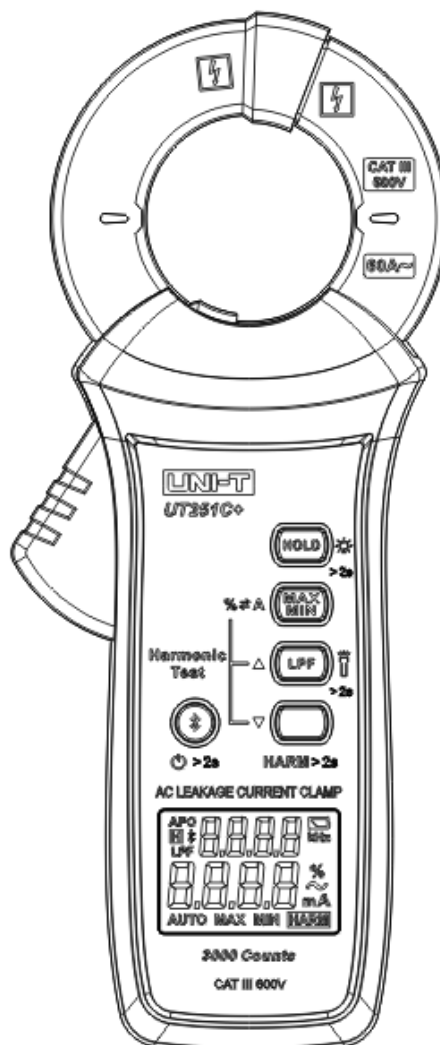


UT251C+

User Manual



Preface

Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read the User Manual thoroughly, especially the “Safety Information” section.

It is recommended to keep this manual at an easily accessible place, preferably close to the device, for future reference.

Limited warranty and liability

This Uni-Trend product will be free from defects in material and workmanship for one year from the date of purchase. This warranty does not cover fuses, disposable batteries, or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on behalf of Uni-Trend. To obtain service during the warranty period, contact your nearest Uni-Trend authorized service center to obtain return authorization information, then send the product to that Service Center with a description of the problem.

This warranty is your only remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Uni-Trend is not liable for any special, indirect, incidental or consequential damages or losses, arising from any cause or theory. Since some states or countries do not allow the limitation of an implied warranty and of incidental or consequential damages, this limitation of liability may not apply to you.

1. Overview

UT251C+ 3000-Count AC Leakage Current Clamp is designed for measuring leakage current. It has features such as high reliability, high safety, full-scale overload protection, and unique appearance. As a practical measurement meter for electricians, UT251C+ can be used to measure uA-level AC leakage current, current below 60A, frequency, and harmonics. This Current Clamp is designed with multiple functions including data hold, low pass filter, Bluetooth communication, undervoltage indication, backlight, auto-off, and more.

UT251C+ has the ability to test or track the leakage current of grounding wire/system, and detect the current of distribution cabinet, the small- and medium current of industrial control system, as well as the current amplitude, frequency and harmonic of small/medium-power equipment or circuit, thereby providing bases for power quality analysis.

2. Features

- 1) Measuring uA-level current, with resolution reaching 1uA.
- 2) Measuring frequency of uA-level current, with resolution reaching 0.01Hz.
- 3) Measuring harmonics of mA-level current
- 4) Continuous fully-automatic ranging (0~60A); 40Hz~1.2kHz frequency response.
- 5) Large jaw opening (40mm)
- 6) Compact design to allow for one-handed operation.
- 7) Measuring leakage current without disconnecting circuits.
- 8) Steep low pass filter (LPF) to accurately measure fundamental current (<60Hz) with high frequency component or high distortion.
- 9) Maximum/minimum value for recording signal fluctuation.
- 10) White backlight and flashlight to enable the user to perform measurement and read data even in dark environments.
- 11) Bluetooth communication function. Recording testing data and generating testing results, image and graph through the use of the APP "UNI-T Smart Measure".
- 12) Measurement category: CAT III 600V

Please carefully read the contents regarding "Safety Information" and "Warning" and strictly follow all precautions.

