# 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 hobbvists.

- 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 a
- 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 measure EMC Directive (2014/30/EU):
- EN 61326-1:2013 EN 61326-2-2:2013

## 2. Accessories

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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, OAT 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!
  - Please check the insulation layer of the test lead before use: it should be in good condition without any damage or broken wires.
- 😽) When " 🚌 " 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
- 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. Flectrical Symbols

4. Liectrical Symbols						
	AC/DC	A	High voltage hazard	Y		
$\overline{\mathbb{A}}$	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) A 20A terminal:
- 20A 250V fast-acting fuse (Φ5x20mm)
- 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  $\leq$ 75%, 30°C~40°C  $\leq$ 50%
- Operating altitude: 0~2000m Battery: AAA 1.5V × 4
- ow battery indication: LCD displays "ఊ" symbol Dimension: about 175mm × 81mm × 48.5mm
- 0) Weight: about 345g (including batteries)
- RF field (1V/m): overall accuracy = specified accuracy + 5% of range RF field (>3V/m): no specified calculation

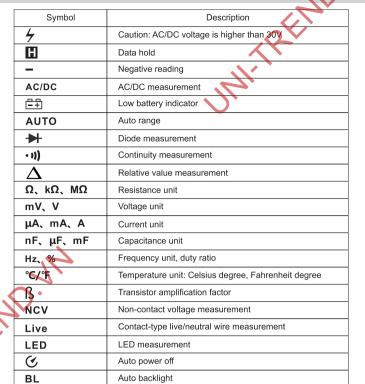
# 6. External Structure (picture 1)

- 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









## 8. Functional Dial and Buttons

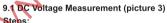
Position	Description	Position	Description
V <del></del>	DC voltage measurement	NCV	Non-contact voltage measurement
V~	AC voltage measurement	hFE	Transistor measurement
A~	AC current measurement	α	Resistance measurement
A	DC current measurement	100mF <del> </del> <del> </del> <del> </del>	Capacitance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

## ● ∰ button:

- 1) Continuity/diode: short press (<2s) to cycle through continuity and diode press
- 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 EFHI and EFLo
- 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.
- 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 " III " 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, "== " symbol will appear on the screen. User needs to replace batteries in time before use. Please also pay special attention to the warning sign "A" beside the test lead terminals, which indicates that the tested voltage or current must not exceed the values listed on the device.



- 1) Switch the dial to V-position (range: 600mV/
- 6V/60V/600V/1000V); Connect the red test lead to <sup>Hz-(-···)</sup> terminal,
- black to COM terminal; 3) Connect the probes to the correct test points

### in the circuit to measure voltage 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  $\stackrel{\text{Hz-If-}}{V\Omega \to C}$  terminal,
- black to COM terminal; 3) Connect the probes to the correct test points

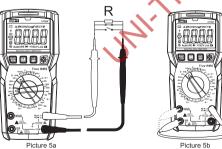
• Do not input voltage over 1000Vrms. It is

in the circuit to measure voltage.



possible to measure higher voltage. However, it may cause damage to the meter Be cautious to avoid electric shock when measuring high voltage.

- 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  $10k\Omega$ , the error can be ignored ( $\leq 0.1\%$ ). 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.</li>
   Frequency measurement range: 45Hz~1kHz (for reference). Min measurement amplitude: 10% of voltage range



# 9.3 Resistance Measurement (picture 5a)

- 1) Switch the dial to  $\Omega$  position (range:  $600\Omega/6k\Omega/60k\Omega/600k\Omega/6M\Omega/60M\Omega)$ , make sure the circuit power is turned off:
- 2) Connect the red test lead to  $v_{\Omega} + c$  terminal, black to COM terminal;
- 3) Connect the probes to the circuit test points to measure the resistance A 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  $0.1\Omega$ ~ $0.3\Omega$  measurement error. To obtain accurate measurement, short-circuit the test leads and use the REL function.
- $\bullet$  If the resistance is greater than  $0.5\Omega$  when the test leads are shorted, please check if the test leads are loose or damaged
- ullet When measuring high resistance at  $60M\Omega$  range, it is normal to take a few seconds
- 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.

AAAA

## 9.4 Continuity and Diode Measurement (picture 6)

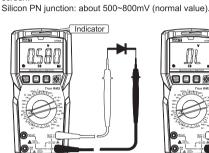
## Continuity measurement steps:

- 1) Switch the dial to > · · · ) position, and make sure the circuit power is turned off:
- 2) Connect the red test lead to \( \frac{Hz-(f-··ii)}{V\O \rightarrow \frac{1}{V\O}} \) terminal, black to COM terminal;
- 3) Connect the probes to the circuit test points; 4) Measured resistance >30 $\Omega$ : The circuit is broken; buzzer makes no sound; red indicator
- Measured resistance  ${\leqslant}30\Omega$ : 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

### 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 the state of the st 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).

