




I Overview

The complete machine circuit design of BM920 series takes large-scale integrated circuit and A/D converter as the core, provided with global function overloading protection to measure direct current voltage and current, A.C. voltage and current, resistor and current, resistor, capacitor, frequency temperature, diode forward voltage drop, transistor hFE parameters and circuit on and off, Infrared remote control signal detection and Identification of live wire etc.

II Safety rules and attentions

- The instrument of model BM920 is in line with IEC1010-1 CAT I 1000V standard. Before use, please read the instruction manual carefully.
- It is not allowed to use with the rear cover not ready; otherwise, it may cause danger.
- Before use, check insulation layer of the pen-shape meter shall be perfect and free of damage and broke wires.
- The range switch shall be set at the correct range position.
- The input signal can not be beyond the specified limits to avoid electric shock and damaging the instrument.
- Shift of the range switch can not be changed during measuring.
- Measure potential difference of the public terminal COM and the ground “” can not exceed 600V to avoid electric shock.
- For testing voltage higher than DC50V and AC36Vrms, be careful to avoid electric shock.
- When the LCD displays “”, electric quantity of the battery is not sufficient, and the battery shall be replaced to ensure normal operation of the instrument.
- Replacement of fuse in the instrument shall employ the same specifications.
- The instrument shall be calibrated once a year at least.

III Performance

1. Insufficient electric quantity indication: “”.
2. Maximum display: 1999 (3 1/2 bit).
3. Automatic switching off: automatically cut off power supply after switching on the machine about 15 minutes.
4. 10A jack: without fuse.
5. mA jack fuse: 0.2A/250V Self-recovery fuse.
6. Battery in the unit: 9V NEDA or 6F22 or equivalence.
7. Environmental conditions:
 - 1) Working temperature: 0°C~40°C RH<75%
 - 2) Storage temperature: -10°C~50°C RH<85%

IV Technical indexes

Precision ± (a % reading + figures) Warranty period: 1 year
Guaranteed temperature precision: 23°C±5°C RH<70%

1. Direct current voltage

| Range | Resolution | Measurement error |
|-------|------------|-------------------|
| 200mV | 0.1mV | ± (0.5%+5d) |
| 2V | 1mV | |
| 20V | 10mV | |
| 200V | 100mV | |
| 1000V | 1V | ± (0.8%+5d) |

Input impedance: 200mV and 2V shift is 1MΩ, and others are 10MΩ.
Overloading protection: 200mV and 2V range is 250V, and others are direct or A.C. PEAK 1000V.

2. A.C. voltage


| Range | Resolution | Measurement error | |
|-------|------------|-------------------|-------------|
| | | BM9205 | BM9208 |
| 200mV | 0.1mV | ± (1.2%+5d) | — |
| 2V | 1mV | ± (0.8%+5d) | — |
| 20V | 10mV | | ± (0.8%+5d) |
| 200V | 100mV | | |
| 700V | 1V | ± (1.2%+7d) | |

Input impedance: 200mV and 2V range is 1MΩ, and others are 10MΩ.
Frequency scope: 40Hz~400Hz (200V and 700V ranges are 40Hz~100Hz).
Overloading protection: 200mV and 2V ranges are 250V, and others are direct current or alternative current peak value1000V.
Display: average value (sine wave valid value calibration).

3. Direct current

| Range | Resolution | Measurement error |
|-------|------------|-------------------|
| 20uA | 0.01uA | ± (1.2%+5d) |
| 20mA | 10uA | ± (0.8%+5d) |
| 200mA | 100uA | ± (1.2%+5d) |
| 10A | 10mA | ± (2%+5d) |

Overloading protection: 0.2A/250V fuse and 10A range without fuse.

 Maximum input current: 10A (input time no more than 10 seconds).
Measuring voltage drop: the full range is DC200mV.

4. Alternative current

| Range | Resolution | Measurement error | |
|-------|------------|-------------------|--------|
| | | BM9205 | BM9208 |
| 20mA | 10uA | ± (1.2%+5d) | — |
| 200mA | 100uA | ± (1.8%+5d) | |
| 10A | 10mA | ± (3%+7d) | |

Overloading protection: 0.2A/250V with fuse, and 10A range without fuse
Maximum input current: 10A (input time no more than 10 seconds)
Measuring voltage drop: the full range is 200mV.
Frequency scope: 40Hz~400Hz.
Display: average value (sine wave valid value calibration)

