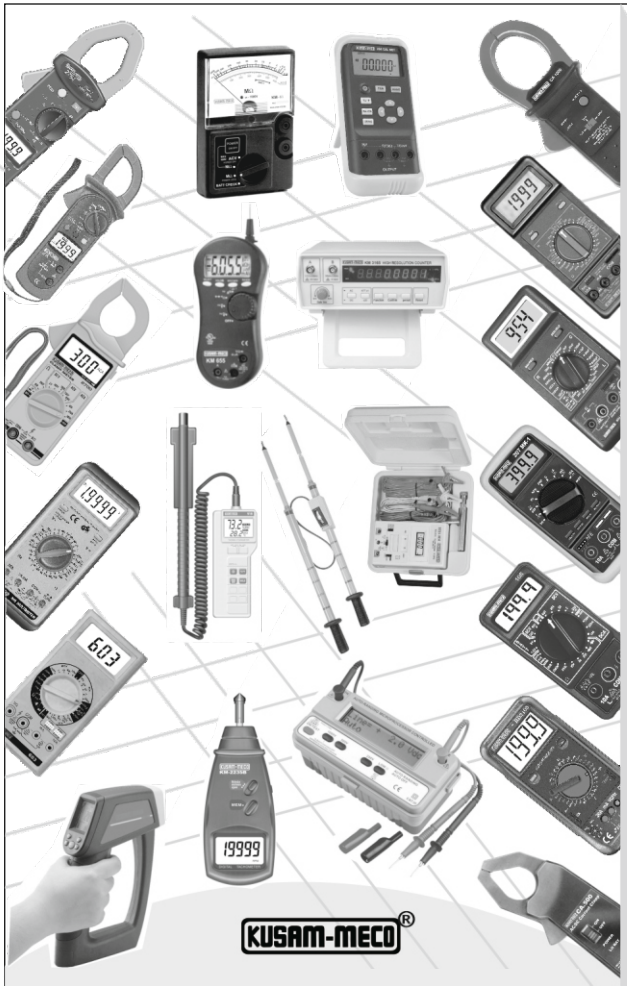


KUSAM-MECO®

Email : sales@kusam-meco.co.in

Website : www.kusamelectrical.com

KUSAM-MECO®

DIGITAL MULTIMETER

MODEL 108

OPERATION MANUAL

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WARRANTY

Each “KUSAM-MECO” product is warranted to be free from defects in material & workmanship under normal use & service. The warranty period is One year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you. This warranty extends only to the original buyer or end-user customer of a “KUSAM-MECO” authorized dealer. This warranty does not apply for damaged Ic’s, Burnt PCB's, fuses, disposable batteries, carrying case, test leads, or to any product which in “KUSAM-MECO’s” opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling. “KUSAM-MECO” authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of “KUSAM-MECO”. “KUSAM-MECO’s” warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a “KUSAM-MECO” authorized service center within the warranty period. THIS WARRANTY IS BUYER’S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. “KUSAM-MECO” SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE WHATSOEVER. All transaction are subject to Mumbai Jurisdiction.

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DIGITAL MULTIMETER

MODEL 108



DT.-09/07

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TAKE MEASUREMENT CAREFULLY AND YOU'LL SPARE YOUR METER AND YOURSELF, SOME PAIN

Nearly every electrical engineer has a hand held Digital Multimeter (DMM). We sometimes take them for granted, until we damage them or "burn them out". If you incorrectly connect your DMM to a circuit or if you have the DMM on wrong setting, you damage the meter and possibly hurt yourself. You can also get into trouble if you try to measure the voltage across a charged capacitor.

DMM users frequently burn their meters by trying to measure current the same way as they measure voltage. Remember, you measure voltage across a circuit, and current through a circuit. When you use the current input, your DMM becomes a low impedance circuit element. If you accidentally connect this low impedance path across your circuit, you'll effectively short-circuit it. You can, therefore send high current through your meter and severely damage it. Unless the meter has a fused input, you can even get an explosion or fire.

