

UT89XE Digital Multimeter User Manual

Preface

Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes. After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

Limited Warranty and Liability

Uni-Trend guarantees that the product is free from any defect in material and workmanship within one year from the purchase date. This warranty does not apply to damage caused by accident, negligence, misuse, modification, contamination or mishandling. The dealer shall not be entitled to give any other warranty on behalf of Uni-Trend. If you need warranty service within the warranty period, please contact your seller directly.

Uni-Trend will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by using this device.

I. Overview

The UT89XE is a 20000-count true RMS digital multimeter with high resolution, high accuracy, and manual range. Aside from normal features of multimeters, this meter also includes conductance measurement (range: 0.1nS~200nS; converted resistance: 5MΩ~10GΩ), which expands the range of resistance measurement and enables high resistance measurement. Designed according to CAT II 1000V/CAT III 600V safety rating, the meter comes with overvoltage/overcurrent alarm and full-featured false detection protection for high voltages.

II. Features

- 20000-count display, true RMS measurement, and fast ADC (3 times/s)
- Conductance measurement (0.1nS~200nS)
- Frequency measurement (200MHz) for sinusoidal/non-sinusoidal waves (such as crystal frequency)
- Max measurable AC/DC voltage: 1000V; max measurable current: 20A
- Peak maximum/minimum capture
- Very large capacitance (200mF) measurement
- Low pass filter (LPF) to measure combined sine wave signals produced by inverters and variable frequency drives
- Auto backlight for flexibly responding to various dark conditions
- Low power consumption (generally: 10mA; sleep state: 50μA) to effectively extend the battery life to 150 hours
- Full-featured false detection protection for up to 600V overvoltage surge, and overvoltage/overcurrent alarm
- 1m drop protection

III. Accessories

Open the package box and take out the meter. Please double check whether the following items are missing or damaged.

1. User manual ----- 1 pc
2. Test leads----- 1 pair
3. K-type temperature probe ----- 1 pc

If any of the above is missing or damaged, please contact your supplier immediately.

⚠ Before using the meter, please read the "Safety Information" carefully.

IV. Safety Information

The meter is designed according to EN 61010-1, EN 61010-2-032, EN 61010-2-033, and EN61326-1 safety standards, and conforms to CAT II 1000V, CAT III 600V, double insulation, and pollution degree 2. If the meter is used in a manner not specified by the manufacturer, the protection provided by the meter may be impaired.

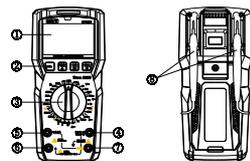
1. Before use, please check if there is any item which is damaged or behaving abnormally. If any abnormal item (such as bare test lead, damaged meter casing, broken LCD, etc.) is found, or if the meter is considered to be malfunctioning, please do not continue to use the meter.
2. Do not use the meter if the rear cover or the battery cover is not completely covered up, or it may pose a shock hazard!
3. During measurement, keep fingers behind the finger guards of the test leads, and do not touch any exposed wires, connectors, unused inputs or circuits being measured to prevent electric shock.
4. Place the function dial in the correct position before measurement.
5. Do not apply more than 1000V between any terminal and earth ground to prevent electric shock and damage to the meter.
6. Use caution when working with voltages above AC 30Vrms, 42Vpeak or DC 60V. Such voltages pose a shock hazard.
7. Never input voltage or current which exceeds the specified limit. If the range of the measured value is unknown, the maximum range should be selected.
8. Before measuring resistance, diode, continuity, or capacitance, switch off the power supply of the circuit, and fully discharge all capacitors.
9. When "OL" is displayed, please replace the batteries in time to ensure measurement accuracy. If the meter is not in use for a long time, please remove the batteries.
10. Do not change the internal circuit of the meter to avoid damage to the meter or user!
11. Do not use or store the meter in high temperature, high humidity, flammable, explosive, or strong magnetic field environments.
12. Clean the meter casing with a soft cloth and mild detergent. Do not use abrasives or solvents!

V. Electrical Symbols

Symbol	Description	Symbol	Description
	Earth (ground) terminal		Caution, possibility of electric shock
	Alternating current		Warning or Caution
	Direct current		Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION

VI. External Structure

1. LCD display
2. Function buttons
3. Function dial
4. "VΩ" terminal
5. "mAμA" terminal
6. "A" terminal
7. "COM" terminal
8. Test leads



VII. Function Buttons

1. SELECT Button

Press to switch between functions in each compound function position.