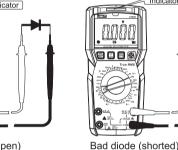
6) If the diode is open or its polarity is reversed, the "OL" symbol will appear on the



Indicator

Good diode (forward bias)

Good diode (reverse bias)



Bad diode (open)

DC

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

## • 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)
- 1) Switch the dial to 100mF + position, the
- green indicator should be on 2) Connect the red test lead to  $V_{\Omega} \rightarrow C$  terminal black to COM terminal. 3) Connect the probes to the pins of capaci
- 4) When measuring large volume capacitor if the vellow 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.

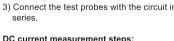


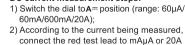
**▲**Warning: Please fully discharge all capacitors before measuring (especially for capacitors with high voltage) to avoid damage to the meter and personal injury

- If the measured capacitor is short-circuited or the capacitance exceeds the
- 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 mAµA or 20A terminal, black to COM terminal 3) Connect the test probes with the circuit in







AC/DC

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.



Steps:

- 1) Switch the dial to Hz% position. 2) Connect the red test lead to Work of terminal, black to COM terminal.
- 3) The frequency value is displayed on the
- 4) Short press (<2s) SEL/REL button to perform duty ratio measurement.
- 5) The duty ratio percentage is displayed on the screen
- 6) When measuring AC voltage or AC current, you can short press (<2s) the SEL/REL button to switch to frequency measurement.



Picture 10

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

### 9.8 Temperature Measurement (picture 10) (UT89X only)

### Steps:

- 1) Switch the dial to °C°F position;
- 2) Plug the K-type thermocouple "+" end to Hz-(←···) terminal and the other end to COM terminal
- 3) Short press (<2s) SEL/REL button to switch between °C and °F.

## **⚠**Notes:

- Only K-type (NiCr~NiSi) thermocouple is applicable (The measured temperature should be less than 230°C/446°F).
- · "OL" symbol appears when the meter is turned on.
- °F=1.8x°C+32

## 9.9 Transistor Measurement (picture 11)

- 1) Switch the dial to hFE position and make sure that the test leads are not connected to any circuit:
- 2) Insert the three pins of the transistor to the corresponding polarity holes on 👹 socket; 3) The reading on the screen is the amplification
  - factor of the measuring transistor. Amplification factor >50: green indicator is on, indicating that the amplification is good. Amplification factor ≤50: yellow indicator is on, indicating that the amplification is poor



## ⚠ Warning:

 Do not input any voltage at any test lead terminals during the transistor measurement to avoid personal injury!

## 9.10 NCV (Non-contact Voltage) Measurement (picture 12)

## Steps:

- 1) Switch the dial to NCV position.
- 2) In NCV sensing level 2 (default, LCD displays "EFHI"), the voltage range is >48V-220V. Place which is at the upper left corner of the multimeter near the live AC power cord. If the voltage of the measured power cord is in the range of sensing level 2, the yellow indicator will start flashing and the buzzer will beep intermittently. According to the intensity of the induced voltage, the yellow indicator flashes with varied frequencies (flashes fast when the intensity is strong), and the buzzer beeps with different intermittent time (the intermittent



time is short when the intensity is strong). The LCD displays the induction intensity from weak to strong --", "---", "----". If the measured power cord is >220V, the red LED will be on. 3) If the measured power cord voltage is <48V, users need to short press (<2s) the SEL/REL button to switch to sensing level 1 (LCD displays "EFLo"). If the

- voltage of the measured power cord is in the range of sensing level 1, the green indicator will start flashing and the buzzer will beep intermittently. According to the intensity of the induced voltage, the green indicator flashes with varied frequencies (flashes fast when the intensity is strong), and the buzzer beeps with different intermittent time (the intermittent time is short when the intensity is strong). The LCD displays the induction intensity from weak to strong by "-"
- 4) Short press (<2s) SEL/REL button again to switch to sensing level 2 (LCD displays "EFHI") measurement.

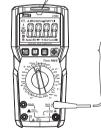
# ⚠ Notes:

- The sensing level varies with the distance between the sensing part and the measured AC power cord.
- The sensing voltage level is for reference only and no specific measurement made. The frequency of the induced voltage is applicable to 50Hz/60Hz.
- During the NCV measurement, users need to hold the multimeter case by hand.

