

UT210C

Mini Digital Clamp Meter Instructions

I. Overview

UT210C mini digital clamp meter features high reliability, high safety, high accuracy and mini size. The circuit design of the complete machine takes the large scale integrated circuit Σ/Δ analog-digital converter as core, and supported with full-range over-load protection circuit. It is applicable for measurement of DC voltage, AC voltage, frequency, resistance, capacitance, diode, circuit on-off, temperature as well as non-contact measurement of AC current and non-contact determination of AC voltage/electromagnetic field. Voltage & current true virtual value response, full-range over-load protection, reliable measurement accuracy and unique appearance design make UT210C a new generation of practical electrotechnical/electric measuring instrument with more excellent performance.

II. OOBA (Out-of-Box Audit)

Open the packing box and take out the instrument. Please carefully check whether or not the following accessories are missing or damaged. If you find any missing or damage, please contact the supplier immediately.

- 1. Instructions.....one copy
- 2. AAA battery 1.5V.....two pieces
- 3. Certification.....one copy
- 4. Probe.....one pair
- 5. Temperature probe.....one pair

III. Safety Instructions

The instrument is designed in conformity with CE certification, EN 61010-1, 61010-2-032 and 61010-2-033 of EU (pollution level 2), measurement category CAT II 600V and CAT III 300V as well as double insulation safety standard. Before using, please read the operation instruction and follow all safety instructions:

Conforms to UL STD. 61010-1, 61010-2-032, 61010-2-033
Certified to CSA STD. C22.2 NO. 61010-1, IEC STD 61010-2-032, 61010-2-033

CAT II: Applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.

CAT III: Applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation, before use and follow all safety instructions.

1. Please follow the operation instruction to use clamp meter, otherwise, the protection provided by the instrument is likely to be weakened.
2. Abide by the national laws and regulations; personal protective equipment must be applied to prevent from the injury caused by electric shock, arc discharge and so on, when working in the environment with bare live wire.
3. Please do not reach beyond any position outside the protective shield of the current clamp meter.

4. Before each use, check whether there are cracks or damages on the shell of current clamp meter and the output cable and whether there is any part under poor connection, and pay attention to the insulation layer surrounding the clamp mouth.
5. Before removing the battery cover, please make sure to remove the clamp meter from all live circuits, and disconnect the leading wire.
6. It is prohibited to use this clamp meter on circuit with voltage of higher than 600V (CAT II 600V), or frequency of above 400Hz.
7. Measurement category classification standard CAT II 600V/ CAT III 300V and pollution level 2 must not be violated.
8. Be sufficiently careful when working in the environment with bare wires, for contacting with wires might lead to electric shock.
9. Special attention shall be paid to 60V DC (direct current), 30V AC (alternating current effective value) or 42V AC (peak value), because there is risk of electric shock.
10. If probe needs to be replaced, ones with the same CAT II 600V /CAT III 300V level according to IEC 61010-031 shall be adopted.
11. Before measuring, function switch must be placed at the correct position and tap positions are not permitted to be switched during measurement, so as to prevent the instrument from damage.
12. Before it is used in high voltage circumstance, it is necessary to measure the known voltage, such as socket for civil use, to confirm validity of the instrument and prevent misleading of damaged instrument.

IV. Electrical Symbols

	Grounding		Warning
	AC (alternating current)		Double insulation
	DC (direct current)		Diode
	Voltage/Volt		Current/Ampere
	Application around and removal from UNINSULATED HAZARDOUS LIVE conductors is permitted		
	Meet EU (European Union) standards		
	This symbol signify the product comply with both USA and Canada requirement		

V. Comprehensive Code

- 1.⚠ Maximum misoperation protection voltage between the input terminal and grounding is 600V.
- 2.⚠ Maximum over-load protection current of the clamp head terminal is 200A.
- 3.Maximum indication: 2,000 Counts, 2-3 times of updating per second. Over-range indicates “OL”.
Diode: around 3.2V
Measuring range: automatic
Polarity: automatic
Working temperature: 0℃-40℃
Relative humidity: 0℃-30℃: ≤75%, 30℃-40℃: ≤50%
Storage temperature: -10℃-50℃
- 4.Electromagnetic compatibility:
In radio-frequency field of 1V/m: total accuracy=dedicated accuracy+5%; as for radio-frequency field over 1V/m, there is no dedicated index.
- 5.Working altitude: 0-2,000m
- 6.Built-in battery: AAA 1.5V×2 pieces
- 7.Low battery: LCD displays 🔋 symbol.