 Warning:

Please carefully read the section "Safety Information" before use.

3. Accessories


Please contact your local distributor if any accessory below is missing or damaged.

1. User Manual-----1 pc
2. 1.5V AAA battery-----3 pcs
3. Carrying bag-----1 pc











4. Safety Information

Please pay attention to “Warning” in the User Manual. “Warning” represents conditions or procedures that can pose hazards to the user and cause damage to the Meter or equipment under test.

The Meter is designed in accordance with IEC/EN61010-1, 61010-2-032, and Electromagnetic compatibility of EN61326-1, and conforms to Double Insulation, Overvoltage CAT III 600V, Pollution Degree 2, and Indoor Use. If the Meter is not used according to the operating instructions, the protection supplied by the Meter can be compromised or lost.

1. Read the operating instructions and the “Warning” before use.
2. Please check the Meter before use to avoid any damage or anomaly. Stop use in case of damaged casing, abnormal display and other problems.
3. Do not use the Meter in circuit with voltage over 600V (CAT III).
4. It is forbidden to use without the battery cover closed well, otherwise it may present a risk of electric shock.
5. Use caution when measuring 60V DC, 30V AC or peak voltage over 42.4V. Hold the Meter behind the protective barrier to avoid electric shock.
6. Please wear protective gear when operating in environments with hazardous live conductors exposed, to prevent electric shock or arc discharge.
7. Do not touch any exposed wire, connector or circuit under test.
8. Do not measure current over the specified value.
9. Do not use the Meter in circuit with voltage exceeding the rated value.
10. Do not keep or use the Meter in environments with high temperature, high humidity, inflammable or explosive substances, or strong electromagnetic field.
11. Do not use in case that the Meter is wet or the user’s hands are wet,
12. Do not alter the internal wiring to avoid damaging the Meter or posing a hazardous risk
13. If the low battery symbol “” appears on the LCD, please replace the batteries in time to ensure measurement accuracy.
14. Switch off the power supply after completing measurement. Remove the batteries if the Meter is not used for a prolonged period of time.
15. Please measure an identified intrinsic current before use to ensure the Meter functions well.
16. Remove the Meter from the measured conductor before opening the battery cover.
17. Failure to follow the User Manual may void the protection provided.
18. Clean the case with wet cloth and neutral detergent. Do not use any abrasive or solvent.

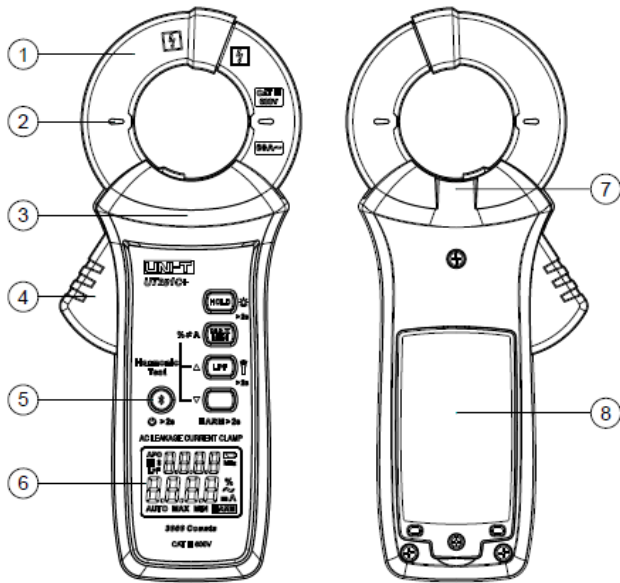
5. Electrical Symbols

	Low battery		Application around and removal from UNINSULATED HAZARDOUS LIVE conductors is permitted.
	AC(Alternating Current)		Warning
	Double Insulated		Adopting Bluetooth communication technology
CAT III	MEASUREMENT CATEGORY III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.		
	Do not place equipment and its accessories in trash. Items must be properly disposed of in accordance with local regulations.		
	Conforms to European Union directives		
	Conforms to UL STD 61010-1, 61010-2-032, Certified to CSA STD C22.2 NO. 61010-1, 61010-2-032,		
	Do not to exceed 100A/m of external low frequency magnetic fields in accordance with IEC 61000-4-8 at 50 Hz and 60 Hz.		