# 9.11 Contact Type Live/Neutral Wire Measurement (picture 13) (UT89X only)

# Steps:

- 1) Switch the dial to Live position.
- Connect the red test lead to <sup>Hz-(←···)</sup> terminal. Do not connect any test leads or conductors
- 3) Insert the red probe to the AC power socket. 4) The live or neutral wire in the socket can be identified by the audio/visual alarm. If the live wire is contacted, the red indicator flashes. and the buzzer beeps. If the neutral wire is contacted, the red indicator is off and the buzzer makes no sound.



# Marnings:

- 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

- When the live wire is >60V, the red indicator will flash and the buzzer will beep. According to the voltage value of the live wire, the indicator flashes with varied frequencies, and the buzzer beeps with different intermittent time. The measured voltage is for reference only and no specific measurement is made.
- The frequency of the induced voltage is applicable to 50Hz/60Hz.
- During the Live measurement, users need to hold the center part of the multimeter

When the LIVE function is applied to the intensive high-voltage electric field measurement, the accuracy for the device to judge the "live wire" may be unstable. In this case, it should be judged by the LCD display in combination with the sound frequency.

# 9.12 LED Measurement (picture 14) (UT89XD only)

- 1) Switch the dial to LED position.
- Connect the red test lead to <sup>Hz-(f····)</sup> terminal, black to COM terminal. 3) Connect the red probe to LED anode, black
- to LED cathode. 4) Reading <11.1V: green indicator will be on,
- indicating that the LED light has a forward voltage drop, and the LED light should be on. Reading >11.1V: indicator will be off, indicating that the voltage drop value of the



LED light is out of the measurement range. 5) Press the HOLD key to keep the value, and the green indicator will be on

If there is no operation for 15 minutes, the meter will automatically shut power. Before the auto shutdown, the buzzer will make five consecutive beens and one long beep and then enter the sleep state. You can wake up the device by pressing any button, and the buzzer will beep once. To disable auto shutdown, switch the dial to OFF position, long press SEL/REL button and turn on the meter, the & symbol disappears on the LCD with three beeps. Restart the meter to restore the Auto-off function.

### Buzzer warning:

- a. Input DCV/ ACV voltage ≥1000V: buzzer warning and red indicator is on, high voltage symbol appears, indicating that the range is at its limit.
- b. Current ≥10A: buzzer warning and the red indicator is on, indicating that the measured current is relatively large and the measurement time should be controlled.
- \*. Low battery detection: when the battery is lower than about 4.5V±0.1V, the low battery symbol " == " appears.

## 10. Technical Index

Accuracy: ± (a% of reading + b digits), 1 year warranty Ambient temperature: 23°C±5°C (73.4°F±9°F) Relative humidity: ≤75%

## **⚠**Notes:

- $^{\star}$ . To ensure accuracy, operating temperature should be within 18  $^{\circ}\text{C} \sim \! 28\,^{\circ}\text{C}$  and the fluctuation range should be within ±1°C.
- Temperature <18°C or >28°C: add temperature coefficient error 0.1 x (specified accuracy)/°C

## 10.1 DC Voltage Measurement

Range	Resolution	Accuracy
600mV	0. 1mV	± (0.5%+4)
6. 000V	1mV	± (0.7%+3)
60. 00V	10mV	± (0.7%+3)
600. 0V	100mV	± (0.7%+3)
1000V	1V	± (0. 7%+10)

▲ Input impedance: \*mV range ≥1000MΩ, \*other ranges: about 10MΩ. (The reading might be unstable at mV range when no load is connected, and it becomes stable once the load is connected,  ${\leqslant}{\pm}5$  digits) Max input voltage: ±1000V Input voltage ≥1000V: audio/visual alarm

## Input voltage >1010V: "OL" appears on LCD 10.2 AC Voltage Measurement

Range	Resolution	Accuracy	Range	Resolution	Accuracy
6. 000V (45~400Hz)	1mV		6. 000V (400~1000Hz)	1mV	± (1.0%+8)
60. 00V (45~400Hz)	10mV	± (0. 8%+5)	60. 00V (400~1000Hz)	10mV	± (1.5%+8)
600. 0V (45~400Hz)	100mV		600. 0V (400~1000Hz)	100mV	1.5%+6)
1000V (45~400Hz)	1V	± (1.0%+10)	1000V (400~1000Hz)	17	± (1. 8%+12)

