UT60S
Smart Digital Multimeter User Manual

Overview
UT60S is a 9999-count true RMS digital multimeter, with full push-button design and laser-engraving light indication, it is clearly visible and easy to be operated in dark environments. UT60S can be used to measure large capacitance up to 99.99mF and automatically identify current input terminal. The meter has multiple features such as overvoltage alarm indication, overcurrent alarm indication, false detection protection for high voltages, etc.

Features
- Full push-button design and laser-engraving light indication.
- Automatically identify current input terminal.
- The power frequency value shows on the slave display when measuring AC voltage.
- 9999-count display, true RMS measurement, and fast ADC (3 times/s).
- Full-featured false detection protection for up to 1000V surge, and overvoltage/overcurrent alarm.
- Extended measuring range, the ⩽100mF response time for stabilizing reading is within 10 seconds compared with similar products.
- NCV function, audible and visual alarm.
- Measurement of flame sensor of heating device can be performed at uA position
- Low power consumption (general: 7mA; sleep state: 10uA) to effectively extend the battery life to 300 hours.

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. Temperature probe ---------- 1 pc

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

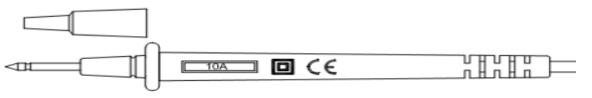
⚠ **Read the "Safety Instruction" carefully before use.**

Safety Instruction
1. Safety Standards
1) The meter is designed according to EN 61010-1:2010; EN 61010-2-030:2010; EN 61010-2-033:2012 and EN 61326-1:2013; EN 61326-2-2:2013.
2) The meter conforms to, double insulation, CAT II 1000V/CAT III 600V overvoltage standard, and pollution degree 2.

2. Safety Information
1) If use the meter without following up the operating instructions, the protection provided by the meter may be impaired or lost.
2) Do not use the meter if the rear cover is not completely covered up, or it may pose a shock hazard and the meter is designed for indoor use.
3) Check and make sure the insulation of the meter and test leads is in good condition without any damage before use. If the insulation of the meter casing is found to be significantly damaged, or if the meter is considered to be malfunctioning, please do not continue to use the meter.
4) Keep fingers behind the finger guards of the test leads when using the meter.
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 or DC 60V. Such voltages pose a shock hazard.
7) The measured signal is not allowed to exceed the specified limit to prevent electric shock and damage to the meter.
8) Place the function dial in the correct position before measurement.
9) Never turn the function dial during measurement to avoid damage to the meter.
10) Do not change the internal circuit of the meter to avoid damage to the meter or user.
11) Damaged fuses must be replaced with fast-acting ones of same specifications.
12) When " " is displayed, please replace the batteries in time to ensure measurement accuracy.
13) Do not use or store the meter in high temperature, high humidity, flammable, explosive, or strong magnetic field environments.
14) Clean the meter casing with a damp cloth and mild detergent. Do not use abrasives or solvents.
15) Use of test probe.

TESTING IN CAT III/IV MEASUREMENT LOCATIONS
Ensure the test lead shield pressed firmly in place. Failure to use the CAT III/IV shield increase arc-flash risk.

TESTING IN CAT II MEASUREMENT LOCATIONS
CAT III shields may be removed for CAT II locations. This will allow testing on recessed conductors such as wall outlet. Take care not to lose the shields.



Electrical Symbols

⚠	Caution, possibility of electric shock	CE	Comply with European Union directives
~	Alternating current	⏚	Earth (ground) TERMINAL
⎓	Direct Current	⚠	Warning
⧈	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION		
ETL Intertek	Conform to UL STD 61010-1, 61010-2-030, 61010-2-033, certified by CSA STD C22.2 No. 61010-1, 61010-2-030, 61010-2-033		
CAT III	It is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.		
CAT II	It is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.		

