

2117R 1000A Clamp Meter User Manual

Overview

2117R is a handheld true-RMS clamp meter designed in accordance with EN61010-1:2010+A1:2019, EN61010-2-032:2012, EN61010-2-033:2012 and CAT II 1000V/CAT III 600V. The meter features overload protection and has basic electric measurement functions. With its high reliability, high safety and high accuracy, 2117R becomes an ideal measurement tool in electronic and electrical field.

Features

- 1) Compact, lightweight, allowing one hand operation, easy to operate in aerial work.
- 2) With misoperation protection function, withstanding the maximum impact of 1000V (30KVA).
- 3) Configured with auto range at 60A, 600A and 1000A, with frequency response reaching to 45Hz~1kHz.
- 4) Capacitance measurement range: 60nF~6mF. With fast ADC (3 times/s), making the response time less than 3 seconds at $\leq 1\text{mF}$ and approximately 6 seconds at $\leq 6\text{mF}$.
- 5) Overvoltage an overcurrent alarm.
- 6) Power consumption is less than 20uA in sleep mode, the power saving function extends battery life to 200 hours.

Please carefully read the information regarding "Safety" and "Warning" in this manual and strictly follow all precautions.

Warning

Please carefully read "Safety Information" prior to using the clamp meter.

Unpacking Inspection

Unpack and take out the meter, please check carefully if the following items are complete or intact.

1. User manual ----- 1pcs
2. Test leads ----- 1 pair
3. Carrying bag ----- 1pcs
4. Certificate ----- 1pcs

In case of shortage or damage, please contact with your supplier.

Safety Information

Please note the "warning signs and words". Warning means the condition or action that may cause threat to user or damage to the meter or equipment to be measured.

The meter is designed and produced strictly in accordance with IEC/EN61010-1, 61010-2-032, 61010-2-033, EN61326-1, 61326-2-2, CAT II 1000V, CAT III 600V, Double Insulation and Pollution Degree 2 standards. Use the meter as specified in the manual, otherwise the protection provided by the meter may be impaired.

1. Check the clamp meter and test leads before use, guard against any damage or abnormal phenomenon. If any abnormal condition were found: bare test lead, damaged insulation, no display in LCD, or the clamp meter is thought not to be able to work normally, please do not use it.
2. It is forbidden to use the clamp meter prior to having rear cap and battery cover in place, or otherwise there will be electric shock.
3. Keep finger within the scope of finger protection position of test lead, and do not contact the bare wire and connector, unused input terminal or the circuit being measured when clamp meter is in operation.
4. Function switches shall be set at the correct position prior to measurement. It is forbidden to perform gear conversion in measurement to guard against damage to the meter.
5. Refrain from applying between the clamp meter terminals and ground the voltage over DC 1000V to guard against electric shock and clamp meter damage.
6. Be careful in measuring RMS voltage higher than DC 60V or AC 30V, since there will be electric shock.
7. Do not measure the voltage or current higher than the allowable input value. Set the function range switch at the maximum range position if the scope of measured value couldn't be defined. Prior to measurement of on-line resistance and diode or the circuit on-off measurement, the power of circuits being measured shall be powered off and all capacitors shall be completely discharged to assure the measurement accuracy.
8. When LCD display shows the icon "⚡", it is required to replace the battery in time to ensure the measurement accuracy. Take out battery when clamp meter is not in use for a long time.
9. Refrain from changing the internal wiring in the clamp meter to guard against damage to the meter and danger.
10. Refrain from storing or using the clamp meter in the explosive and flammable environment with high temperature, high humidity and strong electromagnetic field.

11. Clean the clamp meter case with soft cloth and neutral detergent. To prevent causing corrosion to the case, or damage to the meter and danger, it is forbidden to use abrasive material and solvent.
12. Before each use verify tester operation by measuring a known voltage that is within the rating of this unit.
13. If use the meter without following up the operating instructions, the protection provided by the meter may be impaired or lost.

Electrical Symbols

Symbol	Description
	Danger! High voltage!
	AC (Alternating current)
	DC (Direct current)
	Double insulated
	Grounding
	Warning prompt
	Comply with EU standard
	Comply with UK standard
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.
CAT III	It is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.

General Specifications

LCD display: Maximum display 6099

Polarity display: Auto positive and negative polarity display

Overload display: "OL" or "-OL"

Low voltage display: "⚡" indicates that battery voltage is lower than working voltage, reminding replacing battery.

Prompt for under-voltage shutdown: "Lo.bI" interface appears for 5 seconds in the LCD, the buzzer beeps for three times, then the meter automatically power off.

Test position error: An additional reading error of $\pm 2\%$ may occur when the power to be measured is not clamped at the center of clamp head.

