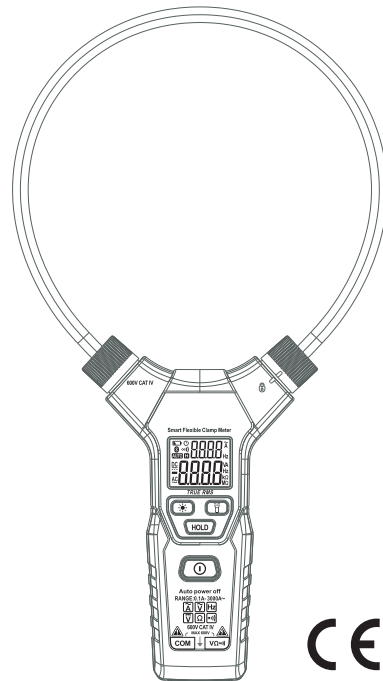


USERS MANUAL

Smart AC Digital Flexible Clamp Meter



EMC&LVD

Designed and Conforms to
IEC61010-1
CAT.IV 600V



Designed and Conforms to
IEC61010-1
CAT.IV 600V

Y01-04-0124 A0



Before using the instrument, please read this manual carefully, and save it well for future using.

size:125x85mm

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1. Statement

In accordance with the international copyright law, without permission or written consent, any information contained in this manual shall not be duplicated in any form. This manual is subject to change in its future versions without further notice.

1.1 Safety Notices



◆ The sign “Caution” indicates any state or operation that may cause damages to the instrument or device.

◆ It requires the operation to be performed with due caution. If the operation is not correctly performed, or the steps of the operation are not followed, the instrument or device may be damaged. Unless these conditions are satisfied or fully understood, no related operation as indicated in the sign “Caution” shall be done.



◆ The sign “Warning” indicates any state or operation that may cause dangers to the user.

◆ It requires the operation to be performed with due caution. If the operation is not correctly performed, or the steps of the operation are not followed, bodily injuries or deaths may arise. Unless these conditions are satisfied or fully understood, no related operation as indicated in the sign “Warning” shall be done.

Before using the instrument, Please read this manual carefully and pay attention to the relevant safety warning information

1.2 Safety Information

The instrument is designed according to the safety requirements of the international safety standards EN61010-1, EN61010-2-032 and EN61326-1 regarding the electronic testing instruments. It is designed and made in strict accordance with the EN61010-1, EN61010-2-032, EN61326-1, CAT IV 600V over voltage safety standard and class of pollution 2.

1.3 Safety Operation Specification



Warning: To avoid such possible safety accidents as electric shock or bodily injury, please strictly observe the following guidelines:











- ⇒ Prior to the use of the instrument, please carefully read the manual, and pay special attention to the related safety warning information herein. The instrument shall be used in stringent conformity to the instructions contained herein, or else the protection function supplied by the instrument may be impaired or damaged.
- ⇒ Prior to the use of the instrument, please check the outer casing for crack or the plastic parts for damage; check the insulating layer for damage; check whether or not there is any exposed metal or sign of wear; and check the connectivity. If any defect is detected, the instrument shall not be used any more.
- ⇒ Prior to the use of the instrument, please check the insulating layer of the flexible clamp for damage; if any, do not use it any longer;
- ⇒ Prior to the use of the instrument, please measure a given voltage with the instrument, to confirm whether or not it is

in good condition;

- ⇒ Please use the instrument according to the measurement type and rated value of voltage or current as indicated on the instrument or in the manual.
- ⇒ Please observe the local and national safety rules. Wear the personal protective equipment (such as the rubber gloves, face masks, flame-retardant clothes etc approved), to avoid injuries caused by electric shock or electric arc due to the exposed dangerous live conductors.
- ⇒ The voltage applied between the input terminals or between any terminal and the ground point shall not exceed the rated value as indicated on the instrument.
- ⇒ Measure with due caution a voltage going beyond 30V (AC true effective value), 42V (AC peak value) or 60V (DC). The voltage of this kind may cause the danger of electric shock.
- ⇒ When the low battery power is indicated on the instrument, the battery shall be promptly replaced, to avoid measuring errors.
- ⇒ Never use the instrument in an environment containing explosive gas or vapor around or a wet environment.
- ⇒ When using the pen, please hold it with fingers at the back of the probe finger protection device.
- ⇒ To make measurement, connect the zero line or ground line, and then the firing line; to finish measurement, disconnect the firing line, and then the zero line and ground line.
- ⇒ Before opening the outer casing or battery cover, remove the pen from the instrument. Never use the instrument with the instrument disassembled or the battery cover opened.

- ⇒ To meet the requirements of the safety standards, the instrument shall be used with the pen supplied. If the pen is damaged, it shall be replaced with one of the same type and the same electrical specification.

