

I. Overview

UT213A/B/C series is a handheld automatic-range clamp meter in 4,000 counts 3 3/4 digit true virtual value. The circuit design of the complete machine takes the large scale integrated circuit Σ/Δ analog-digital converter as core, and the full-range over-load protection circuit and a unique appearance design make it a dedicated electro-technical instrument. It is applicable to measure AC/DC voltage, AC current, DC current (only for UT213C), resistance, diode, circuit on-off, capacitance, temperature (only for UT213B/C), frequency and duty ratio, and it is also equipped with such functions as data-hold, maximum /minimum data measurement (only for UT213B/C), relative value measurement, flashlight, NCV, under-voltage display and auto OFF. The Instructions includes relevant safety information, warning, etc. Please read relevant contents carefully and strictly observe all warnings and cautions.

Warning:

Before using the clamp meter, please read relevant "SafeOperation Criterion".

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.

1. Instructions----- one copy
 2. Probe----- one pair
 3. K-type temperature probe--- one piece
(only for UT213B/C)
 4. Cloth bag-----one piece
- Please contact your supplier in case of any missing or damage.

III. Safety Operation Criterion

Please pay attention to the "Warning Signs and Words". Warnings mean the situations and behaviors that endanger the user or cause losses to the instrument or the equipment to be measured.

The instrument is designed and produced in strict accordance with IEC/EN 61010-1, IEC/EN 61010-2-032 and IEC/EN 61010-2-033, safety standards, and complies with the safety standard of double insulation, over-voltage CAT III 600V and pollution level 2. Please observe the following operation instruction, otherwise, the instrument provided protection is likely to be damaged.

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, IEC STD. 61010-2-033

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. Before using, please check the clamp meter and probe so as to prevent any damage or abnormal phenomenon. If you find that the probe and insulating layer of the shell are damaged obviously, the display screen cannot work, etc., or you consider the clamp meter cannot work well, please don't use the clamp meter any more.
2. It is strictly prohibited to use the clamp meter without the rear cover or battery cover, otherwise, shock hazard may occur.
3. When carrying out the measurement, please be sure that your finger should not exceed the shield and not touch the bare wire and connector, unused input terminal or circuit under measurement, to prevent the electric shock.

4. Before measuring, the function switch must be placed at the correct location and gears of range switch are not permitted to change during measuring, so as to prevent the clamp meter damage.
5. Do not apply DC600V/AC600V or above voltage between the clamp meter terminal and grounding, so as to prevent electric shock and clamp meter damage.
6. When use the instrument to measure DC voltage of higher than 42V or AC RMS voltage of higher than 30V, it is necessary to operate it carefully, for there may be danger of an electric shock.
7. Do not measure the voltage or current higher than the allowable input, and the function range switch must be placed at the maximum range position when the range of the value to be measured is not determined.
Before measuring the resistance, diode or circuit on-off, it is a must to cut off all the power supplies in the circuit and discharge all capacitors, otherwise, it may lead to incorrect measurement results.
8. When the symbol of “” is displayed on the LCD, it is necessary to timely replace the battery, so as to assure the measuring precision. Battery must be removed when the clamp meter was not used for a long time.
9. Please do not change the internal wiring of the clamp meter at random, to prevent instrument damage and insecurity.
10. Do not keep or use the clamp meter in an inflammable and explosive environment with high-temperature, high-humidity, or strong electromagnetic field.
11. During maintenance, please clean the shell of the clamp meter with the soft cloth soaked with neutral detergent, and do not use the abradant and solvent, so as to prevent the shell corrosion, instrument damage and insecurity.

12. the documentation shall indicate that probe assemblies to be used for MAINS measurements shall be RATED as appropriate for MEASUREMENT CATEGORY III or IV according to IEC 61010-031 and shall have a voltage RATING of at least the voltage of the circuit to be measured.

IV. Electrical Symbols

	Double insulation
	Grounding
	Warning
	AC (alternating current)
	DC (direct current)
	Buzzer on/off
	Diode
	Capacitance
	AC or DC (alternating current or direct current)
	Danger: high voltage
	Meet EU (European Union) standards
	This symbol signify the product comply with both USA and Canada requirement

V. External Structure (See Figure 1)

1.Clamp head

It is the sensing device for AC/DC measurement, which convert the current into voltage.

2.Clamp body

It is a kind of safety design to protect the operators' hands from dangerous zone.

3.Clamp head trip handle

Press the trigger to open the clamp head and release the trigger to allow automatic closing of it.

4.Knob switch

For selection of measurement function tap positions.

5.Function keys

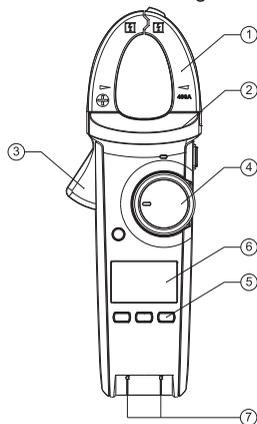
For selection of basic functions.

6.LCD display area

For display of measurement data and functional symbols.

