UNI-T 7720084

UNI-T UT512 Insulation Tester User Manual

Model: UT512 (7720084)

1. Introduction

This manual provides comprehensive instructions for the safe and effective operation, maintenance, and troubleshooting of the UNI-T UT512 Insulation Tester. Please read this manual thoroughly before using the device.

2. Setup

2.1. Unboxing and Initial Inspection

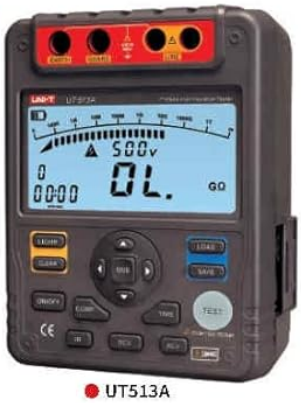
The UT512 Insulation Tester comes securely packaged in a durable case, ensuring its protection during transport. Upon opening the case, you will find the main unit, a user manual, three sets of test leads for various applications, and eight Type C (LR14 Baby) batteries.

UNI-T

UT510 Series Insulation Resistance Testers

SPECIFICATIONS

		Range	UT511	UT512 UT512A	UT513A
Insulation resistance (Ω)	Test voltages	100V~1000V	0%~10%		
		500V~2500V		0%~20%	
		500V~5000V			0%~20%
	100V	0.1MΩ~500MΩ	±(3%+5)		
	250V	0.5MΩ~2GΩ	±(3%+5)		
	500V	1MΩ~4GΩ	±(3%+5)		
		0.5MΩ~5GΩ		±(3%+5)	
		0.5MΩ~20GΩ			±(3%+5)
	1000V	2MΩ~10GΩ	±(3%+5)	±(3%+5)	
		1MΩ~40GΩ			±(3%+5)
	1500V	5MΩ~20GΩ		±(3%+5)	
	2500V	2.5MΩ~100GΩ			±(3%+5)
		10MΩ~100GΩ		±(3%+5)	
	5000V	5MΩ~1000GΩ			±(3%+5)
DC voltage (V)	1000V		±(2%+3)		
	600V			±(2%+5)	±(2%+3)
AC voltage (V)	750V		±(2%+3)		
	600V			±(2%+5)	±(2%+3)
Short-circuit current			<2mA	<1.8mA	>3mA
Low resistance (Ω)	0.1Ω~999.9Ω		±(1%+3)		
Features					
Auto range/Auto power off			√	√	√
Test voltage secondary display					√
Low battery indication			√	√	√
Data storage			18	18	18
Comparison measurement			√	√	√
Polarization index (PI)			√	√	√
Dielectric absorption ratio (DAR)			√	√	√
USB interface				√	√
Analog bar graph			30	30	30
LCD backlight			√	√	√
Over-range warning			√	√	√
High voltage indication			√	√	√
Timing measurement	Around 30 minutes		√		
	Around 15 minutes			√	√
Meets IEC 61557	**UT512A/UT513A:** 61557-1:2007; 61557-2:2007				



UT513A

GENERAL CHARACTERISTICS

Power	1.5V battery (LR14) x 8
Display	123mm x 58mm
Product color	Red and grey
Product net weight	**UT511:** 1.2kg; **UT512/UT512A:** 1.8kg; **UT513A:** 2kg
Product size	202mm x 155mm x 94mm
Standard accessories	2pcs of one plug test lead to one alligator clip (black and green), 1pcs of two plugs test lead to one alligator clip (red), batteries, USB cable **(UT512/UT512A/UT513A)**, PC software CD **(UT512/UT512A/UT513A)**, power adaptor **(UT512/UT512A/UT513A)**
Standard individual packing	Gift box, tool box, English manual
Standard quantity per carton	4pcs
Standard carton measurement	505mm x 345mm x 345mm
Standard carton gross weight	**UT511:** 13.4kg; **UT512/UT512A:** 15.9kg; **UT513A:** 18.9kg
Optional accessories	Power adaptor **(UT511)**

Figure 2.1: Contents of the UNI-T UT512 package. The package includes the UT512 insulation tester, three sets of test leads (red, black, green), a USB cable, batteries, a power adapter, and the English manual, all housed within a protective carrying case.

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Video 2.1: Unboxing and overview of the UNI-T UT512 Insulation Tester. This video demonstrates the contents of the product package, including the main unit, test leads, and accessories, as they are removed from the carrying case.

