

# BM813 AC/DC Clamp Meter Operating Instruction

## I. Introduction

Welcome to use this product.

This is Great Value hand-held clamp meter which has high reliability, security, automatically setting range function etc. the product has a large digital display, full range overload protection, data-hold function, under voltage indication, auto shut off function, it has TRUE RMS measurement function which can accurately measure frequency voltage, non-sinusoidal voltage and inrush current measurement function which can measure inrush current about 80mS RMS, the instrument is suitable for frequency-converting power supply, motor performance test.

This product is ideal instrument for test, maintenance and repair in college, smelting, communications, manufacturing, petroleum, electric power, national defense, electronic, electric power equipment.

## II. Safety standard

The meter in structure complies with the safety requirements of ICE61010-1. Please read the instruction carefully before you use the meter as follow:

- When measuring voltage, AC or DC voltage should not be more than the peak voltage (DC / AC 600V) of the meter.
- Voltage of less than 36V is safety voltage. When the voltage is more than DC 51V or AC36V, the leads should be checked. The test lead should be connected correctly and their insulating property should be under excellent status against electric shock.
- When change of functional measuring range, the test lead should be away from test point.
- It is suggested that for safety the functions and range should be selected correctly although protective function for the full measuring range exists.
- When measurement of current, the input current shouldn't be more than the maximum current labeled on input end.
- Safety symbols:

⚠ Warning!

⚡ Risk of high voltage and electric shock!

☐ Double insulated.

## III. Features

### 3.1 General

3.1.1 The meter is based on CMOS large scale IC and can automatically changed measuring range for measurement of AC/DC voltage, AC, resistance, frequency and capacity, which makes the meter easy to be used.

3.1.2 Display mode: Display by LCD.

3.1.3 Maximum display: 3999 or 9999

3.1.4 Maximum span of jaw: 27mm.

3.1.5 Auto negative polarity indication: Displaying “-”.

3.1.6 Lack of battery power: Displaying “ $\text{=}$ ”.

3.1.7 Auto power OFF

After turning on the instrument and without turning the function switch or pressing any button, the instrument will automatically enter into sleep mode after 10 minutes, to save battery power. when it is in the sleep mode you can press the SEL key to wake up the instrument. If you don't need the automatic sleep mode, you should hold down the DH key to turn on the instrument, and then the symbol "O" will not be display on the LCD.

3.1.8 Work environment: 0°C-40°C, 75%RH.

3.1.9 Storage environment: -10°C-60°C, 85%RH.

3.1.10 Battery : AAA1.5V×1 (IEC6F22, NEDA1604 or JIS006P)

3.1.11 External dimensions: 213 (L) ×80 (W) ×35 (H) mm

3.1.12 Weight: About 240g (including battery's weight)

### 3.2 Technical specifications

Accuracy:  $\pm(\% \text{ reading} + \text{digit})$ ; calibration term is one year.

Ambient temperature: 23°C $\pm$ 5°C; Ambient humidity:  $\leq 70\%$ RH

#### 3.2.1 DCV

Range	Accuracy	Resolution	Input Impedance
400mV	$\pm(0.5\%+5d)$	0.1mV	>100 M $\Omega$
4V		1mV	About 10M $\Omega$
40V		10mV	About 10M $\Omega$
400V		100mV	About 10M $\Omega$
600V		1V	About 10M $\Omega$

#### 3.2.2 ACV

Range	Accuracy	Resolution	Input Impedance
400mV	$\pm(1.2\%+5d)$	0.1mV	>100 M $\Omega$
4V		1mV	About 10M $\Omega$
40V		10mV	About 10M $\Omega$
400V		100mV	About 10M $\Omega$
600V		1V	About 10M $\Omega$

Frequency: 10Hz~1kHz (Warning: Frequency for square wave accuracy is specified from 10Hz to 400Hz).

Display: TRUE RMS (sinusoidal waveform RMS calibration).

#### 3.2.3 DCA

Range	Accuracy	Resolution
400A	$\pm(2\%+10d)$	100mA
600A		1A

#### 3.2.4 ACA

Range	Accuracy	Resolution
400A	$\pm(2\%+10d)$	100mA
600A		1A

AC Conversion Type: TRUE RMS responding, calibrated readings consistent with sinusoidal waveform RMS.

Frequency Range: 50~60Hz.

#### 3.2.5 Resistance $\Omega$

Range	Accuracy	Resolution
400 $\Omega$	$\pm(1\%+3d)$	0.1 $\Omega$
4k $\Omega$		1 $\Omega$
40k $\Omega$		10 $\Omega$
400k $\Omega$		100 $\Omega$
4M $\Omega$	$\pm(1.5\%+5d)$	1k $\Omega$
40M $\Omega$		10k $\Omega$

Overload protection: effective value 220V

#### 3.2.6 Capacitance

Range	Accuracy	Resolution
10nF	$\pm(3\%+20d)$	0.001nF
100nF		0.01nF
1 $\mu$ F	$\pm(3\%+5d)$	0.1nF
10 $\mu$ F		1nF
100 $\mu$ F		10nF
1000 $\mu$ F		100nF
10mF	$\pm(5\%+5d)$	1 $\mu$ F

Overload protection: effective value 250V.

