



MODEL 283 DIGITAL RESISTANCE/RESISTIVITY TEST KIT OPERATING INSTRUCTIONS

DESCRIPTION

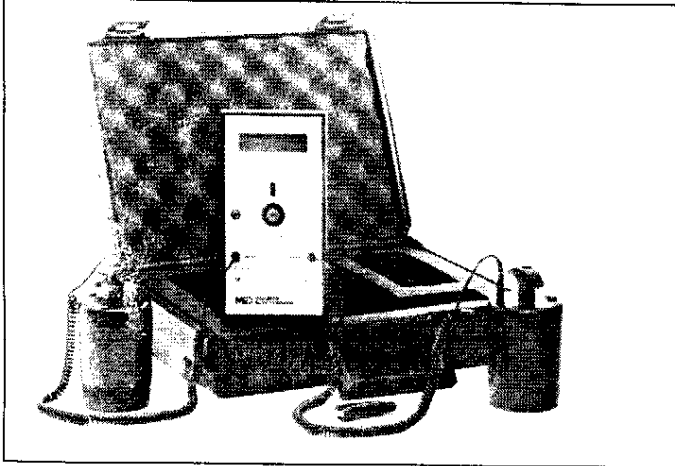


Figure 1. Monroe Model 283

The Digital Surface Resistance/Resistivity Test Kit is a portable instrument designed to measure resistance between two points, resistance to ground, and surface resistivity in accordance with EOS/ESD Association Standard S-4.1. The unit's Liquid Crystal Display allows the user to easily read measurements directly from the meter. No interpretation or calculations is necessary. This kit is designed for evaluating the electrical properties of ESD protective work surfaces, materials and flooring products.

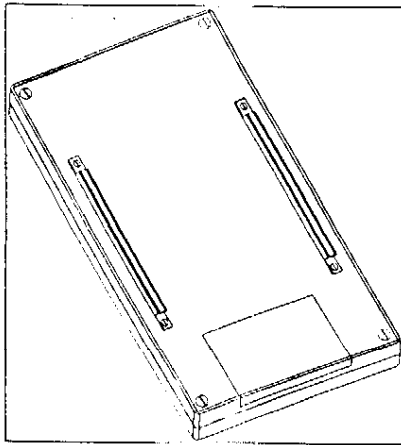


Figure 2. Parallel Resistivity Electrodes on bottom of meter.

The meter also incorporates two parallel electrodes on the bottom of the unit which allows surface resistivity measurements. These parallel electrodes allow for quick and easy testing of a variety of surfaces and materials without the use of the NFPA 5 pound electrodes.

LITERATURE REFERENCES

Monroe recommends that you read the following standards from the ESD Association:

- EOS/ESD-ADVI.0 - Glossary of Terms
- EOS/ESD-S4.1 - Worksurfaces
- EOS/ESD-S6.1 - Grounding
- ESD-S7.1 - Floor Materials
- EOS/ESD-S11.11 - Surface Resistivity

These documents are available directly from the ESD Association, 7902 Turin Road, Suite 4, Rome, NY 13440-2069, (315) 339-6937

In addition to the Association standards, anyone testing ESD protective surfaces may wish to obtain copies of:

- MIL-HDBK-263A
- EIA-541(EIA-IS-5-A)
- ASTM-F-150
- ASTM-D257
- EN 100015

These standards are available from the agencies who produce them. Or ask for our Application Note ES-43.

TEST KIT CONTENTS

Each unit should include the following:

- 1- Protective carrying case
- 1- Digital Surface Resistance/Resistivity Meter
- 2- Test leads
- 2- NFPA 5 pound weighted electrodes
- 1- Grounding clip
- 1- AC adapter/charger
- 1- Manual
- 1- Rechargeable battery

Properly store the meter and component assemblies when not in use. Do not charge battery unless it is fully discharged. Doing so reduces the life of the battery.