Impact resistance strength: 1m fall impact

Maximum openness of clamp head: Diameter 33mm

Maximum dimension of current conductor to be measured:

Diameter 33mm

Power: 2 pieces of AAA 1.5V alkaline battery

Auto power off: The meter will automatically power off if range switch is not dialed or no any button is press within approximately 15 minutes. This function could be disabled as needed.

Dimension: 204mm×63mm×38mm

Weight: About 210g (including battery)

Altitude: 2000m

Operating humidity and temperature: 0°C~30°C ($\leq 80\%RH$),

30°C~40°C ($\leq 75\%RH$), 40°C~50°C ($\leq 45\%RH$)

Storage humidity and temperature: -20°C~+60°C ($\leq 80\%RH$)

Recommended use environment: Indoor use

EMC: At radio-frequency field of 1V/m: Overall accuracy = Specified accuracy + 5% of the range. There is no specified indicator for RF-field over 1V/m.

External Structure (Figure 1)

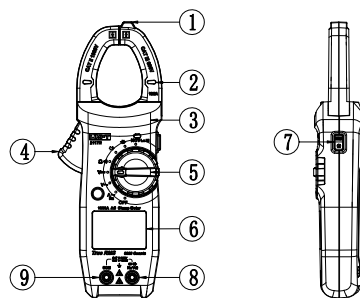


Figure 1

1. NCV sensing point
2. Clamp head: A sensing device used to measure AC current.
3. Clamp body: Safety design to protect operator from touching the dangerous area.
4. Trigger: Press the trigger to open the clamp head, release to close.
5. Rotary switch: Select function gear.
6. LCD display area: Display measurement data and function symbols.
7. Function button: Used to switch measurement functions, turn on/off backlight, and perform data hold.
8. Signal input terminal: Connect red test lead.
9. COM terminal: Connect black test lead.

Button Function

1. SELECT

Used to switch corresponding function ranges.

2. HOLD/BACKLIGHT

- a). Short press to enter data hold mode, press again to exit the mode.
- b). Long press for about 2 seconds to turn on/off the backlight, if the backlight is constantly on, it will automatically turn off after about 1 minute.
- c). Press and hold HOLD button to power on, then the auto power off function will be disabled.

Instructions for Measurement Operation

1. AC current/frequency measurement (Figure 2)

- 1) Select AC current function gear, press SELECT to switch between AC current and frequency, the meter will automatically switch corresponding range (60.00A/600.0A/1000A) according to the input amplitude during current measurement.
- 2) Open the clamp head and clamp the current lead, ensure that the clamp head is completely closed.
- 3) The meter can only measure one current lead at a time, if two or more current leads are measured at a time, the measurement method and result will be wrong.

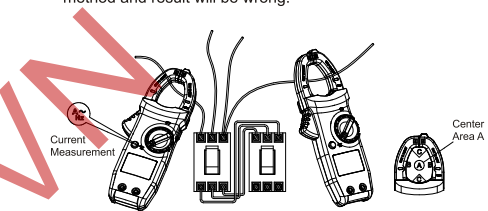


Figure 2

Warning

- When uninsulated conductor is measured, pay attention not to cause short circuit between clamp head and measured object.
- As the meter is sensitive to mechanical stress to different extent, do not release the trigger suddenly, otherwise the reading will be affected in a short time.
- To ensure accurate measurement data, the conductor to be measured must be at the center position of clamp head (A area), if it is deviated (B or C area), an additional reading error of $\pm 2\%$ need to be added to the specified accuracy.
- The buzzer will make sound as out-range alarm when measuring current over 1000A.

2. AC/DC voltage and frequency measurement (Figure 3)

- 1) Connect red test lead to signal input terminal, and connect black test lead to "COM" terminal.
- 2) Set the rotary switch to DC/AC voltage measurement gear, press SELECT to switch between AC voltage and frequency, and connect the test lead in parallel with power source or load to be measured.

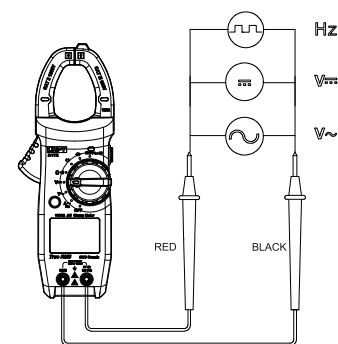


Figure 3

Warning

- AC voltage measurement range should not exceed AC1000V. Higher voltage may be measured, but it may damage the meter.
- Special attention shall be paid to avoid electric shock when measuring high voltage.
- When the measured voltage is higher than 30V/AC, the LCD will show "⚡".

