EAGLOTEST

S456

AUTOMATIC TURN RATIO TESTER

USER MANUAL

CATALOG

SECTION 1

Safety Instructions

Thank you for purchasing our **Automatic Turn Ratio Tester！**

Please Read this user's manual in detail. The operator must fully understand the manual instructions and be able to operate the meter proficiently before performing actual tests.

Strictly follow the safety rules and precautions listed in this manual.

- There's electricity! Danger! The operator must be trained and certified as an electrician to use this meter for field testing. Observe the labeling text and symbols on the front and back panel of the instrument.
- The operator must fully understand the manual instructions and be proficient in the operation of the meter before performing field tests.
- Before use, it should be confirmed that the instrument and accessories are intact, and the insulation layer of the instrument and test line is not broken, exposed or disconnected before use.
- This instrument can be used both indoors and outdoors, but it should be avoided from rain, corrosive gases, dust too thick, high temperature, direct sunlight and other places.
- Do not measure energized test specimens as this may cause damage to personnel or equipment.
- Do not use the meter when it is wet, or replace the batteries.
- Testing in flammable and hazardous locations is prohibited.
- Please do not use it in a strong electromagnetic field environment, so as not to affect the normal operation of the instrument.
- Discontinue use of the meter if metal is exposed due to breakage of the housing

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or test cable during use.

- Do not place and store the instrument for a long time in a hot and humid place or under direct sunlight.
- When not using the meter for a long period of time, please charge or remove the batteries periodically.
- Use, disassembly, calibration, and maintenance of this meter must be performed by authorized and qualified personnel.
- If, for reasons related to this instrument, continued use poses a hazard, it shall be immediately discontinued and immediately sealed and disposed of by an authorized and qualified agency.

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SECTION 2

Introduction

S456 Automatic Turn Ratio Tester, also called **transformer ratio tester**.

It is of vital importance to conduct turn ratio testing for power transformer during the production, user handover, maintenance and test to avoid the emergence of the transformer winding open-circuit, short-circuit, wrong connection and error, ensuring the safety of the power facilities and personnel.

Eaglotest adopts modern electronic computing technology to develop a fully automatic ratio tester, mainly used in a variety of transformer ratio test and vector group test, PT, CT ratio test and polarity test.

Features:

- Accurate and fast measurement;
- Auto vector recognition;
- 5.6-inch Color and Touch Screen;
- Bluetooth connection to App for wireless control of the measurement,;
- Support data viewing, data exporting in EXCEL format via App or PC control software;

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SECTION 3

Specifications

3.1 Range and accuracy

Ratio Test	Accurate	Resolution
0.9000 to 9.9999	± (reading x 0.1% + 3 dgt)	0.0001
10.000 to 99.999	± (reading x 0.1% + 3 dgt)	0.001
100.00 to 999.99	± (reading x 0.2% + 3 dgt)	0.01
1000.0 to 9999.9	± (reading x 0.3% + 3 dgt)	0.1

3.2 General specifications

Output Signal	Three-phase sinusoidal inverter power supply; Automatic voltage adjustment;
Functions	PT, CT for three-phase transformer, single-phase transformer, Z-type transformer, Vector group test, polarity test, continuous test
Ratio Test	0.9000~10000
Tap Changer	1~197 gears
Output Protection	High and low voltage reverse connection protection, output short-circuit protection
Display Mode	5.6-inch color touch screen
Data Storage	Up to 500 sets of data
Data Export	The saved data can be exported via USB pen drive in Word Format
Data Printing	Connect to a Bluetooth printer to print out the current measurement results or the saved data
Mobile APP	Connect the Bluetooth in the phone to access to the App, controlling the measurement, viewing the

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	data, exporting the data in Excel Format
PC Software	Connect to a computer via USB interface to control the measurement, save the data, view the data and export the data in Excel Format
Backlight function	3 gears for backlight setting, automatically reduces brightness after 5 minutes of inactivity to save energy
Power Detection	When the battery voltage is low, the power symbol displays empty battery and pops up a reminder, it will automatically shut down after 30 seconds of no operation.
Automatic Shutdown	15, 30, 60, 120 minutes for auto power off
Power Consumption	Approx. 380mA for standby, approx. 600mA for output measurement (maximum LCD brightness)
Power	Built-in 12.6V 5200mAh lithium battery
Instrument size	Approx. 320mm× 275mm× 145mm
Instrument Weight	**Instrument:** about 3.5kg (including battery) **Test Lead:** Approx. 1.12kg **Gross Weight**: about 6.7kg (instrument + test cable + printer + charger + tool bag)
Test Lines	Three-core sheathed test lead, Red and black, standard length 5m; 10m is optional (three 50A clamp with banana plug)
Working Environment	-10℃～60℃; Relative humidity: 0~90%Rh; No condensation
Storage Environment	-10℃～60℃; Relative humidity: 0~75%Rh
Safety Regulations	IEC61010-1, IEC61326