**Δ**\* Input impedance: about 10MΩ

- True RMS display. Frequency response: 45~1KHz Non-sine wave frequency response: 45Hz~400Hz AC crest factor at 3000 counts: allows ≤3.0 AC crest factor at 6000 counts (full range): ≤1.5
- According to the crest factor, the additional error is ca a) Add 4% when crest factor is 1~2
- ) Add 6% when crest factor is 2~2.5
- c) Add 8% when crest factor is 2.5~3 AC voltage frequency measurement: 45Hz~1kHz. Min measurement amplitude: 10% of voltage range.
- Accuracy guarantee range: 1~100% of range, shorted circuit allows least significant Max input voltage: 1000Vrms
  - Input voltage >1000V: audio/visual alarm
    Input voltage >1010V: "OL" appears on LCD

# 10.3 Resistance Measurement

Range	Resolution	Accuracy
600. 0Ω*	0. 1Ω	±(0.8%+5)
6. 000kΩ	0. 001kΩ	
60,00kΩ	0. 01kΩ	±(0.8%+3)
600. 0kΩ	0. 1kΩ	
6. 000MΩ	0. 001ΜΩ	±(1.5%+5)
60. 00MΩ	0. 01ΜΩ	±(1.5%+25)

Measurement result = reading of resistance - reading of shorted test leads Open circuit voltage: \*about 1V (test current is about 0.4mA)

Overload protection: 600V-PTC

# 10.4 •• Diode Measurement

Range	Resolution	Remark
- >>)	0.1Ω	Set value: Open circuit: resistance >30 $\Omega$ , no beep; Well-connected circuit: resistance $\leqslant$ 30 $\Omega$ , audio/visual alarm
<b>→</b>	0.001V	Open circuit voltage: about 3 V (test current is about 1.2mA) Silicon PN junction normal voltage: about 0.5~0.8V, with audio/visual alarm

# ⚠ Overload protection: 600V-PTC

Reading <0.12V: red indicator will be on with continuous beeps, indicating the diode Reading within 0.12V-2V: green indicator will be on with one beep, indicating the diode

Remark

(NPN/PNP)Vce约1.8V, Ib0约5µA。

 $\pm (6.0\% + 10)$ 

± (10%+0D)

± (10%+0D)

### 10.5 Transistor Measurement Range Resolution

1000β

10.6 Capacitance Me	easurement	4,
Range	Resolution	Accuracy
6.000nF	1pF	±(5%+35)
60.00nF	10pF	
600.0nF	100pF	
6.000uF	1nF	±(2.5%+20)
60.00uF	10nF	
600.0uF	100nF	

# ⚠ Overload protection: 600V-PTC

6.000mF

60.00mF

100.0mF

Measured capacitance ≤600nF: It is recommended to select REL mode for ensuring accuracy (open circuit allows least significant digit <20).

10µF

# 10.7 DC Current Measurement

Range		Resolution	Accuracy
μΑ 60μΑ		0.01µA	
	6 mA(仅UT89XD)	1μΑ	± ( 0.8%+8 )
mA	60mA	10μΑ	± (0.070+0)
7	600mA	0.1mA	
А	20A	10mA	±(2%+5)

 $\Delta$  Overload protection: μA mA range: F1 fuse (φ5×20)mm 630mA 250V 20A range: F2 fuse (φ5×20)mm 20A 250V Input >10A: audio/visual alarm Input >20.1A: "OL" appears on LCD

20A  $|(45 \sim 400 \text{Hz})| 10 \text{mA} | \pm (3.0\% + 5) | A$ 10mA ±(3.5%+8) (400 ~ 1000Hz) True RMS display. Frequency response: 45~1KHz

\* Non-sine wave frequency response: 45+1z~400Hz

AC crest factor at 3000 counts: allows ≤3.0

AC crest factor at 6000 counts (full range): ≤1.5

According to the crest factor, the additional error is calculated as follows:
a) Add 4% when crest factor is 1-2
b) Add 6% when crest factor is 2-2.5
c) Add 8% when crest factor is 2-2.5
c) Add 8% when crest factor is 2.5~3

\* AC current frequency measurement: 45Hz~1KHz.

Min measurement range: mA gear position>5.5A.

Accuracy guarantee range: 1~100% of range, open circuit allows least significant digit <2.

Input >10A: audio/visual alarm

Input >20.1A: "OL" appears on LCD.