2.2. Battery Installation

The UT512 requires eight Type C (LR14 Baby) batteries for operation. To install the batteries, locate the battery compartment on the back of the device. Use a screwdriver to open the compartment. Insert the batteries, ensuring correct polarity, then close and secure the compartment.

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Video 2.2: Battery installation for the UNI-T UT512. This segment shows the process of opening the battery compartment, inserting the eight Type C batteries, and securing the cover.

2.3. Connecting Test Leads

For voltage measurements, connect the single red and black test leads to the appropriate ports on the tester. For resistance measurements, you will need the additional red test lead and connect it as shown in the operating section.

3. Operating Instructions

3.1. General Operation and Display

The UT512 features a large display and intuitive button layout. The device is designed for ease of use in various testing scenarios. The display provides clear readings and indicators for measurement modes, battery status, and other relevant information.

Figure 3.1: Front view of the UNI-T UT512 Insulation Tester. This image highlights the large LCD display, function buttons, and input terminals for various measurements.

3.2. Voltage Measurement (DC/AC)

To perform voltage measurements, connect the single red and black test leads. Press the 'DCV/ACV' button to switch between DC and AC voltage measurement modes. The meter can measure DC voltage from 30V up to 1000V and AC voltage up to 750V.

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Video 3.2: Demonstrating voltage measurement with the UNI-T UT512. This video illustrates how to connect the test leads and switch between DC and AC voltage measurement modes, showing readings from a power supply.

3.3. Low Resistance Measurement

For low resistance measurements, connect the additional red test lead. Press the 'LO' button to enter the low resistance measurement mode. The range for this mode is from 0 to 1 kOhm. If the resistance is below 30 Ohms, an audible beep will sound.

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Video 3.3: Low resistance measurement demonstration. This video shows connecting the test leads and using the 'LO' mode to measure resistors, including the audible beep for low resistance values.

3.4. High Resistance (Insulation) Measurement

To initiate high resistance (insulation) measurement, press the 'HO' button. You can select the measuring voltage (100V, 250V, 500V, 1000V) using the up and down arrow buttons. Long-pressing the 'TEST' button will start the insulation measurement, providing high voltage to the crocodile clamps. Exercise extreme caution and avoid touching the leads during this process.
The bar graph on the display will indicate the measurement progress. An 'OL' (Overload) reading signifies a very high resistance, indicating good insulation. The UT512 can measure high resistance from 100 kOhm up to 10 GOhm.

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Video 3.4: High resistance (insulation) measurement. This video explains the concept of PI and demonstrates setting up and performing a PI test over 10 minutes, showing the resistance changes and final PI calculation.

3.5. Polarization Index (PI) Measurement

The Polarization Index (PI) is a crucial indicator of insulation quality, reflecting its ability to withstand electrical stress over time. It depends on factors such as humidity, chemical contamination, mechanical stress/damage, and material aging. The PI is calculated as the ratio of resistance after 10 minutes to the resistance after 1 minute ($PI = R_{10min} / R_{1min}$).
To perform a PI measurement, select 1000V test voltage. Set the first timer to 1 minute and the second timer to 10 minutes using the 'TIME' button. Press 'TEST' to start the measurement. The display will show the time elapsed for each timer and the resistance value.

Table 3.5.1: Polarization Index (PI) Standards

PI	Standard
4 or more	The best
4~2	Good
2.0~1.0	Warning
1.0 or less	Bad

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Video 3.5: Polarization Index (PI) measurement. This video explains the concept of PI and demonstrates setting up and performing a PI test over 10 minutes, showing the resistance changes and final PI calculation.

3.6. Measuring a Transformer

The UT512 can be used to check the insulation of a transformer. Connect the test leads between the winding and the core (or ground). Ensure there is no paint on the core connection for accurate readings. The measurement should ideally show no resistance (OL) for good insulation.

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Video 3.6: Testing a transformer's insulation. This video demonstrates how to connect and test a high voltage probe, showing the expected resistance reading.

3.7. Measuring High Resistance with a Pencil

For an experimental demonstration of high resistance measurement, you can use a pencil to draw graphite stripes on a sheet of paper. Connect the crocodile clamps to different points on the graphite line. The meter will show the resistance, which can be very high depending on the length and thickness of the graphite path. The UT512 can measure up to 10 GOhm in this mode.