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3.3 Test Leads Corresponding Interface

Test Color	Yellow	Green	Red
HV Markings	A	B	C
	U	V	W
	H1	H2	H3
LV Markings	a	b	c
	u	v	W
	X1	X2	X3

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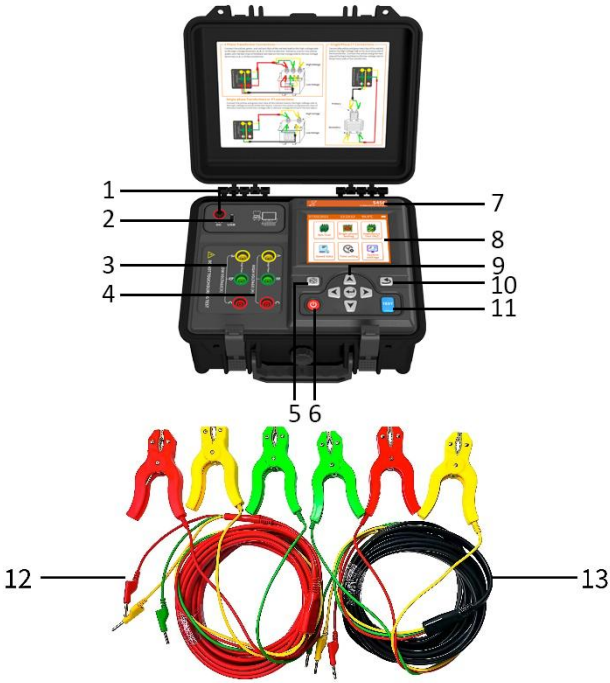
Structure



1. Power charging port
2. USB port (pen driver and computer)
2. LV terminal
4. HV terminal
5~6, 9~11: Operation buttons
7. Model labeling
8. Color touch screen
12. Red HV Test Lead
13. Black LV Test Lead

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Operation

Caution!!	**Do not reverse the connection of the HV and LV test leads during testing.**
	Do not short-circuit the connector of the instrument, otherwise the output and measurement of the instrument will be affected.
	Disable the "Data Export Function" when the instrument is connected to the computer to avoid damage to the instrument or computer.
	Please charge the battery in time when the battery is low, otherwise it is easy to damage the battery.
	The instrument is not waterproof, please do not use it in rainy environment.

5.1 Instrument operation

5.1.1 Power ON/OFF

Power ON/OFF: press and hold the key for 2 seconds, the instrument will turn on and enter into initialization (about 3 seconds), and enter into the function menu interface after the completion of initialization. Short press the to turn off the instrument.

Auto shutdown: When the low power or auto shutdown time reaches, the instrument buzzer rings and pop-up window reminds, and it will shut down automatically after 30

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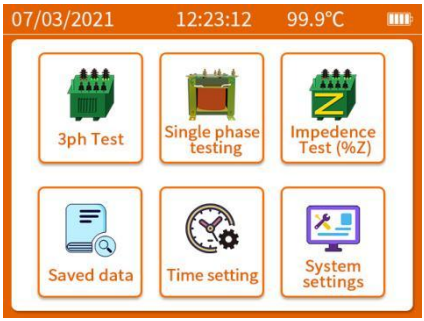
seconds, press any key to cancel.



5.1.2 System setup

Setting: Select the **System Setting** in the menu interface and press ↵ to enter the system setting interface to set "Brightness", "Bluetooth", "Sound", "Printer", and "Auto Power Off". Select the required option by pressing the ▲ ▼ key, and press the ↵ key or ◀ ▶ key to turn on or off.

Screen brightness: After the instrument is turned on for 5 minutes without operation, the instrument automatically reduces the brightness to save power, press any key to restore the set brightness.

Firmware Upgrade: When selecting the "Firmware Upgrade" option and pressing ↵, a pop-up window "Waiting for Upgrade" will appear waiting for PC to send the

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upgraded firmware. Exit upgrade by pressing any key before upgrading. When you enter the upgrade state, you can not operate the meter. Please don't power off or disconnect during the upgrade process, the meter will restart automatically after the upgrade is completed.