General Specifications
1. The maximum voltage between input terminal and earth ground is 1000Vrms.
2. 10A terminal protection:10A H 1000V quick-acting fuse, Φ6×32mm，Fuse breaking rating: 10KA
3. 9999-count display, show "OL" when overrange, update 3 times per second.
4. Range: Auto
5. Backlight: manually turn on and auto turn off after 30 seconds.
6. Polarity: Display symbol "—" for negative polarity input.
7. Data hold: "HOLD" display on top right of LCD.
8. Low battery indication: " " display on bottom left of LCD.
9. Battery: AAA battery 1.5V×3
10. Working temperature: 0℃～40℃ (32℉～104℉)
    Storage temperature: -10℃～50℃ (14℉～122℉)
    Relative humidity: 0℃～30℃ ⩽75%, 30℃～40℃ ⩽50%
    Working altitude: 0～2000m
11. Dimension: 169*81*46mm
12. Weight: about 290.2g (including batteries)

External structure (Figure 1)
1. LCD display
2. Audible and visual indicator
3. Function button
4. Input terminal
5. Hanging hook
6. Test probe holder
7. Battery cover
8. kickstand

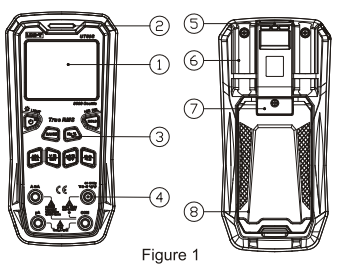


Figure 1

Function buttons
*. : 1. Short press to enter manual range switch mode for voltage, current and resistance.
2. Long press for ⩾2s to return to auto measurement mode.
3. Press for ⩾2s when turning on the meter to disable auto power off function. (Full display: POFF)
*. : 1. The sub window under ACV/ACA function displays frequency measurement.
2. Short press to display frequency in main window and display duty cycle % in sub window.
*. HOLD: 1. Short press HOLD to hold current test data, "HOLD" is shown on LCD.
2. Long press HOLD for about ⩾2s to enter REL mode, LCD displays "△".
*. : Long press (⩾2s) to turn on the meter, long press again to turn it off.
*. : Long press to switch input signal of AC/DC voltage and NCV.
*. : Long press to switch signal of AC/DC voltage and temperature.
*. : Switch input signal of resistance/continuity/capacitance/diode and retain current function.
*. : Automatically identify current after the test probe is connected, in current mode, short press to switch AC/DC current measurement functions.

Operating Instructions
1. AC/DC Voltage Measurement (Figure 2)
1) Short press " " for AC/DC voltage test.
2) Short press" " for AC/DC mV voltage test
3) Insert the red test lead into the "VΩ" terminal, black test lead into the "COM" terminal, and make the probes in contact with both ends of the measured voltage (parallel connection to the load).
4) Read the test result from LCD.

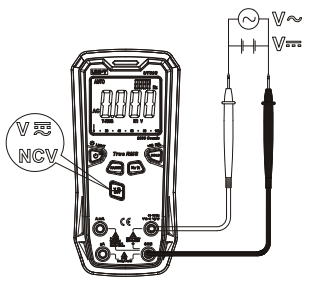


Figure 2

⚠ **Warning**
- Do not input a voltage over 1000V, or it may damage the meter and hurt the user.
- The input impedance of the meter is 10MΩ. This load effect may cause measurement errors in high-impedance circuits. If the impedance of the circuit is ≤10kΩ, the error can be ignored (≤0.1%).
- Be cautious to avoid electric shock when measuring high voltages.
- Before each use, verify meter operation by measuring a known voltage.

2. Resistance Measurement (Figure 3)
1) Short press " " for resistance test.
2) Insert the red test lead into the "VΩ" terminal, black test lead into the "COM" terminal, and make the probes in contact with both ends of the measured resistance (parallel connection to the resistance).
3) Read the test result from LCD.

⚠ **Warning**
*. Before measuring resistance, switch off the power supply of the circuit and discharge all capacitors before measuring resistance.
*. 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.
*. If the measured resistor is open or the resistance exceeds the maximum range, the LCD will display "OL".
*. When measuring low resistance, the test leads will produce 0.1Ω~0.2Ω measurement error. To obtain the final accurate value, the resistance of shorted test leads should be subtracted from the measured resistance value.
*. When measuring high resistance, it is normal to take a few seconds to stabilize the reading.
*. Do not input voltages over 60 VDC or 30 VAC.

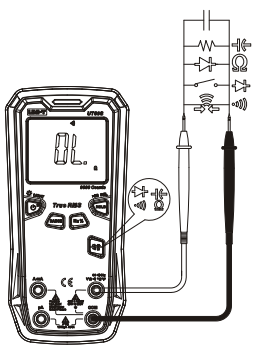


Figure 3

3. Continuity Test (Figure 3)
1) Short press " " for continuity test.
2) Insert the red test lead into the "VΩ" terminal, black test lead into the "COM" terminal, and make the probes in contact with the two test points.
3) When measured resistance⩽10Ω, the circuit is in good conduction status and the buzzer beeps continuously along with a green LED indication. When measured resistance⩾50Ω, the circuit is broken, buzzer makes no sound along with a yellow LED indication. When measured resistance ⩾100Ω, LED shows red indication.

