

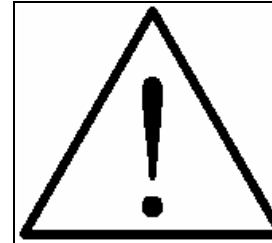
PROVA 710

Micro-Ohmmeter

User Manual



WARNING



Do not use the ohmmeter before you read the following instructions.

Do not measure any resistance (object) with electrical potential (voltage). The electrical potential (voltage) could cause damage to the ohmmeter.



Do Not Plug in the AC adapter when the ambient temperature exceeds 45°C / 113°F .



Do Not charge the lithium battery when the ambient temperature exceeds 45°C / 113°F .

PROVA INSTRUMENTS INC.

Table of Contents

I. Warning	1
II. Features	2
III. Panel Description	3
A. Front Panel	3
B. Rear Panel	7
C. Top Panel	8
IV. Operation	9
A. Resistance Measurement with Test Leads	9
B. Manual Range (Sub-Range)	12
C. Alarm Function	12
D. Cable Length Measurement	13
E. Setup or Recall HI / LO Limits and Resistance per unit	13
F. RECORD & READ Functions	15
V. Specifications	16
A. Electrical Specifications	16
B. General Specifications	17
VI. Battery Recharging	18
VII. Battery Replacement	18
VIII. Maintenance & Cleaning	19

I. Warning

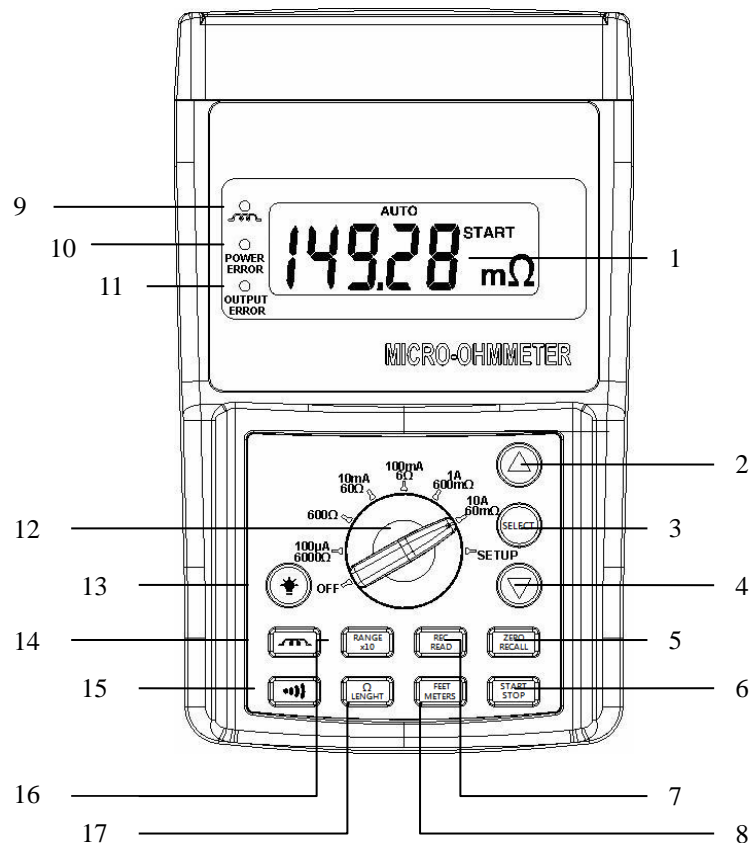
- Do not use the lithium battery elsewhere.
- Do not soak or immerse the lithium battery in any liquid.
- The lithium battery may explode if disposed of in Fire.
- The lithium battery must be recycled or disposed of properly.
- Do not expose the lithium battery to temperature higher than 60°C or 140°F.
- Do not disassemble or crash the lithium battery.
- The lithium battery is glued to the plastic battery cover. Do not attempt to remove it from the battery cover.
- Do not short circuit the lithium battery
- Do not use any sharpened tool to damage the lithium battery.
- Do not touch the battery if the lithium battery is damaged (Damage may result in high temperature).