6. General Characteristics

1. Overload protection: 60A
2. Display count: 3000
3. Auto ranging
4. Overrange indication: “OL”
5. Error caused by the testing position: An error of $\pm 1.0\%$ of the reading will be produced if the measured object is not centered at the clamp jaws.
6. Undervoltage indication: $\leq (3.7 \pm 0.2V)$ approx.
7. Power supply: AAA 1.5V battery $\times 3$
8. Operating temperature: $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$ ($32^{\circ}\text{F} \sim 104^{\circ}\text{F}$)
9. Storage temperature: $-10^{\circ}\text{C} \sim 60^{\circ}\text{C}$ ($14^{\circ}\text{F} \sim 140^{\circ}\text{F}$)
10. Relative humidity: $\leq 75\%$ ($0^{\circ}\text{C} \sim 30^{\circ}\text{C}$ below); $\leq 50\%$ ($30^{\circ}\text{C} \sim 40^{\circ}\text{C}$)
11. Operating altitude: $\leq 2000\text{m}$
12. Electromagnetic compatibility: As per EN61326-1 and EN61326-2-2
13. External dimensions: $200.1\text{mm} \times 70.5\text{mm} \times 40\text{mm}$
14. Weight: 350g approx.
15. Jaw opening: 40mm
16. Safety standard: IEC 61010-1, 61010-2-032: CAT III 600V
17. Pollution Degree 2
18. Indoor use

7.External Structure (Figure 1)




- 1. Clamp jaws
- 2. Geometric center mark
- 3. Protective barrier
- 4. Trigger: Press to open the clamp jaws
- 5. Functional buttons
- 6. LCD display
- 7. Flashlight
- 8. Battery cover

8.LCD Display



Symbol	Description
APO	Auto power off
H	Data hold
B	Bluetooth

LPF	Low pass filter
AUTO	Auto ranging
MAX MIN	Maximum/Minimum value
HARM	Harmonics measurement
mA、A	Unit of current: Milliampere, ampere
~	Alternating current
%	Unit of harmonic: Percentage
Hz、kHz	Unit of frequency: Hertz, kilohertz
	Under voltage

9. Functional Buttons

Description:



All button functions are defined on the condition that the Meter is in power-on state. All buttons (except the power button) are disabled in power-off state.

The main display shows “Err” one second if a button is disabled in the current function.


Short press: Press for $\leq 1s$


Long press: Press for $\geq 2s$

1.   $>2s$;

- 1) Long press: Power on/off the Meter.
- 2) Short press: Turn on/off the Bluetooth function when the Meter is in power-on state. After the Bluetooth function is opened, the symbol “” flashes at a frequency of 1 Hz to indicate that the Meter can be connected to the APP. With the Meter connected successfully via Bluetooth, the symbol “” stops flashing and it appears on the LCD. The auto-off function is disabled (except when the Bluetooth symbol flashes) in Bluetooth-connected state and enabled in Bluetooth-disconnected state.

2.  $>2s$;

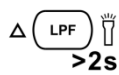
- 1) Short press: Enter or exit the data hold function. With Bluetooth connected, the single recording function of the APP will be triggered while HOLD is triggered. The symbol “” appears on the LCD in HOLD function.
- 2) Long press: Turn on/off the flashlight.
- 3) To disable the auto-off function, please power on the Meter while holding down the HOLD button. The symbol “APO” is not shown on the LCD when the auto-off function is disabled.