Even if you correctly insert your DMM into the circuit, you can still damage your meter. Don't try to measure current in excess of your meter's capacity. Handheld DMMs usually have a maximum current rating of 10A or 20A.

If you are measuring current in industrial environment, you can easily exceed those ratings. The best way to avoid damage is to use a clamp meter or to connect a clamp attachment to your DMM.

To prevent excess current from flowing through your meter, always disconnect the test leads from the circuit under test whenever you change DMM functions. Set your meter to the correct function, say current, and its highest range for the setting, say 10A. Next, connect the test leads before you apply power to the circuit. To be safe, start by setting your meter to its highest range first.

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OVERVIEW

⚠ **Warning**

To avoid electric shock or personal injury, read the "Safety Information" and "Rules for Safe Operation" carefully before using the Meter.

Digital Multimeter Model - 108 (hereafter referred to as "the Meter") is a 3 ½ digits Multimeter with steady operations, and highly reliable hand - held measuring instrument having different measurement positions. The Multimeter not only can measure AC / DC Voltage, DC Current, Resistance, Continuity, Transistor hFE, Diode, but also has Battery check facility.

Terms in this manual

⚠ **Warning** : Identifies conditions and actions that could result in serious injury or even death to the user.

⚠ **Caution** : Identifies conditions and actions that could cause damage or malfunction in the instrument.

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UNPACKING INSPECTION

Open the package case and take out the Multimeter. Check the following items carefully to see any missing or damaged part :

Item	Description	Qty.
1	English Operating Manual	1 piece
2	Test Lead	1 pair

In the event you find any Part missing or damaged, please contact your dealer immediately.

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FEATURES :

- **10A Fused**
- **High - Accuracy, Digital Reading.**
- **Large LCD For Easy Reading.**
- **Buzzer sounds when the lead is connected to wrong input terminals.**
- **Instant Continuity Buzzer.**
- **Overload Protection on all ranges.**
- **Recessed safety designed input jacks.**
- **Overload protection 500V in Resistance Range.**
- **Display :** 3½ digit LCD display (2000 Counts)
- **Digit Size :** 18.5mm(H)

INTERNATIONAL ELECTRICAL SYMBOLS

~	AC (Alternating Current).
⎓	DC (Direct Current).
≂	Both DC & AC.
⏚	Grounding.
⧈	Double Insulated.
- +	Deficiency of Built-In Battery.
•)))	Continuity Test.
→|←	Diode.
⎯▭⎯	Fuse.
⚠	Warning ! Refer to the Operating Manual.
⚡	Caution ! Risk of Electric Shock.

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GENERAL SPECIFICATIONS :

Display	: 3½ digit LCD. Maximum reading 1999 with automatic sign.
Overrange indication	: Highest digit of (1) or (-1) Is displayed.
Low battery	: The " - + " is displayed when The battery voltage drops below the operating voltage.
Measurement rate	: 2.5 measurements per Second, nominal.
Operating temperature	: 0°C to + 50°C, <75% RH.
Storage temperature	: -20°C to 60°C, <80% RH with battery removed.
Accuracy	: Accuracy specifications at 23±5°C less than75%RH.
Power	: Single 9 V Battery.
Dimension	: 151mm (L),70mm(W), 38mm(H)
Weight	: Approx (200 grams) including battery
Alarm	: Buzzer Sounds when the lead is connected to the wrong input terminals.
Accessories	: Test leads, Battery, Operators Manual, Carrying Case, Protective Holster.

