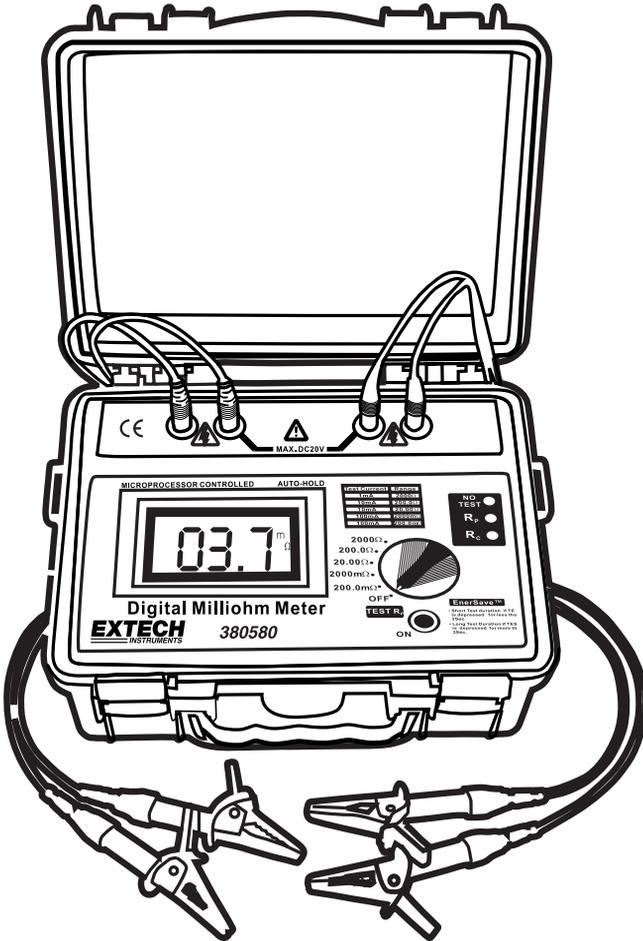


# User's Guide

# **EXTECH** INSTRUMENTS

## Model 380580

## Battery Powered Milliohm Meter



## Introduction

Congratulations on your purchase of Extech's Model 380580 Battery Powered Milliohm Meter. This device offers five resistance ranges with resolution as low as 0.1mΩ. The 4-wire Kelvin clip connection ensures optimum accuracy. Typical applications include transformer, motor coil, and PC Board resistance measurements. This professional meter, with proper care, will provide years of safe reliable service.

## Specifications

### General Specifications

Display	1.0" (25 mm) LCD (1999 counts)
Measurement terminals	4-Terminal Kelvin type
Measurement Range	Five ranges (see listing below)
Sampling Time	Approximately 3 times per second
Over input indication	Indication of "1 - -"
Operating Temperature	5°F to 131°F (-15°C to 55°C)
Operating Humidity	<80% RH
Power Supply	8 x 1.5V AA Batteries
Weight	3.3 lbs (1.5kg)
Dimensions	9.8x7.5x4.3" (250x190x110 mm) with cover

### Range Specifications

Range	Resolution	Test Current	Accuracy	Open Circuit Voltage
200.0mΩ	0.1mΩ	100mA	± 0.5% + 2 digits	4.2V
2000mΩ	1mΩ	100mA	± 0.5% + 2 digits	4.2V
20.00Ω	0.01Ω	10mA	± 0.5% + 2 digits	4.2V
200.0Ω	0.1Ω	10mA	± 0.5% + 2 digits	4.3V
2000Ω	1Ω	1mA	± 0.5% + 2 digits	4.4V

### International Symbols



This symbol, adjacent to another symbol or terminal, indicates the user must refer to the manual for further information.



This symbol, adjacent to a terminal, indicates that, under normal use, hazardous voltages may be present

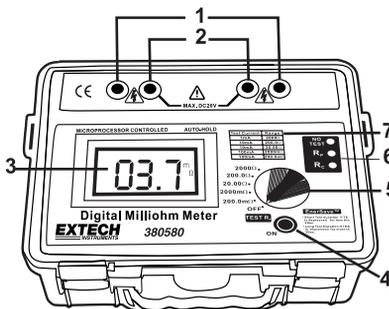


Double insulation

## Meter Description

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1. Current Terminals
2. Potential Measurement Terminals
3. LCD Display
4. Start/Stop Test Button
5. Range Select/Power Switch
6. LED Error Lights
  - No Test/Over Temperature
  - $R_P$  Voltage Regulation
  - $R_C$  Current Regulation
7. Current/Range Table



## Leads

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Current Leads- Banana plug to alligator clip