FEATURES

- **Display:** ½ inch high digital LCD display provides easy to read resistivity/resistance measurements. Values are expressed with a mantissa and exponent power.
- **Test Button:** This button turns on the power to the meter. When released the measured reading remains for 10-20 seconds.
- **Test Range Voltage Switch:**
10 Volts for $1 \times 10^3 - 1 \times 10^{11}$ ohms
100 Volts for $1 \times 10^6 - 1 \times 10^{12}$ ohms
- **Jacks:** 2.5 mm phone plugs fit the meter jacks. Banana plugs only fit the electrodes.
- **AC - Battery Charger Adapter:** 12 volts DC - 100mA
- **9 Volt Battery Compartment.**
- **Parallel Electrodes.**

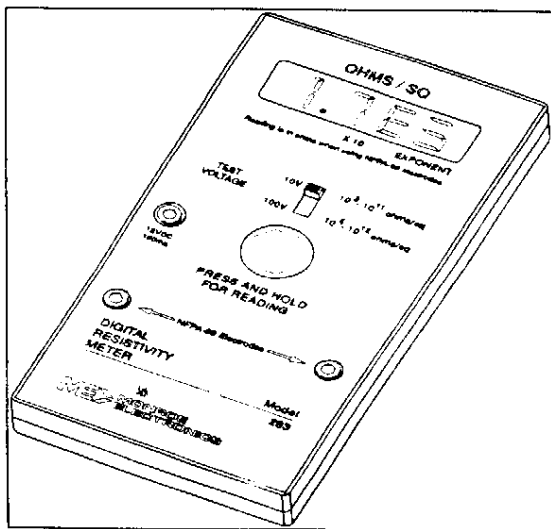


Figure 3. Features of the Digital Surface Resistance/Resistivity Meter.

SURFACE RESISTANCE MEASUREMENTS- Complies with EOS/ESD-S4.1

Point to point surface resistance measurements are made using the meter with both of the 5 pound weight electrodes. This test determines the resistance between two points, independent of a groundable point. To perform surface resistance tests you must first determine what test procedure to use. The test procedure helps you to determine proper preparation of the material to be tested and the spacing of the

weights. Once testing parameters are determined you can proceed with the following instructions:

A. Connect the test leads to the meter by inserting the banana termination end of a test lead into the 5 pound electrode and the mini phone plug end into the meter.

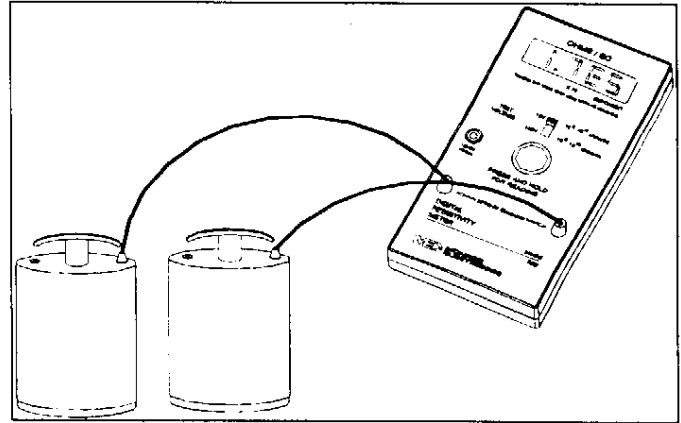


Figure 4. Setting up for Point To Point testing.

B. Place both electrodes on the material at positions determined by the procedure selected. Set the meter to the required test voltage determined by the test procedure and the resistance of the material.

C. Press and hold the red test button for 10 - 20 seconds. The measured resistance value appears on the display. This reading should be expressed in ohms.

RESISTANCE TO GROUND MEASUREMENTS - Complies with EOS/ESD-S4.1

The Resistance-to-Ground measurements indicate the surface resistance between selected locations on a work surface and a groundable point or points. Ground points are usually in the form of snaps installed on the material so that the material can be grounded via ground cords. The charge dissipative rate of all ESD protective materials is related directly to electrical resistance to ground. When making Resistance-to-Ground measurements, follow this procedure

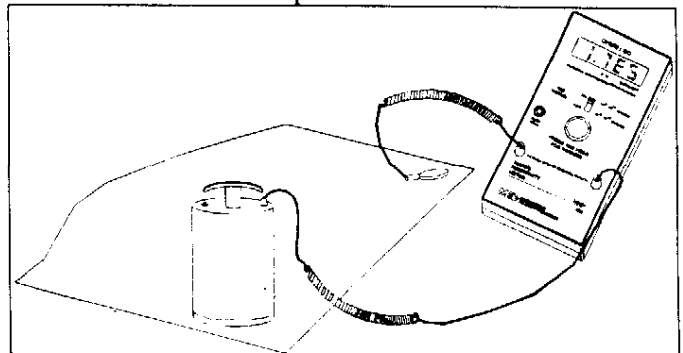


Figure 5. Setting up for Resistance To Ground testing

A. Connect one of the 5 pound electrodes to the meter using one of the test leads.

B. Using the other test lead connect the mini phone plug end to the meter. Connect the grounding clip included, onto the banana plug on the other end of the lead. Now connect the grounding clip to the groundable point on the surface to be tested.

