

# UT89X/UT89XD Digital Multimeter

## 1. Introduction

UT89X/UT89XD are 6000-count true RMS digital multimeters. A unique feature is the NCV function which can quickly identify live and neutral wires through light intensity. In addition, the UT89X can measure temperature and detect live/neutral wire through a single test lead by contact. The UT89XD can perform LED measurements. The whole series are designed with audio/visual alarm, allowing you to observe the test result more intuitively. The flashlight and the auto backlight features are also convenient when measuring in the dark. With ergonomic design and durable double injection build, UT89X series are perfect measurement tools for electricians and hobbyists.

### Features:

- 1) Double injection, durable and ergonomic
- 2) Audio/visual alarm (applied in voltage/current/capacitance/diode/transistor/continuity/NCV/LED measurement)
- 3) Up to 1000V voltage measurement
- 4) Up to 20A current measurement
- 5) NCV measurement with voltage levels can measure voltage down to about AC 12V/50Hz and distinguish live/neutral wires by sensing.
- 6) Live measurement: single probe to identify live/neutral wire by contact (UT89X)
- 7) Up to 100mF capacitance measurement
- 8) LED measurement can output voltage about 12V/5mA (UT89XD)
- 9) LCD auto backlight and flashlight
- 10) Design according to CAT III 600V, CAT II 1000V safety requirements and the following directive standards:  
LVD Directive (2014/35/EU):  
EN 61010-1:2010  
EN 61010-2-030:2010  
EN 61010-2-033:2012 (for hand-held meters with voltage measurement function)  
EMC Directive (2014/30/EU):  
EN 61326-1:2013  
EN 61326-2-2:2013

## 2. Accessories

Open the package box and take out the device. Please check whether the following items are deficient or damaged, and conduct your supplier immediately if they are.

- 1) User manual ----- 1 pc
- 2) Test leads ----- 1 pair
- 3) K-type (NiCr-NiSi) thermocouple ----- 1 pc (UT89X)
- 4) 1.5V AAA battery ----- 4 pcs
- 5) Indicator function description color card ----- 1 pc

## 3. Safety Instructions

### 3.1 Safety Standards

- CAT III 600V, CAT II 1000V, double insulation, and material pollution grade II.
- CAT safety level: Category III is suitable for measuring circuits connected to the power distribution section of a building's low voltage power supply unit.

### 3.2 Safety Instructions

- 1) Do not use the device if the battery cover or the rear cover is not covered up or it will pose a shock hazard!
  - 2) Please check the insulation layer of the test lead before use: it should be in good condition without any damage or broken wires.
  - 3) When "LO" symbol appears on the screen, it indicates that the battery is low. Replace the battery in time to ensure measurement accuracy.
  - 4) Functional dial should be switched to proper position.
  - 5) The measured signal is not allowed to exceed the specified limit to prevent electric shock and damage to the meter!
  - 6) Never switch the functional dial when measuring to avoid damage to the meter!
  - 7) After each measurement, disconnect the test leads with the circuit.  
For current measurement, switch off the power supply first, and then disconnect the test leads with the circuit.
  - 8) Be cautious when the measured voltage is higher than DC 60V or AC 30Vrms to avoid electric shock!
  - 9) Do not use or store the meter in high temperature and high humidity environments. The performance of the meter may be affected.
  - 10) Do not change the internal circuit of the meter to avoid damage to the meter and users!
  - 11) Clean the case with a damp cloth and mild detergent. Do not use abrasives or solvents!
  - 12) Please operate the meter according to this manual, otherwise the protective measures of the meter may be invalid.
  - 13) Replace the test lead if the insulation layer is damaged.
- Warning: The replaced test leads should comply with EN 61010-031 safety standard, CAT III 600V, CAT II 1000V and can measure current above 20A.

## 4. Electrical Symbols

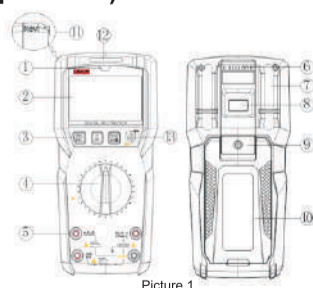
	AC/DC		High voltage hazard
	Warning		Grounding
	Double insulation		Low battery indication