Overload protection: (similar to DC current overload protection)

Range

(400 ~ 1000Hz)

600mA

Resolution Accuracy

 $10\mu A \pm (1.5\% + 12)$ 

 $0.1\text{mA} \pm (2.5\% + 5)$ 

Resolution Accuracy

 $10\mu A \pm (1.0\% + 12)$ 

 $0.1\text{mA} \pm (2.0\% + 3)$ 

10.8 AC Current Measurement

Range

(45 ~ 400Hz)

600mA

(45 ~ 400Hz)

## 10.9 Frequency/Duty Ratio Measurement

Range		Resolution	Accuracy
Frequency	9.999Hz ~ 10MHz	0. 001Hz~100kHz	± (0.1%+4)
Duty ratio	0.1% ~ 99.9%	0. 1%	±(2%+5)

Measurement range: 10Hz~10MHz (auto range)

- \$\\$100kHz\\$100mVrms \\$input amplitude \\$30Vrms >100kHz\\$100mVrms \\$input amplitude \\$3 >1MHz: 600mVrms \\$input amplitude \\$30Vrms

The duty ratio is only applied to square wave measurement (≤10kHz, 300mVrms ≤input amplitude ≤30Vrms)
Frequency ≤1kHz: duty ratio is 10.0%-95.0%
Frequency >1kHz: duty ratio is 30.0%-70.0%

Overload protection: 600V-PTC

## 10.10 Temperature Measurement (UT89X only)

	•		• /
	Range	Resolution	Accuracy
	-40°C ~0°C	1°C	± (6%+5)
	0°C ~400°C	1°C	± (2%+4)
	400°C~1000°C	1°C	± (2%+5)
Г	-40°F∼32°F	1°F	± (6%+9)
Г	32°F∼752°F	1°F	± (2%+8)
Г	752°F∼1832°F	1°F	+ (2%+9)

# ⚠ Overload protection: 600V-PTC

10. 11 LED measurement (0189XD only)				
Range	Resolution	Accuracy		
11. 1V	0.01V	±(10%)		

⚠ Open circuit voltage: about 12V. Short circuit current: ≤5mA (11.10V:OL appears). Overload protection: 600V-PTC

## 10.12 LED Three-color Indicator

Function	LED Indicator Color	Description	
NCV	LED off	>12V	Note: The voltage range is for reference only.
	LED on (green)	12V-48V: green LED flickers from slow to fast, buzzer beeps from slow to fast.	
	LED on (yellow)	>48V-220V: yellow LED flickers from slow to fast, buzzer beeps from slow to fast.	
	LED on (red)	>220V: red LED is on.	
LIVE (UT89X only)	LED off	<60V	Note: The voltage range is for reference only.
	LED on (red)	>60V: red LED flickers from slow to fast, buzzer beeps from slow to fast to indicate different voltage level.	
LED (UT89XD only)	LED off	OL	
	LED on (green)	<11.1V	
Continuity	LED off	OL	
	LED on (red)	Non-conducting (>30Ω)	
	LED on (green)	Conducting (≤30Ω)	
Diode	LED on (green)	Conducting (0.12V-2V)	
	LED on (red)	Breakdown (<0.12V)	
	LED off	>2V	
Transistor	LED on (green)	Amplification factor >50	
	LED on (yellow)	Amplification factor ≤50	
	LED off	Amplification factor =0	
Capacitance	LED off	<20pF	
	LED on (green)	The capacitor is fully charged	
	LED on (yellow)	The capacitor is charging	
Voltage	LED off	DCV <1000V, ACV <1000V	
	LED on (red)	DCV ≥ 1000V, ACV ≥ 1000V	
Current	LED off	<10A	
	LED on (red)	≥10A	

# 11. Maintenance

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

- Clean the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- If there is any malfunction, stop using the device and send it for maintenance The maintenance and service must be implemented by qualified professionals o designated departments.

# 11.2 Battery/Fuse Installation and Replacement (picture 15)

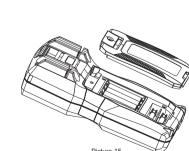
Battery specification: 1.5Vx4 AAA batteries Fuse specification: mA input terminal: "F1" φ5×20mm 630mA 250V

20A input terminal: "F2" φ5×20mm 20A 250V ⚠ Note: Replace the battery immediately when the low battery indicator " 🚉 "

appears on the LCD, otherwise the measurement accuracy might be affected. Please refer to Picture 15 to replace the battery or fuse:

remove the cover to replace the battery or fuse.

1. Switch the dial to "OFF" position and remove the test leads 2. Place the product panel downward and loose the screw on the battery cover.



Uni-Trend reserves the right to update the content of this manual without further notice.

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