5. Resistance

| Range | Resolution | Measurement error |
|-------|------------|-------------------|
| 200Ω | 0.1Ω | ± (0.8%+5d) |
| 2KΩ | 1Ω | |
| 20KΩ | 10Ω | |
| 200KΩ | 100Ω | |
| 2MΩ | 1KΩ | ± (1%+5d) |
| 20MΩ | 10KΩ | |
| 200MΩ | 100KΩ | ± (5%+10d) -10d |

Overloading protection: 220V valid value
Open circuit voltage: <1V (200MΩ range is 2.8V)
About 10 displayed in case of short circuit for 200MΩ range: actual measurement value = display value -10
For example: the measured standard resistance is 100MΩ, the instrument display is 101.0 and the real value is 101.0 - 10 = 100.0

6. Capacitance Cx

| Range | Resolution | Measurement error |
|-------|------------|-------------------|
| 20nF | 10pF | ± (2.5%+20d) |
| 200nF | 100pF | |
| 2μF | 1nF | ± (5%+10d) |
| 200μF | 100nF | |

Overloading protection: 36V DC or peak value

7. Frequency F

| Range | Resolution | Measurement error |
|-------|------------|-------------------|
| | | BM9208 |
| 2KHz | 1Hz | ± (1.5%+5d) |
| 20KHz | 10Hz | |

Notes: valid value of the tested frequency signal: 300mV~50V
Overloading protection: 220V valid value

8. Temperature°C



| Range | Resolution | Measurement error |
|--------------|------------|-------------------|
| | | BM9208 |
| -20~400°C | 1°C | ± (0.75%+4d) |
| 401°C~1000°C | 1°C | ± (1.5%+15d) |

Notes: model K thermal coupler is used (temperature probe).


9. Crystal triode hFE testing

| Range | Notes | Testing conditions |
|-------|----------------------------|---|
| hFE | Displayed scope 0~1000β | I _{bc} ≈10μA, V _{ce} ≈2.8V |


10. Diode and buzzing continuous conductance testing

| Range | Notes | Testing conditions |
|---|--|--|
|  | Display forward conductance round value of diode | Forward direct current about 1mA Backward direct current voltage about 2.8V |
|  | When the conductance resistance is < about 50Ω, buzzer in the machine works, and round value of the resistance is displayed. | Open circuit voltage about 2.8V |

Overloading protection: 220V valid value

11. Infrared remote control signal detection () and Identification of live wire
() See instructions

V Operation instructions

Before use, pay attention to the symbol beside the jacket of the testing pen “”, which reminds you the tested voltage or current not beyond this value. In addition, before use, the range switch shall be set at the switch which you want to set.

1. D.C. voltage measurement

- 1) The black lead is inserted into COM jacket, and the red lead is inserted into V/Ω jacket.
- 2) Estimate maximum value of the tested signal voltage, select proper range, and connect the leads to the tested load or signal source to read the value.

In addition: polarity of the red pen will be simultaneously displayed on the screen.

Notes:

- a. Before measurement, if range of the tested voltage can not be estimated, the range switch shall be set at the maximum range shift (1000V shift), and select proper shift according to the displayed value.
- b. If the screen only displays 1, it means that the tested voltage is beyond the range and voltage higher than 1000V can not be input. Although reading can be acquired, there is danger of damaging internal wires and causing safety accidents.
- c. Avoid electric shock when measuring high voltage.

2. A.C voltage measurement

- 1) The black lead is inserted into COM jacket, and the red lead is inserted into V/Ω jacket.
- 2) Estimate maximum value of the tested signal voltage, select a proper range and connect the leads to the tested load or signal source to read the value.

Notes:

Please refer to the D.C. voltage notes a, b and c.

3. D.C. current measurement

- 1) The black lead is inserted into COM jacket. When the tested current is less than 200mA, the red lead is inserted into mA jacket; when the tested current is 200mA~10A, the red lead is inserted into 10A jacket.
- 2) Set the range switch at the range of the D.C. current range, and the leads is connected with the circuit in series connection. When the instrument displays the current reading, polarity of the red pen will be displayed.

Notes:

- a. Before measurement, if the range of the tested current can not be estimated, set the range switch at the maximum range switch (10A shift), and select a proper shift according to the displayed value.
- b. If the screen only displays 1, it means that the tested current is beyond the range, and the range switch shall be shifted higher.
- c. Maximum input current of mA jacket is 200mA
- d. 10A jacket is not provided with fuse, the measurement time shall be less than 10 seconds to avoid precision affected by heating of wires.

4. A.C. current measurement

- 1) The black lead is inserted into COM jacket. When the tested current is less than 200mA, the red lead is inserted into mA jacket; if the tested current is 200mA~10A, the red lead is inserted into 10A jacket.
- 2) Set the range switch at the A.C. current range scope, and the leads is connected with the tested circuit in series connection.