7.Measurement input terminal

For input of measurement signal.



VI. Description of LCD Symbols

S/N	Symbol	Description
1	Δ	Prompt of relative value measurement/reset status
2	AC DC	Prompts of alternating current and direct current
3	—	Negative readings
4	\rightarrow	Prompt of diode measurement
5	••)	Prompt of circuit on-off measurement
6	H	Prompt of data-hold
7	Ω k Ω M Ω	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 μ F 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 MIN	Prompt of maximum and minimum measurement
15		Prompt of under-voltage of built-in battery
16		Prompt of auto OFF
17	Δ	Prompt of high voltage input (danger)
18	OL	Prompt of over-range and instrument overflow
19	%	Prompt of duty ratio measurement

VII. Functions of Keys

1. SELECT

Click once to select the tap positions.

2. HOLD

Click once to enter reading-hold measuring mode; click once again to exit.

Hold the key to open backlight. For UT213A/B/C, hold again within 15s to close backlight or wait for 15s for automatic closing.

3. MAX/MIN (Only for UT213B/C)

Click once to enter maximum measuring mode (LCD displays "MAX" symbol), and click once again to enter minimum measuring mode (LCD displays "MIN" symbol), which is operated as a cycle. Hold the key to exit. It is only valid to measure AC voltage /current, resistance and temperature.

4. Hz% (Only for UT213A)

Click at voltage gear position for voltage-frequency switching; Click at frequency gear position for frequency-duty ratio switching.

5. REL

Click once to enter relative value measuring mode, with measured value-basic value displayed (applicable to measurement of AC/DC voltage, AC current, resistance and temperature, excluding DC current). Click again to exit. Under DC current measuring mode, hold once to enter resetting mode, and LCD will display "Δ" symbol; hold it again to exit.

6. FLIGHT

UT213A: click to turn the flashlight on or off.

UT213B/C: hold to turn the flashlight on and click again to turn it off.

VIII. Technical Indexes

1. General Specification

1. General Specification

Liquid crystal display: Maximum display up to 4000;
Polarity display: Automatic positive and negative polarity display;

Over-load display: Display in "OL" or "-OL";

Battery voltage display: When the battery voltage is lower than the working voltage, "⚡" symbol will be displayed and new battery will be required;

Sampling rate: Approximately 3 times/second;

Sensor type: Coil induction (UT213A/B) or Hall effect sensor (UT213C);

Measured position error: When measuring the current, $\pm 1.0\%$ additional error may occur if it fails to put the source to be measured into the central position of the probe;

Impact-resistant strength: 1m height impact can be borne;

Maximum opening dimension of clamp head: Diameter of 30mm;

Predicted maximum dimension of the current wire: Diameter of 30mm;

Electromagnetic field effect: When the electromagnetic field interference exists, it probably displays unstable or incorrect readings;

Power requirements: Three AAA 1.5V batteries;

Auto OFF function: UT213A: 30min for automatic switch off;

UT213B/C: 15min for automatic switch off;

This function can be closed as necessary.

Dimension: 228mm×77mm×41mm;

Weight: Approximately 265g (battery included);

2. Environmental Limitation

Working environment: Indoor use;

Maximum altitude: 2,000m;

Safety regulations: IEC/EN 61010-1;

IEC/EN 61010-2-032;

IEC/EN 61010-2-033

CAT III 600V; Pollution grade:2;

Operating temperature and humidity: 0°C-30°C (not larger than 80%RH), 30°C-40°C (not larger than 75%RH), 40°C-50°C (not larger than 45% RH);

Storage temperature and humidity : -20°C-+60°C (not larger than 80%RH);

3. Electrical Specification

Accuracy: \pm (% reading + word count), calibration period is a year

Ambient temperature: 23°C \pm 5°C;

Ambient humidity: \leq 75%RH;

Temperature coefficient: 0.1 \times (accuracy)/°C;

1. AC current (\tilde{A})

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
4.000A (only for UT213A/B)	0.001A	$\pm(2.5\%+30)$	400A
40.00A	0.01A	$\pm(2.5\%+5)$	
400.0A	0.1A	$\pm(1.8\%+9)$ (UT213A/B) $\pm(2.5\%+5)$ (UT213C)	

Display: UT213A-average value; UT213B/C-true virtual value; applicable to 10% to 100% of the measurement range.

UT213A/B frequency response: 50Hz-60Hz;

UT213C frequency response: 40Hz-400Hz;

2. DC current (\bar{A}) (Only for UT213C)

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
40.00A	0.01A	$\pm(2.0\%+3)$	400A
400.0A	0.1A		

DCI base number shall be cleared by pressing ZERO key.

3. AC voltage (\tilde{V})

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
4.000V	0.001V	$\pm(1.2\%+5)$	600V DC/AC
40.00V	0.01V		
400.0V	0.1V		
600V	1V	$\pm(1.5\%+5)$	

value; applicable to 10% to 100% of the measurement range.