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Video 3.7: High resistance measurement using a pencil. This video illustrates an unconventional method of demonstrating high resistance by measuring the resistance of a graphite line drawn on paper.

3.8. Testing a High Voltage Probe

The UT512 can also be used to test high voltage probes. Connect the probe to the tester and initiate a test. The meter should show a resistance of approximately 101 MOhm, indicating the probe's internal resistance.

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Video 3.8: Testing a high voltage probe with the UT512. This video demonstrates how to connect and test a high voltage probe, showing the expected resistance reading.

3.9. Summary of Possible Measurements

- AC Voltage: 30V - 750V
- DC Voltage: 30V (5V) - 1000V
- Low Resistance: 0-1 kOhm
- Shorting Beep: Audible alert for low resistance.
- High Resistance: 100 kOhm up to 10 GOhm
- PI / DAR (R measurements over time): Polarization Index / Dielectric Absorption Ratio for insulation quality.
- Test the quality of insulation materials.
- Comparison of test-results in good or bad conditions.

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4. Specifications

The UNI-T UT512 is part of the UT510 Series Insulation Resistance Testers. Below are the detailed specifications for the UT512 model.

Figure 4.1: Detailed specifications for the UT510 Series, including the UT512 model. This table provides information on test voltages, insulation resistance ranges, DC/AC voltage measurement, short-circuit current, low resistance, and various features.

4.1. General Characteristics

- **Power:** 1.5V battery (LR14) x 8
- **Display:** 123mm x 58mm
- **Product Color:** Red and grey
- **Product Net Weight:** 1.8kg
- **Product Size:** 202mm x 155mm x 94mm
- **Standard Accessories:** 2pcs of one plug test lead to one alligator clip (black and green), 1pcs of two plugs test lead to one alligator clip (red), batteries, USB cable, PC software CD, power adaptor, English manual.
- **Standard Individual Packing:** Gift box, tool box, English manual
- **Standard Quantity per Carton:** 4pcs
- **Standard Carton Measurement:** 505mm x 345mm x 345mm
- **Standard Carton Gross Weight:** 15.9kg
- **Optional Accessories:** Power adaptor (UT511 only)

5. Maintenance

Regular maintenance ensures the longevity and accuracy of your UNI-T UT512 Insulation Tester.

5.1. Cleaning

Wipe the device with a soft, dry cloth. Do not use abrasive cleaners or solvents. Ensure the device is powered off and disconnected from any circuits before cleaning.

5.2. Battery Replacement

Replace batteries when the low battery indicator appears on the display. Always use eight new Type C (LR14 Baby) batteries. Refer to Section 2.2 for detailed battery installation instructions.

5.3. Storage

Store the tester in its original carrying case in a cool, dry place away from direct sunlight and extreme temperatures. If storing for extended periods, remove the batteries to prevent leakage.

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6. Troubleshooting

If you encounter issues with your UNI-T UT512, refer to the following common troubleshooting steps:

6.1. Device Not Powering On

- Check if the batteries are correctly installed and have sufficient charge. Replace if necessary.
- Ensure the ON/OFF button is pressed firmly.

6.2. Inaccurate Readings

- Verify that the test leads are securely connected to the correct ports and to the circuit under test.
- Ensure the correct measurement mode (DCV, ACV, LO, HO) is selected for the task.
- Check for any external interference or environmental factors (e.g., extreme humidity) that might affect readings.

6.3. "OL" (Overload) Indication

- In resistance modes, "OL" typically indicates that the measured resistance is higher than the meter's maximum range, which is often desired for good insulation.
- If "OL" appears in voltage modes, it may indicate that the voltage exceeds the selected range or the meter's maximum input. Disconnect immediately and select a higher range or verify the circuit voltage.

6.4. Device Unresponsive (Crash)

If the meter becomes unresponsive, press the 'E-STOP' button to immediately shut down the device. This can help reset the unit in case of a software or hardware hang.

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7. Warranty and Support

UNI-T products are designed and manufactured to the highest quality standards. For warranty information, technical support, or service inquiries, please refer to the official UNI-T website or contact your local distributor. Keep your purchase receipt as proof of purchase for warranty claims.
For additional support, you may refer to the manufacturer's contact information or the QR code found on the product packaging: C241076252