3.  :

- 1) Short press: Enter the MAX/MIN function, then enter the statistic mode to refresh data continuously, with maximum value displayed by default. Then, short press again to cycle through maximum value \rightarrow minimum

value→maximum value...; Long press to exit the statistics mode and return the standard mode.

- 2) Short press the HOLD button in statistics mode to stop refreshing data, then short press the MAX/MIN button to read back the MAX/MIN value. Short press the HOLD button again to exit the HOLD function and continue refreshing data.
- 3) In the MAX/MIN function, the Meter exits the auto-ranging mode and enters the current range, and the auto-off function is disabled. When the Meter exits the MAX/MIN function, it enters the auto-ranging mode and the auto-off function is enabled (If the auto-off function is disabled manually, then it will be kept in disabled state).
- 4) MAX/MIN button is disabled in HOLD function.
- 5) MAX/MIN button is disabled in HARM function.
- 6) When entering the MAX/MIN mode in LPF function, the Meter will calculate the MAX/MIN value in LPF function. To exit the LPF function and the MAX/MIN mode, please short press the LPF button.
- 7) For harmonics with different orders in HARM function, i.e., H-01 / H-02......, short press to switch between amplitude and harmonic ratio.



4. >2s :

- 1) Short press in the standard measurement mode: Enter or exit the LPF function. The symbol "LPF" appears on the LCD in the LPF function.
- 2) In HOLD function, the LPF function is disabled.
- 3) In MAX/MIN function, the LPF function is disabled.
- 4) In HARM function, the LPF function is disabled.
- 5) In HARM function, short press to scroll through: THDF → THDR → H-01 → H-02 ... → H-20 → THDF → THDR → ...
- 6) Long press: Turn on/off the flashlight (flashlight is off by default and the user needs to turn it off manually).




5. HARM >2s :

- 1) Long press: Enter or exit the harmonic measurement function.
- 2) In the HOLD, MAX/MIN and LPF functions, long press HARM to exit the HOLD, MAX/MIN and LPF functions and enter the HARM function.
- 3) In HARM function, short press to scroll through: THDF → H-20 → H-19 → ... H-01 → THDF → THDR → ...

Note: H-20 denotes the 20th order, etc.

10. Operating Instructions

Please check the embedded batteries (AAA 1.5V \times 3) before use. If low battery occurs, the symbol “” will appear on the LCD, then please replace the batteries in time.