VI. Drawing for Product Panel

1. Clamp head.
2. Protective shield.
3. Clamp head trigger: press the trigger to open the clamp head.
4. NCV indicator light: if induced AC electric field intensity and induced distance meet the indicated values, alarm will be given out and indicator light will flash.
5. Function selection knob switch: turning this knob switch to switch to relevant functions on the panel.
6. HOLD/  key: used to lock the measured readings; hold the key for 2 seconds to turn on or off the backlight.
7. MAX/MIN key: pressing this key to display the maximum value and press again to display the minimum value, which forms a cycle of operation (maximum value- minimum value). Holding this button for more than 2s (including 2s) to exit this function.
8. SELECT key: used for function selection at compound tap positions, such as ACV/Hz/DCV, resistance/circuit on-off/diode/capacitance, °C/°F, etc.
9. LCD display screen: displaying interface of measurement function, symbol, value and so on.
10. Positive end jack: when testing voltage and resistance/circuit on-off/capacitance/diode and measuring temperature with probe, insert red probe/temperature probe into this jack.
11. COM end jack: when testing voltage, and resistance/circuit on-off/capacitance/diode and measuring temperature with probe, insert black probe/temperature probe into this jack.
12. Clamp head geometric center indication mark.

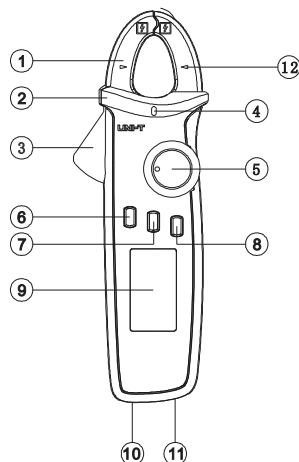


Figure I

VII. Description of Symbols

S/N	Symbol	Description
1	TRMS	Prompt of real valid value measuring status
2	AC/DC	Prompts of alternating current/direct current
3	—	Negative readings
4	▶	Prompt of diode measurement
5	••)	Prompt of circuit on-off measurement
6	□	Prompt of data-hold
7	Ω, kΩ, MΩ	Units of resistance: ohm, kilohm and megaohm
8	Hz, kHz, MHz	Units of frequency: hertz, kilohertz and megahertz
9	mV, V	Units of voltage: millivolt and volt
10	mA, A	Units of current: milliampere and ampere
11	nF, μF, mF	Units of capacitance: nanofarad, microfarad and millifarad
12	(EF)NCV	Prompt of non-contact AC voltage sensing
13	Auto	Prompt of automatic range
14	MAX	Prompt of maximum value holding
15	MIN	Prompt of minimum value holding
16	MAX-MIN	Prompt of maximum-minimum difference value holding
17	🔋	Prompt of under-voltage of built-in battery
18	🔄	Prompt of auto-OFF

VIII. Operation Instructions

1. Measuring of AC Voltage/Frequency/DC Voltage

- Select AC voltage/frequency or DC voltage tap position.
- Insert red probe into red jack (positive end), and insert black probe into black jack (COM end).
- Touch the measured part with red and black probes, such as power socket (Figure II).

Read the measured value from LCD screen.

When measuring voltage or frequency, the maximum input voltage is 600V (AC/DC), and this is not allowed to be exceeded; otherwise, it is possible to cause electric shock and damage the instrument.

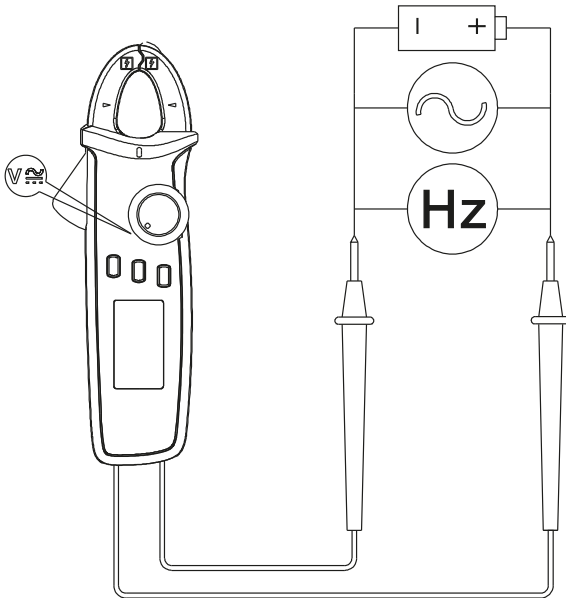


Figure II

2. Measuring of Resistance/Circuit on-off/ Diode/ Capacitance

- Select corresponding functions.
- Insert red probe into red jack (positive end), and insert black probe into black jack (COM end).
- Connect the probe in parallel to the measured part (Figure III).
- Read the measured value from LCD screen.