5.1.3 Date and time settings

The time setting interface is used to calibrate the instrument time. After entering the time setting interface, press the " ◀ " or " ▶ " key to move the cursor, press " ▲ " or " ▼ " key to modify the time and date parameters. After setting, press " ↵ " key to save the actual setup.

5.1.4 Measurement Parameter Interface

Test function:

Three-phase test: ratio and vector group test for three-phase transformers.

Single-phase test: CT, PT, ratio and polarity test for single-phase transformer.

Z-Type Test: Ratio and vector group test for Z-type transformers.

Normal Test: suitable for the confirmed HV and LV vector group of three-phase transformers, just enter the correct HV and LV vector group to start the test.

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Blind Measurement Function: auto vector recognition, suitable for unclear vector group for HV and LV winding, it can accurately measure the ratio and vector group.

Parameter Setting:

Specimen No.: The number of the test specimen can be named by the user;

Rated HV and Rated LV: the rated HV and LV voltage values marked on the nameplate of the transformer to be tested, or enter the value according to the actual ratio. These two parameters are the rated ratio values for reference when the instrument calculates the ratio error, only when the value is set successfully can the current tap position and ratio error be calculated correctly.

Tap: The rated tap spacing and rated tap position provide the instrument with a baseline reference for tap position calculation and are entered correctly according to the nameplate of the specimen. For specimens without a tap position, enter 00 or 01 for the rated tap position.

Vector group: Set the vector group for the specimen. When the information is confirmed, correctly enter the parameters of the tested device. For unknown vector group, user can select "?" option then the instrument will conduct the test by automatically recognizing the vector group.

Measurement mode: Three-phase ratio: Measure the three-phase ratio according to the set HV and LV vector group to conduct ratio test for three phases; **Vector Group**: only measure the selected vector group, phase ratio test including Three-phase AB, Three-phase BC, and Three-phase CA.

Note: When the user selects "Auto", the instrument will automatically determine the vector group; In the normal test function mode, the user needs to set the vector group correctly, otherwise it will lead to incorrect measurement results; In the blind test

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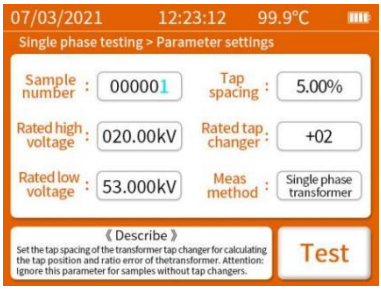
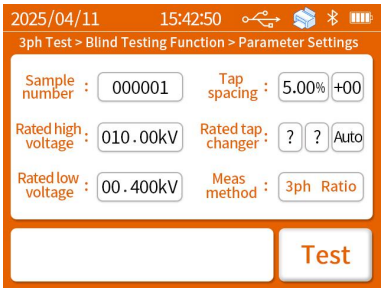
function mode, if user selects "?" or "Auto", the instrument will judge the vector group, even though the vector wiring is not confirmed, it will not affect the measured ratio result.

Parameter setting:

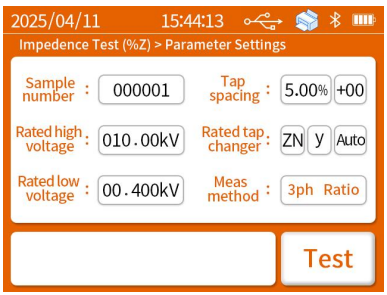
Press ▲ ▼ to switch the parameter that needs to be set, press ◀ or ▶ to enter the setting state of this parameter and select the data bit that needs to be set, then press ▲ ▼ to modify the selected data, and then press ↵ to save after the setting is completed.



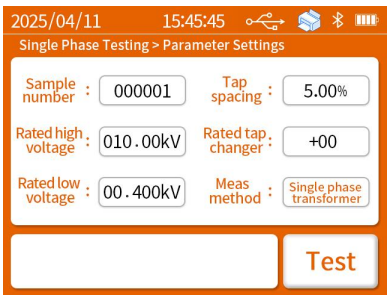
Three-phase test parameter setting interface