ELECTRICAL SPECIFICATION :

DC VOLTAGE

Range	Resolution	Accuracy
200 mV	100 μV	± (2% rdg + 1 dgt)
2 V	1 mV	
20 V	10 mV	
200 V	100 mV	
600 V	1 V	

OL. Protection : 600V DC for 15 sec. on 400mV range, 600V DC or AC on other range

Input Impedance : 10MΩ

AC VOLTAGE

Range	Resolution	Accuracy
200 V	100 mV	± (3% rdg + 4 dgts)
600 V	1 V	

OL. Protection : 600V DC or AC

Input Impedance : 4.5 MΩ

DC CURRENT

Range	Resolution	Accuracy
2 mA	1 μ A	± (2.0% rdg + 1 dgt)
20 mA	10 μ A	
200 mA	100 μ A	
10 A	10 mA	± (3.0% rdg + 1 dgt)

OL. Protection : 10A Input, fuse, 10A/250V For 1.5 sec.

Other range Input : 0.8A/250V Fuse

Voltage Burden : 10A range 700mV MAX

FREQUENCY

Range	Accuracy
0 - 20 KHz	± 4%

Overload Protection : 500 V DC or AC rms

RESISTANCE

Range	Resolution	Accuracy
200 Ω	100 mΩ	± (1.5% rdg + 3 dgts)
2 KΩ	1 Ω	± (1.5% rdg + 1 dgt)
20 KΩ	10 Ω	
200 KΩ	100 Ω	
2 MΩ	1 KΩ	
20 MΩ	10 KΩ	± (3.0% rdg + 3 dgts)

OL. Protection : 500V DC or AC rms.

DIODE TEST

Range	Test Voltage	Accuracy
1.0m ± 0.6mA	3.0V MAX	± (3.0% rdg + 3 dgts)

OL. Protection : 500V DC or AC rms.

CONTINUITY TEST

Audible Sound Buzzer	Less than 100Ω

Overload Protection : 500 V DC or AC rms

TRANSISTOR hFE TEST

Range	Vce	Basic DC Current
0 to 1000	2.8V ± 0.4V	10 μA

BATTERY TEST

Range	Vce	Basic DC Current
1.5 V	1 mV	± (3.0% rdg + 3 dgts)
9 V	10 mV	

Load Current : 1.5V - 150mA, 9V - 6mA

Overload Protection : 500 V DC or AC rms

RULES FOR SAFE OPERATION (1)

⚠ **Warning**

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules :

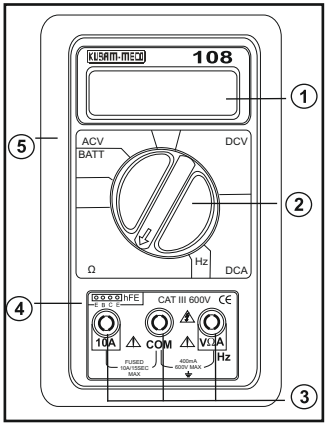
- Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for Continuity. Replace damaged test leads with leads of identical electrical Specifications before using the Meter.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
- The rotary switch should be placed in the right position and no any changeover of range should be made while measurement is conducted to prevent damage of the Meter.
- When measurement is taken at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken for there is danger of electric shock.
- Use the proper terminals, function, and range for your measurements.
- Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after the meter is dampened.

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Rules For Safe Operation (2)

- When using the test leads, keep your fingers behind the finger guards.
- Disconnect circuit power and discharge all high -voltage capacitors before testing resistance, continuity, diodes, or current.
- Replace the battery as soon as the battery indicator  appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
- Turn the Meter power off when it is not in use and take out the battery when not using for a long time.
- Constantly check the battery as it may leak when it has not been used for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

THE MULTIMETER STRUCTURE (see figure 1)



(Figure 1)

1) **LCD DISPLAY :**
   A 3½ digit display (maximum reading 1999) indicates measured values, Low Battery.
2) **FUNCTION SELECTOR :**
   To Select ACV, DCV, DCA, Resistance, Diode Test, Continuity Test, Transistor Test & Battery Check.
3) **INPUT JACKS (VΩ, COM and A) :**
   Test leads are inserted into these jacks for Voltage, Current, Resistance measurement and Continuity, Diode and Battery test.
4) **INPUT SOCKET FOR TRANSISTOR TEST :**
   PNP and NPN transistors are inserted into these sockets for their measurement values.
5) **Protective Holster :**
   To prevent damage to the meter.

