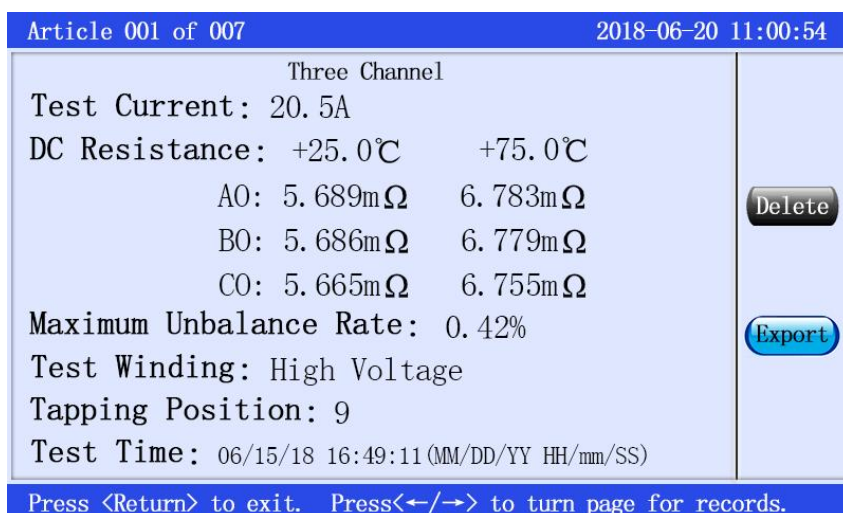


Figure X

Press '↑' or '↓' key in Figure X to select operation menu. Press 'OK' key to implement the selected operation. Select "delete" and press 'OK' key to delete currently display record and display test data for the following record. Select "derive" and then press 'OK' key, and if the instrument is connected to U disk at this time (after the U disk is inserted to USB interface of the instrument, there will be a symbol of U disk on the right lower corner of the figure), the current record data can be derived to U disk file, otherwise the instrument will prompt "no U disk detected". Press '←' or '→' key to display the following record data.

5. Time correction:

Under the main menu as shown in Figure IV, move the selected cursor to <time setting> and then press 'OK' key to correct calendar time, as shown in Figure XI.

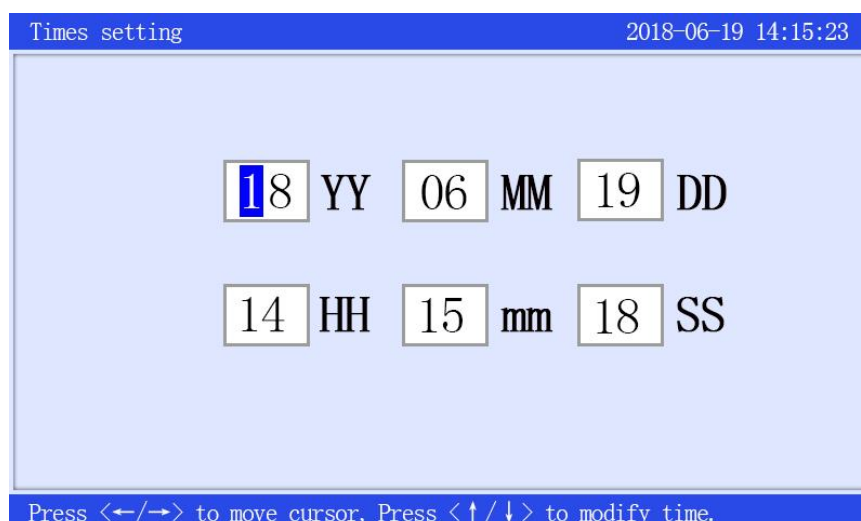


Figure XI

Press '←' or '→' key in time setting interface to select position to be modified; press '↑' or '↓' key to modify value of the position. After correction of time, press 'Return' key to quit time setting.

6. Communication setting:

Under the main menu as shown in Figure IV, move the selected cursor to <communication parameter> and then press 'OK' key to set relevant parameters for instrument communication, as shown in Figure XII.

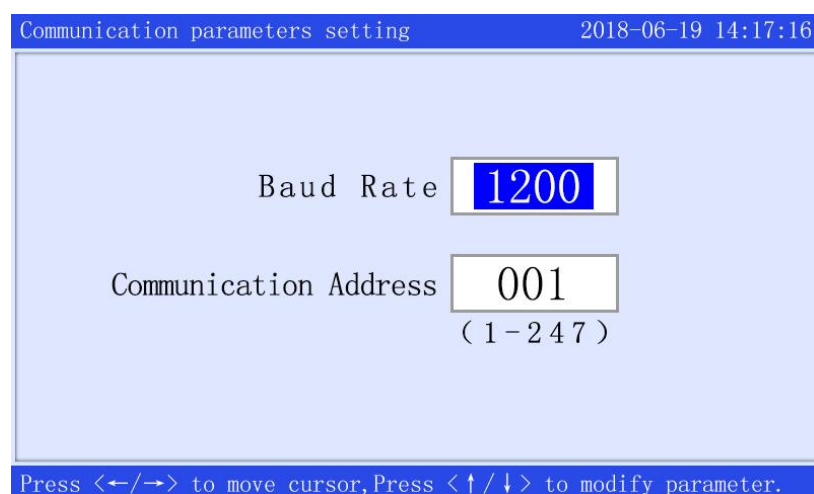


Figure XII

Press '←' or '→' key in communication parameter setting interface to select the parameter to be modified. When Baud rate is selected, press '↑' or '↓' key to select Baud rate required (Baud rate 1,200/2,400/4,800/9,600/19,200); when communication address is selected, press '↑' or '↓' key to modify the value. After setting of communication parameters, press 'Return' key to quit and return to the main menu.

VIII. Matters Needing Attention

Please be sure to reset before measurement of no-load regulating transformer to tapping point. It is

only after discharging and stopping of alarm noise that the tapping point can be switched.

1. The dismantling of wires shall be carried out after the discharging and stopping of alarm noise.
2. When three-channel is used, pay attention that the first time establishment of magnetic circuit during test of first group of data may take longer time; stabilization time for switching and tapping may be shortened.
3. Short circuit points of the three lines in saturable magnetic circuit method may have residue current during wire dismantling after discharging and may cause ignition and discharging during the dismantling. This is normal.

IX. FAQ and Solutions

1. Not able to test and the buzzer keeps on sounding

Once this situation occurs, check whether there is temperature protection first and whether the fan works normally. If the fan works normally, start up without test and allow the fan to cool down, and then re-test.

2. LCD fails to light in startup

Once this situation occurs, check whether the power supply is normal. Then, check whether the fuse is melt. If yes, replace with new one.

3. Display current drop during the current charging

This machine adopts automatic selection of current output. To achieve stable measurement results, the measurement current may be smaller than charging current. This is normal.

***** If you cannot solve the above problems, please contact us timely *****

X. Packing List

Main machine of DC resistance tester	One set
Special test cables	One set
Three-core power line	One pc
Protective tube 5A	Two pcs
Certificate of quality/guarantee card	One pc
Packing list	One pc
Operation manual	One volume

XI. After-Service

The instrument will be renewed free of charge for product quality problems within one month from the date of purchase; within one year, the instrument will be repaired free of charge if there is a malfunction or problem during use. The company provides lifetime warranty and technical services for the whole machine. For any abnormality or fault, please contact our company in time for the most convenient solution.