

# UT205B/UT205A+/UT206A+ 1000A Clamp Meter User Manual

## I. Overview

UT205B/UT205A+/UT206A+ are handheld AC clamp meters with auto range, designed in accordance to EN61010-2010 and CAT III 600V/CAT II 1000V, and with full-featured protection ensuring users a safe and reliable measurement experience. These meters have functions including basic electric measurement, inrush current measurement (UT206A+), high-accuracy current measurement, making them ideal measurement tools for electricians.

## II. Features

- 1) Lightweight and compact.
- 2) Full-featured false detection protection for up to 600V (30kVA) energy surge, overvoltage and overcurrent alarm functions.
- 3) Frequency response of current up to 50Hz~1kHz, inrush current measurement function (UT206A+), current frequency monitoring function (UT205B).
- 4) Large capacitance measurement (60nF~60mF), fast ADC (3 times/s), response time for capacitance measurement: less than 6s for  $\leq 1\text{mF}$ ; about 8s for  $\leq 60\text{mF}$ .
- 5) Overvoltage and overcurrent alarm function.
- 6) The circuit has an automatic power saving function, the consumption in sleep state is  $<20\mu\text{A}$ , which effectively extends the battery life to 200 hours.

**Warning:** Before using the meter, please read the Safety Information carefully.

## 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 (UT206A+ only)
4. Carrying bag ----- 1 pc

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

## IV. Safety Information

The meter is designed in accordance with IEC/EN61010-1, 61010-2-032 and electromagnetic radiation protection EN 61326-1 safety standards, and conforms to CAT III 600V, CAT II 1000V, double insulation and pollution grade II. In case the meter is not used according to the operating instructions, the protection provided by the meter may be compromised or lost.

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 use the meter.
2. Do not use the meter if the rear cover or the battery cover is not covered up, or it will pose a shock hazard!
3. When using the meter, your fingers must be placed behind the finger guard ring of the test leads. During measurement, do not touch exposed wires, connectors, unused inputs, or circuits being measured to prevent electric shock.
4. The function switch should be placed in the correct position before measurement. It is forbidden to change the position during measurement to avoid damage to the meter!
5. Do not apply voltage over 1000V between any meter terminal and earth ground to prevent electric shock or damage to the meter.
6. Be cautious when the measured voltage is higher than 60V (DC) or 30Vrms (AC) to avoid electric shock!
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. Before measuring the resistance, diode and continuity online, switch off the power supply of the circuit, and fully discharge all capacitors to avoid inaccurate measurement.
8. When the "⚡" symbol appears on the LCD, 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.
9. Do not change the internal circuit of the meter to avoid damage to the meter and user!
10. Do not use or store the meter in high temperature, high humidity, flammable, explosive and strong magnetic field environments.
11. Clean the meter casing with a soft cloth and mild detergent. Do not use abrasives or solvents!

## V. Electrical Symbols

Symbol	Description	Symbol	Description
	High voltage hazard		Double insulated
	AC		Grounding
	DC		Warning
	Conforms to EU standards		

## VI. General Specifications

1. Max display: 4099 (UT205B/UT205A+); 6099 (UT206A+)
2. Polarity display: Auto
3. Overload display: "OL" or "-OL"
4. Low battery indication: The "⚡" symbol is displayed.
5. Low battery shutdown prompt: The "Lo.b" interface appears on the LCD and lasts for about 10s, the buzzer beeps three times, and the meter automatically shuts down.
6. Test position error: If the source under test is not placed at the center of the clamp jaws when measuring current,  $\pm 2.0\%$  additional error in reading will be produced.
7. Drop protection: 1m
8. The maximum size of conductor to be measured in diameter: UT205A+/UT206A+ 45mm; UT205B 56mm.
9. Battery: AAA battery 1.5V $\times$ 2
10. Auto power off: If there is no operation of the function switch or any button for 15 minutes, the meter will automatically power off. This function can be turned off as needed.
11. Dimension: 242mm $\times$ 76.5mm $\times$ 52mm
12. Weight: About 235g (including batteries)
13. Altitude: 2000m
14. Operating temperature and humidity: 0 $^{\circ}\text{C}$ ~30 $^{\circ}\text{C}$  ( $\leq 80\%$ RH), 30 $^{\circ}\text{C}$ ~40 $^{\circ}\text{C}$  ( $\leq 75\%$ RH), 40 $^{\circ}\text{C}$ ~50 $^{\circ}\text{C}$  ( $\leq 45\%$ RH)
15. Storage temperature and humidity: -20 $^{\circ}\text{C}$ ~60 $^{\circ}\text{C}$  ( $\leq 80\%$ RH)
16. Electromagnetic compatibility:  
RF $\leq 1\text{V/m}$ , overall accuracy=specified accuracy+5% of range  
RF $>1\text{V/m}$ , no specified calculation