Warning: There is about 20pF dead zone in the 10nF, capacitance below 20pF can not be measured

#### 3.2.7 Frequency

Range	Accuracy	Resolution
100Hz	$\pm(0.5\%+3d)$	0.01Hz
1kHz		0.1Hz
10kHz		1Hz
100kHz		10Hz
1MHz		100Hz
10MHz		1kHz
40MHz		10kHz

Overload protection: effective value 250V. Input sensitivity RMS: effective value 1V.

⚠NOTE: If the voltage of the frequency being measured is above 30V, set the rotary function switch to the ACV measured function and press “SEL” key to enter voltage frequency measured function, in order to avoid damage the instrument.

#### 3.2.8 DUTY

Range	Accuracy	Resolution
1%~99%	$\pm(0.5\%+3d)$	0.1%

Overload protection: effective value 250V.

input sensitivity RMS: 1V

#### 3.2.9 Temperature

Range	Resolution	Accuracy
-50~300°C	1°C	$\pm(1\%+5)$
301~1000°C	1°C	$\pm(1.9\%+15)$
-58~600 °F	1 °F	$\pm(1.2\%+6)$
601~1832 °F	1 °F	$\pm(1.9\%+25)$

Temperature sensor: K WREN- 010 bare contact thermojunction

Overload protection: effective value 250V.

#### 3.2.10 Forward voltage drop of diode $\rightarrow$

Displaying approximate forward voltage values of diode. Measuring condition: forward direct current is 1.5mA; opposite DC voltage is about 3 V.

#### 3.2.11 Continuity Test $\bullet$ )

In the case that the resistance between two tested points is less than about 90 $\Omega$  $\pm$ 20 $\Omega$ , the buzzer will bring up sound. Test condition: Open-circuit voltage is about 0.5V.

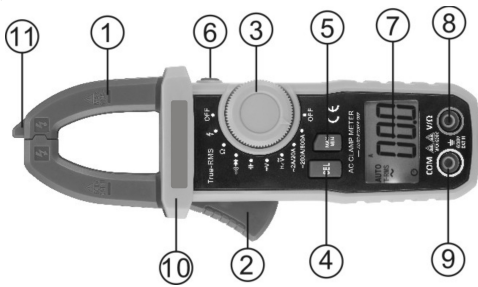
## IV. Operation

### 4.1 Instruction for control panel

- Jaws
- Trigger
- Rotary switch: This switch is used to select functions.
- “SEL” function selection button: Press this button continuously to select all the functions in the gear in a circular manner, select the surge mode in the AC current gear, and press the button in the DC current gear to display zero.
- “RAN” manual range key: When a certain range needs to be fixedly used, the manual range RAN key can be used. Press this key to cycle through all ranges of each function.
- DH reading hold key: press this key once to lock the current reading and display the "DH" symbol at the same time, press this key

again to cancel the hold function, and the "DH" symbol disappears. Long press "DH" for 2 seconds to turn on or off the backlight.

- (7) LCD display
- (8) "V $\Omega$ " jack: This is positive input terminal for voltage, resistance frequency, temperature, capacity and diode.
- (9) "COM" jack: This is negative (ground) input terminal
- (10) Barrier
- (11) NCV induction head



#### 4.2 Measurement of AC/DC voltage

Turn the Rotary switch to "V". Then plug black lead in "COM" socket, and plug red lead in "V/ $\Omega$ " socket. connect the test lead with the two ends of the circuit and then directly read the reading on the LCD display

**NOTE:** 1. The inrush measuring function can only be change range manually, before the test, if the voltage is unknown, manually set the measuring range to 600V .

2. Don't measure the peak voltage more than 600V, otherwise it might damage the instrument ,if the screen only displays OL, it means that the tested voltage is higher than 600V.

3. Press the SELECT key in the ACV function to enter the voltage frequency measurement mode, it can measure the the frequency range from 10Hz to 100KHz with voltage higher than AC2V.

4. Measure the voltage less than 400mV at the capacitor position.

##### 4.3.1 DC current measurement

(1) Turn rotary switch to "DCA" range, if it isn't displaying zero ,press "SEL" button until zero displayed on the LCD.

(2) Press the trigger, opens the mouth of the clamp, and hold a wire ( put the wire in the clamp center ), read the reading directly.

##### 4.3.2 AC current measurement

Turn rotary switch to "~A" range. Press the trigger, opens the mouth of the clamp, and hold wire ( put the wire in the clamp center ), read the reading directly

Note: 1. INRUSH measuring can only be manually setting range. when the current value being measuring is unknown, turn the rotary switch to 600A and press INRUSH key to entry INRUSH measuring function.