2. PEAK/REL Button

- 1) In the capacitance position, press to store the current reading as a reference for future readings. When the LCD display value is reset to zero, the stored reading will be subtracted from the future readings. Press again to exit the relative value mode.
- 2) In the AC voltage/current position, press to enter peak measurement, "CAL" will be displayed and disappear after 2s. Press to cycle through the peak maximum (P-MAX) and peak minimum (P-MIN). Press for about 2s to exit.

3. MAX/MIN Button

Press to cycle through the measured maximum (MAX) and minimum (MIN). Press for about 2s to exit.

4. HOLD/BACKLIGHT Button

- 1) Press to perform/cancel data hold.
- 2) Press for about 2s to turn on/off auto backlight. If on, the backlight automatically goes out after 60s.

VIII. Operating Instructions

1. AC/DC Voltage Measurement

- 1) Insert the red test lead into the "VΩ" terminal, and black test lead into the "COM" terminal.
- 2) Turn the function dial to the AC/DC voltage position, and connect the test leads to the measured load or power supply in parallel.

⚠ Caution:

- Do not input a voltage over 1000V, or it may damage the meter.
- Be cautious to avoid electric shock when measuring high voltages.
- When the measured voltage is \geq AC 30V or DC 60V, the LCD will display "⚠". When the measured voltage is \geq 1000V, the meter will sound an alarm and the "⚠" will flash.

2. Resistance/Conductance Measurement

- 1) Insert the red test lead into the "VΩ" terminal, and black test lead into the "COM" terminal.
- 2) Turn the function dial to the "Ω"/"nS" position, and connect the test leads to both ends of the measured resistance in parallel.

⚠ Caution:

- If the measured resistor is open or the resistance exceeds the maximum range, the LCD will display "OL".
- Before measuring resistance, switch off the power supply of the circuit, and fully discharge all capacitors.
- If the resistance is not less than 0.5Ω when the test leads are shorted, please check if the test leads are loose or abnormal.

3. Continuity Test

- 1) Insert the red test lead into the "VΩ" terminal, and black test lead into the "COM" terminal.
- 2) Turn the function dial to the "•••" position, and connect the test leads to both ends of the measured load in parallel.
- 3) When measured resistance $<$ 10Ω, the circuit is in good conduction status and the buzzer beeps continuously. When measured resistance \geq 50Ω, the buzzer makes no sound.

⚠ Caution:

- Before testing continuity, switch off the power supply of the circuit, and fully discharge all capacitors.

4. Diode Test

- 1) Insert the red test lead into the "VΩ" terminal, and black test lead into the "COM" terminal. The polarity of the red test lead is "+" and of the black test lead is "-".
- 2) Turn the function dial to the "▶" position, press the SELECT button to switch to diode test, and connect the test leads to the positive and negative poles of the measured diode.
- 3) When $0.08V \leq$ reading $<$ 1.2V, the buzzer beeps once indicating the normality of the diode. When reading $<$ 0.08V, the buzzer beeps continuously indicating the damage of the diode. For silicon PN junction, the normal value is generally about 500mV~800 mV.

⚠ Caution:

- If the diode is open or its polarity is reversed, the LCD will display "OL".
- Before testing the diode, switch off the power supply of the circuit, and fully discharge all capacitors.

5. Capacitance Measurement

- 1) Insert the red test lead into the "VΩ" terminal, and black test lead into the "COM" terminal.
- 2) Turn the function dial to the capacitance position, and connect the test leads to both ends of the measured capacitance in parallel. For capacitance \leq 100nF, it is recommended to use the relative value mode.

⚠ Caution:

- If the measured capacitor is shorted or the capacitance exceeds the maximum range, the LCD will display "OL".
- When measuring capacitance $>$ 400μF, it may take some time to stabilize the reading.
- Before measuring, fully discharge all capacitors (especially high-voltage capacitors) to avoid damage to the meter and user.

6. Temperature Measurement

- 1) Insert the positive pole of the temperature probe into the "VΩ" terminal and negative pole into the "COM" terminal.
- 2) Turn the function dial to the "°C/F" position, fix the temperature probe on the object under test, and read the temperature value of the tested object directly from the display after a few seconds.
- 3) Press the SELECT button to switch between °C and °F.