## VII. External Structure

1. NCV sensing end
2. Clamp jaws
3. Hand guard
4. Jaw opening trigger
5. Function switch
6. LCD display
7. Function buttons
8. Positive (+) input jack
9. COM (negative -) input jack

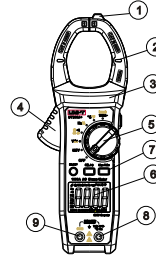


Figure 1

## VIII. Button Description

### 1. SELECT Button

In the composite function position, press this button to switch between the corresponding measurement functions; in current measurement function position, long press this button (about 2s) to enter INRUSH measurement function, short press to refresh the current reading, long press again to exit INRUSH measurement function.

### 2. HOLD/LIGHT Button

- a). Short press this button to enter or exit the data hold mode.
- b). Long press this button (about 2s) to turn on/off the light, the light will automatically turn off after 5 minutes.

### 3. MAX/MIN Button

Short press this button to enter the maximum/minimum measurement mode and long press this button to exit (only valid for AC/DC voltage, AC current). The meter will consecutively make beep sounds twice if this button is pressed in other inapplicable function positions.

### 4. REL/BACKLIGHT Button

- 1) In the voltage, capacitance and resistance positions, press this button 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 this button again to exit the relative value mode. The meter will consecutively make beep sounds twice if this button is pressed in other inapplicable function positions.
- 2) Long press for about 1~2 seconds to turn on/off the backlight, the backlight will automatically turn off after the backlight is on for about 1 minute.
- 3) Long press for about 3 seconds to enable the backlight to enter always-on mode, long press for about 2 seconds to exit the mode.

## IX. Operating Instructions

### 1. AC Current/Motor Inrush Current Measurement (Figure 2 & 3)

- 1) Select the AC current range. The clamp meter will automatically switch corresponding range according to the input amplitude during measurement.
- 2) Press the trigger to open the clamp jaws, and fully enclose one conductor.
- 3) Only one conductor can be measured at a time, otherwise the measurement method and reading will be wrong.

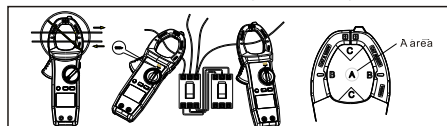


Figure 2

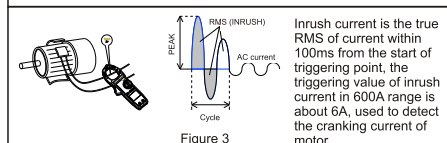


Figure 3

Inrush current is the true RMS of current within 100ms from the start of triggering point, the triggering value of inrush current in 600A range is about 6A, used to detect the cranking current of motor.

**Warning:**

- Short circuit is not easy to occur between the clamp jaw and the measured object, but when measuring uninsulated conductor, please be careful not to cause short circuit between the uninsulated conductor and the clamp jaws.
- The measurement is sensitive to mechanical stress to some extent, so please do not release the trigger suddenly when it is pressed, otherwise the impact will affect the reading in a short time.
- To ensure measurement accuracy, the measured conductor must be centered in the clamp jaws (A area), if it is deviated from center area (in B or C areas),  $\pm 2.0\%$  additional error in reading will be produced.
- When the measured current is  $>1000\text{A}$ , the meter will automatically sound an alarm.

## 2. AC/DC Voltage and Frequency Measurement

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

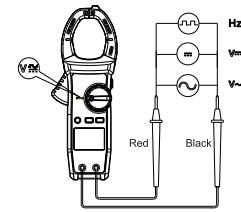


Figure 4

**Warning:**

- Do not input voltage above 1000V (AC). Although it is possible to measure higher voltage, it may damage the meter.
- Be cautious to avoid electric shock when measuring high voltage.
- When the measured voltage is  $>30\text{V/AC}$ , the LCD will display the high voltage alarm prompt "⚡".