1.4 Safety Symbols


	High voltage warning
	AC (alternating current)
	DC (direct current)
	AC or DC
	Warning, an important safety sign
	Grounding
	Device to be protected by double insulation or reinforced insulation
	Battery under-voltage
	This indicates that the product meets the provisions of all related European laws
	This additional product label indicates that the electrical / electronic product shall not be discarded into the household refuses.
CAT. III 1000V	CAT. III 1000V over voltage protection
CAT. IV 600V	CAT. IV 600V over voltage protection


- 1** flexible clamp, used for measuring alternating current
- 2** flexible clamp bonnet lock
- 3** main display
- 4** auxiliary display
- 5** backlight button
- 6** illuminating lamp button
- 7** power on-off button
- 8** data hold button
- 9** COM input jack
- 10** V input jack

3. Instrument operation

This instrument is a smart digital flexible clamp meter. So its operation is very simple. Its working dispenses with the need for function selection. It can identify the measured signals, take measurements, and display the measuring results automatically.

3.1 Power on/off


Power on: with the device in the off state, press the  button, and keep it pressed, until the buzzer produces the sound "di" .

Power off: with the device in the on state, press the  button, and keep it pressed, until the buzzer produces the sound "di" .


3.2 Auto Shut-down Function

If no button is pressed, and no signal is input, the device will turn off automatically within five minutes.


3.3 Backlight Function

Press the  button to turn on the backlight; press the button again to turn off the backlight.

3.4 Illumination Function

Press the  button to turn on the illumination lamp; press the button again to turn off the illumination lamp.

3.5 Data Hold Function

Press the  button to enable the data hold function, with the symbol "H" shown on the display; press the button again to disable the function.

3.6 AC/DC Voltage/ Resistance Measurement/ Connectivity

1. Press the power button to turn on the device;
2. Insert the red pen into the V jack, and the black pen into the COM jack;
3. Connect the pens in parallel to the circuit, power source or resistance to be measured. The device detects AC voltage, DC voltage or resistance automatically;
4. When the resistance is measured, if the resistance is smaller than about 50Ω , the built-in buzzer will make a sound;
5. The measuring results are read from the display. When the DC voltage is measured, the display will also show the voltage polarity of the test point of the red pen;
6. When the AC voltage is measured, the frequency will also be shown on the auxiliary display;
7. At the end of measurement, press the power button to turn off the device.

 **Note:**



The device's automatic detection order:

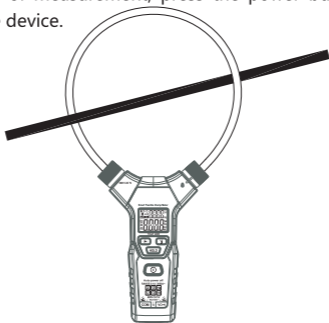
AC voltage → DC voltage → AC current, resistance and connectivity

Warning:

To avoid such possible safety accidents as electric shock or bodily injury, please strictly observe the safety work guidelines.

3.7 AC Current Measurement

1. Press the power button to turn on the device;
2. Release the flexible clamp bonnet lock, allow the flexible clamp to go round the tested wire or conductor, insert the flexible clamp into the bonnet lock, and lock the bonnet lock (see the figure below);
3. The device identifies and measures the DC current automatically;
4. The current is shown on the main display, and the frequency is shown on the auxiliary display;
5. In the event of current measurement, if both V jack and COM jack measure the voltage or resistance, then the main display will show the voltage or current, and the auxiliary display will show the current instead of the frequency;
6. At the end of measurement, press the power button to turn off the device.




Warning:

To avoid such possible safety accidents as electric shock or bodily injury, please strictly observe the safety work guidelines.

Note:

It needs much time for zero return after current measurement. This arises from the measuring circuit for true RMS. It is normal.

4. General Technical Indicators

- Environmental conditions for service:
EN61010-1, EN61010-2-032, EN61326-1, CAT IV 600V, class of pollution 2;
Height above sea level: < 2000 m;
Temperature and humidity of working environment: 0~40°C (<80% RH, ignored at <10°C);
Temperature and humidity of storage environment: (-10~60°C, with battery removed);
- Temperature coefficient: 0.1x accuracy/ °C;
- Allowable maximum voltage between measuring terminal and ground: DC 600V or AC effective value;
- Sampling rate: around 3 times per second;
- Display: LCD;
- Over range indication: "OL" displayed;
- Low battery voltage indication: " " will be shown on the display, when the battery voltage is lower than the normal working voltage;
- Input polarity indication: the symbol "-" is automatically displayed;
- Power source: 3x1.5V AAA battery;

- Overall dimension: 324x178x30mm.

5. Accuracy Indicator

The accuracy applies within one year of calibration.

Reference conditions: ambient temperature 18°C~28°C, relative humidity $\leq 80\%$.

5.1 DC Voltage

Range	Resolution	Accuracy
6V	0.001V	$\pm (0.8\% + 3 \text{ Digits})$
60V	0.01V	
600V	0.1V	

Minimum DC voltage measurement: 0.2V (DC);

Input impedance: 2M Ω ;

Maximum input voltage: 600V DC or AC effective value.