3. Continuity, resistance, diode and capacitance measurement (Figure 4)

- 1) Connect red test lead to signal input terminal, and connect black test lead to "COM" terminal
- 2) Set the rotary switch to continuity/resistance, diode or capacitance gear, press SELECT to switch between continuity and resistance, and connect in parallel with both ends of resistor to be measured.

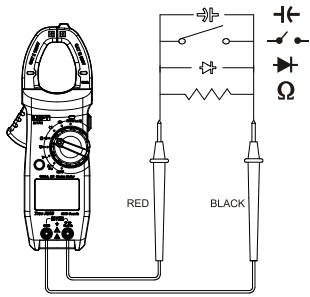


Figure 4

Warning

- If the measured resistance is open-circuit or the resistance value exceeds the maximum range, the LCD will show "OL".
- When measuring on-line resistance, the circuit power must be powered off and all capacitors must be discharged completely before measurement.
- If the resistance value of test lead at short circuit is $\geq 0.5\Omega$, please check if the connection of test lead is loose or identify other reasons.
- When measuring continuity, if the resistance between two measured ends is $< 30\Omega$, the circuit is conductive and the buzzer beeps consecutively. If the resistance is $30\Omega \sim 50\Omega$, the buzzer sounds or remains silent; if the resistance is $> 51\Omega$, the buzzer remain silent.
- When measuring diode, "▶" polarity shall be distinguished, read from the LCD display the approximate forward voltage of PN junction of measured diode. The normal voltage of silicone PN junction is 500~800mV generally.
- Before measuring capacitance "C", short-circuit the capacitance electrode for capacitance over μF and discharge all capacitors completely, especially for capacitance with high voltage.
- Do not input voltage over DC/AC 30V.

4. NCV sensing (Figure 5)

- There are two sensitivity modes, press SELECT to select 100V or 220V measurement mode according to local power frequency voltage, bring the NCV sensing end to power frequency electric field, when the intensity of measured electric field reaches to certain extent, LCD shows "L" and the buzzer beeps. The faster the buzzer beeps, the stronger the electric field.
- EFLo sensing condition (100 V), EFLo will be displayed when no electric field is sensed, "L" will be displayed when electric field is sensed, the faster the buzzer beeps, the stronger the electric field.
- EFHi sensing condition (220V), EFHi will be displayed when no electric field is sensed, "H" will be displayed when electric field is sensed, the faster the buzzer beeps, the stronger the electric field.

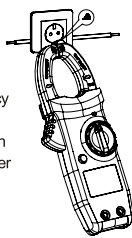


Figure 5

Warning

- The NCV sensing end shall be close to the measured electric field to ensure measurement sensitivity.
- When the voltage of measured electric field is higher than 100V AC, please check if the conductor of measured electric field is insulated.

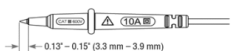
5. Other functions

- Auto power off: If the rotary switch is not dialed within 15 minutes during measurement, the meter will automatically power off to save power. In auto power off state, press any button to awake the meter or restart the meter after setting the rotary switch to OFF position.
- To disable auto power off function, please hold down HOLD button and turn on the meter in power off state. To enable the auto power off function, please turn off and restart the meter.
- Buzzer: The buzzer will make a beep sound for about 0.25 seconds when the meter is powered on or any active button is pressed. When measuring voltage or current, the buzzer will make intermittent beep sound as out-range alarm.
- Low voltage detection: VDD is detected when the power is on, LCD shows "Lo" if the voltage is lower than about 2.5V.
- Under-voltage shutdown function: when the battery voltage is less than about 2.4V, "Lo" will be displayed and "Lo.bt" interface will appear in LCD display for a few seconds, then the meter will automatically power off after the buzzer consecutively beeps for three times.

6. Probe usage

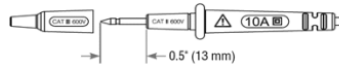
TESTING IN CAT III MEASUREMENT LOCATIONS

Ensure the test lead shield pressed firmly in place. Failure to use the CAT III shield increases 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 standard wall outlets. Take care not to lose the shields.



Technical Specifications

Accuracy: $\pm(\%$ reading+ digit number), one-year warranty
 Ambient temperature and humidity: $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$; $\leq 75\%$ RH
 Temperature coefficient: temperature condition to ensure accuracy is $18^{\circ}\text{C}\sim 28^{\circ}\text{C}$, temperature fluctuation range is within $\pm 1^{\circ}\text{C}$.
 If temperature is $< 18^{\circ}\text{C}$ or $> 28^{\circ}\text{C}$, additional temperature coefficient error = $0.1 \times (\text{specified accuracy}) / ^{\circ}\text{C}$. $\pm(1.5\%+4)$ & $45\sim 65\text{Hz}/\pm(2.0\%+5)$ & $65\sim 1\text{kHz}$