Voltage input impedance \geq 10M Ω ;

Frequency response: 40Hz-400Hz;

4. DC voltage (\bar{V})

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
400.0mV	0.1mV	$\pm(1.0\%+8)$	600V DC/AC
4.000V	0.001V	$\pm(0.8\%+1)$	
40.00V	0.01V	$\pm(0.8\%+3)$	
400.0V	0.1V		
600V	1V	$\pm(1.0\%+3)$	

Voltage input impedance \geq 10M Ω

5. Resistance (Ω)

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
400.0 Ω	0.1 Ω	$\pm(1.2\%+2)$	600V DC/AC
4.000k Ω	0.001k Ω	$\pm(1.0\%+2)$	
40.00k Ω	0.01k Ω		
400.0k Ω	0.1k Ω		
4.000M Ω	0.001M Ω	$\pm(1.2\%+3)$	
40.00M Ω	0.01M Ω	$\pm(2\%+5)$	

6. Conductivity test (\cdot)

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
400.0 Ω	0.1 Ω	UT213A (ON) $\leq 30\Omega$, the buzzer will ring /(OFF) $\geq 70\Omega$, the buzzer will not ring Open-circuit voltage is about 1.2 V	600V DC/AC

7. Diode test (\blacktriangleright)

Measurement Range:	4.000V
Resolution Ratio:	0.001V
Overload Protection:	600V DC/AC
Accuracy:	For UT213A, open-circuit voltage is about 1.5V, and measurable PN junction \leq forward voltage drop value of 1.5V. For UT213B/C, open-circuit voltage is about 3.3V, and measurable PN junction \leq forward voltage drop value of 3V. Normal voltage value of silicon PN junction is about 0.5-0.8V.

8. Capacitance (--)

UT213A

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
50.00nF	0.01nF	$\pm(4.0\%+25)$	600Vrms
500.0nF	0.1nF	$\pm(4.0\%+5)$	
5.000 μ F	0.001 μ F		
50.00 μ F	0.01 μ F		
100.0 μ F	0.1 μ F		

UT213B/C

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
40.00nF	0.01nF	$\pm(4.0\%+25)$	600V DC/AC
400.0nF	0.1nF	$\pm(4.0\%+5)$	
4.000uF	0.001uF		
40.00uF	0.01uF		
400.0uF	0.1uF		
4.000mF	0.001mF	$\pm(10\%)$	
40.00mF	0.01mF	For reference only	

9. Temperature(°C) Only for UT213B/C

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
-40°C~40°C	1°C	$\pm(3.0\%+5)$	600V DC/AC
40°C~400°C			
400°C~1000°C		$\pm(1.0\%+3)$	
-40°F~104°F	1°F	$\pm(3.0\%+10)$	
104°F~752°F			
752°F~1832°F		$\pm(1.0\%+6)$	

10. Frequency Hz

Measurement Range	Resolution Ratio	Accuracy	Overload Protection
10Hz ~ 1 MHz	0.01Hz ~ 1K Hz	$\pm(0.1\%+4)$	600V DC/AC

UT213A: 10Hz-1MHz

200mVrms≤input amplitude≤20Vrms

UT213B/C:

≤100KHz: 100mVrms≤input amplitude≤20Vrms

>100KHz-1MHz: 200mVrms≤input amplitude
≤20Vrms

11. NCV

Measurement range	Accuracy
NCV	≥100Vrms, < 10mm audio and visual alarm

IX. Measuring Operation Instructions

1. Measuring of AC Current (See Figure 2)

- 1) Switch to the AC current gear position, press the trigger to open the clamp head, use the clamp head to pick up the conductor to be tested, and release the trigger slowly until the clamp head is fully closed. Please ensure that the conductor to be tested shall be placed at the center of clamp head, or error may occur; only one current conductor can be measured during one test with clamp meter, or false readings may be displayed.
- 2) Read the AC current value directly from the display.

⚠ Caution:

- The current measurement shall be operated within the range of 0°C–40°C; the trigger shall not be released suddenly, for impact may lead to change of readings within a short time since Hall element (UT213C) is sensitive not only to magnetism, but also to heat and mechanical stress to a certain extent.
- In order to ensure accurate measuring data, the conductor to be tested must be placed at the center of clamp head, or additional error of $\pm 1.0\%$ may occur.

- AC conversion is a true virtual value response mode through AC coupling, which is corrected through sine wave input. Therefore, the accuracy of non-sine wave must be adjusted in accordance with the following:
 If wave crest factor is 1.4-2.0, the accuracy is +1.0%;
 If wave crest factor is 2.0-2.5, the accuracy is +2.5%;
 If wave crest factor is 2.5-3.0, the accuracy is +4.0%.

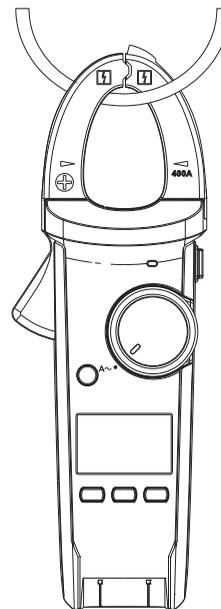


Figure 2