FUNCTIONAL BUTTONS

Below table indicates the functional button operations.

Buttons	Operation Performed
POWER (Black Switch)	Turn the Meter on and off. ● Rotate the **SWITCH** to turn on the Meter. ● Rotate the **SWITCH** to turn off the Meter.

DISPLAY SYMBOLS (see figure 2)



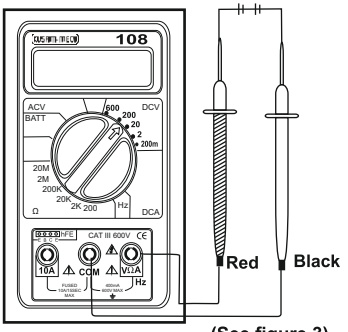
(Figure 2)

No.	Symbol	Meaning
1	⚡	Dangerous Voltages.
2	- +	The battery is low. ⚠ Warning : To avoide false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.
3	—	Indicates negative reading.

MEASUREMENT OPERATION

- Make sure the Low Battery display - + is not on, otherwise false readings may be provided.
- Pay extra attention to the ⚠ symbol which is located besides the input terminals of the Meter before carrying out measeurement.

A. DC VOLTAGE MEASUREMENT



(See figure 3)

⚠ **Warning**

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 600V DC or 600V rms AC although readings may be obtained.

The DC Voltage ranges are : 200mV, 2V, 20V, 200V and 600V. To measure DC voltage, connect the Meter as follows.

1) Insert the red test lead into the **VΩ** →|— input terminal and the black test lead into the **COM** input terminal

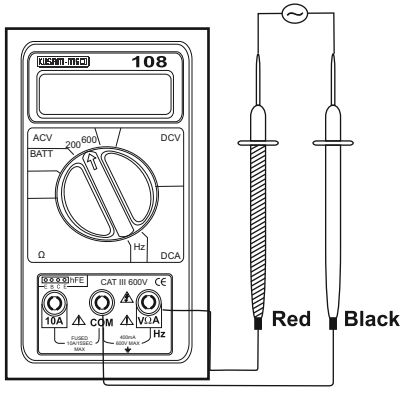
2) Set the rotary switch to an appropriate measurement position in V ⎓ range.

3) Connect the test leads across with the object being measured.
The measured value is shown on the display.

Caution :

- If the value of voltage to be measured is unknown, use the maximum measurement position (600V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays "1" indicating the existing selected range is overloaded, it is required to select a higher range in order to obtain a correct reading.
- In each range, the Meter has an input impedance of approx. 10MΩ . This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ , the error is negligible (0.1% or less).
- When DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

B. AC VOLTAGE MEASUREMENT



(see figure 4)

Warning :

To avoid harm to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 600V DC or 600V rms although readings may be obtained.

The AC Voltage measurement has 2 measurement positions on the rotary switch : 200V and 600V

To measure AC Voltage, connect the Meter as follows :

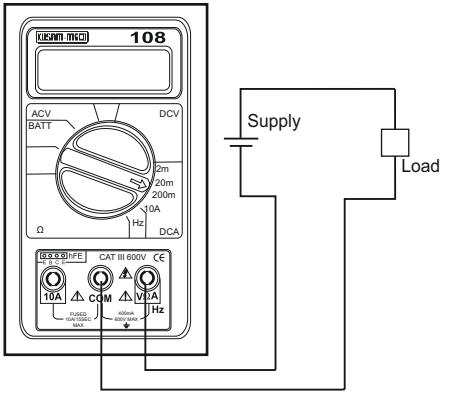
1) Insert the red test lead into the VΩ→|← terminal and the black test lead into the **COM** terminal.
2) Set the rotary switch to an appropriate measurement position in V ~ range.
3) Connect the test leads across with the object being measured.
   The measured value is shown on the display.

