

# BM91A OPERATING INSTRUCTIONS




## I. Introduction

The measuring appliance is a kind of stable and reliable numeral multi-meter, with battery power supply. With The entire overload protection, The measuring appliance can measure the DC voltage and the electric current, the alternating voltage and the electric current, the resistance, capacitance, the diode, the transistor hFE parameter and the electric circuit passes or breaks and so on. With accurate measure, and stable and reliable performance, it is your ideal tool.

## II. Safety Rules and Notes

The design of this measuring appliance conforms to the safety standard of IEC1010-1. Please read this handbook carefully before use.

1 notes on securities mark

-  Warning, be careful!
-  Danger of being hit by high-pressured electric!
-  Dual insulation protection.

2 when measure, do not surpass the greatest stipulated input value.

3 do not surpass 10V voltage to the input end, except the voltage grade

4 all grades of positions when the input value is bigger than the greatest stipulated value, can display the warning symbol "1".

5 measuring appliances should avoid the straight sunlight, the high temperature, and moisture.

6. after use, must release the power switch to turn off the power

7 if it doesn't use or a long time, should take out the battery, in case the battery leaks to damage the parts.

## III. Capability

### 1.General features

- 1-1. way of Display: Liquid crystal display;
- 1-2 greatest display: 1999 (3 1/2)
- 1-3. measure way: Double integral (3 1/2) A/D transformation;
- 1-4. Sampling speed: approximately 2.5 per second;
- 1-5. displays while surpass the measuring range : Highest position display "1";
- 1-6. display of insufficient battery: Displays "BAT";
- 1-7. auto power off
- 1-8. Working conditions: 0~40 °C, relative humidity <80%;
- 1-9. storage environment: -10~50 °C, relative humidity <80%;
- 1-10 Power source: One 9v battery (6F22 );

1-11 external dimensions : 178 (length) 85 (width) 35 (height) mm

1-12 weight: approximately 270g (contain battery)

### 2. Technical index

Accuracy is specified for a period of year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 75%.

#### 2-1 DC voltage

range	Resolution	Accuracy
200mV	0.1mV	± (0.5%+5)
2V	1mV	
20V	10mV	
200V	100mV	
1000V	1V	± (0.8%+5)

Input impedance: 10MΩ.

Overload protection: 200mV: 250V, the rest is direct current or maximum value of AC 1000V.

#### 2-2.AC voltage

range	Resolution	accuracy
200mV	0.1mV	± (1.2%+5)
2V	1mV	
20V	10mV	± (0.8%+5)
200V	100mV	
700V	1V	± (1.2%+5)

Input impedance: 200mV,2V:1MΩ,20V~700V:10MΩ.

Frequency range: 40Hz~400Hz (200V, 700V measuring range 40Hz~100Hz) .

Overload protection: 200mV,2V direct current or maximum value of AC250V, 20V~700V:700V

display: average value (sine wave virtual value calibration )

#### 2-3.DC current

range	Resolution	accuracy
20mA	10μA	± (0.8%+5)
200mA	100μA	
10A	10mA	± (2%+5)

Overload protection: F 0.2A/250V self-resetting fuse, 10A no fuse

△greatest input current: 10A (not surpass10 seconds) .

Measure voltage: approximately 200mV full measure range.

#### 2-4.AC current

range	Resolution	accuracy
20mA	10μA	± (1%+5)
200mA	100μA	
10A	10mA	± (3%+7)

Overload protection: F 0.2A/250V self-resetting fuse, 10A no fuse.

greatest input current: 10A (not surpass seconds) .

△ Measure voltage: 200mV for full measure range.

Frequency range : 40Hz~400Hz.

display: average value (sine wave virtual value calibration)

#### 2-5.resistance

range	Resolution	accuracy
200Ω	0.1Ω	± (0.8%+5)
2kΩ	1Ω	
20kΩ	10Ω	
200kΩ	100Ω	
2MΩ	1kΩ	± (1%+5)
20MΩ	10kΩ	
200MΩ	100kΩ	



Overload protection: 220V virtual value.

Plough voltage: <1V (200MΩ for 2.8V measure range) .

#### 2-6.capacitance

range	Resolution	accuracy
20nF	10pF	± (3%+5)
200nF	100pF	
2uF	1nF	
200μF	100nF	± (5%+10)

#### 2-7 DIODE and Continuity

range	Illustration	Test conditions
	Displays the diode forward voltage approximation	Positive direction DC1mA Reverse direction DC3V
	Breakover resistance< approximately50Ωbeep rings, displays the resistance approximation	Plough voltage about3V

Overload protection: 220V virtual value.

#### 2-8. Crystal triode hFE testing

Range	Notes	Testing conditions
hFE	Displayed scope 0~1000β	I <sub>bo</sub> ≈10μA, V <sub>ce</sub> ≈2.8V

## IV. OPERATING INSTRUCTIONS

Before use pay Caution to mark "△" beside measures pen, this is to warn you that the tested voltage and electric current can not surpass the instructed measuring range . In addition, to set in the files position to the supposed measure range before use

### 1. DCV measure

1) inserts the black test lead to the COM jack, inserts the red test lead to VΩ jack.