(1) AC current

Range	Resolution	Accuracy
60.00A	0.01A	$\pm(1.5\%+4)$ & $45\sim 65\text{Hz}$ $\pm(2.0\%+5)$ & $65\sim 1\text{kHz}$
600.0A	0.1A	
1000A	1A	
Monitoring frequency:		$\pm(1.0\%+5)$
20H~10kHz		

- Frequency response: 45Hz~1kHz
- The maximum value of last digit is allowed to be less than 3 in the range of 60A at open circuit.
- Accuracy range: 5%~100% of the range
- The input amplitude of monitoring frequency should be $\geq 4\text{A}$

(2) AC voltage

Range	Resolution	Accuracy	Overload protection
6.000V	0.001V	$\pm(1.0\%+2)$	1000Vrms
60.00V	0.01V		
600.0V	0.1V		
1000V	1V		
Monitoring frequency		$\pm(0.1\%+3)$	
10H~10kHz			

- Input impedance $\geq 10\text{M}\Omega$
- Frequency response: 45~400Hz
- Accuracy range: 5~100% of the range
- The input of monitoring frequency should be sine wave signal of $\geq 5\text{V}$

(3) DC voltage

Range	Resolution	Accuracy	Overload protection
600.0mV	0.1mV	$\pm(0.7\%+3)$	1000Vrms
6.000V	0.001V		
60.00V	0.01V	$\pm(0.8\%+2)$	
600.0V	0.1V		
1000V	1V		

- Input impedance $\geq 10\text{M}\Omega$
- The maximum value of last digit is allowed to be ≤ 2 in the range of 600mV at short circuit. Not return to zero.
- Accuracy range: 1%~100% of the range

(4) Resistance

Range	Resolution	Accuracy	Overload protection
600.0 Ω	0.1 Ω	$\pm(1.0\%+5)$	1000Vrms
6.000k Ω	0.001k Ω		
60.00k Ω	0.01k Ω	$\pm(0.8\%+2)$	
600.0k Ω	0.1k Ω		
6.000M Ω	0.001M Ω		
60.00M Ω	0.01M Ω	$\pm(2.5\%+5)$	

(5) Continuity test

Range	Resolution	Accuracy	Overload protection
600.0 Ω	0.1 Ω	When $\leq 30\Omega$, the buzzer beeps.	1000Vrms
		When $\geq 50\Omega$, the buzzer remains silent.	
		Open-circuit voltage: about 1.0V	

(6) Diode test

Range	Resolution	Accuracy	Overload protection
6.000V	0.001V	Open-circuit voltage: 3.2V	1000Vrms
		Forward voltage of PN junction: $\leq 3\text{V}$	
		Normal voltage of silicone PN junction: 0.5~0.8V	

(7) Capacitance

Range	Resolution	Accuracy	Overload protection
60.00nF	0.01nF	$\pm(4.0\%+10)$	1000Vrms
600.0nF	0.1nF		
6.000 μF	0.001 μF	$\pm(4.0\%+5)$	
60.00 μF	0.01 μF		
600.0 μF	0.1 μF		
6.000mF	0.001mF		

Measured value = Displayed measurement value - Open-circuit value, the maximum value of last digit is allowed to be 10 at open circuit.
 Accuracy range: 5%~100% of the range

(8) NCV

Range	Sensing condition	Accuracy
NCV	Power frequency voltage: 50Hz/60Hz 100V (Applicable to EFLo mode) 220V (Applicable to EFHi mode)	Take insulated conductor as sensing condition, select EFLo or EFHi with SELECT button. 1) EFLo will be displayed when no electric field is sensed, "L" will be displayed when electric field is sensed, the faster the buzzer beeps, the stronger the electric field. 2) EFHi will be displayed when no electric field is sensed, "H" will be displayed when electric field is sensed, the faster the buzzer beeps, the stronger the electric field.

Maintenance (Figure 6)

Warning: keep the test leads away prior to opening the base cap.

- Please set the rotary switch to OFF position to avoid battery consumption when the clamp meter is not in use.
- General maintenance
 - The clamp meter should be maintained and serviced by qualified professional serviceman or designated maintenance department.
 - Clean the casing with dry cloth, it is forbidden to clean with cleaning agent containing abrasive material or solvent.

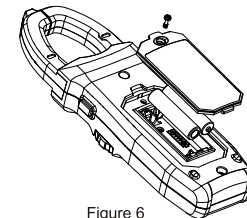


Figure 6

- Installation or replacement of battery
 Please install or replace battery as following steps:
 - Shut down the clamp meter, move away the test lead located at the input terminal.
 - Put the panel facing down, screw out the battery box screws, take off battery cap and take out battery, install new battery as per the indication of polarity.
 - After installing new battery, load the battery cap and screw on screws.

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