## 5. General Specifications

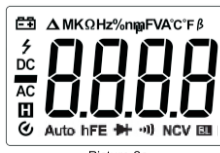
- 1) Max voltage between input terminal and ground: please refer to the technical index for more details.
- 2) 20A terminal: 20A 250V fast-acting fuse (Φ5x20mm)
- 3) mA/μA terminal: 630mA 250V fast-acting fuse (Φ5x20mm)
- 4) Display count: 6000  
Max capacitance: 99.9mF
- 5) Others:  
Range: Auto/manual  
Polarity: Auto  
Refreshes 2-3 times/s; "OL" appears when over-range.  
Display: TN screen  
Operating temperature: 0°C~40°C (32°F~104°F)  
Storage temperature: -20°C~60°C (-4°F~140°F)  
Relative humidity: 0°C~ below 30°C ≤75%, 30°C~40°C ≤50%  
Operating altitude: 0~2000m  
Battery: AAA 1.5V × 4  
Low battery indication: LCD displays "LO" symbol  
Dimension: about 175mm × 81mm × 48.5mm  
Weight: about 345g (including batteries)
- 11) EMC:  
RF field (1V/m): overall accuracy = specified accuracy + 5% of range  
RF field (>3V/m): no specified calculation

## 6. External Structure (picture 1)

- 1) Auto backlight sensing window
- 2) LCD screen
- 3) Functional buttons
- 4) Functional dial
- 5) Input terminals
- 6) Hook
- 7) Multifunctional test lead slot
- 8) Flashlight
- 9) Battery cover screw
- 10) Case holder
- 11) NCV sensing part
- 12) Audio/visual alarm indicator
- 13) Transistor test ports



## 7. UT89X/UT89XD LCD screen (picture 2a/2b)



Symbol	Description
	Caution: AC/DC voltage is higher than 30V
	Data hold
	Negative reading
<b>AC/DC</b>	AC/DC measurement
	Low battery indicator
<b>AUTO</b>	Auto range
	Diode measurement
	Continuity measurement
	Relative value measurement
<b>Ω, kΩ, MΩ</b>	Resistance unit
<b>mV, V</b>	Voltage unit
<b>μA, mA, A</b>	Current unit
<b>nF, μF, mF</b>	Capacitance unit
<b>Hz, %</b>	Frequency unit, duty ratio
<b>°C/°F</b>	Temperature unit: Celsius degree, Fahrenheit degree
	Transistor amplification factor
<b>NCV</b>	Non-contact voltage measurement
<b>Live</b>	Contact-type live/neutral wire measurement
<b>LED</b>	LED measurement
	Auto power off
<b>BL</b>	Auto backlight

## 8. Functional Dial and Buttons

Position	Description	Position	Description
<b>V~</b>	DC voltage measurement	<b>NCV</b>	Non-contact voltage measurement
<b>V~</b>	AC voltage measurement	<b>hFE</b>	Transistor measurement
<b>A~</b>	AC current measurement	<b>Ω</b>	Resistance measurement
<b>A~</b>	DC current measurement	<b>100mF</b>	Capacitance measurement
<b>Live</b>	Contact-type live/neutral wire measurement (UT89X only)		Diode PN junction voltage/continuity measurement
<b>OFF</b>	Shutdown	<b>LED</b>	LED measurement (UT89XD only)
<b>Hz, %</b>	Frequency/duty ratio measurement	<b>°C/°F</b>	Temperature measurement (UT89X only)

### button:

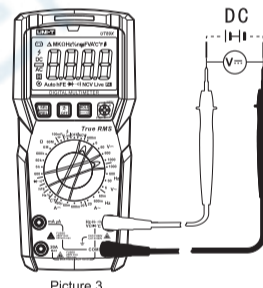
- 1) Continuity/diode: short press (<2s) to cycle through continuity and diode measurement.
  - 2) Hz%: short press (<2s) to cycle through frequency and duty ratio measurement.
  - 3) ACV: short press (<2s) to cycle through frequency and AC voltage measurement.
  - 4) ACA: short press (<2s) to cycle through frequency and AC current measurement.
  - 5) °C/°F: short press (<2s) to cycle through Celsius degree and Fahrenheit degree measurement.
  - 6) NCV: short press (<2s) to cycle through the sensing range of EFH1 and EFL0.
  - 7) In the off state, press and hold the SEL/REL key, then rotate the dial to turn on the device. The product enters the non-sleep mode, and the buzzer produces 5 beeps every 15 minutes, reminding the user to turn off the product.
  - 8) Long press (>2s) REL key to enter/exit REL measurement mode, LCD will display the REL symbol (applied to V, mV, uA, mA, A, CAP, Ω measurement).
- button: press to turn on/off the auto backlight.
  - button: short press (<2s) and the displayed value will be locked, and the LCD will display the "L" symbol; short press again and the value will be unlocked. Long press (>2s) this button to turn on/off the flashlight.

## 9. Operation Instructions

Please first check the internal 1.5Vx4 batteries. If the battery voltage is low when the device is turned on, "LO" symbol will appear on the screen. User needs to replace batteries in time before use. Please also pay special attention to the warning sign "Δ" beside the test lead terminals, which indicates that the tested voltage or current must not exceed the values listed on the device.