⚠ **Warning**
*.Switch off the power supply of the circuit and discharge all capacitors before test.

4. Diode Test (Figure 3)
1) Short press " " for diode test.
2) Insert the red test lead into the "VΩ⇥|" terminal, black test lead into the "COM" terminal, and make the probes in contact with the two endpoints of the PN junction.
3) If the diode is open or its polarity is reversed, the LCD will display "OL". For silicon PN junction, the normal value is generally about 500mV~800mV (0.5V~0.8V). Buzzer beeps instantly when readout displayed, test leads short-circuit buzzer beeps continuously.

⚠ **Warning:**
*. Switch off the power supply of the circuit and discharge all capacitors before testing the PN junction.
*. The test voltage is about 4.0V/1.5mA.

5. Capacitance Measurement (Figure 3)
1) Short press " " for capacitance test.
2) Insert the red test lead into the "VΩ" terminal, black test lead into the "COM" terminal, and make the probes in contact with the two endpoints of the capacitance.
3) 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. So, please use the relative value measurement (REL) mode to automatically subtract the fixed value.

⚠ **Warning**
- If the measured capacitor is shorted or the capacitance exceeds the maximum range, the LCD will display "OL".
- When measuring high capacitance, it is normal to take a few seconds to stabilize the reading.
- Before measuring, discharge all capacitors (especially high-voltage capacitors) to avoid damage to the meter and user.

6. AC/DC Current Measurement (Figure 4a,4b)
1) Insert the red test lead into the "μA" or "mA/A" terminal, black test lead into the "COM" terminal.
2) Short press " " to switch between AC and DC current.
3) Connect the test leads to the power supply or circuit under test in series.
4) Read the test result from LCD.

⚠ **Warning**
- 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 "mA/A" terminal is overloaded, the built-in fuse will be blown and must be replaced. Self-recovery protection circuit is built for the overload of "uA" terminal.
- Do not connect the test leads to any circuit in parallel during current measurement to avoid damage to the meter and user.
- "μA" terminal can be used to heating system flame rectifier circuit detection (Figure 4b)
- When test leads did not inserted into terminal and press " " current button LCD would display "LEAd" to prompt to insert test leads

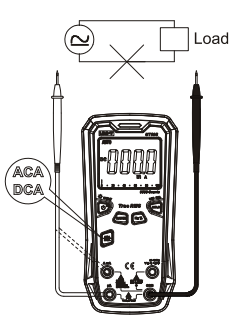


Figure 4a

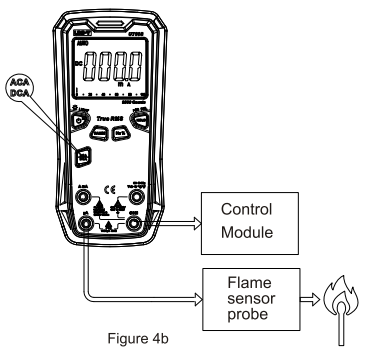


Figure 4b

7. Temperature Measurement (Figure 5)
1) Long press " " for temperature test.
2) Insert the K-type thermocouple into the "VΩ" and "COM" terminals, and fix the temperature sensing end of the thermocouple on the object under test, read the temperature from LCD after the value stabilizes.

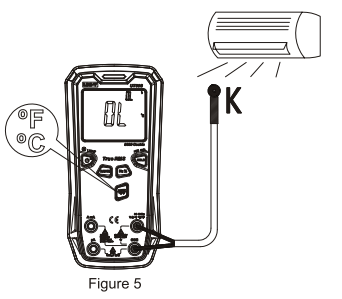


Figure 5

⚠ **Warning**
The LCD displays "OL" when the meter is turned on. Only K-type thermocouple is applicable, and the measured temperature should be less than 250°C/482°F (°F = °C × 1.8 + 32).

8. Frequency Measurement (Figure 6)

1) When measuring AC voltage/current, press “ ” to enter frequency or duty cycle measurement mode.
2) Insert the red test lead into the “VΩHz” terminal, black test lead into the “COM” terminal, and connect the test leads to both ends of the signal source in parallel (measuring range: 10Hz~10MHz).
3) Read the test result from LCD.