1. AC Current and Frequency Measurement (Figure 2)

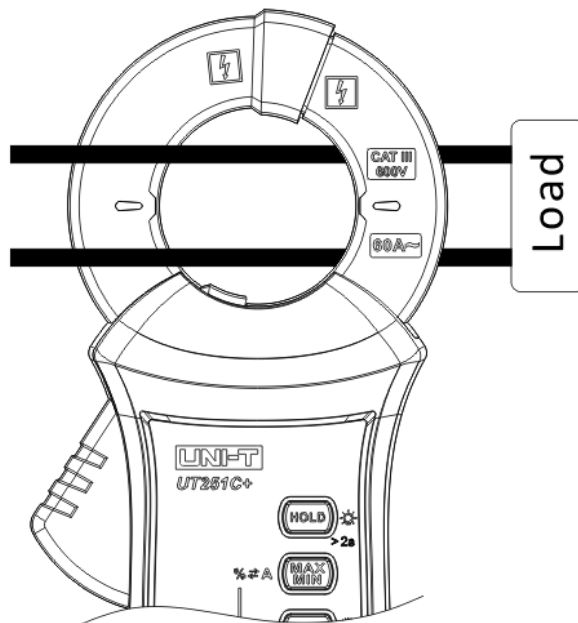


Figure 2-1 Measuring AC leakage current for single-phase two-wire loop wires

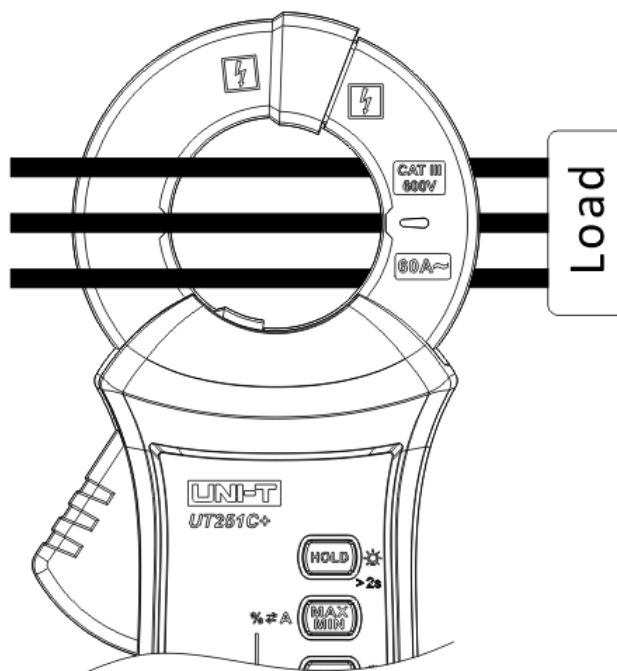


Figure 2-2 Measuring AC leakage current for single-phase three-wire or three-phase three-wire loop wires