## 3. Resistance, Continuity, Capacitance and Diode Measurement

- 1) Insert the red test lead into the signal input terminal, and the black test lead into "COM" terminal.
- 2) Turn the function switch to the "Ω" position, press the SELECT button to select resistance measurement, and connect the test leads with both ends of the measured resistance in parallel.

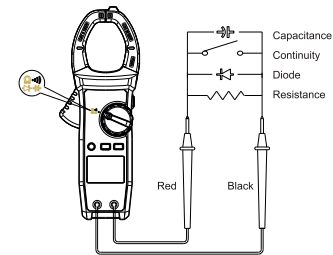


Figure 5

**Warning:**

- If the measured resistor is open or the resistance exceeds the maximum range, the LCD will display "OL".
- Before measuring the resistance online, switch off the power supply of the circuit, and fully discharge all capacitors to avoid inaccurate measurement.
- If the resistance is not less than 0.5Ω when the test leads are short-circuited, please check the test leads for looseness or other abnormalities.
- For continuity measurement, if measured resistance is  $<30\Omega$ , the circuit is in good conduction status and the buzzer beeps continuously; if measured resistance is 30Ω~50Ω, the buzzer may make sounds or make no sound; if measured resistance is  $>51\Omega$ , the buzzer makes no sound certainly.
- For diode measurement, "▶" polarity is needed to be distinguished, read the approximate forward PN junction voltage of measured diode directly from the display. For the silicon PN junction, the normal value is generally about 500~800mV.
- Before measuring capacitance "⚡", it is recommended to use "REL" measurement mode for capacitance  $\leq 100\text{nF}$ . For capacitance above  $\mu\text{F}$ , short-circuit the electrode of the capacitor and fully discharge all capacitors (especially for capacitors with high voltage) to avoid damage to the meter and user.
- Do not input voltage over AC/DC 30V to avoid personal injury.

## 4. Temperature Measurement (UT206A+ only) (Figure 6)

- 1) Insert the positive pole of the temperature probe into the signal input terminal and negative pole into "COM" terminal.
- 2) Turn the function switch to "C/F" position and the LCD will display room temperature.
- 3) Fix the temperature probe on the object to be tested, and read the temperature value of the tested object directly from the display after a few seconds.

4) Press the SELECT button to switch between °C and °F.

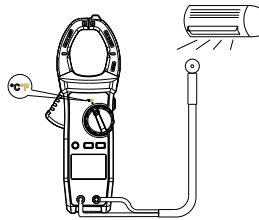


Figure 6

**Warning:**

- The ambient temperature of the meter should be in the range of 18-28°C, otherwise it will cause measurement error.
- The positive and negative poles of the temperature probe should be properly connected. Do not measure non-insulated live objects to avoid incorrect readings.
- Do not input voltage higher than 30V to avoid personal injury.

**5. Non-Contact AC Electric Field Sensing (NCV) for UT205B and UT206A+ (Figure 7)**

The electric field sensing sensitivity is divided into two levels. According to the local power-frequency voltage, press SELECT to choose 110V or 220V measurement mode, bring the NCV sensing end of the clamp jaws to power-frequency electric field, when the intensity of measured electric field reaches to a certain level, the LCD will display segment "----" and the buzzer will make beep sound. As the intensity of the measured electric field increases, the buzzer will beep at a higher frequency.

- HFLo measurement condition (110V), when electric field is not sensed, HFLo will be displayed; when electric field is sensed, "— — —L" will be displayed, the higher the frequency at which the buzzer beeps, the stronger the electric field.
- HFHi measurement condition (220V), when electric field is not sensed, HFHi will be displayed; when electric field is sensed, "— — —H" will be displayed, the higher the frequency at which the buzzer beeps, the stronger the electric field.

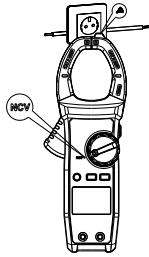


Figure 7

**Warning:**

- Use the NCV sensing end of the clamp jaws to approach the measured electric field, otherwise the measurement sensitivity will be affected.
- When the measured electric field voltage is  $\geq 100V$  (AC), observe whether the conductor of the measured electric field is insulated to avoid personal injury.

