USER MANUAL

MICROOHM METER

PCE-MO 2005

ENGLISH

User manuals in various languages (français, italiano, español, português, nederlands, türk, polski) can be found via our product search on:
www.pce-instruments.com

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
- Maximum test current is 10A (60000 uΩ range only)
- Two working modes: Resistive (normal) and Inductive mode.
- Good / Fail set-function for input quality control
- Built-in buzzer sound (GOOD STATUS) to assist the Q.C. judgment
- Special „CALCULATE"-function to measure cable / wire length
- Wide measuring range: 5 u Ω - 6K Ω, 6 ranges
- Large size and back-light LCM display, easy read-out
- LSI circuit provides high accuracy, reliability and durability
- Built-in over input protection
- Durable bench type housing plastic case stand

SPECIFICATIONS

General Specifications

Test Range (Test Current)	60000 uΩ (10 A DC) 600 m Ω (1 A DC) 6000 mΩ (100 mA DC) 60000 mΩ (10 mA DC) 600 Ω (1 mA DC) 6000 Ω (100 uA DC)
Warning Setup	- Warning LCD-Indicator - Buzzer
Operating Temp.	0 ... 50°C / 32 ... 122°F
Operating Humidity	Less than 80 % R.H.
Power Supply	DC 1.5 V, AA (UM-3) Battery X 8 PCs. AC to DC 9V Power adapter

Fuse protection	» 10 A / 250 V » Size: 6.3 x 32 mm dia.
Dimension	225 x 125 x 64 mm (8.86 x 4.92 x 2.52 inch)
Weight	Approx. 790 g (1.74 LB)
Standard Accessories	4 wire with 2 Kelvin clips.....1 pair Instruction Manual.....1 PC AC/DC 9V power adapter.....1 set
Optional Accessories	» USB cable, USB-01 » RS232 cable, UPCB-02 » Data Acquisition software, SW-U801-WIN., SW-E802 » SD card data recorder, DL-9602SD

Electrical Specifications (23± 5 °C)

Range	Resolution	Test current	Accuracy
60000 u Ω	1 u Ω	10 A	± (0.25 % + 25 d)
600 m Ω	10 u Ω	1 A	
6000 mΩ	100 u Ω	100 mA	
60000 mΩ	1000 u Ω	10 mA	
600 Ω	10 mΩ	1 mA	
6000 Ω	100 mΩ	100 mA	± (0.75 % + 3 d)
@ 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
60000 u Ω	Approx. DC 4.33 V
600 m Ω	Approx. DC 4.33 V
6000 mΩ	Approx. DC 4.33 V
60000 mΩ	Approx. DC 4.33 V
600 Ω	Approx. DC 4.33 V
6000 Ω	Approx. DC 4.33 V

FRONT / REAR PANEL DESCRIPTION

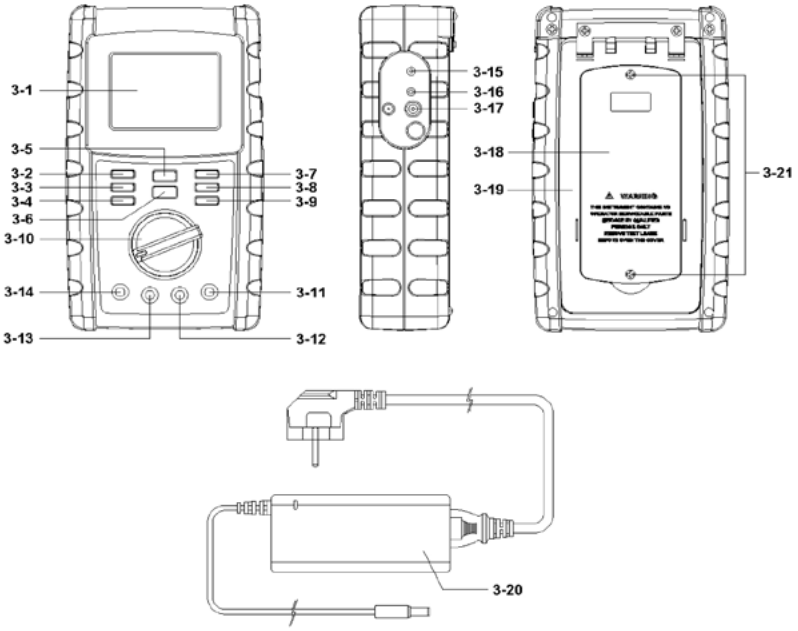


Fig. 1

3-1 Display
3-2 Backlight key
3-3 Zero key
3-4 SET / TEST key
3-5 HOLD key
3-6 START / STOP key
3-7 L / ▲ key
3-8 Beep / ◀ key
3-9 COMP / ▼ key
3-10 Power / Range rotary switch
3-11 Force Terminal „+“
3-12 Sense Terminal „+“
3-13 Sense Terminal „-“
3-14 Force Terminal „-“
3-15 RS232 socket
3-17 DC 9V power adapter socket
3-18 Battery Cover / Battery compartment
3-19 Stand
3-20 AC/DC 9V power adapter
3-21 Battery cover screws