Notes:

Refer to the D.C. current measurement notes a, b, c and d.

5. Resistance measurement

- 1) The black lead is inserted into COM jacket, and the red lead is inserted into V/Ω jacket.
- 2) Set the range switch at Ω range scope, and the leads is connected with the tested circuit in bridge connection.

Notes:

- a. When the tested resistance >1MΩ, reading of the instrument can be stabilized after several seconds, which is normal for measuring high resistance.
- b. When measuring high resistance, the resistor shall be inserted into V/Ω and COM jackets to avoid interference.
- c. When testing online resistors, please confirm that the tested circuit is powered off and the capacitor is fully discharged, and the measurement can be carried out.
- d. In case of short circuit, the range 200MΩ has about indicated value 10, which will be subtracted when measuring. For example, when measuring 100 MΩ resistance, and the displayed value is 101.0, and the results are 101.0 - 10=100.0

6. Capacitance measurement

- 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. Frequency measurement (Only available for BM9208)

- 1) The black lead is inserted into COM jacket, and the red lead is inserted into V/Ω jacket.
- 2) Select a proper range, and the leads is parallelly connected to the tested signal to read the value.

Notes:

- a. Valid value of input voltage value of the frequency shift is 200mV to 10V.

- b. Maximum value of the input protection voltage is 220V.

8. Temperature measurement (Only available for BM9208)

- 1) Red end of model K temperature probe is inserted into mA jacket and the black end is inserted into COM jacket.
- 2) The probing end (also called thermal end) is placed at the forecast environment to observe the instrument reading.


Notes:

- a. When the temperature shift is suspended at the input end, it displays a random value, and temperature of the tested environment can be displayed after the temperature probe is inserted.
- b. When the temperature probe is not inserted into the instrument, the displayed value is meaningless. Limit temperature of the accompanied model K WRNM-010 exposed contact thermal coupler is 250℃ (300℃ for a short while).

9. Crystal triode hFE parameters measurement

- 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 10μA and Vce about 2.8V.



10. Diode measurement

- 1) The black lead inserted into COM jacket, and the red lead is inserted into V/Ω jacket (polarity of the red pen is "+").
- 2) Set the range switch at , and the testing leads is connected with the tested diode in bridge connection.

Notes:

- a. When the input end is open circuit, the instrument displays 1, which is beyond the range.
- b. The displayed value is forward voltage drop value. When the diode is connected in a reverse direction, it is beyond the range.


11. Buzzing continuity conductance testing

- 1) The black lead is inserted into COM jacket, and the red lead is inserted into V/Ω jacket.
- 2) Set the range switch at  range (the same shift with diode  testing), and the leads is connected with both ends of the circuit be tested in bridge connection.
- 3) If resistance between the tested points is less than 50Ω, the buzzer will work.

Notes:

Conductance of the tested circuit must be checked with power off. For any loading signal will make the buzzer make sound which causes error judgment.

12. Infrared remote control signal detection

This shift is set up for measuring whether the infrared remote control transmitter is working properly. When on the shift, Vertically align the transmitting head of the infrared remote control transmitter to the infrared receiver  below the power switch, and keep the deviation not more than ±15°, and then press down the remote control button. If the red LED flashes, indicate that the transmitter is working correctly. Move the transmitter in a certain distance (i.e.1-30cm) to be able to measure the state of the output power of the transmitter.

Note: 1. When the reciver head is exposed directly under strong light, the red indicator will be on, and the light intensity of red indicator will be changed with the strong /weak of the light (This is the reference for Illuminance Meter), so when only detect the infrared remote controller, the reciver of the multimeter should be kept away from strong light source.

2. The transmitting head of the remote controller must be perpendicular to the infrared receiver of the meter. (Maximum deviation angle is:±15°)

13. Identification of live wire (▲)

The red pen is inserted into V/Ω jacket, and the black pen is inserted into COM jacket. Take the insulated part of the black pen by one hand, and do not connected to the line to be tested; ▲ is displayed in the meter when the red pen is connected to the live wire, and ▲ is not displayed in the meter when the red pen is connected to the zero line or the grounding.

Special note: The identification symbol "▲" of the live wire can not be kept.

14. Data holding

When pressing DH key, the data is held on the screen; when the DH key is released, it enters normal measurement conditions again.

Special note: The identification symbol "▲" of the live wire can not be kept.

VI Accessories

1. 1 Instruction manual
2. 1 couple of pen meters
3. 1 piece of PVC protection sleeve
4. Temperature probe of model K (Only available for BM9208)