- C1- Green
- C2- Blue

Voltage Potential Leads- Banana plug to alligator clip

- P1- Red
- P2- Black

Kelvin Clips- Banana Plugs (2) to Kelvin Clip

- Red (P1) Green (C1)
- Black (P2) and Blue (C2)

## Measurement Considerations

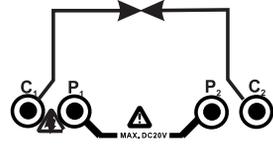
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1. Do not apply voltage to the meter input terminals. Meter damage may result.
2. Always insure that the circuit to be measured is switched OFF, isolated and completely de-energized before connecting the test leads.
3. If the Over Temperature LED (NO TEST) indicator is lit, allow the instrument to cool down before proceeding further.
4. The  $R_C$  led indicates when the test current falls out of regulation. Selecting a higher range may eliminate the condition.
5. The  $R_P$  led indicates when the voltage on the device under test is too high. Selecting a lower range may eliminate the condition.
6. If either the  $R_C$  or  $R_P$  led is on, the measurement may be in error.
7. The current terminals are fuse protected.
8. Keep the potential test leads as short as possible. Long leads may introduce noise.
9. When using the four separate alligator clip leads always place the current leads outside the potential leads.

## Preliminary Checks

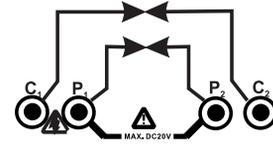
### Current Regulation Check

1. Connect the current leads  $C_1$  and  $C_2$  to the meter.
2. Set the function switch to the 200.0m $\Omega$  range.
3. Momentarily press the **TEST  $R_C$**  button. The meter will intermittently beep and  $R_C$  will light
4. Short the current leads  $C_1$  to  $C_2$ .
5. The  $R_C$  LED should go off, indicating that the meter is operating correctly.
6. Momentarily press the **TEST  $R_P$**  button to stop the test
7. The meter will return to **NO TEST** status.



### Voltage Measurement check

1. With the current test leads  $C_1$  and  $C_2$  shorted, connect and short the potential (voltage) leads  $P_1$  and  $P_2$ .
2. Set the Function switch to the 200.0m $\Omega$  position. The **NO TEST** status LED will light.
3. Momentarily press the **TEST  $R_P$**  button. (the meter will intermittently beep)
4. The display should indicate 00.0
5. Momentarily press the **TEST  $R_P$**  button to stop the test. The **NO TEST** status LED will light.
6. Remove the shorts from  $P_1$  and  $P_2$ , and  $C_1$  and  $C_2$  and
7. Short the test leads  $P_1$  to  $C_1$  and  $P_2$  to  $C_2$
8. The  $R_P$  LED as well as the **NO TEST** status LED should light indicating an over-voltage or over-range
9. Turn the rotary selector switch to OFF



### Polarity check

1. Short the test leads  $P_1$  to  $C_2$  and  $P_2$  to  $C_1$  together.
2. Set the Function switch to the 200.0m $\Omega$  position.
3. The "-1" negative indicator should appear in the display.



### Operation check

Use the Kelvin clips for this test

1. Short all the leads ( $P_1, P_2, C_2, C_1$ ) together. **The  $P_1, P_2, C_2, C_1$  order is important.**
2. Set the Function switch to the 200.0m $\Omega$  position. The **NO TEST** status LED will light.
3. Momentarily press the **TEST  $R_P$**  button. (the meter will intermittently beep)
4. The display should indicate near 00.0 (depending on the test clip connections) and both  $R_P$  and  $R_C$  LEDs should remain off.
5. Momentarily press the **TEST  $R_P$**  button to stop the test.