### 9.1 DC Voltage Measurement (picture 3)

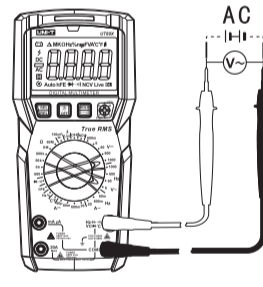
- Steps:
- 1) Switch the dial to **V~** position (range: 600mV/6V/60V/600V/1000V);
  - 2) Connect the red test lead to  $\frac{H}{V}$  terminal, black to COM terminal;
  - 3) Connect the probes to the correct test points in the circuit to measure voltage.



Picture 3

### 9.2 AC Voltage Measurement (picture 4)

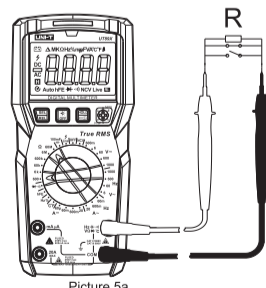
- Steps:
- 1) Switch the dial to **V~** position (range: 6V/60V/600V/1000V);
  - 2) Connect the red test lead to  $\frac{H}{V}$  terminal, black to COM terminal;
  - 3) Connect the probes to the correct test points in the circuit to measure voltage.



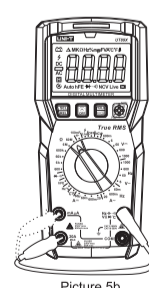
Picture 4

### Warnings:

- Do not input voltage over 1000Vrms. It is possible to measure higher voltage. However, it may cause damage to the meter.
  - Be cautious to avoid electric shock when measuring high voltage.
- Notes:
- Before using the device, it is suggested to measure a known voltage for verification.
  - The meter input impedance is about 10MΩ. This load may cause measurement error when measuring the high impedance circuit. In most cases, if the circuit impedance is under 10kΩ, the error can be ignored (≤0.1%).
  - The input impedance of DC mV scale is infinite (≥1000MΩ), and it does not attenuate when measuring weak signals, so the measurement accuracy is high. However, when the test leads are disconnected, there may be a value on the screen, which is normal and will not affect the measurement result.
  - Readings of AC measurement are true RMS.
  - At AC voltage position, short press (<2s) SEL/REL button to enter frequency measurement. Frequency measurement range: 45Hz~1kHz (for reference). Min measurement amplitude: 10% of voltage range.



Picture 5a



Picture 5b

## 9.3 Resistance Measurement (picture 5a)

- Steps:
- 1) Switch the dial to **Ω** position (range: 600Ω/6kΩ/60kΩ/600kΩ/6MΩ/60MΩ), make sure the circuit power is turned off;
  - 2) Connect the red test lead to  $\frac{H}{\Omega}$  terminal, black to COM terminal;
  - 3) Connect the probes to the circuit test points to measure the resistance.

### Notes:

- If the measured resistor is open or the resistance exceeds the maximum range, the "OL" symbol will be displayed on the screen.
- Before measuring the on-line resistance, switch off the power supply of the circuit, and fully discharge all capacitors.

- When measuring low resistance, the test leads will produce 0.1Ω~0.3Ω measurement error. To obtain accurate measurement, short-circuit the test leads and use the REL function.
- If the resistance is greater than 0.5Ω when the test leads are shorted, please check if the test leads are loose or damaged.
- When measuring high resistance at 60MΩ range, it is normal to take a few seconds to steady the readings.
- The internal 630mA and 20A fuses can be checked by the 6MΩ measurement function. Please refer to Picture 5b for more details: Insert the red probe to the 630mA or 20A input terminal to measure the resistance. If both fuses are blown, the "OL" symbol will appear on the screen.

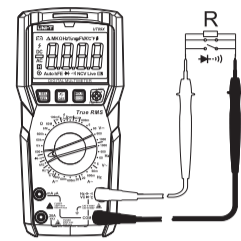
## 9.4 Continuity and Diode Measurement (picture 6)

### Continuity measurement steps:

- 1) Switch the dial to position, and make sure the circuit power is turned off;
- 2) Connect the red test lead to  $\frac{H}{\Omega}$  terminal, black to COM terminal;
- 3) Connect the probes to the circuit test points;
- 4) Measured resistance >30Ω: The circuit is broken; buzzer makes no sound; red indicator is on.

Measured resistance ≤30Ω: The circuit is in good conduction status; buzzer beeps continuously; green indicator is on.

If "OL" appears on the screen, the circuit is in open status.