Do not input voltage of higher than DC 60V or AC 30V when measuring the range of resistance/capacitance/diode, in order to avoid personal injury or damage of instrument.

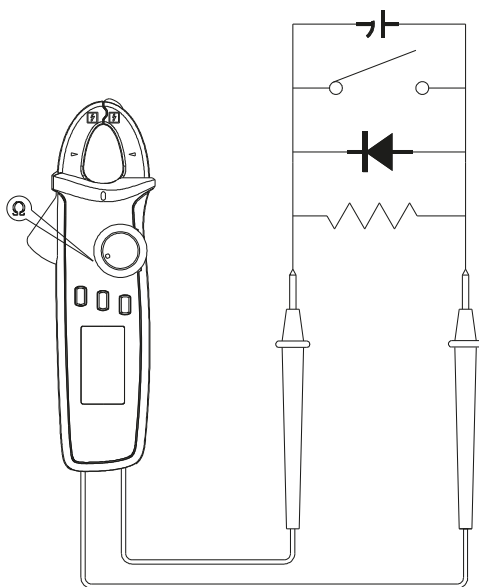


Figure III

3. Measuring of AC Current (Figure IV)

1) AC current

- Select AC current position.
- Open the clamp head, clasp the wire (single wire), and put the wire in the geometric center indicated in the clamp head. Make sure that the left and right clamp heads are completely closed, without gap between them.

Read the measured data from LCD. If the reading is positive, it means current flows from positive end marked on the clamp head to the negative end, and vice versa. Take out the probe when measuring current, in order to avoid electric shock.

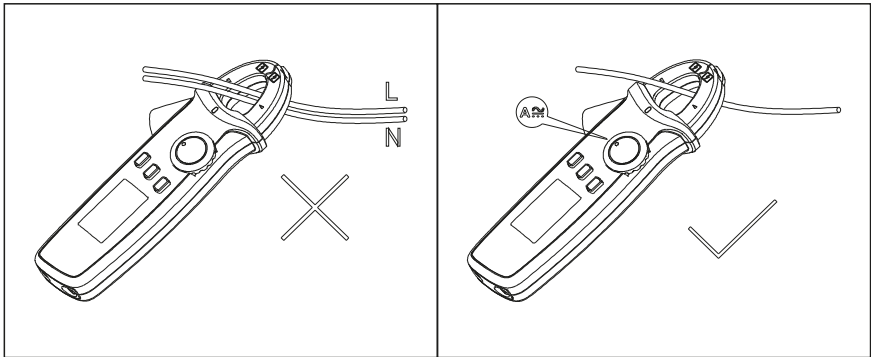


Figure IV

4. Measuring of NCV Non-contact Electric Field (Figure V)

The front end of clamp head can be used for sensing at 8-15mm from the tested object, in order to detect the existence of AC voltage or electromagnetic field. When the simulating value of AC voltage: $\leq$ threshold voltage of 100V, it displays “EF”; $>$ threshold voltage of 100V, LCD will display “-”, i.e., “-”, “--”, “---” and “----” corresponding to the sensing voltage. Meanwhile, the buzzer will ring with differentiated rhythms and NCV light will flash, to distinguish the intensity of the electric field.

When measuring range is switched to NCV measuring, the measuring probe shall be pulled out to avoid electric shock.