BASIC 4 WIRE MEASURING PRINCIPLE

The **DIGITAL MICRO-OHM 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 WIRE MEASURING PRINCIPAL“ to maintain the meter in high accuracy.

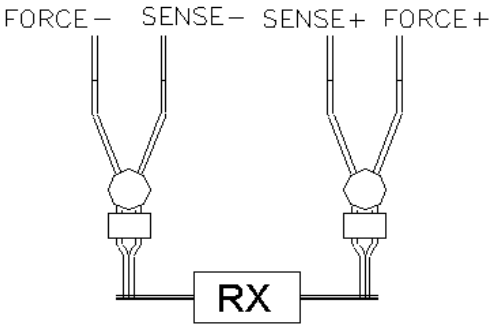


Fig. 2

- Please refer „Electrical Specification“,
  Each range has a predetermined test current (from 6000 Ω to 60000 uΩ).
- The unknown resistor Rx is subjected to a set current flow.
- From the terminal „Sense +“ and „Sense -“ you can measure a voltage Vx = Is x Rx.
- The meter can use the following formula to determine the unknown resistance (Rx) value based on the Vx value:

$$Rx = Vx / Is$$

- The measured resistance value between „Sense +“ and „Sense -“ is not affected by any stray resistance of the test wire.

RECAUTION & PREPARATIONS FOR MEASUREMENT

- Before using the meter in the 60000 uΩ range, please make sure that the power supply is a DC 9V power adapter.
- It's prohibited to input voltage to the 4 wire input terminal (Force +, Sense +, Sense -, Force -) to prevent any internal circuit damage.

MEASURING PROCEDURES

Key instructions

Key	Function
Backlight key	Press this key to turn the backlight on and off.
ZERO key	When a few readings are shown on the display prior to measurement.
SET / TEST key	Press this key to do HI / LO limit setup. Press this key to return to the TEST status.
HOLD key	Press this key to do data hold.
START / STOP key	Press this key to start or stop a measurement.
L /▲ key	Press this key to set the work mode (Resistive or Inductive). Press this key to adjust up value.
BEEP / ◀ key	Press this key to open / close the buzzer function. Press this key to select the digit unit.
COMP / ▼ key	Press this key to start „GOOD, FAIL“ status judgment. Press this key to adjust down value.

Symbols & units of display

Symbol & Unit	Function
uΩ, mΩ, Ω	Ohm unit
.)))	Appears when the „BEEP“ function has started.
HOLD	Appears when the “HOLD“ function has started.
GOOD	Has passed Q.C. Appears when the comparison operation is complete.
FAIL	It is higher or lower than maximum / minimum accepted value. Appears when the comparison operation is complete.
COMP	Appears on the “COMPARE“ function.
L	Appears on the “INDUCTIVE“ mode.
HI	Appears to showing HI limit.
LO	Appears to showing LO limit.

Resistance Measurement

1. Power on the instrument by rotating the „Power / Range rotary switch“ to exit the „OFF“ position and then select measuring range from 60000 uΩ to 6000 Ω according to your requirement.

Note:

» **Always select the highest range (6000 Ω) if you don‘t know the resistance value of the resistor and then select lower range in sequence.**

» **At 60000 uΩ (10A) a DC 9V adapter must be used from socket.**

» **Over range LCD shows „-----“.**

» **Can‘t measure the resistance value, LCD will show 0.0000, 0.000 or 0.00.**

2. Connect the

» Red cable (with white O ring marker) to „Force +“ terminal

» Red cable (no white O ring marker) to „Sense +“ terminal

» Black cable (with white O ring marker) to „Force -“ terminal

» Black cable (no white O ring marker) to „Sense -“ terminal

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

4. Press the „START / STOP“ key to start measuring the unknown device. Press once again to stop the measure function and freeze the result at LCM.

5. When your tested material has inductive, you can press „L / ▲“ key to change to inductor mode (at 600 mΩ and 60000 uΩ range), Display will showe „L“ mark (normal is resistor mode).