⚠ Caution:

- The ambient temperature of the meter should be within 18°C~28°C, otherwise it may cause measurement error.
- The positive and negative poles of the temperature probe should be properly connected. Do not measure non-insulated charged objects to avoid incorrect readings.

7. AC/DC Current Measurement

- 1) Insert the red test lead into the "mAμA" or "A" terminal, and black test lead into the "COM" terminal.
- 2) Turn the function dial to the AC/DC current position, and connect the test leads to the measured load or power supply in series.

⚠ Caution:

- Switch off the power supply of the circuit, make sure the input terminals and dial position are correct, and then connect the meter to the circuit in series.
- If the range of the measured current is unknown, select the maximum range and then accordingly reduce.
- If the "mAμA" or "A" terminal is overloaded, the built-in fuse will be blown and must be replaced.
- Do not connect the test leads to any circuit in parallel during current measurement to avoid damage to the meter and user.
- When the measured current is close to 20A, each measurement time should be $<$ 10s and the rest interval should be $>$ 15 minutes.

8. Frequency Measurement

- 1) Insert the red test lead to V terminal and the black one to the COM terminal.
- 2) Turn the function dial to the Hz position, connect the test leads to the measured object.

⚠ Note:

- The voltage of measured object shall be lower than 30V, or the accuracy will be affected.

9. Others

1) Auto Power Off

- a. During measurement, if there is no operation of the function dial or any button for 15 minutes, the meter will automatically shut down to save power. Users can wake it up by pressing any button (except SEL) or turning the function dial.
- b. To disable the auto-off function, press and hold the Max/Min button in the off state, and turn on the meter. To recover the function, restart the meter.

2) Buzzer Alarm

- a. The buzzer beeps once (about 0.25s) at any valid press of buttons or turning of the function dial.
b. The buzzer beeps continuously when the input voltage or current is over range.

3) Low Battery Detection

When the battery voltage is <4.6V, "Lo.B" is displayed. After the symbol lasts for 20s, the meter displays "Lo.B" and automatically shuts down after 60s.

IX. Specifications

1. General Specifications

- 1) Max display: 19999
- 2) Polarity display: Auto
- 3) Overload display: "OL" or "-OL"
- 4) Low battery indication: "Lo.B" is displayed.
- 5) Battery: 4×1.5V AAA
- 6) Auto power off: If there is no operation of the function dial or any button for 15 minutes, the meter will automatically power off. This function can be disabled.
- 7) Dimensions: 189.4mm×89mm×53.8mm
- 8) Weight: About 370g (including batteries)
- 9) Operating altitude: 2000m
- 10) Operating temperature and humidity: 0°C~30°C (≤80%RH), 30°C~40°C (≤75%RH), 40°C~50°C (≤45%RH)
- 11) Storage temperature and humidity: -20°C~60°C (≤80%RH)
- 12) Electromagnetic compatibility:
RF=1V/m, overall accuracy = specified accuracy + 5% of range
RF>1V/m, no specified calculation

2. Electrical Specifications

Accuracy: ± (a% of reading + b digits), 1 year calibration period
Ambient temperature: 23°C ± 5°C; ≤80%RH
Temperature coefficient: To ensure measurement accuracy, the operating temperature should be within 18°C~28°C and the fluctuation range should be within ±1°C. When the temperature is <18°C or >28°C, add temperature coefficient error: 0.1 × (specified accuracy)/°C.

1) AC Voltage

Range	Resolution	Accuracy
200.00mV	0.01mV	±(1.0%+25)
2.0000V	0.0001V	±(0.8%+25)
20.000V	0.001V	
200.00V	0.01V	
1000V	1V	±(1.2%+25)

- Overload protection: 1000V
- Input impedance: About 10MΩ
- Frequency response: 45Hz~400Hz, true RMS display
- Accuracy guarantee: 5%~100% of range
- AC crest factor: The full-scale value of the AC crest factor can reach 3.0. If the crest factor of a non-sinusoidal wave is ≤3.0, no additional error will be added. The accuracy of other crest factors beyond the range are not assessed.