II. Features

- Resistance Measurement (4-wire) of resistive and inductive materials.
- Work with Kelvin clip leads (standard accessory); or Double prod test leads (optional); or Alligator clip leads (prepared by users).
- 10A (60 mΩ) maximum test current.
- Best resolution 1μΩ.
- Basic accuracy 0.25%.
- Auto range or Manual range (there are 6 ranges of current measurement and 3 sub-ranges in each current range).
- Programmable Hi-Lo limits (for alarm function) and Resistance per unit (Ω/LENGTH) with memory of 20 data.
- Hold function.
- Cable length measurement (Feet or Meter).
- Memory of 3,000 measurement data.
- Large LCD (5-digit) with backlight.
- Rechargeable lithium battery (3400mAH) and built-in charging circuit.
- Low battery indication.
- Low power consumption.
- Communicate with PC via USB cable.

III. Panel Description

A. Front Panel



1. **LCD:** 4 5/6 Digit LCD with Backlight.

2. **▲ button:** When switched to SETUP, press ▲ button to increment

value by 1. Press and hold ▲ button for over 2 seconds to increment value swiftly. When recalling stored data, press ▲ button to display the next stored data (increment the index of data location).

3. **SELECT button:** When switched to SETUP, press **SELECT** button to select HI (Limit) or LO (Limit) or display cable resistance per foot or meter (Ω / LENGTH).

4. **▼ button:** When switched to SETUP, press ▼ button to decrement value by 1. Press and hold ▼ button for over 2 seconds to decrement value swiftly. When recalling stored data, press ▲ button to display the previous stored data (decrement the index of data location).

5. **ZERO / RECALL button:** When measuring resistance, press **ZERO / RECALL** button to enter Relative Measurement mode (the present readings will be reset to zero), or press **ZERO / RECALL** button for over 2 seconds to exit the Relative Measurement mode. When switched to SETUP, use this button to recall the pre-stored sets of HI limits, LO limits and resistance per unit (total 20 sets).

6. **START / STOP button:** When measuring resistance, press **START / STOP** button to start measurement. Press **START / STOP** button again to stop the measurement and hold the present reading.

7. **REC / READ button:** When measuring resistance, press **REC / READ** button to display the number of the present recorded data and have the present reading recorded. When switched to SETUP, press **REC / READ** button to enter READ data mode; press it again to exit READ

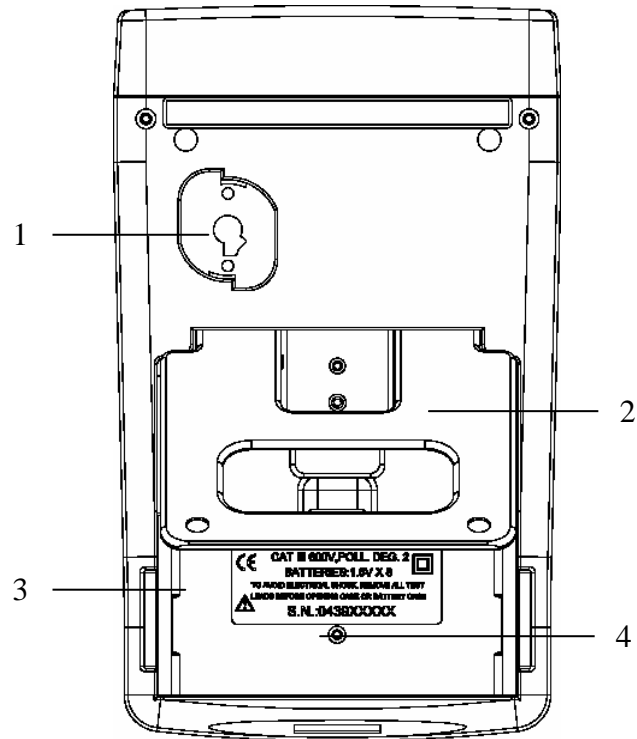
data mode. In the READ mode, users can recall data stored by pressing the ▲ or ▼ button.

8. **FEET / METERS button:** When measuring cable length, press **FEET / METERS** button to select the length unit between Meter (M) and Feet (FT).
9. **LED :** When LED is on, the measurements are for both inductive and resistive materials. When LED is off, the measurements are for resistive materials only.
10. **“POWER ERROR” LED:** When this light is on, the errors may be caused by one of the following reasons:
 - (1) Battery voltage is low.
 - (2) Blown fuse.
 - (3) Measuring a resistance (object) with electrical potential (voltage).
(Note: the electrical potential (voltage) could cause damage to the ohmmeter.)
11. **“OUTPUT ERROR” LED:** When this light is on, the errors may be caused by one of the following reasons:
 - (1) Test leads or the measured cable is not connected properly.
 - (2) Resistance is too high (higher than the measurement range).
 - (3) The output current is less than rated for the load.
12. **Rotary Switch:** The Switch provides selections among: OFF, 6 measurement ranges (6000Ω, 600Ω, 60Ω, 6Ω, 600mΩ and 60mΩ),

and SETUP.