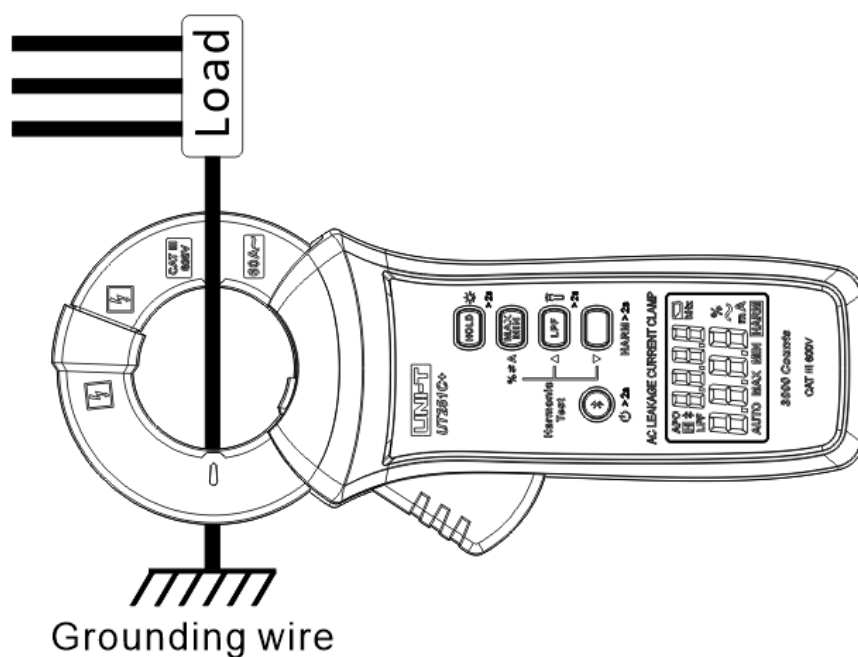


Figure 2-3 Measuring AC leakage current for single grounding wire

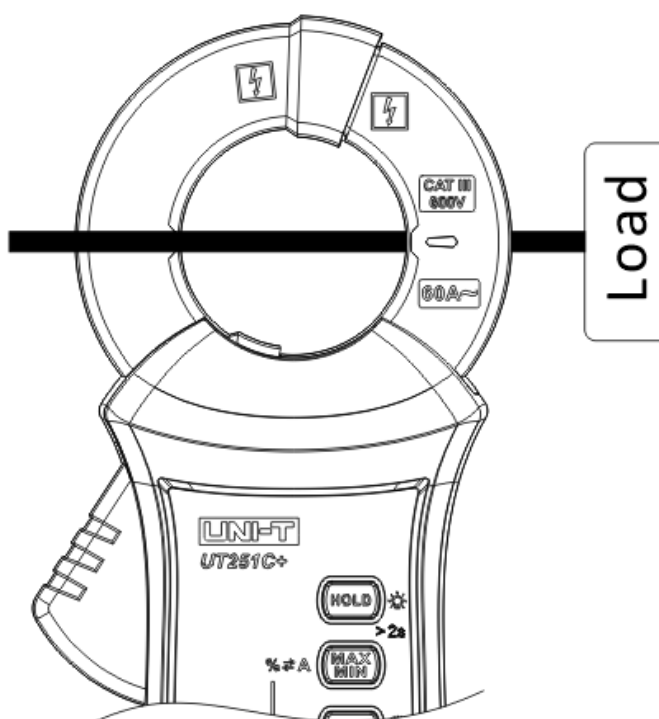


Figure 2-4 Measuring AC leakage current for one of the loop wires

- 1) Long press the power button to turn on the Meter.
- 2) Open the clamp jaws, clamp the cable, and set the cable at the geometric center of the clamp jaws. Make sure the clamp jaws are closed in place.
- 3) When the readings are stabilized, read from the LCD the measured current and the frequency of measured current.
- 4) Measure AC leakage current for single-phase two-wire loop wires, single-phase three-wire or three-

phase three-wire loop wires, and single grounding wire. As shown in Figure 2-1 Figure 2-2, and Figure 2-3.

- 5) Clamp one of the loop wires and measure its AC current, as shown in Figure 2-4.

Warning:


- *.Please perform current measurement on the condition that the ambient temperature is 0°C~40°C. The Meter is sensitive to mechanical stress to some extent. Do not release the trigger abruptly to avoid inaccurate reading caused by impact.
- *.The clamp jaws are precision sensor. Do not open or close the clamp jaws abruptly to avoid impact or vibration.
- *.To ensure an accurate measurement result, please set the measured conductor at the center of the clamp jaws.
- *.Keep the Meter away from other live conductors when performing current measurement, and make sure the measured conductor centered at the clamp jaws is in vertical state.
- *. If the measured current is >AC 60A, please stop test to avoid damage to the Meter or use a meter with higher range for test.
- *.Hold the Meter behind the protective barrier to avoid electric shock or personal injury.

2. Harmonics Measurement (Figure 2-4)


- 1) Long press the HARM button to enter the harmonic measurement function.
- 2) Other operating instructions and precautions about harmonic measurement are same as that of current measurement.
- 3) Read the measured harmonic component from the LCD.
- 4) In harmonic measurement mode, the harmonic ratio or amplitude can be viewed by pressing button. See “Functional Buttons” for details.

11、Other Functions

- 1) Auto-off

The Meter will power off automatically in 15 minutes of inactivity. To restart the Meter, please long press the “” button. When the Meter is powered on, the auto-off function is enabled by default and the symbol “APO” appears on the LCD. The auto-off function is disabled (except when the Bluetooth symbol flashes) in Bluetooth-connected state and enabled in Blue-tooth disconnected state. Please hold down the “HOLD” button to disable the auto-off function (without the symbol “APO” shown in the disabled state) or restart the Meter to enable it.

- 2) Low voltage detection:

The symbol “” appears on the LCD if the battery voltage is less than about 3.7V.

- 3) Forced shutdown:

If the battery voltage is less than about 3.3V, the Meter will be shut down forcibly; If less than about 2.2V, it may not work normally.

- 4) Dual displays:

For current measurement: The main display shows the measured current, and the sub-display shows the frequency of measured current.