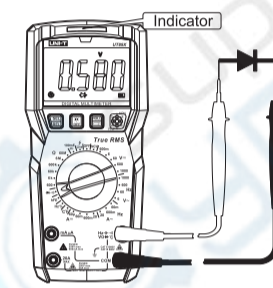


Picture 6

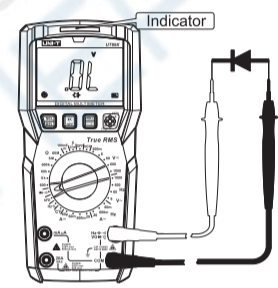
### Diode measurement steps:

- 1) Switch the dial to position;
- 2) Short press (<2s) SEL/REL button to activate the diode measurement;
- 3) Connect the red test lead to  $\frac{H}{\Omega}$  terminal, black to COM terminal;
- 4) Connect the red probe to diode anode, black to diode cathode;
- 5) Reading <0.12V: red indicator will be on with continuous beeps, indicating the diode may break down; Reading within 0.12V~2V: green indicator will be on with one beep, indicating the diode is in good condition (for reference).
- 6) If the diode is open or its polarity is reversed, the "OL" symbol will appear on the screen.

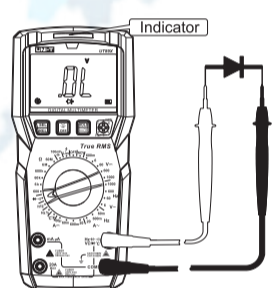
Silicon PN junction: about 500~800mV (normal value).



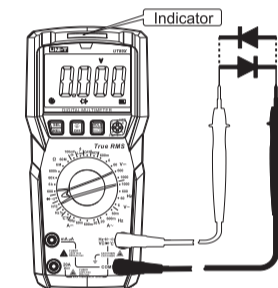
Good diode (forward bias)



Good diode (reverse bias)



Bad diode (open)



Bad diode (shorted)

### Warning:

- Do not input voltage higher than DC 60V or AC 30V to avoid personal injury!

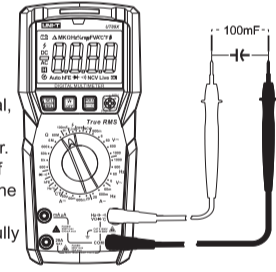
### Notes:

- Before checking the continuity or measuring the diode online, switch off the power supply of the circuit, and fully discharge all capacitors.
- Diode test voltage range: about 3V

## 9.5 Capacitance Measurement (picture 7)

### Steps:

- 1) Switch the dial to 100mF position, the green indicator should be on.
- 2) Connect the red test lead to  $\frac{H}{\Omega}$  terminal, black to COM terminal;
- 3) Connect the probes to the pins of capacitor.
- 4) When measuring large volume capacitor, if the yellow indicator is on, it indicates that the capacitor is being charged, and the green indicator will be on when the capacitor is fully charged, then wait for the steady reading.



Picture 7

### Warning:

- Please fully discharge all capacitors before measuring (especially for capacitors with high voltage) to avoid damage to the meter and personal injury.

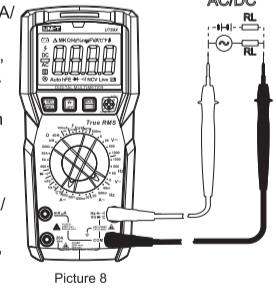
### Notes:

- If the measured capacitor is short-circuited or the capacitance exceeds the maximum range, the "OL" symbol will appear on the screen.
- When measuring large volume capacitors, it may take a few seconds to obtain steady readings.
- When there is no input, the meter displays a fixed value (intrinsic capacitance).
- For small capacitance measurement, this fixed value must be subtracted from the measured value to ensure measurement accuracy. Or users can choose the relative measurement function (REL) to automatically subtract the intrinsic capacitance.

## 9.6 AC/DC Current Measurement (picture 8)

### AC current measurement steps:

- 1) Switch the dial to **A~** position (range: 60mA/600mA/20A);
- 2) According to the current being measured, connect the red test lead to mA/μA or 20A terminal, black to COM terminal;
- 3) Connect the test probes with the circuit in series.



Picture 8

### DC current measurement steps:

- 1) Switch the dial to **A~** position (range: 60μA/60mA/600mA/20A);
- 2) According to the current being measured, connect the red test lead to mA/μA or 20A terminal, black to COM terminal;
- 3) Connect the test probes with the circuit in series.

### Warnings:

- To prevent possible electric shock, fire or personal injury, switch off the power supply of the circuit before measuring the current, and then connect the meter with the circuit in series.
- Please choose the correct input terminal and function to measure. If the range of the measured current is unknown, select the maximum range and then accordingly reduce.
- There are fuses inside the 20A and mA/μA terminals. Do not connect the test leads with any circuit in parallel to avoid damage to the meter and personal injury.

### Notes:

- Readings of AC measurement are true RMS.
- If the tested current is 6A~10A, the max measurement time should not exceed 60 seconds, and the next test should be after 1 minute.
- If the tested current is ≥10A, the max measurement time should not exceed 10 seconds, and the next test should be after 15 minutes.
- When measuring AC current, short press (<2s) SEL/REL button to display AC frequency.