Three-phase blind test parameter setting interface



Z-type test parameter setting interface



Single-phase measurement parameter setting interface

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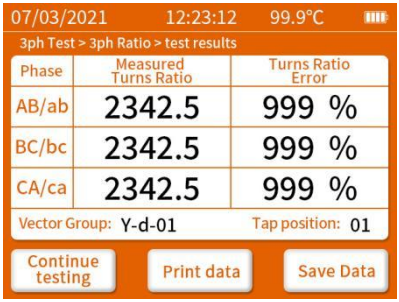
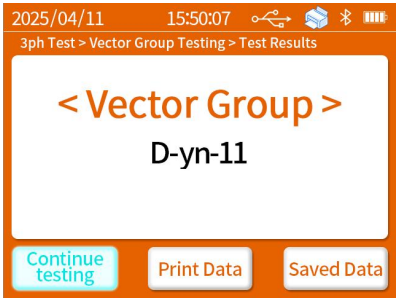
5.1.5 Measurement Results Interface

When the completion of measurement, it enters the test result interface, choose the functions of "Continue Test", "Print Data" and "Save Data", press ▲ ▼ ◀ ▶ to switch and select the required function options, and press ↵ key to execute.

The following figure shows the test result screen for the three-phase test:

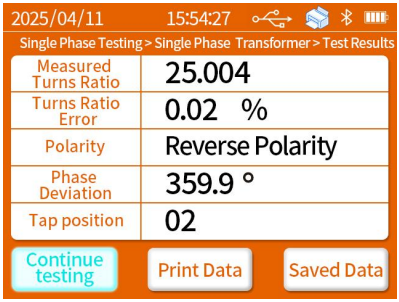


Three-phase test result interface

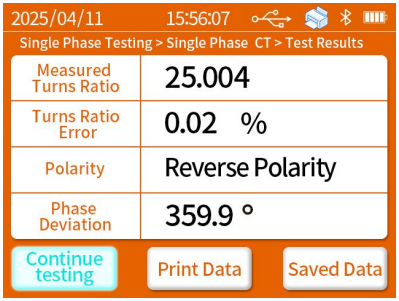


Group test result interface

Single-phase test result interface:



Single-phase transformer test result interface



Single-phase CT test result interface

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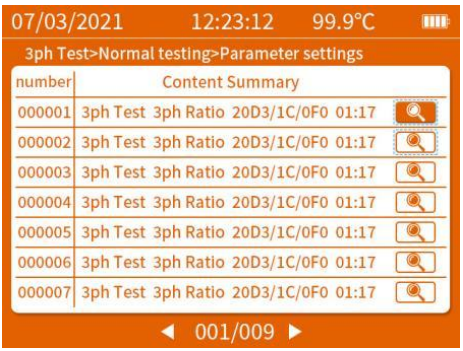
5.1.6 Record Search Interface

Record Viewing: After entering the record query interface, the instrument displays the record list, which contains the test date, time, type and other information of each record. Press ▲ ▼ ◀ ▶ to select the measurement parameters required, and press ↵ to enter the specific access interface to view the specific contents of the records.

Data Deletion: In the record query interface, press the "TEST" key to bring up a pop-up window prompting the user whether to delete the saved records. Select "Yes" option and press ↵ key to delete all stored data, select "No" and press ↵ key or press other keys to quit deleting data. (**Note: The data deletion operation will delete all the measurement data, please pay attention to backup the data before deletion, the deletion operation will take about 8 seconds, and there will be a pop-up window prompting when the deletion is completed.)**



5.1.7 Instructions for using the printer

The Bluetooth printer needs to be connected to the instrument before use, and then select the desired print data to print.

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Printer connection steps:

- Power ON, and the printer's power indicator lights up and blinks;
- The instrument turns on the printer function. Turn on the "Printer Settings" function in the instrument setup screen;
- Wait for the printer to connect, when the instrument displays the printer icon then the instrument is successfully connected to the printer.

Printer paper: printer "MODE" indicator light on behalf of the printer out of paper, grab the printer compartment cover on both sides up to open the paper compartment cover; insert the print paper into the center, and pull the paper out of a section so that it exceeds the position of the tear paper, paper smooth face up (otherwise it can not be printed on the paper); the printer compartment cover closed, a short press on the "FEED" button, then the whole process for paper change completes.

5.2 Wiring test

Caution	**Electrically charged and dangerous! It must be operated by trained and authorized personnel. The operator must strictly observe the safety rules, otherwise there is a risk of electric shock, causing personal injury or equipment damage.**
	Danger! Do not measure the charged transformer, must be disconnected from the test before wiring, please make sure that the test item does not store voltage, otherwise there is a danger of electric shock, resulting in personal injury or equipment damage.
	Before testing, connect the test line to the instrument, and then connect the test line to the transformer under test correctly. The high and low

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	voltage sides of the instrument need to be connected correspondingly with the HV and LV sides of the transformer, and cannot be reversed.
	Test wires must not be short-circuited to each other or connected to ground during testing;
	During the test, the operator should not touch the measuring port of the instrument, the measuring line and the transformer interface to avoid personal injury.
	The test cable must be removed from the object under test before it can be unplugged from the meter after the test is completed.

