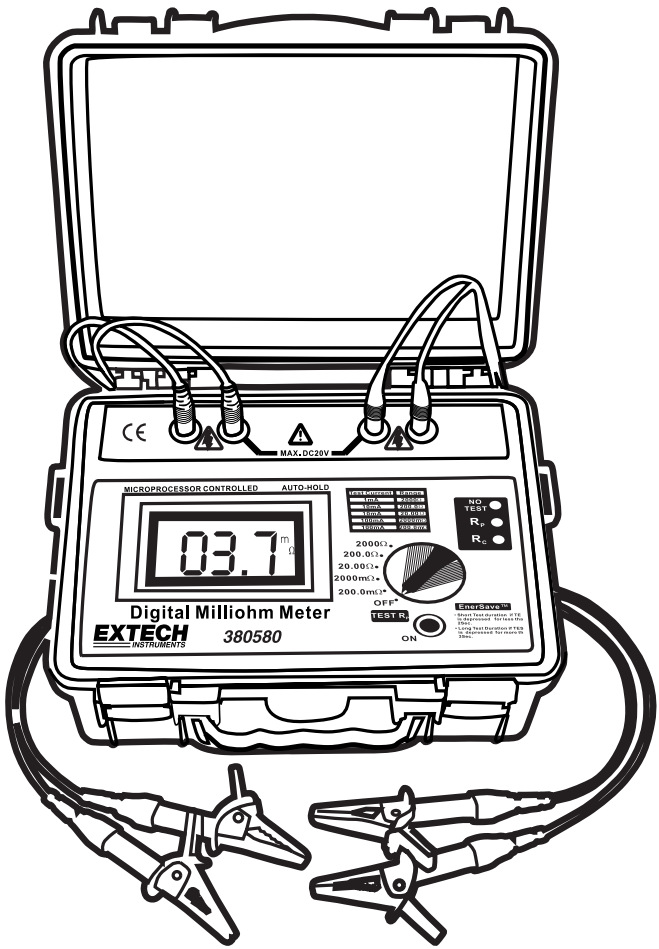
User's Guide

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	5ºF to 131ºF (-15ºC to 55ºC)
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

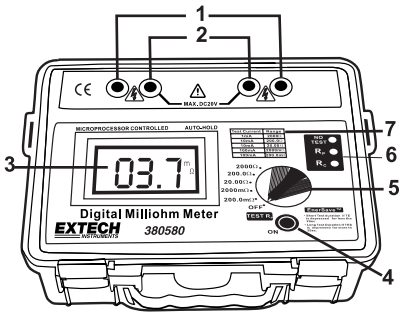
This symbol, adjacent to another symbol or terminal, indicates the user must refer to the manual for further information.

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

Double insulation

Meter Description

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

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)

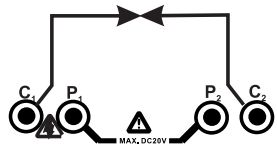
Black (P2) and Blue (C2)

Measurement Considerations

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.

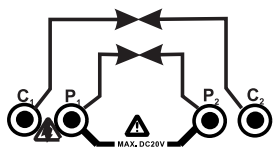
Preliminary Checks

Current Regulation Check



1. Connect the current leads C_1 and C_2 to the meter.
2. Set the function switch to the 200.0mΩ range.
3. Momentarily press the TEST R_P 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.

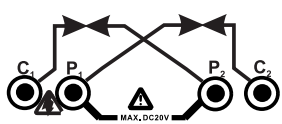
Voltage Measurement check



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 200.0mΩ 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

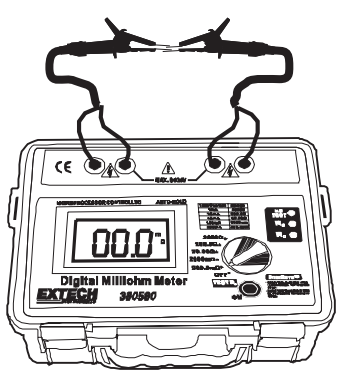
Polarity check



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

Operation check

Use the Kelvin clips for this test

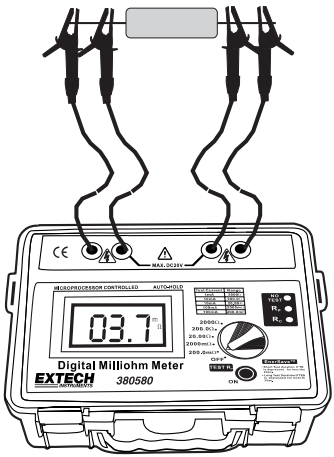


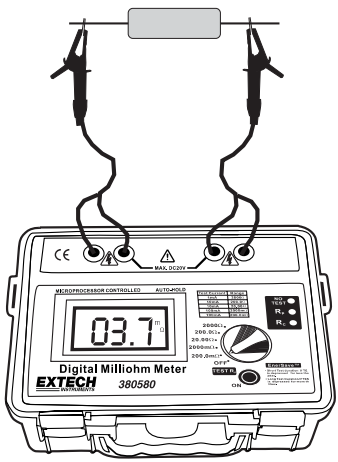
1. Short the all the leads (P_1, P_2 ,C_2,C_1) together. **The P_1, P_2 ,C_2,C_1 order is important.**
2. Set the Function switch to the 200.0mΩ position. The **NO TEST** status LED will light.
3. Momentarily press the TEST R_P button. (the meter will intermittently beep
4. The display should indicate 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

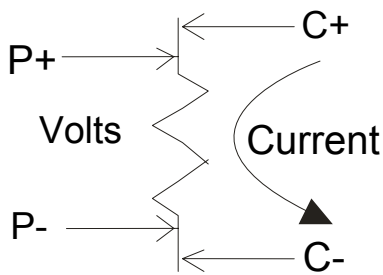
1. Select the desired measuring range on the meter. If the resistance of the device is unknown, start with the highest range and work downward.
2. Clip the test leads onto the device under test. Note: When using the 4-wire/4 alligator clip test leads, it is recommended that the current test leads be 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_P 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_P 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

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:



Rx = Vx / Is

Where:

Vx is the voltage drop across the device under test;

Is is the test current;

Rx is the resistance of the device under test.

Thermal Effects

Temperature can have a significant effect on the performance of millohmeter 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 cooper 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.