Caution :

- If the value of voltage to be measured is unknown, use the maximum measurement position (600V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays " 1 " indicating the existing selected range is overloaded, it is required to select a higher range in order to obtain a correct reading.
- When AC Voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

C. DC CURRENT MEASUREMENT

(see figure 5)



Warning :

Never attempt an in - circuit current measurement where the open circuit voltage between terminals and ground is greater than 60V DC or 30V rms. If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. Use proper terminals, function, and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

The DC current measurement has 4 measurement positions on the rotary switch : 2mA, 20mA, 200mA and 10A.

To measure DC current, Connect the meter as follows :

1) Turn off power to the circuit. Discharge all high - voltage capacitors.
2) Insert the red test lead into the mA or 10A terminal and the black test lead into the **COM** terminal
3) Set the rotary switch to an appropriate measurement position in mA or A range.
4) Break the current path to be tested. Connect the red test lead to the positive side of the break and the black test lead to the negative side of the path.
5) Turn on power to the circuit.
   The measured value is shown on the display.

Caution :

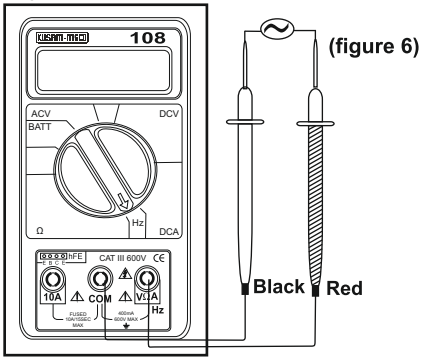
- If the value of current to be measured is unknown, use the maximum measurement 10A position terminal, and reduce the range step by step until a satisfactory reading is obtained.
- When current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

D. FREQUENCY MEASUREMENT

⚠ Warning

To avoid harm to you or damages to the Meter, do not attempt to measure voltages higher than 60V AC although reading may be obtained.

When the frequency signal to be tested is higher than 30V rms, the Meter cannot guarantee accuracy of the measurement.



(figure 6)

The frequency measurement range is 20KHz.
To measure frequency, connect the Meter as follows.

1) Insert the red test lead into the VΩ terminal and the black test lead into the COM terminal.
2) Set the rotary switch in the Hz range.
3) Connect the test leads accross with the object being measured.

The measured value is shown on the display.

⚠ Caution

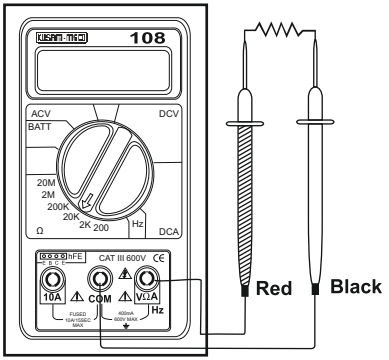
- When Hz measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

E. RESISTANCE MEASUREMENT

⚠ Warning

To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.

(figure 7)



The resistance range has 6 measurement positions on the rotary switch : 200Ω, 2KΩ, 20KΩ, 200KΩ, 2MΩ, 20MΩ.

To measure resistance, connect the meter as follows :

1) Insert the red test lead into the VΩ terminal and the black test lead into the **COM** terminal.
2) Set the rotary switch to an appropriate measurement position in Ω range.
3) Connect the test leads across with the object being measured.
The measured value is shown on the display,

Note :

- The test leads can add 0.1Ω to 0.3Ω of error to the Resistance measurement. To obtain precision readings in low-resistance, that is the range of 200Ω, short-circuit the input terminals beforehand and record the reading obtained (call this reading as X). (X) is the additional resistance from the test lead.
  Then use the equation :
  Measured resistance value (Y) - (X) = precision readings of resistance.
- When there is no input, for example in open circuit condition, the Meter displays " 1" When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

⚠ Caution :

1) Never connect high voltage to the input sockets with the switch in Resistance range.

