

BM853A+ OPERATOR'S MANUAL

I. Introduction

Welcome to use this product.

BM853A+ adopts high-performance MCU processor, it is Great Value as has high reliability, security, automatically setting range function, hand-held clamp meter etc.. the product has a large digital display, full range overload protection, data-hold function, undervoltage 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, The function to measure DC current range up to DC 400A/6000A, which is widely used in electroplating, DC welding machine, motor vehical test and all kinds of DC 5A current measurement. It is more excellent for a new generation of practical electrical measuring instrument.

This product is ideal instrument for test, maintenance and repairs 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. Read the instruction carefully as follows before you use the meter:

1. When measuring voltage, AC or DC voltage should not be more than the peak voltage (DC / AC 600V) of the meter.
2. 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.
3. When change of functional measuring range, the test lead should be away from test point.
4. It is suggested that for safety the functions and range should be selected correctly although protective function for the full measuring range exists.
5. When measurement of current, the input current shouldn't be more than the maximum current labeled on input end.
6. 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

3.1.4 Maximum span of jaw: 30mm.

3.1.5 Auto negative polarity indication: Displaying “-”.

3.1.6 Lack of battery power: Displaying “ ”.

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 SELECT 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 “” 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 : 9V×1 (IEC6F22, NEDA1604 or JIS006P)

3.1.11 External dimensions: 221 (L) × 75 (W) × 31 (H) mm

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

3.2 Technical specifications

Accuracy: ±(% reading + digit); calibration term is one year.

Ambient temperature: 23°C±5°C; Ambient humidity: ≤70%RH

3.2.1 DCV

Range	Accuracy	Resolution	Input impedance
400mV	± (0.8%+2d)	0.1mV	About 10MΩ
4V		1mV	About 10MΩ
40V		10mV	About 10MΩ
400V		100mV	About 10MΩ
600V	± (1%+3d)	1V	About 10MΩ

3.2.2 ACV

Range	Accuracy	Resolution	Input impedance
400mV	± (1.2%+5d)	0.1mV	About 10MΩ
4V		1mV	About 10MΩ
40V		10mV	About 10MΩ
400V		100mV	About 10MΩ
600V	± (1.5%+5d)	1V	About 10MΩ

Frequency: 10Hz~1kHz (Warning: Frequency for square wave accuracy is specified from 10Hz to 400Hz); display: TRUE RMS (sinusoidal waveform RMS calibration).

Overload protection: 250V at mV range, DC1000V or peak value AC1000V at V range

3.2.3 DCA

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

3.2.4 ACA

Range	Accuracy	Resolution
400A	± (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 Ω

Range	Accuracy	Resolution
400Ω	± (1%+3d)	0.1Ω
4kΩ		1Ω
40kΩ		10Ω
400kΩ		100Ω
4MΩ	± (1.5%+5d)	1kΩ
40MΩ		10kΩ

Overload protection: effective value 220V

3.2.6 Capacitance

Range	Accuracy	Resolution
10nF	± (3%+20d)	0.001nF
100nF		0.01nF
1μF		0.1nF
10μF		1nF
100μF		10nF
1000μF	± (5%+5d)	100nF
10mF		1μF

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	± (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 “SELECT” key to enter voltage frequency measured function, in order to avoid damage the instrument.

3.2.8 DUTY

Range	Accuracy	Resolution
1%~99%	± (0.5%+3d)	0.1%

Overload protection: effective value 250V.

input sensitivity RMS: 1V

3.2.9 Forward voltage drop of diode

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

3.2.10 Continuity Test

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

IV. Operation

4.1 Instruction for control panel

- (1) jaws
- (2) Trigger
- (3) Rotary switch: This switch is used to select functions such as current, voltage, capacitance, resistance, temperature, frequency, forward voltage drop of diode, continuity and turn on/off the meter.
- (4) “SELECT” button: When press the key continuously, change the range of all function for a proper range you need.
- (5) “RANGE” button: One may change the measuring range by pressing this button, press this key to cycle from small to large range of each function
- (6) INRUSH: measuring Inrush voltage, current key, in AC measuring function press the key 2 seconds, it will measure the Inrush value, and show the "INR" symbol in the LCD, INRUSH function can measure current or voltage with the minimum period up to valid values 80mS, in the inrush mode, instrument automatically enter the manual range function, if the measurement range is unknown, press RANGE key to the maximum range, first press the INRUSH button 2 seconds again inrush measurement will be resumed, and the "INR" symbol disappear.

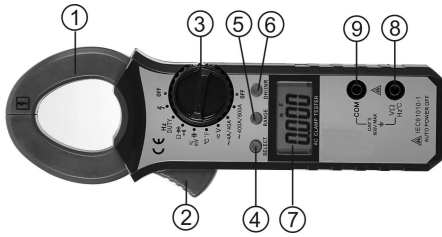
ZERO: zero key of DC current function, when measuring DC current and it is not display zero without measuring, press ZERO key to make it display zero before measure.

DH: Data hold button: The user may hold the present reading and keep it on the display by pressing the "DH" button. Press the button again to cancel the data-hold function

(7) LCD display

(8) "V Ω " jack: This is positive input terminal for voltage, resistance frequency, temperature, capacity and diode.

(9) "COM" jack: This is negative (ground) input terminal



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/ Ω " 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 and then press the PH key to enter the INRUSH measuring function.

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 SRLECT 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 AC 30V~600V.

4.3.1 DC current measurement

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

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 Ω or \rightarrow . At this time, the meter is reserved at resistance range.

(2) Plug red lead in "V/ Ω " 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 Ω 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/ Ω " 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. Δ 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/ Ω " 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 NON CONTACT VOLTAGE TESTING

Set the rotary switch at the desired " \rightarrow " range position. NCV and \sim symbol will be displayed on the LCD, connect the red test lead to "V Ω " jack and the black test lead without being connected, hold the red test lead to approach the phase line of commercial power, switch, or charge, (hold the red test lead to touch the metal terminal if it is necessary), the meter will display " \rightarrow ", the higher the tested voltage is, the more " \rightarrow " will be displayed, and the buzzer will warning hurriedly. 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.

When the meter has no response to the voltage, you can contact the red test lead to the metal of the terminal.

Δ Caution:

1. even if there is no indication, voltage may still exist. Do not judge the wire whether there is voltage absolutely through 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 contact voltage testing.

V. Maintenance of meter

Δ 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 Cloth bag: 1 piece