For harmonic (HARM) measurement: The main display shows the harmonic ratio or the amplitude of harmonic component, and the sub-display shows the types of harmonics such as THDF and THDR or harmonic orders such as H-01..., H-02..., etc.

12、Specification

Accuracy: $\pm(a\% \text{ of reading} + b \text{ digits})$, one-year guarantee, recommended calibration period: 1 year / time

Operating temperature: $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($73.4^{\circ}\text{F} \pm 9^{\circ}\text{F}$) ; Relative humidity: $\leq 75\text{RH}$

 Warning :

- The temperature condition to ensure accuracy is 18°C to 28°C . The fluctuation range of ambient temperature keeps within $\pm 1^{\circ}\text{C}$. If the temperature is $< 18^{\circ}\text{C}$ or $> 28^{\circ}\text{C}$, then the additional error of temperature coefficient is $"0.1 \times (\text{Specified accuracy})/^{\circ}\text{C}"$.

1. AC Current Measurement

Range	Resolution	Accuracy	
		40Hz~60Hz	60Hz~1.2kHz
3.000mA	0.001mA	$\pm (2\%+5)$	$\pm (3\%+9)$
30.00mA	0.01mA	$\pm (1\%+5)$	$\pm (2\%+9)$
300.0mA	0.1mA		
3.000A	0.001 A		
30.00A	0.01 A		
60.0A	0.1 A		

*.Overload protection: 60A rms

*.Displaying the RMS value of sinusoidal wave

*.Frequency response: 40Hz~1.2kHz

*.Range to ensure accuracy: 5~100% of range

*.In LPF function: The accuracy is 3mA: $\pm (3\%+9)$, 30mA\300mA\3A\30A\60A: $\pm (3\%+9)$ at 40Hz~60Hz. The accuracy is not specified at 60.01Hz~110Hz. The attenuation is $\geq -3\text{db}$ if the frequency is $\geq 110\text{Hz}$.

*.Zero correction: The decimal less than about 0.01 mA will be corrected to zero.

*.When the Meter is not in auto-ranging mode (that is, in MAX/MIN function), the symbol "OL" appears on the LCD if the measured value exceeds 3300 digits (the maximum range exceeds 61.0A). When the Meter is in auto-ranging mode, the symbol "OL" will appears on the LCD if the measured value is over 61.0A.

2. Frequency Measurement

Range	Resolution	Accuracy
99.99Hz	0.01 Hz	$\pm (0.1\%+5)$
999.9Hz	0.1 Hz	
5.000KHz	0.001KHz	

*.Overload protection: 60A rms

*.When measuring current, the frequency of current is shown simultaneously.

*.Auto-ranging

*.Range to ensure accuracy: 40Hz to 5kHz; 600uA \leq Measured input amplitude \leq 60A

3. Harmonics Measurement

Harmonic order	Resolution	Accuracy
1~6	0.1%	$\pm (3.5\%+10)$
7~8		$\pm (4.5\%+10)$
9~10		$\pm (5\%+10)$
11~15		$\pm (7\%+10)$
16~20		$\pm (10\%+10)$


*.Overload protection: 60A rms

*.Minimum current to ensure accuracy: Measured fundamental wave: $\geq 1\text{mA}$; Fundamental wave: 40Hz~60Hz; Harmonic bandwidth: $\leq 1.2\text{kHz}$

*.Harmonic order to ensure accuracy: $\leq 20^{\text{th}}$ order (for fundamental wave of 40Hz~60Hz)

*.Display THDF, THDR, and harmonic components of different orders by pressing button. THDF: Total harmonic distortion to fundamental; THDR: Total harmonic distortion to total RMS values.

*.Applicable for AC signals crossing through the point of zero twice or less in one cycle.

*.To read the amplitude of corresponding harmonic, please press the " $\% \rightarrow A$  " button under harmonic measurement mode. The accuracy of amplitude is $\pm (2\%+9)$.