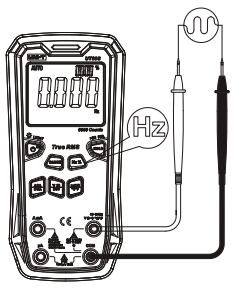


Figure 6

⚠ Warning

*.The output signal of the measurement should be <30V, otherwise the measurement accuracy will be affected.

9. Non-Contact Voltage (NCV) Sensing (Figure 7)

1) To sense whether there is AC voltage or electric field in the space, short press “ ” for NCV test.
2) When the top-left end of the meter gets close to a charged object (about 100V), the LCD will display segment to indicate the intensity of electric field, at the same time, the buzzer will beep and the LED will flash (“-” displayed along with green light flash, “--” displayed along with yellow light flash, “---” or “----” displayed along with red light flash), if the frequency for buzzer beeping becomes higher, more segments will appear (up to “----”). As the intensity of the measured electric field increases, the frequency for buzzer beeping and LED flash will be higher.

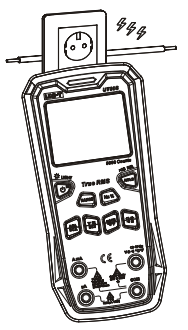
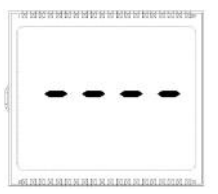


Figure 7

3) The diagram of the segment indicating the intensity of the electric field sensing is shown below.



10. Others

1) The meter cannot enter the normal measurement state until its full display for about 2s after the starting up.
2) During measurement, if no any button is pressed within 15 minutes, the meter will automatically shut down to save power, long press “ ” to wake it up. To disable the auto-off function: when turning on the meter, press and hold “ ”until LCD shows “POFF” and the buzzer consecutively beeps three time.
3) The buzzer beeps once if any valid button is pressed.
4) Buzzer alarm
   The buzzer beeps continuously when the input voltage ≥990.0V or input current >9.900A, indicating that it is at the range limit.
5) The buzzer makes three consecutive beeps about 1 minute before auto power off, and makes one long beep when the meter shuts down.
6) Low battery detection:
   Battery voltage < 3.6V: “ ” is displayed, the meter still works.
   Battery voltage < 3.0V: “ ” is displayed after the meter is turned on, the meter cannot work.

Technical Specifications

Accuracy: ± (a% of reading + b digits), 1 year warranty
Ambient temperature: 23°C±5°C (73.4°F±9°F)
Relative humidity: ≤75%
⚠ Warning
*.To ensure measurement accuracy, the operating temperature should be within 18°C~28°C and the fluctuation range should be within ±1°C.
Temperature coefficient: 0.1 x (specified accuracy)/°C (<18°C or >28°C)

1. DC voltage

Range	Resolution	Accuracy
9.999mV	0.001mV	±(0.7%+8)
99.99mV	0.01mV	±(0.7%+3)
999.9mV	0.1mV	±(0.5%+3)
9.999V	0.001V	
99.99V	0.01V	
999.9V	0.1V	

• Input impedance: About 10MΩ. Unstable digits display when the circuit is open in mV range, the digits stabilize (≤ ±3 digits) after connecting to the load.
• Max input voltage: ±999.9V, “OL” is displayed at >1000V.
• Overload protection: 1000Vrms (DC/AC).

2. AC Voltage

Range	Resolution	Accuracy
9.999mV	0.001mV	±(1%+3)
99.99mV	0.01mV	
999.9mV	0.1mV	±(0.8%+3)
9.999V	0.001V	
99.99V	0.01V	
999.9V	0.1V	

• Input impedance: About 10MΩ.
• Frequency response: 40Hz~400Hz, sine wave RMS (mean response).
• Max input voltage: AC 1000V, “OL” is displayed at >1010V.
• Overload protection: 1000Vrms (DC/AC).

3. Resistance

Range	Resolution	Accuracy
99.99Ω	0.01Ω	±(0.8%+8)
999.9Ω	0.1Ω	±(0.8%+2)
9.999kΩ	0.001kΩ	
99.99KΩ	0.01KΩ	
999.9KΩ	0.1KΩ	
9.999MΩ	0.001MΩ	±(1.5%+3)
99.99MΩ	0.01MΩ	±(2.0%+5)

• Measurement result = displayed value – resistance of shorted test leads.
• Overload protection: 1000V

4. Continuity and Diode

Range	Resolution	Accuracy
•))	0.1Ω	Broken circuit: Resistance ≥50Ω, no beep, light up yellow. Resistance ≥100Ω, light up red. Well-connected circuit: Resistance ≤10Ω, consecutive beeps, light up green.
▶|	0.001V	Open circuit voltage: About 4V (test current is about 1.5mA). For silicon PN junction, the normal value is about 0.5V~0.8V.