13. **button:** Press this button to enable/disable the backlight. The backlight is dimmed automatically after 30 seconds.
14. **button:** [for 600mΩ (1A) and 60mΩ (10A) ranges]
When LED is off, the measurements are for resistive materials only. To measure inductive materials, please press button.
15. **button:** Press button to turn on/off the alarm function (HI and LO). When the alarm function is enabled, the icon will be shown in LCD. If the value of resistance is within the HI-LO range, a “PASS” will be shown in LCD. If the value of resistance is out of HI-LO range, the beeper will sound. But if the value of resistance is out of the measuring range (LCD displays OL), the alarm function is disabled.
16. **RANGE / x10 button:** In each rotary switch position, three sub-ranges can be selected by pressing this button. Press **RANGE / x10** button for over 2 seconds to return to Auto Range. In the auto range, a symbol of AUTO will be displayed in LCD. In the SETUP mode, press this button to move the decimal point of a number.
17. **Ω / LENGTH button:** Press this button to select (resistance) measurement mode and length mode. Press **Ω / LENGTH** button for over 2 seconds to store the present value of resistance as the resistance per foot or meter (Ω/LENGTH).

B. Rear Panel



1. Communication port

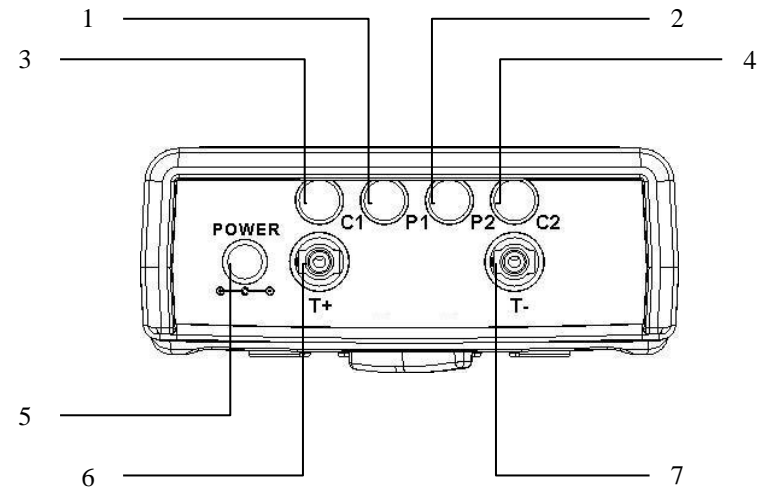
To connect Micro-Ohmmeter with PC via USB cable.

2. Stand.

3. Battery cover.

4. Screw of battery cover.

C. Top Panel



1. P1 Alligator Clip Terminal or 4-wire Test Leads Terminal.

2. P2 Alligator Clip Terminal or 4-wire Test Leads Terminal.

3. C1 Alligator Clip Terminal or 4-wire Test Leads Terminal.

4. C2 Alligator Clip Terminal or 4-wire Test Leads Terminal.

5. POWER for the input of AC adaptor.

6. T+ Kelvin Clip Terminal.

7. T- Kelvin Clip Terminal.

IV. Operation

Note:

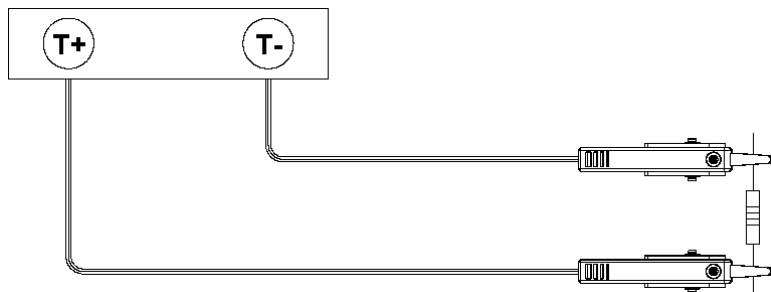
1. The lithium rechargeable battery is charged and installed at factory; users may operate the ohmmeter directly without charging first. However, when LCD displays the low battery icon please charge the battery first before operation.
2. After **START/STOP** button is pressed to start measurement, the ohmmeter can not be stopped until the internal circuit operates properly.

