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# Manual

## Electric resistance tester

### PCE-MO 2001



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## 1. Features

- 4 terminal devices for accurate measurement of very low resistance.
- Ideal for measuring the resistance of the motor coil, transformer, PCB layout.
- Ideal for testing protective conductors, lightning conductors and welded points.
- Wide measuring range, 0.1 m ohm - 2000 ohm, 5 ranges.
- 18 mm, large size LCD display, easy to read-out.
- LSI circuit provides high accuracy, reliability and durability.
- Built-in over input.
- Durable & portable housing plastic case with the front protective cover.

## 2. Specifications

### 2.1 General Specifications

|                       |   |
|-----------------------|---|
| Display               | 18 mm ("0.7") LCD, Max. Indication 1999.  |
| Range                 | 200 m ohm, 2,000 m ohm, 20 ohm, 200 ohm, 2000 ohm.  |
| Zero                  | External adjustment for zero value of the display. Adjusting range approx. $\pm 50$ counts. |
| Input Terminal        | 4 terminal input, accurate for low ohms measuring.  |
| Over input Indication | Indication of "1".  |
| Sampling Time         | Approx. 0.4 sec.  |
| Operating Temp        | 0° to 40°C (32° to 104°F).  |
| Operating Humidity    | Less than 80% R.H..   |
| Fuse                  | 500 mA, 250 V, size :5 x 20 mm.   |
| Power Supply          | AC 110V $\pm 10\%$ , 50/60 Hz or AC 230V $\pm 10\%$ , 50/60 Hz.                             |
| Power Consumption     | Less than 2 VA.   |
| Dimension             | 160 x 120 x 85 mm, with housing front cover.  |
| Weight                | Approx. 680 g (1.5 LB)  |
| Standard Accessories  | Power Cale.....1 PC<br>4 wire with 2 kelvin clips.....1 pair<br>Instruction manual.....1 PC |

### 2.2 Electrical Specifications (23 $\pm$ 5°C)

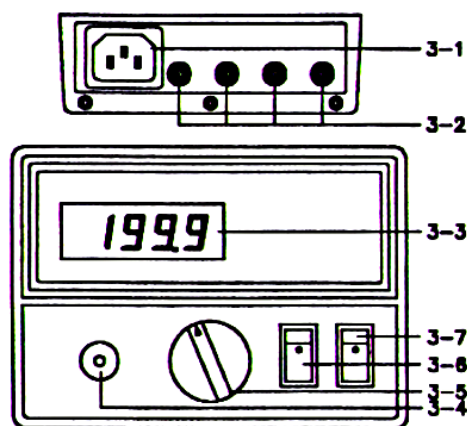
| Range      | Resolution | Test current | Accuracy           |
|------------|------------|--------------|--------------------|
| 200 m ohm  | 0.1 m ohm  | 100 mA       | $\pm(0.75\% + 4d)$ |
| 2000 m ohm | 1 m ohm    | 10 mA        |                    |
| 20 ohm     | 10 m ohm   | 10 mA        |                    |
| 200 ohm    | 0.1 ohm    | 1 mA         | $\pm(0.75\% + 2d)$ |
| 2000 ohm   | 1 ohm      | 1 mA         |                    |

| Range      | Open circuit voltage |
|------------|----------------------|
| 200 m ohm  | Approx. 3.8 V DC     |
| 2000 m ohm | Approx. 3.4 V DC     |
| 20 ohm     | Approx. 3.4 V DC     |
| 200 ohm    | Approx. 3.2 V DC     |
| 2000 ohm   | Approx. 3.2 V DC     |

Remark:

Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.