**6. Others**

- Auto power off: During measurement, if there is no operation of the function switch or any button for 15 minutes, the meter will automatically shut down to save power. You can wake it up by pressing any button or restart it after turning the function switch to the OFF position
- To disable the auto power off function, press and hold the SELECT button in the off state, and then turn on the meter. To resume the auto power off function, restart the meter after shutdown
- Buzzer: When any button is pressed or the function switch is turned, if it is valid, the buzzer will make one beep (about 0.25s). When measuring voltage or current, the buzzer will beep intermittently to indicate the over range
- Low battery detection: The internal VDD will be automatically detected as long as the meter is on. If it is lower than 2.5V, the LCD will display the "Lo.Bt" symbol.
- Low battery shutdown function: When the battery voltage is lower than about 2.4V, the LCD displays the "Lo.Bt" symbol, the "Lo.Bt" interface appears and lasts for a few seconds, the buzzer makes consecutive beeps three times, and then the meter automatically shuts down.

**X. Technical Specifications**

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

**(1) AC Current**

Range			Resolution	Accuracy	
UT205B	UT205A+	UT206A+		45~65Hz	65~1kHz
----	40.00A	60.00A	0.01A		
999.9A	400.0A	600.0A	0.1A	$\pm$ (1.5%+5)	$\pm$ (2.5%+5)
1000A	1000A	1000A	1A		
		600.0A (INRUSH)	0.1A	$\pm$ (5.0%+10)	
Monitoring frequency of current (UT205B): 40Hz~1kHz			----		$\pm$ (1.0%+5)

- Frequency response: 45Hz~1kHz
- For 60A range, open circuit allows least significant digit <3.
- Accuracy guarantee range: 1%~100% of range
- The triggering value of inrush current at 600A range is 6A, the triggering time is within 100ms approximately.

**(2) AC Voltage**

Range			Resolution	Accuracy	Overload Protection
UT205B	UT205A+	UT206A+			
4.000V	4.000V	6.000V	0.001V		1000Vrms
40.00V	40.00V	60.00V	0.01V	$\pm$ (1%+2)	
400.0V	400.0V	600.0V	0.1V		
1000V	1000V	1000V	1V	$\pm$ (1%+5)	
Voltage frequency monitoring: 10Hz~10kHz			/		

- Input impedance:  $\geq 10M\Omega$ .
- Frequency response: 45~400Hz
- Accuracy guarantee range: 5~100% of range
- The input voltage amplitude of voltage frequency should be >5V.

**(3) DC Voltage**

Range			Resolution	Accuracy	Overload Protection
UT205B/UT205A+	UT206A+				
400.0mV	600.0mV		0.1mV	$\pm$ (0.7%+3)	1000Vrms
4.000V	6.000V		0.001V		
40.00V	60.00V		0.01V	$\pm$ (0.8%+2)	
400.0V	600.0V		0.1V		
1000V	1000V		1V		

- Input impedance:  $\geq 10M\Omega$
- For mV range, short circuit allows least significant digit  $\leq 5$ ; for other ranges, reset to zero at short circuit.
- Accuracy guarantee range: 1%~100% of range.

**(4) Frequency/Duty Ratio**

Range	Resolution	Accuracy	Overload Protection
10Hz ~ 10MHz	0.01Hz ~ 0.01MHz	$\pm$ (0.1%+4)	600Vrms
0.1% ~ 99.9%	0.1%	$\pm$ (3.0%+5)	1) Measuring sensitivity: $\leq 100kHz$ : 200mVrms $\leq$ input amplitude $\leq 20Vrms$ $>100kHz\sim 1MHz$ : 600mVrms $\leq$ input amplitude $\leq 20Vrms$ $>1MHz\sim 10MHz$ : 1.8Vrms $\leq$ input amplitude $\leq 20Vrms$ 2) Duty ratio is only applicable to the measurement of square wave $\leq 10kHz$ ; amplitude: 1Vp-p Frequency $\leq 1kHz$ , duty ratio: 10.0%~95.0% Frequency $>1kHz$ , duty ratio: 30.0%~70.0%