Warning:

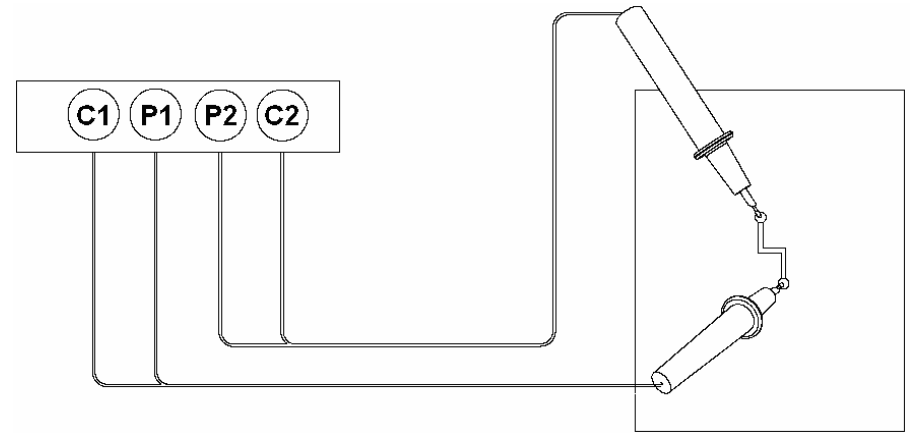
Do not measure any resistance (object) with electrical potential (voltage). The electrical potential (voltage) could cause damage to the ohmmeter.

A. Resistance Measurement with Test Leads

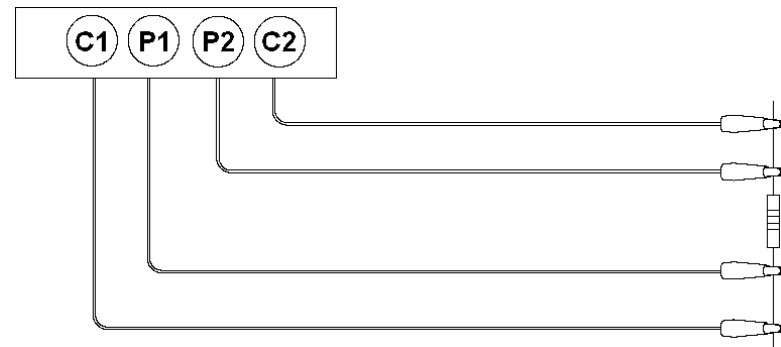
Kelvin clips (Standard accessory)



4-wire double prod test leads (Option)



Alligator clips (prepared by users)



6000Ω, 600Ω, 60Ω, or 6Ω Ranges

 LED is always ON for these 4 ranges)

1. Connect the test leads to the Ohmmeter and to the materials for measurement.
2. Turn the switch to a proper measurement range. Five dash lines (-----) will be shown in LCD.
3. Press **START / STOP** button to start measurement.
4. LCD will display the value of resistance continuously. Both resistive and


inductive materials can be measured.

5. To stop measurement, press **START/STOP** button again. The “H” (HOLD) symbol will be shown in LCD; and the last measurement result will remain on the LCD display.



600mΩ (1A) or 60mΩ (10A) ranges

 LED is OFF by default for these 2 ranges)

Resistive Materials:

1. Connect the test leads to the Ohmmeter and on to the materials for measurement.
2. Turn the switch to a proper measurement range. Five dash lines (----) will be shown in LCD. The  LED is OFF. The measurement is for resistive material only.
3. Press **START / STOP** button to start measurement.
4. LCD will display the value of resistance continuously. Only resistive materials can be measured.
5. To stop measurement, press **START/STOP** button again. The “H” (HOLD) symbol will be shown in LCD; and the last measurement result will remain on the LCD display.

Inductive and Resistive Materials:

1. If inductive material is to be measured (such as coil of motor or a transformer), press  button to turn on  LED. Both resistive and inductive materials can be measured.
2. Press **START/STOP** button to start measurement.
3. When a stable reading is obtained the measurement will stop automatically. The “H” (HOLD) symbol will be shown in LCD; and the last measurement result will remain on the LCD.