This instrument can measure the ratio, ratio error, connection group, tap position, polarity, angle difference and other parameters of three-phase transformer, Z-type transformer, single-phase transformer, single-phase voltage transformer, single-phase current transformer. When using the instrument and the test device need to be correctly wired and set the measurement parameters.

5.2.1 Three-phase transformer wiring

The **yellow**, **green** and **red** test clamps of the red test wire on **HV** side of the instrument need to be clamped on the **HV phase A, B** and **C** of the specimen, and the **yellow**, **green** and **red** test clamps of the black test wire on the **LV** side of the instrument need to be clamped on the **LV phase a**, **b** and **c** of the specimen.

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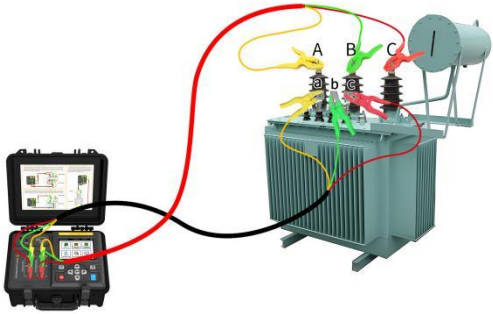
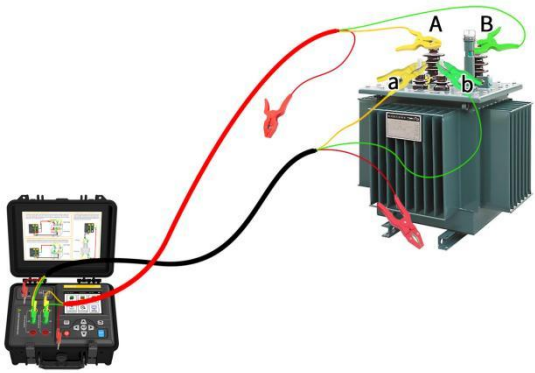


5.2.2 Single-phase transformer or single-phase PT wiring

The **yellow** and **green** test clamps of the red test wire on the **HV** side of the instrument should be clamped on the **HV** end of the specimen; the **yellow** and **green** test clamps of the black test wire on the **LV** side of the instrument should be clamped on the **LV** end of the specimen.



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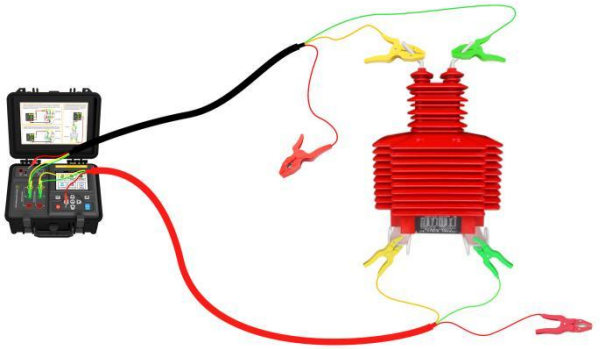
5.2.3 Single-phase CT wiring

The **yellow** and **green** test clamps of the red test wire on the **HV** side of the instrument should be clamped on the secondary side of the specimen; the **yellow** and **green** test clamps of the black test wire on the **LV** side of the instrument should be clamped on the primary side of the specimen.



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Battery Management

- **Charge the battery in time, and charge the battery every 3 months if the meter is not used for a long time.**
- **When replacing the batteries, note the battery polarity or the meter may be damaged.**
- When the battery voltage is lower than 10.8V, please charge it in time, the charging time is about 4 hours.
- If can't turn on the instrument after long time storage, please use the charger to charge continuously for 8 hours and then try to turn on the instrument, if you still can't turn on the instrument and the instrument doesn't respond please contact Eaglotest.
- Please use 12.6V charger for charging, otherwise it is easy to damage the battery.

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SECTION 7

Packing List

Instrument	1
Tool Bag	1
Three core sheathed test lead	1 set (red and black)
Bluetooth printer	1
12.6V 1A Charger	1
Dual A-port USB communication cable	1
Instruction manual, warranty card, certificate of conformity	1

Note:

- **We are not responsible for other damages caused by the use of this product.**
- **The contents of this user manual do not justify the use of the product for special purposes.**
- **The Company reserves the right to modify the contents of the user manual. In case of modification, no further notice will be given.**

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