• Overload protection: 1000Vrms (DC/AC)

5. Capacitance

Range	Resolution	Accuracy
9.999nF	0.001nF	In REL mode: ±(4%+10)
99.99nF	0.01nF	±(4.0%+5)
999.9nF	0.1nF	
9.999μF	0.001μF	
99.99μF	0.01μF	
999.9μF	0.1μF	
9.999mF	0.001mF	±10%
40.00mF	0.01mF	
99.9mF	0.1mF	

• For capacitance ≤100nF, it is recommended to use REL mode to ensure measurement accuracy.
• Overload protection: 1000Vrms (DC/AC).

6. Temperature

Range			Resolution	Accuracy
℃	- 40 ~ 1000℃	-40 ~ 0℃	1℃	±4℃
		> 0 ~ 100℃		±(1.0%+5)
		> 100 ~ 1000℃		±(2.0%+5)
℉	- 40 ~ 1832℉	-40 ~ 32℉	1℉	±5℉
		> 32 ~ 212℉		±(1.5%+5)
		> 212 ~ 1832℉		±(2.5%+5)

• K-type thermocouple is only applicable to the measurement of temperature below 250°C/482°F.
• Overload protection: 1000Vrms (DC/AC).

7. DC Current

Range	Resolution	Accuracy
999.9μA	0. 1μA	±(0.8%+3)
999.9mA	0.1mA	±(1.0%+3)
9.999A	0.001A	

• The alarm sounds at ≥10A. “OL” is displayed at >10.00A.
• Overload protection: 1000Vrms.

8. AC Current

Range	Resolution	Accuracy
999.9μA	0. 1μA	±(1.0%+3)
999.9mA	0.1mA	±(1.2%+3)
9.999A	0.001A	

• Frequency response: 40Hz~400Hz.
• Display: RMS.
• Accuracy: 5~100% of the range, zeroing at short circuit.
• The alarm sounds at ≥9.9A, “OL” is displayed at >10A.
• Overload protection: 1000Vrms.

9. Frequency

Range	Resolution	Accuracy
9.999Hz~9.999MHz	0.001Hz~0.001MHz	±(0.1%+5)
0.1%~99.9%	0.1%	±(3%+5)

- Overload protection: 1000Vrms (DC/AC)
- Voltage range (mV): 200mVrms ≤ input amplitude ≤ 30Vrms, the duty cycle is only applicable to the measurement of square wave at ≤1kHz, 1.0%-99.0%.
- Voltage range (V): input amplitude ≥5Vrms, the duty cycle is only applicable to the measurement of square wave at ≤1kHz, 10%-90%.
- Current range (A): 10% of the maximum input amplitude, the duty cycle is only applicable to the measurement of square wave at ≤1kHz, 10%-90%.
- Frequency range of slave display: 40Hz～1KHz, the amplitude is same as main display.

Maintenance

⚠Warning: Switch off the power supply and remove the test leads before opening the rear cover.

1. General Maintenance

1) Clean the meter casing with a damp 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 (Figure 8)

1) Battery Replacement
a. Power off the meter, remove the test leads from the input terminals, and remove the protective cover.
b. Unscrew and remove the battery cover.
c. Replace with 3×1.5V AAA batteries, observing correct polarity.
d. Secure the battery cover and tighten the screw.

2) Fuse Replacement
a. Power off the meter, remove the test leads from the input terminals, and remove the protective cover.
b. Unscrew and remove the rear cover.
c. Replace the blown fuse (specifications: Fuse 10A/1000V Φ6.35×32mm ceramic tube).
d. Secure the rear cover and tighten the two screws.

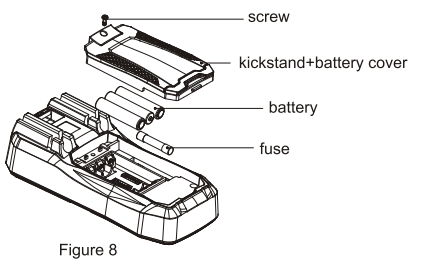


Figure 8

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