4. Operating Uncertainties of EN 61557-13

	IEC 61557-13
Intrinsic Uncertainty A	2.0 %
Percentage operating uncertainty B[%]	2.0 %
E1.2 Clamp jaw position	0.0 %
E2 Supply voltage	0.0 %
E3 Temperature	0.0 %
E9 Distorted waveform	1.0%
E11 External low frequency magnetic field	1.0%
E12 Load current	0.5%
E13 Touch current caused by common mode voltage	0.0 %
E14 Frequency	1.0%
E15 Repeatability	1.0%

13、Bluetooth Software

1. Introduction

The Bluetooth software is a mobile APP and supports iOS 10.0 or newer and Android 5.0 or newer currently.

2. Download (iDMM2.0)

① For Android

Method 1: Search “UNI-T Smart Measure” on the official website of UNI-Trend.

Method 2: Open the browser of mobile phone and scan the QR code below. Do not scan by WeChat.

Method 3: Search “UNI-T Smart Measure” from Google Play, Tencent APP store, Huawei APP store, MI AAP store, VIVO APP store, and OPPO APP store. Method 1 and 2 are recommended for latest version.

② For IOS

Method 1: Search "UNI-T Smart Measure" at "App Store".

Method 2: Turn on the scanning function of mobile phone, then scan the QR code below.



Android



iOS

3. Use

3.1 Open the Bluetooth functions of both the Meter and your mobile phone, tap the “UNI-T Smart Measure” APP icon on your phone desktop to open the software, then the software enters the navigation interface and searches nearby Bluetooth-enabled meters automatically. After that, select the corresponding meter and make connection. Alternatively, scan the QR code at the Meter to make direct connection. In connected state, data communication, measurement result display, button control and other operations can be achieved.

3.2 The “UNI-T Smart Measure” APP has multiple functions including Bluetooth communication, data recording, device management, report generation, data sharing, data synchronizing, and more. For the operating instructions about these functions, please refer to the “UNI-T Smart Measure” User Manual (Tap the “Menu” button, “Setting” button, and then “Help Guide” button to obtain the User Manual).

4. Uninstallation

Uninstall the software through the uninstallation function of mobile phone.

14、Maintenance

⚠ Warning: Please power off the Meter before opening the rear cover or battery cover.

1. General maintenance

- Please clean the case with wet cloth and neutral detergent regularly. Do not use abrasives or solvents
- If any problem with the Meter is found, please stop use and send it for servicing.
- The calibration and maintenance must be performed by qualified maintenance personnel or designated service center

2. Install or replace batteries (Figure 3)

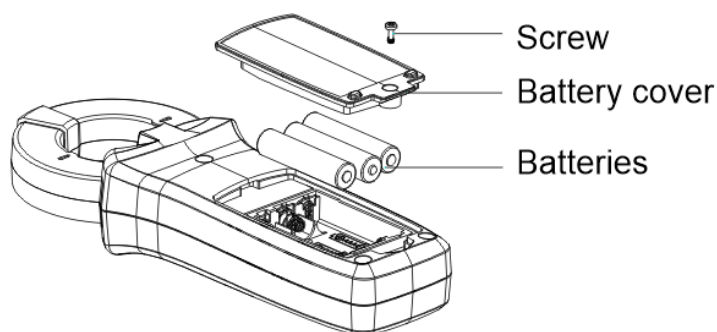
Battery specification: 1.5V AAA battery × 3

New batteries within 30 days, discharge method: 1 hour per day, estimated usage time: 20 hours

If the low battery symbol appears on the LCD, please replace the batteries immediately, otherwise it may cause an accuracy error.

Please install or replace batteries as follows:

- a. Power off the Meter.
- b. With the front side facing down, loosen the screw, remove the battery cover, take out the batteries, and install new batteries (Do not reverse the battery polarity).
- c. Install the battery cover and tighten the screw.



The contents in the User Manual is subject to change without further notice

UNI-T®

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