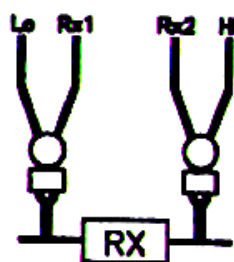
### 3. Front Panel Description



- 3-1 AC Power Input Socket
- 3-2 4 Wires Input Terminal
- 3-3 Display
- 3-4 Zero Adjust Knob
- 3-5 Power Off/Range Rotary Switch

### 4. BASIC 4 WIRES MEASURING PRINCIPLE

The DIGITAL MILLIOHM METER is the precision, wide range & small resistance with high resolution measuring instrument. As for preventing any measuring errors, especial to avoid the influence of "LEAD STRAY RESISTANCE" or "TEST WIRE'S RESISTANCE". The meter is designed according the following "4 WIRES MEASURING PRINCIPAL" to let the meter within high accuracy.



- \* Please refer to 2.2 Electrical Specification ( page 3 ), each range exist the exciting test current (from Hi to Lo terminal ).
- \* The standard current is dropped to the unknown resistor Rx.
- \* From the terminal Rx1, Rx2 can measure a voltage :  $V_x = I_s \times R_x$ .
- \* According the  $V_x$  value, then meter can get the unknown resistance (Rx) values from following formula :  

$$R_x = \frac{V_x}{I_s}$$
- \* The measured resistance between Rx 1 and Rx 2 is not affected by any stray resistance of test wire.

## 5. PRECAUTION & PREPARATIONS FOR MEASUREMENT

1. Please check carefully if the meter's power supply is AC 110 V or AC 220 V before operating the meter. There is a label at the rear of the meter to show the proper power source outlet AC 110 V or AC 220 V. Please don't input voltage to input terminal (Lo, Rx1,Rx2, Hi ) to prevent any internal circuit damage.



Caution:  
Do not touch the power source outlet & the power cord plug. Risk of electric shock!



Caution:  
Do not apply any voltage to the input terminal!  
Please check the right power supply voltage (110 Vac or 230 Vac ) before operating the meter.

2.
  - a. Engage the "Power On/Off Switch ( Fig.1) to the " On" position ("12 position).
  - b. Rotate the " Power off/Range Rotary Switch " (Fig. 1) to the convenient & right range 200 m ohm, 2000 m ohm, 20 ohm, 200 ohm, 2000 ohm.
  - c. Engage the "200 m ohm/200 m ohm, 20 ohm, 200 ohm, 2000ohm Select Switch"( Fig. 1) to the "200ohm" position for the 200 m ohm range measurement.
  - d. Engage the "200m ohm/200 m ohm , 200 ohm, 2000 ohm Select Switch" (fig. 1) to the "2000 m ohm, 20 ohm, 200 ohm, 2000 ohm "position except the 200 m ohm range measurement.
3. After select the above right range, then should make the following " ZERO ADJ. PROCEDURE ":
  - a. Short the 2 clips.
  - b. Rotate the "Zero Adjust Knob" (3-4, Fig. 1) until the display reading values show the zero values.
 Consideration:
  - Zero adjustment is necessary for range 200 m ohm, 2000 m ohm, 20 ohm only.
  - Recommend user select 200 m ohm range to make "ZERO ADJ. PROCEDURE"
4. Connect the 2 clips as following Fig. 3 to measure the unknown resistance.

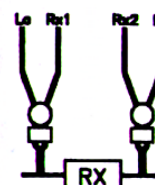


Fig. 3

5. Connect the 2 Kelvin clips as following Fig. 4 to measure the unknown resistance between two test points, such as PCB layout.

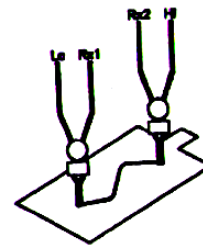


Fig. 4

## 6. MEASURING PROCEDURES

1. Rotate the " Power off/Range Rotary Switch " ( 3-5, Fig. 1)to the convenient & right range 200 m ohm, 2000 m ohm, 20 ohm, 200 ohm, 2000 ohm.



- This instrument contains no operator serviceable parts, service by qualified persons only.
- Cleaning Only use the dry cloth to clean the plastic case!

In this direction will find a vision of the measurement technique:  
<http://www.industrial-needs.com/measuring-instruments.htm>

**NOTE:** "This instrument doesn't have ATEX protection, so it should not be used in potentially explosive atmospheres (powder, flammable gases)."