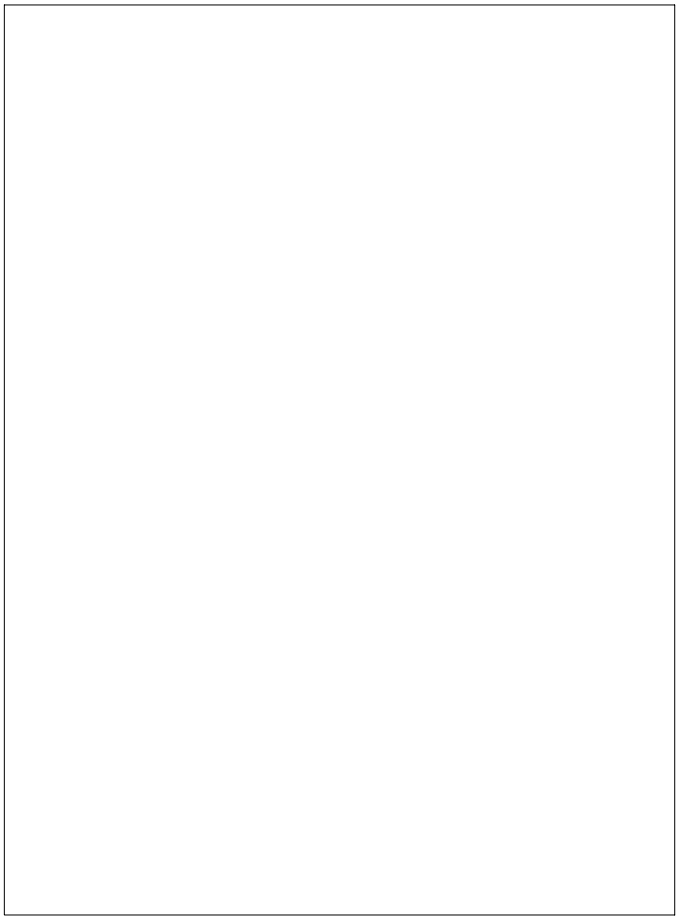
MILLIOHM METER *Bench type*

Model : MO-2002



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1. FEATURES

* 4 terminal devices for accurate measurement of very low resistance.
* Ideal for measuring the resistance of components precisely.
* Ideal for testing protective conductors, lightning conductors and welded points.
* Wide measuring range, 0.01 m ohm - 20K ohm, 7 ranges.
* 20 mm, large size LED display, easy read-out.
* LSI circuit provides high accuracy, reliability and durability.
* Built-in over input protection.
* Durable bench type housing plastic case stand.

2. SPECIFICATIONS

2-1 General Specifications

Test Range (Test Current)	20 m ohm (1 A DC) 200 m ohm (1 A DC) 2 ohm (100 mA DC) 20 ohm (10 mA DC) 200 ohm (1 mA DC) 2 K ohm (100 uA DC) 20 K ohm (10 uA DC)
Warning Setup	* Warning LED Indicator * Buzzer
Operating Temp.	0to 50C (32to 122F).
Operating Humidity	Less than 80 % R.H..
Power Supply	AC 110V 15%, 50/60 Hz or AC 230V 15%, 50/60 Hz.
Fuse for Power Supply	* 500 mA/250 V * Size : 5 X 20 mm dia..

Dimension	280 x 210 x 90 mm (11.0 x 8.3 x 3.5 inch)
Weight	Approx. 2.2 Kg (4.85 LB).
Standard Accessories	Power Cord.....1 PC. 4 wire with 2 Kelvin clips.....1 pair. Instruction Manual.....1 PC.

2-2 Electrical Specifications (23± 5 ℃)

Range	Resolution	Test current	Accuracy
20 m ohm	0.01 m ohm	1 A	± (0.2 % + 6 d)
200 m ohm	0.1 m ohm	1 A	± (0.2 % + 4 d)
2 ohm	1 m ohm	100 mA	
20 ohm	0.01 ohm	10 mA	
200 ohm	0.1 ohm	1 mA	
2 K ohm	0.001 K ohm	100 uA	
20 K ohm	0.01 K ohm	10 uA	
@ The above accuracy is based on the reading value. *@ Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.*			

Range	Open Circuit Voltage
20 m ohm	Approx. DC 2.7 V
200 m ohm	Approx. DC 3.3 V
2 ohm	Approx. DC 3.5 V
20 ohm	Approx. DC 4.1 V
200 ohm	Approx. DC 4.5 V
2 K ohm	Approx. DC 4.5 V
20 K ohm	Approx. DC 4.5 V