2) LPF AC Voltage

Range	Resolution	Accuracy
200.00V	0.01V	±(2%+30)
1000.0V	0.1V	

- Overload protection: 1000V
- LPF reading = measured value × $\sqrt{2}$ ± (2%+30)

3) DC Voltage

Range	Resolution	Accuracy
200.00mV	0.01mV	±(0.05%+5)
2.0000V	0.0001V	
20.000V	0.001V	
200.00V	0.01V	
1000V	1V	±(0.1%+5)

- Overload protection: 1000V
- Input impedance: About 10MΩ
- For mV range, short circuit allows least significant digit ≤5.
- Accuracy guarantee: 1%~100% of range

4) AC Current

Range	Resolution	Accuracy
2000.0μA	0.1μA	±(1.5%+15)
200.00mA	0.01mA	
20.000A	0.001A	±(2.5%+35)

- Overload protection: 250Vrms
- Frequency response: 45Hz~400Hz, true RMS display
- AC crest factor: The full-scale value of the AC crest factor can reach 3.0. If the crest factor of a non-sinusoidal wave is ≤3.0, no additional error will be added. The accuracy of other crest factors beyond the range are not assessed.
- Accuracy guarantee: 5%~100% of range.

5) DC Current

Range	Resolution	Accuracy
200.00μA	0.01μA	±(0.5%+4)
2000.0μA	0.1μA	
200.00mA	0.01mA	±(0.8%+6)
20.000A	0.001A	±(2.0%+15)

- Overload protection: 250Vrms
- Accuracy guarantee: 1%~100% of range.
- The actual reading shall increase 3 digits if lower than 5% of range.

6) Resistance

Range	Resolution	Accuracy
200.00Ω	0.01Ω	±(0.4%+10)
2.0000kΩ	0.0001kΩ	±(0.4%+5)
20.000kΩ	0.001kΩ	
200.00kΩ	0.01kΩ	
2.0000MΩ	0.0001MΩ	±(1.2%+25)
20.000MΩ	0.001MΩ	
200.0MΩ	0.1MΩ	±(5.0%+10)

- Overload protection: 600V

7) Conductance

Range	Resolution	Accuracy
200.00nS	0.01nS	±(1.2%+50)

- Overload protection: 600V

8) Continuity

Range	Resolution	Accuracy
200.00Ω	0.01Ω	<10Ω: Consecutive beeps ≥50Ω: No beep Open circuit voltage: About 2.8V

- Overload protection: 600V

9) Diode

Range	Resolution	Accuracy
20.000V	0.001V	Open circuit voltage: About 2.8V Measurable PN junction: Forward voltage drop ≤2V For silicon PN junction, the normal value is generally about 0.5V~0.8V.

- Overload protection: 600V

10) Capacitance

Range	Resolution	Accuracy
20.000nF	0.001nF	±(4.0%+50)
200.00nF	0.01nF	
2000.0nF	0.1nF	
2.0000μF	0.0001μF	
20.000μF	0.001μF	
200.00μF	0.01μF	
2.0000mF	0.1μF	±(10%)
20.000mF	0.001mF	
200.00mF	0.01mF	

- Overload protection: 600V
- Measurement result = displayed value – capacitance of open-circuit test leads
- For capacitance ≤100nF, it is recommended to use the relative value mode.
- Open circuit allows least significant digit ≤20.

11) Temperature

Range	Resolution	Accuracy
-40°C 40°C	0.1°C	±4°C
40°C 400°C		±(1.0%+5°C)
400°C 1000°C		±(2.0%+5°C)
-40°F 104°F	0.1°F	±5°F
104°F 752°F		±(1.5%+5°F)
752°F 1832°F		±(2.5%+5°F)

- Overload protection: 600V

12 Frequency

Range	Resolution	Accuracy
200.00Hz 60.00MHz	0.01Hz 0.01MHz	±(0.1%+3)

- Overload protection: 600V

X. Maintenance

⚠ Warning: Before opening the rear cover or battery cover, switch off the power supply and remove the test leads.

1. General Maintenance

- 1) Clean the meter casing with a soft cloth and mild detergent. Do not use abrasives or solvents!
- 2) If there is any malfunction, stop using the meter and send it for maintenance.
- 3) The maintenance and service must be implemented by qualified professionals or designated departments.

2. Battery/Fuse Replacement

- 1) Turn the function dial to the "OFF" position, and remove the test leads from the input terminals.
- 2) Unscrew and remove the battery cover.
- 3) Replace with 4×1.5V AAA batteries, observing correct polarity.
Or replace the blown fuse (specifications: F1 Fuse 630mA 250V Φ5x20mm ceramic tube; F2 Fuse 20A 250V Φ5x20mm ceramic tube)
- 4) Secure the battery cover and tighten the screw.

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