**(5) Resistance**

Range		Resolution	Accuracy	Overload Protection
UT205B/UT205A+	UT206A+			
400.0 $\Omega$	600.0 $\Omega$	0.1 $\Omega$	$\pm$ (1.0%+5)	600Vrms
4.000k $\Omega$	6.000k $\Omega$	0.001k $\Omega$		
40.00k $\Omega$	60.00k $\Omega$	0.01k $\Omega$	$\pm$ (0.8%+2)	
400.0k $\Omega$	600.0k $\Omega$	0.1k $\Omega$		
4.000M $\Omega$	6.000 M $\Omega$	0.001M $\Omega$	$\pm$ (2.5%+5)	
40.00M $\Omega$	60.00 M $\Omega$	0.01M $\Omega$		

**(6) Continuity**

Range		Resolution	Accuracy	Overload Protection
UT205B/UT205A+	UT206A+			
400.0 $\Omega$	600.0 $\Omega$	0.1 $\Omega$	$\leq 30\Omega$ : The buzzer beeps $\geq 50\Omega$ : No beep Open-circuit voltage: About 1.0V	600Vrms

**(7) Diode**

Range		Resolution	Accuracy	Overload Protection
UT205B/UT205A+	UT206A+			
4.000V	6.000V	0.001V	Open-circuit voltage: About 3.2V Measurable PN junction: Forward voltage drop $\leq 3V$ For the silicon PN junction, the normal value is generally about 0.5~0.8V.	600Vrms

**(8) Capacitance**

Range		Resolution	Accuracy	Overload Protection
UT205B/UT205A+	UT206A+			
40.00nF	60.00nF	0.01nF	$\pm$ (4.0%+10)	600Vrms
400.0nF	600.0nF	0.1nF		
4.000uF	6.000uF	0.001uF	$\pm$ (4.0%+5)	
40.00uF	60.00uF	0.01uF		
400.0uF	600.0uF	0.1uF	$\pm$ (10%)	
4.000mF	6.000mF	0.001mF		
40.00mF	60.00mF	0.01mF		

- Measured value = displayed value - open circuit value of the test leads, open circuit allows least significant digit >0. (For capacitance  $\leq 100nF$ , it is recommended to use "REL" measurement mode).
- Accuracy guarantee range: 5%~100% of range.

**(9) Temperature (UT206A+)**

Range	Resolution	Accuracy	Overload Protection
-40°C~40°C	1°C	$\pm 4^\circ C$	600Vrms
40°C~400°C		$\pm$ (1.5%+4)	
400°C~1000°C		$\pm$ (2.0%+4)	
-40°F~104°F	$\pm 5^\circ F$		
104°F~752°F	$\pm$ (2.0%+4)		
752°F~1832°F	$\pm$ (2.5%+4)		

**(10) NCV (UT205B/UT206A+)**

Range	Sensing condition	Accuracy
NCV	Power frequency voltage (50Hz/60Hz): 100V (EFLo) 220V (EFHi)	Take insulated conductor as sensing condition: Select HFLo or HFHi with SELECT button. 1) When electric field is not sensed, HFLo will be displayed; when electric field is sensed, "— — —L" will be displayed, the higher the frequency at which the buzzer beeps, the stronger the electric field. 2) When electric field is not sensed, HFHi will be displayed; when electric field is sensed, "— — —H" will be displayed, the higher the frequency at which the buzzer beeps, the stronger the electric field.

**XI. Maintenance**

**Warning:** Before opening the rear cover of the meter, remove the test leads to avoid electric shock.

**1. General Maintenance**

- 1) When the meter is not in use, place the function switch in the OFF position to avoid continuous consumption of battery energy.
- 2) Clean the meter casing with a soft cloth and mild detergent. Do not use abrasives or solvents!
- 3) The maintenance and service must be implemented by qualified professionals or designated departments.

**2. Battery Replacement**

- 1) Turn off the meter and remove the test leads from the input terminals.
- 2) Unscrew the screw of the battery compartment, remove the battery cover, and replace the 2 standard AAA batteries according to the polarity indication.
- 3) Secure the battery cover and tighten the screw.

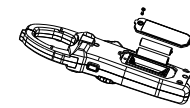


Figure 8

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