HI / LO WARNING SETUP

This instrument has Hi, Lo warning value setup function and a buzzer which are specially designed for quality control.
To enter setting mode, first click the „SET / TEST“ button.

1. Hi warning value setup
The last digit should flash at „H i warning value“ on the display. Then press „L / ▲“ keys to increase or „COMP / ▼“ key to decrease the digit that you want to alter the value. Press the „BEEP / ◄“ key to set warning value. When used to move 1st digit unit to next digit unit (10th, 100th. 1000th).

» **Hypothesize display is set at 180.00.**

2. LO warning value setup
Finish (1) procedure then press the „SET / TEST“ key again. The last digit should flash at „LO warning value“ on the display. Other ways of operating are explained above.

» **Hypothesize display is set at 179.00.**

3. Finish (1)(2) procedure then press the „SET / TEST“ key once. The function should return to TEST MODE and indicate measure value when clipping the resistor.

4. When measuring period press „COMP / ▼“ key once. The display will show „GOOD“ or „FAIL“ symbol to show the measuring results.

For example:

a. The value was readout 179.50. The display should show „GOOD“ symbol and buzzer sounds (If buzzer function has been pressed on status, the buzzer sounds can hrlp to assist Q.C judgment). The resistance value within the accuracy passes the Q.C.

» **Press „BEEP / ◂“ key once to start buzzer, press once again to disable „BEEP“ function.**

b. The value was readout 180.10 or 178.60. The display should show „FAIL“ symbol. The resistance value is outside the accuracy.

CALCULATE CABLE / WIRE LENGTH

Calculate the cable length before measuring. You should sample one unit length (meter or feet).

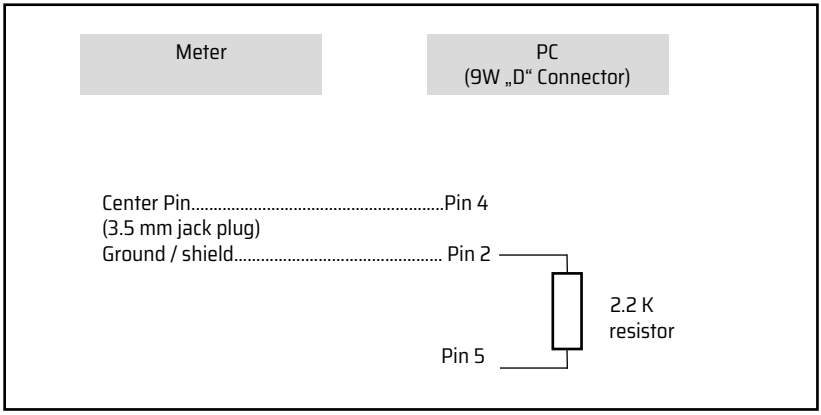
1. First, take one sample from a long cable or wire. Then measure 1 m or 1 feet length - unit.
2. Measue the unknown cable. Wait a moment until the reading is stable. Stop the measureing action and hold the range.
3. Press „HOLD“ key to release HOLD status.
4. Press „SET / TEST“ key more than three seconds into sample unit mode.
5. Then press „L / ▴“ key or „COMP / ▾“ key to select unit (meter or feet).
6. Press „START / STOP“ key to sample the unit value.
7. Press „SET / TEST“ key to save the value and show the cable length.The length of the unknown cable is now measured.
8. Once, press „SET / TEST“ key more than 3 secend. Will return to measure mode.

RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal.

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format:

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicates the following status:

D15	Start Word, 02
D14	4
D13	1

D12, D11	Annunciator for Display		
	Ω = 38	mΩ = B1	uΩ = F5
D10	Polarity 0 = Positive 1 = Negative		
D9	Decimal Point (DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D8 to D1	Display reading, D1 = LSD, D8 = MSD, for example:		
	If the display reading is 1234, then D8 to D1 is: 00001234		
D0	End Word, 0D		

RS232 FORMAT: 9600, N, 8, 1

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

BATTERY REPLACEMENT

1. When the left corner of LCD display shows „  “, it is necessary to replace the battery. However, in-spec. measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
2. Loose the „Battery Cover Screws“ and take away the „Battery Cover“ from the instrument and remove the battery.
3. Replace with DC 1.5 V battery (UM3, AA,Alkaline/heavy duty) x 8 PCs, and reinstate the cover.
4. Make sure the battery cover is secured after changing the batteries.

DISPOSAL

For the disposal of batteries in the EU, the (EU) 2023/1542 directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose. In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law. For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations. If you have any questions, please contact PCE Instruments.

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