B. Manual Range (Sub-Range)

There are three sub-ranges in each of the six rotary switch ranges. Users can select each sub-range by pressing the **RANGE** button.

Please refer the Specifications for the sub-ranges. The OL symbol will be shown in LCD if the value of resistance is out of sub-range. The resolution remains the same for the three sub-ranges.


In the manual range, the symbol of AUTO in LCD will disappear.

C. Alarm Function

After the HI and LO limits are set up (refer to “Setup HI and LO Limits”), press  button to turn on the alarm function. When alarm function is enabled, the  icon will be shown in LCD.

If the resistance measured falls within the range of HI and LO limits, a symbol of PASS is shown in the LCD. If not, the buzzer will beep to signal users.

If the reading is OL, the alarm function is temporarily disabled until a reading is obtained.

Users can press this same () button to turn off the alarm function.

D. Cable Length Measurement

1. Prepare a 1 foot or 1 meter long cable.
2. Clip on to the both ends of the cable.
3. Select the proper range of resistance, press **START / STOP** button to measure the resistance of the 1 foot or 1 meter long cable.
4. Press the **Ω /LENGTH** button for over 2 seconds. Users will hear a beep sound, and the LCD will display unit of FT (or m). The measured resistance value will be stored as the resistance of 1 foot or 1 meter in the ohmmeter.
5. If FT (or m) is not the unit desired, press the **FEET/METERS** button to change unit. Then Press the **Ω /LENGTH** button for over 2 seconds again.
6. Disconnect the 1 foot or 1 meter long cable. Connect the Kelvin clips to the cable to be measured. The LCD will display the length of the cable.
7. If the LCD shows OL, turn the rotary switch to select a higher range until the LCD does not show OL.

NOTE:

1. The range of length is 0.0001 ft (or m) to 9999K ft (or m).
2. When the cable is disconnected, OL Ω (ohm) is displayed instead of OL FT or m.
3. When the resistance is 0, then 0 Ω is displayed instead of 0 FT or m.
4. If the length is less than 0.0001 feet or meters but greater than 0, then 0.0001 feet or meters is displayed.

E. Setup or Recall HI / LO Limits and Resistance per unit

There are up to 20 sets of pre-stored data (HI limit, LO limit, and Resistance per unit). The pre-stored Resistance per unit (Ω /LENGTH) can be recalled and used for cable length measurement.

1. Turn the switch to SETUP range.
2. Press **SELECT** button to choose the settings of HI limit, LO limit, or Resistance per unit.
3. Press **ZERO / RECALL** button to select the setting group (total 20 sets).
4. Press **SELECT** button to choose a displayed limit or Resistance per unit.
5. To set a new limit or Resistance per unit, press **▲** or **▼** button to increment or decrement value. To increment or decrement value faster, press and hold the **▲** or **▼** button for over 2 seconds.
6. Press **RANGE / x10** button to move the decimal to the next position. Thus the value can be incremented or decremented faster.
7. To store the modified data, press the **SELECT** button.

NOTE:

1. If the reading of resistance is OL (over-loaded), the unit does not show PASS in LCD or beep. The alarm function works only when the resistance is within measuring range.
2. The limits of HI and LO alarms are 0.001m Ω and 999.99 Ω .
3. The limits of Resistance per unit are 0.001 $\mu\Omega$ /ft (or m), 999.99 Ω /m, 304.79 Ω /ft.

F. RECORD & READ Functions

RECORD

1. Under resistance measurement, press **REC / READ** button.
2. LCD displays the number of measurement data. And the present readings will be automatically recorded in Micro-Ohmmeter.
3. Press **Ω/LENGTH** button to let LCD display resistance or cable length.

The memory capacity of this Ohmmeter is 3000 measurement data.

When it is over 3000 data, there will be a long beep sound and no further data can be recorded in the Ohmmeter. To clear the memory, turn off the Ohmmeter, then press **REC / READ** button and turn on the Ohmmeter simultaneously.

Note: If necessary please download and save the measurement data before you clear the memory.

READ

1. Turn the switch to SETUP.
2. Press **REC / READ** button, then the LCD will display the data location and the data readings.
3. Press **▲ ▼** buttons to read the previous or next stored data.