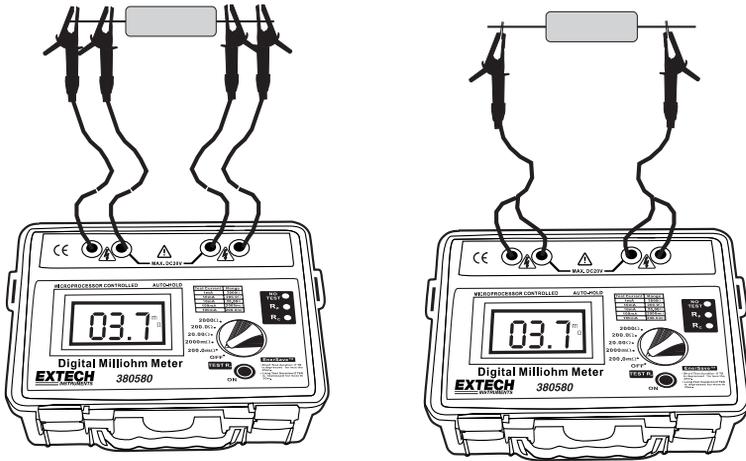


**Note:** These tests can be performed on any range.

## Measurement Procedure

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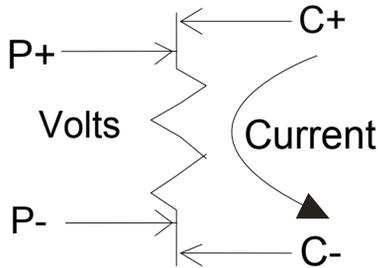
1. Select the desired measuring range on the meter. If the resistance of the device is unknown, start with the highest range and work downward.
2. Clip the test leads onto the device under test. Note: When using the 4-wire/4 alligator clip test leads, it is recommended that the current test leads be outside of the potential test leads (as shown in the diagram below).
3. For a short test duration of 10 seconds, press the TEST R<sub>P</sub> button for less than 2 seconds. This EnerSave™ feature can be used to conserve battery power.
4. For a long test duration of 60 seconds, press the TEST R<sub>P</sub> button for more than 3 seconds.
5. During the test, the meter will intermittently beep. At the end of the test or if the test is stopped, "HOLD" will appear and the last reading will be "frozen" on the display.



## Measurement Principles

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The test current flows through the resistance from the **Current+ (C+)** terminal to the **Current - (C-)** terminal. The **P+** and **P- (POTENTIAL)** terminals measure the voltage drop across the device under test only, thus eliminating the lead and contact resistances. The meter displays the resistance based on the test current and the measured voltage; refer to the equation below:



$$R_x = V_x / I_s$$

Where:

**V<sub>x</sub>** is the voltage drop across the device under test;

**I<sub>s</sub>** is the test current;

**R<sub>x</sub>** is the resistance of the device under test.

## Thermal Effects

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Temperature can have a significant effect on the performance of milliohmeter due to the temperature coefficient of the resistance under test and thermal EMF's across dissimilar conductors.

Most conductors have a large temperature coefficient of resistance

For example: 0.4%/°C for copper. A copper conductor that has a resistance of 10.00m ohm at 20°C will increase to 10.40m ohm at 30°C. This should be taken into account..

A current going through a resistance will also elevate the temperature so duration of the test can also change the resistance.

## BATTERY INSTALLATION

**WARNING:** To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover.

1. Turn power off and disconnect the test leads from the meter.
2. Open the rear battery cover by removing two screws (B) using a slotted head screwdriver.
3. Insert the batteries into battery holder, observing the correct polarity.
4. Put the battery cover back in place. Secure with the screws.

## REPLACING THE FUSES

There are three fuses:

### Power Supply Fuse

1. The power supply fuse is located in the battery compartment.
2. Remove the two screws to open the battery compartment.
3. Always use a fuse of the proper size and value.

### Current Circuit Fuse

1. Fuse protection for the current terminals.
2. If the fuse is blown, the  $R_C$  LED will stay on.
3. The fuse is located under the printed circuit board.
4. There are 4 mounting screws that have to be removed.
5. Two screws are located under the black feet on the bottom of the unit.
6. The other two screws are located in the battery compartment.
7. Remove the battery compartment door and the batteries to access these screws.
8. Always use a fuse of the proper size and value.

### Potential Circuit Fuse

1. Fuse protection for the potential terminals.
2. If the fuse is blown, the  $R_P$  LED will stay on.
3. The fuse is located under the printed circuit board.
4. There are 4 mounting screws that have to be removed.
5. Two screws are located under the black feet on the bottom of the unit.
6. The other two screws are located in the battery compartment.
7. Remove the battery compartment door and the batteries to access these screws.
8. Always use a fuse of the proper size and value.

## Calibration and Repair Services

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Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Service Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

## Warranty

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**EXTECH INSTRUMENTS CORPORATION** warrants this instrument to be free of defects in parts and workmanship for **one year** from date of shipment (a six month limited warranty applies to sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website [www.extech.com](http://www.extech.com) for contact information. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.



Support line (781) 890-7440

Technical support: Extension 200; E-mail: [support@extech.com](mailto:support@extech.com)

Repair & Returns: Extension 210; E-mail: [repair@extech.com](mailto:repair@extech.com)

**Product specifications subject to change without notice**

For the latest version of this User's Guide, Software updates, and other up-to-the-minute product information, visit our website: [www.extech.com](http://www.extech.com)

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