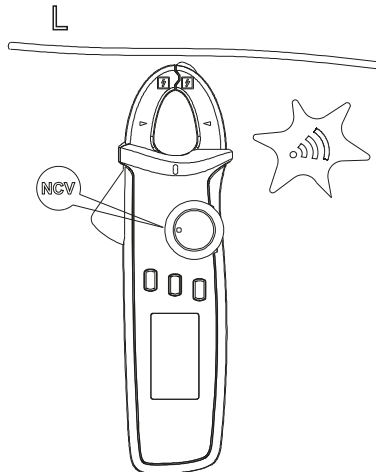


Figure V

5. Measuring of Temperature

- Temperature sensor: only applicable to K type temperature sensor.
- Switch to select temperature tap position.
- Input end open circuit instrument displays OL, and displays ambient temperature in case of short circuit.
- Connect to K type temperature sensor with black probe into COM end and red probe into $^{\circ}\text{C}$ end to measure $^{\circ}\text{C}$ or $^{\circ}\text{F}$ values. $^{\circ}\text{F}=1.8^{\circ}\text{C}+32$

Caution:

K type (nickel-chromium to nickel-silicon) point thermocouple temperature sensor configured is only applicable to measurement of temperature below $230^{\circ}\text{C}/446^{\circ}\text{F}$. Measuring of higher temperature shall be performed with K type temperature sensor with applicable measuring range.

6. Other Functions

- Holding the HOLD key for 2 seconds to turn on or off LCD backlight.
- Auto-OFF

If the knob switch is not operated for 15 minutes during the process of measuring, the instrument will start “Auto-OFF” to save energy. During auto-OFF status, click any key to wake up the instrument, or turn the knob switch to OFF and restart it again. Auto-OFF means that the instrument enters super-low power consumption status.

- **Stop auto-OFF:**
Hold SELECT key, and then connect and start the instrument, 5 times of buzzing will be given out to prompt that the auto-OFF function will be cancelled. The auto-OFF function will be resumed when the instrument is switched off and then restarted.
- The buzzer will give out 5 times of alarm around 1 minute before starting auto-OFF status, and give out 1 long alarm before power-off. When auto-OFF function is cancelled, the buzzer will give out 5 times of alarm every 15 minutes.
- **Buzzer:** buzzer will give out a short “beep” (about 0.25 second) if pressing any key or switching to valid functions. In tap positions, if the tested circuit is in sound conductivity ($\leq 10\Omega$), the buzzer will keep ringing. When the measured AC/DC voltage is higher than 600V or current is higher than 200A, the buzzer will also give out continuously interrupted “Beep” sound to warn against over-range.
- **Low voltage detection:** when the voltage is lower than 2.5V, low battery symbol “” will be displayed, when measuring accuracy might be reduced, and new battery shall be used in time. If the voltage is lower than 2.2V, the instrument will only show low battery symbol after starting, but will not work.
- When battery supply voltage is reduced to 2.6V, LCD backlight will be dim or cannot be started, but measuring function can still be available.

IX. Technical Indexes

Accuracy: $\pm (a\% \text{ reading} + b \text{ word count})$, warranty period is 1 year; this specification is determined based on the assumption that the temperature fluctuation range is within $\pm 1^{\circ}\text{C}$; in case of ambient temperature change of $\pm 5^{\circ}\text{C}$, the rated accuracy shall be applicable after 2 hours.

Ambient temperature: $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($73.4^{\circ}\text{F} \pm 9^{\circ}\text{F}$), relative humidity: $\leq 75\%$

Temperature coefficient: $0.1 \times (\text{specified accuracy})/^{\circ}\text{C}$ ($< 18^{\circ}\text{C}$ or $> 28^{\circ}\text{C}$)

1. Measuring of DC Voltage

Measuring Range	Resolution Ratio	Accuracy
200.0mV	0.1mV	$\pm (1\%+8)$
2.000V	1mV	$\pm (0.7\%+3)$
20.00V	10mV	
200.0V	100mV	
600V	1V	

 Voltage input impedance: about 10MΩ. (Due to the high input impedance, instable digit might be displayed in open circuit with 200mV measuring range, but such digit will be able to be measured stably in case of connection to tested source with internal resistance of lower than 10 MΩ; however, the influence of measured source on measuring reading shall be considered.)

 Maximum voltage input: $\pm 600\text{V}$.

2. Measuring of AC Voltage

Measuring Range	Resolution Ratio	Accuracy
2.000V	1mV	$\pm (1.0\%+3)$
20.00V	10mV	
200.0V	100mV	
600V	1V	$\pm (1.2\%+3)$

⚠ Voltage input impedance is all around 10MΩ.

⚠ Maximum voltage input: 600Vrms.

● Display true virtual value. Frequency response: 45-400Hz

● Accuracy assurance range: 5-100% measuring range, with less than 10 residual counts allowable in case of short circuit.

● The following deviation shall be added to calculate non-sinusoidal wave based on crest factor:

a) Crest factor is 1-2: add 3%.

b) Crest factor is 2-2.5: add 5%.

c) Crest factor is 2.5-3: add 7%.