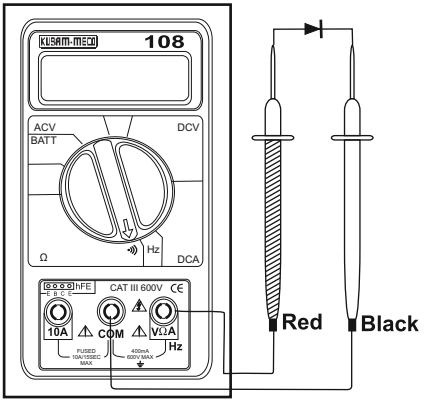
2) Using Resistance measurement function in a Live circuit will produce false results and may damage the instrument. In many cases the suspect component must be disconnected from the circuit to obtain an accurate reading.

F. MEASURING DIODES & CONTINUTY

(See figure 8)

⚠ Warning

To avoid damage to the Meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring diodes and continuity.



(figure 8)

TESTING DIODES

Use the diode test function to check diodes, The diode test sends a current through the Semiconductor junction, and then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

To test a diode out of a circuit, connect the Meter as follows :

1) Insert the red test lead into the VΩ → terminal and the black test lead into the **COM** terminal.

2) Set the rotary switch to →|← position.

3) For forward voltage drop reading on any Semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode. The measured value is shown on the display.

⚠ Caution :

- In a circuit, a good diode will produce a forward voltage drop reading of 0.5V to 0.8V; however ; the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- Connect the test leads to the proper terminals as said above, to avoid error display. The LCD will display "1" indicating open-circuit for wrong connection. The unit of diode is Volt (V), displaying the positive connection voltage-drop value.
- When diode testing has been completed, disconnect the connection between the testing leads and the circuit under test.

TESTING FOR CONTINUITY

To test for continuity, connect the Meter as follows :

1. Insert the red test lead into VΩ →|← terminal and the black test lead into the **COM terminal.**
2. Set the rotary switch to •)) position
3. Connect the test leads across with the object being measured.
   The buzzer sounds if the resistance of a circuit under test is less than 30Ω.
   The LCD displays the resistance value of a circuit under test.

⚠ Caution :

- The LCD displays "1" indicating the circuit being tested is open.
- When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test.

G. TRANSISTOR TESTING

To test the Transistors, connect the Meter as below :

1. Switch on the meter in the transistor measurement mode.
1. Insert the transistor (NPN or PNP) in the sockets provided.
2. The measured value is shown on the LCD display.

H. BATTERY TEST

To test the battery, connect the Meter as below :

1. Connect the red test lead to the VΩ terminal and the black test lead in the COM terminal.
2. Set the Function / Range switch to the desired 1.5V or 9V.
3. Connect the test leads to the 1.5V DC battery under test. Normally a good 1.5V battery will read above 1.4V.

Consult the battery manufacturer for complete battery specifications to determine actual battery life remaining & condition of battery.

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MAINTENANCE

⚠**Warning**
To avoid false reading, replace the battery as soon as the battery indicator appears.

TO REPLACE BATTERY :

- Disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the meter.
- Turn the Meter OFF.
- Remove the screws from the bottom case and separate the bottom case from the front case.
- Remove the battery from the battery compartment.
- Replace the battery with a new standard 9V Battery.
- Rejoin the bottom case and the front case, and reinstall the screw.

TO REPLACE FUSE :

- Disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals.
- Turn the Meter OFF.
- Remove the screws from the bottom case and separate the bottom case from the front case.
- Remove the burnt fuse from the fuse holder and insert a new fuse with the same electrical specifications.
- Rejoin the bottom case and the front case, and reinstall the screw.

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TEST CERTIFICATE

DIGITAL MULTIMETER

This Test Certificate warrantees that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. **108**

SERIAL NO. _____

DATE: _____

ISO 9001:2015
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