V. Specifications

A. Electrical Specifications

(23°C±5°C)

1. Manual Range:

	Range	Resolution	Accuracy
10 A	400 μΩ ~ 4000 μΩ	1 μΩ	±0.25%±25 μΩ
	1.500 mΩ ~ 16.000 mΩ		
	5.000 mΩ ~ 60.000 mΩ		
1 A	4.00 mΩ ~ 40.00 mΩ	10μΩ	±0.25%±250μΩ
	15.00 mΩ ~ 160.00 mΩ		
	50.00 mΩ ~ 600.00 mΩ		
100 mA	0.0400 Ω ~ 0.4000 Ω	100μΩ	±0.25%±2.5 mΩ
	0.1500 Ω ~ 1.6000 Ω		
	0.5000 Ω ~ 6.0000 Ω		
10 mA	0.400 Ω ~ 4.000 Ω	1 mΩ	±0.25%±25 mΩ
	1.500 Ω ~ 16.000 Ω		
	5.000 Ω ~ 60.000 Ω		
1 mA	4.00 Ω ~ 40.00 Ω	10 mΩ	±0.25%±250 mΩ
	15.00 Ω ~ 160.00 Ω		
	50.00 Ω ~ 600.00 Ω		
100μA	0.0400 kΩ ~ 0.4000 kΩ	100 mΩ	±0.75%±3 Ω
	0.1500 kΩ ~ 1.6000 kΩ		
	0.5000 kΩ ~ 6.0000 kΩ		

2. Auto Range:

	Range	Resolution	Accuracy
10A	400 $\mu\Omega$ ~ 60.000 m Ω	1 $\mu\Omega$	$\pm 0.25\% \pm 25 \mu\Omega$
1 A	4.00 m Ω ~ 600.00 m Ω	10 $\mu\Omega$	$\pm 0.25\% \pm 250 \mu\Omega$
100 mA	0.0400 Ω ~ 6.0000 Ω	100 $\mu\Omega$	$\pm 0.25\% \pm 2.5$ m Ω
10 mA	0.400 Ω ~ 60.000 Ω	1 m Ω	$\pm 0.25\% \pm 25$ m Ω
1 mA	4.00 Ω ~ 600.00 Ω	10 m Ω	$\pm 0.25\% \pm 250$ m Ω
100 μ A	0.0400 k Ω ~ 6.0000 k Ω	100 m Ω	$\pm 0.75\% \pm 3$ Ω

B. General Specifications

Power Source: Rechargeable Lithium Battery,
3400mAh (11.1V)

Battery Recharging Time: 10 hours

AC adaptor: AC 110V or 220V input,
(for Battery Charging) DC 15V / 1~3A output
Please note the polarity of the DC output

LCD Display: 4 5/6 Digit LCD + Backlight

Dimension: 257(L) x 155(W) x 57(H) mm

Weight: 1160g / 40.0oz (Batteries included)


Operation Environment: 0°C ~ 50°C, 85% RH

Storage Environment: -20°C ~ 60°C, 75% RH

Standard Accessories: USB Cable x 1
Rechargeable Lithium Battery x 1
AC adaptor x 1, Software CD x 1
User Manual x 1, Software Manual x 1
Kelvin Clip leads x 1 set

Option: 4-wire double prod test leads

VI. Battery Recharging

When LCD displays the low battery icon , please charge the lithium battery:

1. Connect the AC Adaptor to the Ohmmeter.
2. Turn the switch of the Ohmmeter to any ranges except OFF.
3. After about 10 hours of recharging, the battery recharging will automatically finish.

VII. Battery Replacement

If the lithium battery can not be charged, users should always purchase a new lithium battery from the distributor or importer. The charging circuit built-in is designed only for the lithium battery included. The lithium battery is always sold with the plastic battery cover.

Do not purchase a lithium battery from a source which is not approved by the manufacturer.

Warning: Non-approved lithium battery could cause damage or hazard to the users.

VIII. Maintenance & Cleaning

1. Servicing not covered in this manual should only be performed by qualified personnel. Repairs should only be performed by qualified personnel.
2. Periodically wipe the case and cable with a damp cloth and detergent; do not use abrasives or solvents.
3. Please remove all the batteries if users won't use the micro-Ohmmeter for a long time.

Address of Agent, Distributor, Importer, or Manufacturer