3. FRONT PANEL DESCRIPTION

Fig. 1

3-1	Power Switch	3-9	HI Set VR
3-2	Range Selector	3-10	LO Set VR
3-3	HI/LO Selector	3-11	Display
3-4	Test/Set Selector	3-12	HI Indicator
3-5	Force Terminal "+"	3-13	GO Indicator
3-6	Sense Terminal "+"	3-14	LO Indicator
3-7	Sense Terminal "-"	3-15	Buzzer Switch
3-8	Force Terminal "-"	3-16	Power Socket (Fuse included)

4. BASIC 4 WIRES MEASURING PRINCIPLE

The DIGITAL MILLIOHM METER is a precise, wide range, small resistance and high resolution measuring instrument. As for preventing any measuring errors, especially to avoid the influence of "LEAD STRAY RESISTANCE" or "TEST WIRE'S RESISTANCE", the meter is designed according to the following "4 WIRES MEASURING PRINCIPAL" to maintain the meter in high accuracy.

Fig. 2

* Please refer to 2-2 Electrical Specification (page 2), each range exists fixed test current (from 20K to 20m ohm).
* The fixed current flow through the unknown resistor Rx.
* From the terminal " Sense + " and " Sense - " can measure a voltage Vx = Is x Rx.
* According the Vx value, then meter can get the unknown resistance (Rx) values from following formula :

  Rx = Vx/Is

* The measured resistance value between "Sense +" and "Sense -"is not affected by any stray resistance of test wire.

5. PRECAUTION & PREPARATIONS FOR MEASUREMENT

* Please check carefully the meter's power supply is AC 110 V or AC 230 V (220 V, 240 V) before operating the meter. There is a label at the rear of the meter that shows the power source of the meter.
* It's prohibited to input voltage to the 4 wire input terminal (Force +, Sense +, Sense -, Force -) to prevent any internal circuit damage.

6. MEASURING PROCEDURES

1) Power on the instrument by pressing the " Power Switch " (3-1, Fig. 1) to the " ON " position and then select measuring range from 20 m ohm to 20K ohm according to your requirement. Make sure the " Set/Test Switch " (3-4, Fig. 1) at the " Test " position.

Note :

Always select the highest range (20K ohm) if you don't know the resistance value of the resistor and then select lower range in sequence.

** Over range LED shows " 1 ".*

** Can't measure the resistance value LED shows " 000 ".*

2) *Connect the*

** Red cable (with white O ring marker) to " Force + " terminal (3-5, Fig. 1)*

* Red cable (no white O ring marker) to " Sense + " terminal (3-6, Fig. 1)

** Black cable (with white O ring marker) to " Force - " terminal (3-8, Fig. 1)*

* Black cable (no white O ring marker) to " Sense - " terminal (3-7, Fig. 1)

3) Connect the 2 Kelvin clips as following Fig. 3 to measure the unknown resistance.

Fig. 3

7. HI / LO WARNING SETUP

This instrument has Hi, Lo warning value setup function and a buzzer which are specially designed for quality control. For instance monitoring a batch of 180 ohm resistor with 0.5% accuracy.

1) Hi warning value setup
   Set the " Test/Set Selector " (3-4, Fig. 1) and " HI/LO selector " (3-3, Fig. 1) at " Set " and " HI " position and then adjust the " HI Set VR " (3-9, Fig. 1) until the LED display shows 180.9.
2) LO warning value setup
   Set the " Test/Set Selector " (3-4, Fig. 1) and " HI/LO selector " (3-3, Fig. 1) at " Set " and " LO " position and then adjust the " LO Set VR " (3-10, Fig. 1) until the LED display shows 179.1.
3) Clip the resistor with the 4 wire Kelvin Clips and set the " Test/Set Selector " (3-4, Fig. 1) at " Test " position. At the mean time the LED display tells you the resistance value of the resistor and you can judge whether the value is within accuracy by watching the HI, GO, LO indicator.

HI indicator lighting :
Out of the accuracy, higher than maximum acceptance resistance value.

GO indicator lighting :
Resistance value within the accuracy. Pass the Q.C.

LO indicator lighting :
Out of the accuracy, lower than minimum acceptance resistance value.

Buzzer On / Disable

When GO indicator lights, the buzzer sounds to assist the Q.C. judgment. To disable the buzzer by setting the buzzer Switch (3-15, Fig. 1) in the rear panel at " OFF " position.