3. Measuring of Frequency

Functions	Measuring Range	Resolution Ratio	Accuracy
ACV Hz	100Hz ~ 60KHz	0.01Hz ~ 0.01kHz	$\pm(0.1\%+4)$

4. Measuring of Resistance

Measuring Range	Resolution Ratio	Accuracy
200.0Ω*	0.1Ω	$\pm(1.0\%+2)$
2.000kΩ	1Ω	
20.00kΩ	10Ω	
200.0kΩ	100Ω	
2.000MΩ	1kΩ	$\pm(1.2\%+3)$
20.00MΩ	10kΩ	$\pm(1.5\%+5)$

⚠ * Measuring range: measured value = displayed value - probe short circuit value

Open circuit voltage: around 1V

Overload protection: 600V-PTC

5. Circuit on-off and Measuring of Diode

Measuring Range	Resolution Ratio	Accuracy
	0.1 Ω	When circuit off resistance value is $\geq 150\Omega$, buzzer will not ring; when the resistance is set as $\leq 10\Omega$ under sound circuit conductivity, the buzzer will ring continuously.
	1 mV	Open circuit voltage is around 3.2V; silicon PN junction normal voltage is around 0.5-0.8V.

 Overload protection: 600V-PTC

6. Measuring of Capacitance

Measuring Range	Resolution Ratio	Accuracy
20.00nF~200.0 μ F	10pF~100nF	$\pm (4\%+5)$
2.000mF~20.00mF	1 μ F~10 μ F	$\pm 10\%$

 Overload protection: 600V-PTC

- For tested capacitance of $\leq 1\mu\text{F}$, it is suggested to test with shorter wires; otherwise, the readings before connection of tested capacitance shall be deducted to ensure measuring accuracy.

7. Measuring of AC Current

Measuring Range	Resolution Ratio	Accuracy
20.00A	10mA	$\pm (2.5\%+10)$
200.0A	100mA	$\pm (2.0\%+10)$

 Overload protection: 200A

- Accuracy assurance range: 10-100% measuring range, with less than 5 residual counts allowable in case of ACA open circuit.
- Display true virtual value. Frequency response: 50-60Hz
- The following deviation shall be added to calculate non-sinusoidal wave according to crest factor:
 - a) Crest factor is 1-2: add 3%.
 - b) Crest factor is 2-2.5: add 5%.
 - c) Crest factor is 2.5-3: add 7%.

8. Measuring of Temperature

Functions	Measuring Range	Resolution Ratio	Accuracy
Temperature °C	-40~0°C	1°C	±3
	>0~100°C		±(1.0%+3)
	>100~1000°C		±(2.0%+3)
Temperature °F	-40~32°F	1°F	±5
	>32~212°F		±(1.5%+5)
	>212~1832°F		±(2.5%+5)

X. Maintenance and Repair

1. General Maintenance

 Warning: please be sure to cut off the power supply before opening the rear cover of the instrument, and pull out the probe from the jack and the tested circuit.

- * The shell shall be regularly cleaned by wet cloth and cleanser. Abradant or solvent shall not be applied.
- * If abnormalities are found in the instrument, stop using and send it for repair.
- * If validation or repair is needed, the instrument shall be sent to be repaired by qualified professional maintenance staff or designated maintenance department.

2. Battery Replacement (as shown in Figure VII)

- * If LCD displays low battery symbol “”, the internal battery shall be replaced immediately, otherwise it will influence the accuracy of measuring.
- * Battery specification: AAA 1.5V × 2pieces

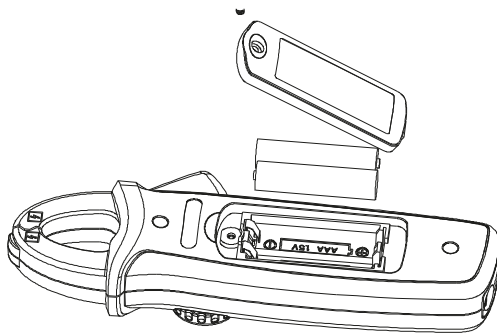


Figure VII

Operation Sequence

1. Turn the power switch to "OFF" position, and remove the probe from the jack.
2. Unscrew the screw in rear battery cover. Take out the batteries as per the figure.
3. Replace 2PCS new batteries (specification: AAA 1.5V)

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