2) set the range switch to the V= range, Connect test leads across the source or load under measurement., it will display the polarity the red test leads meets

△: Caution:

a. if don't know the range of the voltage measured before measure, should set the measure range switch at the highest grade, and then lower the grade gradually

b, if the display monitor only displays " 1 ", shows the voltage being measured has surpassed the measuring range, the measure range switch needs to be moved to the highest grade.

c, means not to surpass 1000V voltage, in order to avoid damage interior line of measuring appliance.

d, specially pays Caution when measuring high voltage, avoids getting an electric shock.

## 2.ACV measure

1) inserts the black test lead to the COM jack, the red test lead V $\Omega$  jack.

2) set the measure range switch to the V~ range, Connect test leads across the source or load under measurement, You can get reading from LCD

⚠Caution: a, refers to the DC voltage pays Caution a, b, d.

b, means not to surpass 700V voltage, in order to avoid damaging interior line of measuring appliance.

## 3. DC current measure

1) Connect the black test lead to COM jack and the red to the mA jack for a maximum 200mA current , for a maximum 10A current, move the red lead to the 10A jack.

2) Set the rotary switch at the desired A= range position.

3) Connect test leads in series with the load under measurement.

4) You can get reading from LCD. The polarity of the red lead connection will be indicated along with the current value.

NOTE:

a. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.

b. When only the figure '1' is displayed, it indicates over-range situation and the higher range has to be selected.

c. "⚠" means the socket mA's maximum current is 200mA and 10A's maximum current is 10A, over current will destroy the fuse. Since 10A is not fused, the measuring time should be less than 10 second to prevent precision from affecting by circuit heating.

## 4.AC current measure

1) Connect the black test lead to COM jack and the red to the mA jack for a maximum 200mA current , for a maximum 10A current, move the red lead to the 10A jack.

2) Set the rotary switch at the desired A~ range position.

3) Connect test leads in series with the load under measurement.

⚠Caution Refers to DC electric current for a, b, c.

## 5.resistance measure

1) Connect the black test lead to the COM jack and the red table test lead to V $\Omega$  jack.

2) Set the rotary switch at the desired  $\Omega$  range position, Connect test leads across the resistance under measurement..

⚠Caution:

a, when the input end leads the way, the measuring appliance displays " 1 " for the surpassed measuring range

b, when the measured resistance >1M $\Omega$ , the measuring appliance needs several seconds to stabilize the reading, this is normal regarding to high resistance measure

c, when measuring high resistance, as far as possible insert the resistance to V $\Omega$  and the COM jack directly as far as possible, avoids disturbing.

d, when measuring the on-line resistance, make sure to confirm the measured electric circuit has shut off, at the same time the electric capacity has given out the electricity power, then carry on the survey.

## 6. capacitor measure

1) The black lead is inserted into COM jacket, and the red lead is inserted into mA jacket.

2) Set the range switch at F range scope, and the leads is connected with the tested circuit in bridge connection.

Notes:

a. Before connecting the capacitor, the instrument can be calibrated at zero; however, several indicated value can not affect the testing precision.

b. Do not connect external voltage or the charge capacitor to the input jacket. When electric quantity of the capacitor is large enough, it will discharge to the internal instrument, and the measurement precision is affected, and even the instrument may be burnt down.

## 7. transistor hFE measure

1) Set the range switch at hFE shift.

2) Confirm the crystal triode is PNP or NPN, and pins E, B and C of the tested tube is inserted into the testing holes of the instrument.

3) The instrument displays hFE round value, and the testing conditions are base current 10 $\mu$ A and Vce about 2.8V.

## 8.diode measure

1) insert the black test lead to the COM jack, insert the red test lead to V $\Omega$  jack (red test lead polarity is "+").

2) set the rotary switch to the  $\rightarrow$  range, connect the test pen to the measured diode.

⚠Caution:

a, when the input end leads the way, measuring appliance displays the surpassed measuring range condition.

b, the measuring appliance displays the value of positive voltage, while the diode is connected reversely, it display the surpassed condition

## 9.continuous buzzer pass or break measure

1) insert the black test lead to the COM jack, insert the red test lead to the V $\Omega$  jack.

2) set the rotary switch to the  $\rightarrow$  range (the same as the diode  $\rightarrow$  measuring range), connect the test lead to the two ends of the measured current

3) if the resistance between the two ends being measured is smaller than approximately 50  $\Omega$  the buzzers then can send out the sound.

⚠Caution:

a, when the input end leads the way, measuring appliance displays the surpassed measuring range condition.

b, the measured electric circuit must be measured without power source, because any load signal will be able to cause the buzzer sound, thus cause the wrong judgment.

## V. maintenance

1. this appliance is a precise electronic meter, do not modify the internal circuit at random, in case damage.

2. do not connect to the voltage above 1000VDC or virtual value 700V AC, in case get electric shock or damage the device.

3. make sure not to connect to improper measuring range modify internal circuit in order to avoid damages.

4. do not input voltage when the measuring range switch is at electric current, resistance, diode or buzzer position.

5. never use it when it is not completely covered, in case electric shock.

6. when replace the battery and fuse, must after put aside the test pen and cut off the power.

7. keep the cover clean, could use a little water or diluted cleanser, but not gasoline, ethanol, in case corruption.

8. avoid high temperature, high moist environment, in case to worsen the performance.

9. if not used for a long time, take out the battery, in case the battery leaks to damage the interior line.

## VI. Accessories

6.1 Test lead: 1 set

6.2 users manual: 1 piece