5.2 AC Voltage

Range	Resolution	Accuracy	
		45~65Hz	40~2000Hz
6V	0.001V	$\pm (1.2\% + 3 \text{ Digits})$	$\pm (2.0\% + 5 \text{ Digits})$
60V	0.01V		
600V	0.1V		

Minimum AC voltage measurement: 0.5V (AC);

Input impedance: 2M Ω ;

Maximum input voltage: 600V DC or AC effective value;

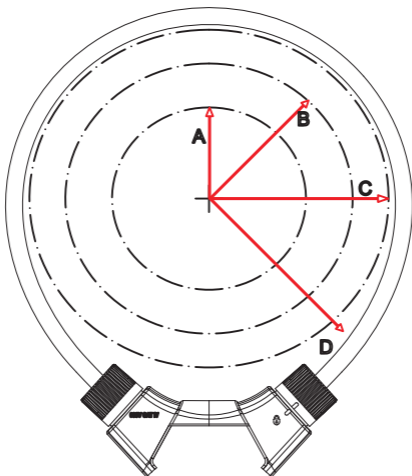
Frequency domain: 40Hz~2000Hz, true RMS.

Other frequencies are not validated yet.

5.3 Position Error of Flexible Clamp

The precision and position error refers to the error of measurement taken at the best measuring position, within the range of working temperature and humidity, in the absence of interference from external electric field or magnetic field.

Optimum Measuring Range		Position Error
A	35 mm	$\pm 0.5\%$
B	50 mm	$\pm 1.5\%$
C	60 mm	$\pm 2.0\%$
D	>60 mm	$\pm 5.0\%$



5.4 AC Current

Range	Resolution	Accuracy (40~65Hz)
60A	0.01A	±(1.5% +5Digits) (<10A:±(2.0% +10Digits))
600A	0.1A	
3000A	1A	±(2.0% +5Digits)
Range	Resolution	Accuracy (65~200Hz)
60A	0.01A	±(2.5% +5Digits)
600A	0.1A	
3000A	1A	± (3.0% +5 Digits)
Range	Resolution	Accuracy (200~1,000Hz)
60A	0.01A	± (3.0% +5 Digits) (>1000A,Not validated yet)
600A	0.1A	
3000A	1A	

Minimum AC current measurement: 0.1A. 0 is displayed when the measured value is smaller than 0.1A.

Maximum measured current: effective value of AC 3,000A.

Frequency domain: 40Hz~1000Hz, true RMS

5.5 Frequency

Range	Resolution	Accuracy
40~1000Hz	0.1Hz	± (0.5% +2 Digits)
1kHz~10kHz	1Hz	

Current channel: sensitivity 10A, range 40~1kHz;


Voltage channel: sensitivity 1V, range 40~10kHz.

5.6 Resistance

Range	Resolution	Accuracy
6kΩ	0.001 kΩ	± (1.0%+3 Digits)
60kΩ	0.01 kΩ	
600kΩ	0.1 kΩ	
6MΩ	0.001MΩ	

Input protection: max. 600V DC or AC effective value.

5.7 Connectivity

Function	Description	Testing Environment
	When the built-in buzzer sounds, the measured resistance is less than 50Ω.	Tested current: around 1mA; open-circuit voltage: around 0.8V.

Input protection: max. 600V DC or AC effective value.

6. Instrument Maintenance

This section provides the basic maintenance information. If you are not an experienced maintainer, and are not acquainted with the calibration, performance testing and maintenance, your attempt to maintain the device is not recommended.

Warning



To avoid any possible electric shock, fire or bodily injury:

- ◆ **If the battery cover or back cover is opened, never use the device for any measurement;**
- ◆ **Remove the input signal before cleaning the device;**
- ◆ **Use the specified replacement parts. The device shall be maintained by the qualified technical staff.**


6.1 General Maintenance

Use the wet cloth and a small amount of detergent to clean the outer casing of the device. Never use any abrasive or chemical solvent.

6.2 Battery Replacement

Warning



- ◆ To avoid any electric shock or bodily injury due to wrong reading, the battery shall be promptly replaced, when the symbol “” appear on the device’ s display.
- ◆ To ensure safe operation and maintain the product, the battery shall be removed if the device will not be used for a long time, to avoid any damage to the product due to electric leakage of the battery.
- ◆ Only use the fuse tube of the specified amperage, fuse rating, voltage rating and fusing rate.
- ◆ To avoid any electric shock or bodily injury, before opening the back cover for replacing the battery, turn off the device, and disconnect the pens from the measured circuit.

Replace the battery by following the steps below:

- ① Turn off the device;
- ② Disconnect the pens from the measured circuit, and remove them from the device;
- ③ Unscrew with the screwdriver the screw fixing the battery cover, and remove the battery cover;
- ④ Remove the old battery, and place a new one;
- ⑤ Replace the battery cover, and tighten the screw.