2. When measuring current ,the clamp might hold only one wire, it is null to catch one more another wire

##### 4.4 Measurement of resistance, continuity and forward Voltage drop of diode

**Warning!** When measurement of resistance or continuity, make sure that no voltage is with the circuit and components.

(1) Turn the Rotary switch to the range of  $\Omega$  /  $\rightarrow$  . At this time, the meter is reserved at resistance range.

(2) Plug red lead in "V/ $\Omega$ " socket, and plug black lead in "COM" socket

(3) Connect the leads with the two ends of the circuit or component, and then read the value of resistance.

(4) Press SELECT key to change the range of  $\rightarrow$  . When the resistance measured is less than about  $90\Omega \pm 20\Omega$ , the buzzer sounds. This is continuity testing.

(5) When the test lead is under open-circuit or input-overload status, the display will display "OL".

(6) When measuring diode, press the SELECT key to the function of  $\rightarrow$  .

(7) Connect the test lead with the two ends of the diode, and then read the value of forward voltage drop value.

(8) When the test lead is under reverse connection or open-circuit status, the display will display "OL".

**Note:** a、 When the resistance measured is above  $1M\Omega$ , it needs several seconds for the reading to be stable, it is normal when measuring high resistance.

b、 When measuring high resistance, insert the resistance pin directly into the V  $\Omega$  and COM jack, so as to avoid interference

c、 When measuring resistance in a circuit make sure the power to the circuit is turned off and all capacitors are discharged.

#### 4.5 Measurement of capacitance

**Warning!** When measurement of capacity, the measured capacitor should be completely discharged.

(1) Turn the Rotary switch to " $\rightarrow$ " function. Plug red lead in "V/ $\Omega$ " socket, and plug black lead in "COM" socket.

**Warning:** The range for capacitor can't be set manually. When the capacity value is large, the time for measurement may be a little longer.

- a. Do not take an external voltage or charged capacitor (especially a large capacitor) connected to the test terminal
- b. When a large capacitor is serious leakage or breakdown, the measurement value may be instability

#### 4.6 Measurement of frequency / DUTY Ratio

(1) Turn the Rotary switch to "Hz" function. if you want to measure DUTY Ratio, Press SELECT key to switch

(2) Plug red test lead in "V/ $\Omega$ " terminal and plug black lead in "COM" terminal.

(3) Connect the leads with measured circuit and then read the reading.

(4) When the voltage exceeding 30V, please enter the Voltage frequency measurement mode by pressing the SELECT key in the "ACV" measurement function.

#### 4.7 Measurement of temperature

Turn the Rotary switch to the function of temperature, then plug the cold end (plug end) of temperature sensor to the V/ $\Omega$  and COM socket (black end for COM socket and red end for V/ $\Omega$  socket). Place the working end (temperature end) of the sensor on or in the measured object. Then read the temperature value (in  $^{\circ}C$ ) on the display. If you need to measure that " $^{\circ}F$ ", push the SEL key to switch.

**Caution:** When the cold terminal of the sensor isn't inserted into the meter, the meter might display approximate environmental temperature. K WRNM- 010 bare contact thermo junction has a limiting temperature of  $250^{\circ}C$  ( $300^{\circ}C$  for short time).

#### 4.8 Non contact or Phase line recognition

Set the rotary switch at the desired " $\rightarrow$ " range position. NCV and symbol will be displayed on the LCD, The NCV Sensor head approach the electric line , switch, or charge.

plug red test lead in the "V/ $\Omega$ " socket and black lead without being used, place the red test lead near the electric line, switch, or socket, the phase metal terminal need not to be connected, the meter will display " $\rightarrow$ ", the higher the tested voltage is , he more " $\rightarrow$ " will be displayed, and the buzzer will warning hurrier, If the red test lead touch the conductor, when there is voltage between null line and ground line, much more " $\rightarrow$ " will be displayed when measuring the phase line than the null line.

**Caution:**

1. Even if there is no indication, voltage may still exist. Do not judge the wire whether there is voltage absolutely throught the non contact voltage testing, the testing may be effected by many factors such as the socket design, the insulation thickness and types etc.

2. Interference source of external environment, such as flash, motor etc, may false trigger the non connect voltage testing.

#### V. Maintenance of meter

**Warning!** Switch off the power, remove the test lead and any of input signals to prevent electric shock before opening the cover of meter or the cover of battery.

5.1 When the meter displays the symbol of " $\rightarrow$ ", the battery should be changed. Open the battery cover, and then change the used battery with new battery to ensure the normal operation of the meter.

5.2 Keep the meter and the pens clean, dry and non-destructive. Clean cloth or detergent may be used for cleaning the cover of the meter. No grinding agent or organic solvent can be used for the same cleaning purpose.

5.3 The meter should be protected against damage, vibration and impact. It shouldn't be placed where high temperature or intense magnetic field exists.

5.4 Calibrating of the meter is done on a yearly basis.

#### VI. Accessories

6.1 Test lead: 1 set

6.2 Users manual: 1 piece

6.3 Temperature sensors: 1 set