C. Position the electrode on the material at the position specified by the procedure selected. Set the meter to the desired test voltage range. Be sure to keep the cords separated in order to prevent false readings, especially when testing high resistance materials.

D. Press and hold the red test button for 10 - 20 seconds. The measured resistance value appears on the display. This reading should be expressed in ohms. Record the reading, humidity, temperature and test voltage.

E. Repeat procedure on other points on the material under test.

SURFACE RESISTIVITY MEASUREMENTS -

A. Firmly place the meter's parallel probes on the surface of the material to be tested, at the position specified by the procedure selected.

B. Press and hold the red test button for 10 - 20 seconds. The measured resistance value appears on the display. This reading is expressed in ohms/sq. You may also want to record ambient temperature and humidity.

ERROR MESSAGES

- An "L" appears when the value of the measurement is below 1×10^3 ohms on the 10 volt scale or 1×10^6 ohms on the 100 volt scale.
- An "H" appears if the value of the measurement is over 5×10^{12} ohms.
- A "P" appears on the LCD display if there is too much electrical 60 Hz noise in the area or if a test is performed on a high open resistance.
- A "BAL" appears on the LCD display as the meter is being operated if the battery needs recharging. To maximize the life of the battery do not recharge until a low battery "BAL" is displayed.

CLEANING

Work surfaces or materials to be tested should be cleaned prior to testing to ensure that surface dirt and contamination do not affect the test results. Periodically clean the built-in parallel electrodes and the two 5 lb. conductive rubber probe electrode surfaces. Use solvent-free rubber cleaners. We recommend using an anti-static cleaner or Stat Wipes, pre-saturated cleaning wipes. Be sure the surface is dry before testing.

POWER REQUIREMENTS

The meter is powered by a rechargeable 9 volt Nickel/Cadmium battery or a special AC to DC adapter. The adapter is also used to recharge the 9 volt battery.

MAINTENANCE

Your Surface Resistance Test Kit requires little maintenance, and there are no user serviceable parts. If your meter requires service beyond cleaning the probes or recharging the battery, please contact the factory.

CALIBRATION

The 283 Digital Surface Resistance Test Kit is calibrated to manufacturers specifications. Calibration to NIST traceable standards is available, please call or fax our Customer Service Department for information on factory calibration.

In-house calibration can be performed by using 1% resistors in each of the meter ranges. Simply attach the resistors to the enclosed cords using grounding clips and recording the meter display. Adjustments to the internal resistance pots can be done quite easily. Request this adjustment procedure from the Monroe Customer Service Department.

SPECIFICATIONS

Ranges: $1 \times 10^3 - 1 \times 10^{11}$ ohms @ 10 Volts
 $1 \times 10^6 - 1 \times 10^{12}$ ohms @ 100 Volts

Power Supply:
9 volt Rechargeable Nickel/Cadmium battery and AC adapter/charger included. Alkaline battery optional.

Battery Life: Nickel/Cadmium - 1 hour

Charge Time: 12 hours

AC Adapter Output: 12 volt DC, 100mA

Internal Electrodes:
Two parallel conductive silicone rubber replaceable electrodes.

External Electrodes:
Two-5 pound weighted electrodes. 2.5" in diameter, complies with EOS/ESD-S4.1

Operating Conditions: 60°F - 90°F, 10-50% RH

Display: One six character .500" LCD display

Accuracy: $10^3 - 10^9 = \pm 15\%$ at 10-90% RH
 $10^9 - 10^{11} = \pm 20\%$ at 10-60% RH
 $10^{11} - 10^{12} = \pm 30\%$ at 10-50% RH

Meter Weight: 13 oz.

Charger Weight: 11 oz.

Meter Dimensions: 7.5"L x 4"W x 1.75"H

Power Switch:
Momentary on. Releasing the switch holds and displays reading for > 10 seconds.

LIMITED WARRANTY

Monroe expressly warrants that for a period of two (2) years from the date of purchase, Monroe's Model 283 Test Kits to be free of defects in material (parts) and workmanship (labor). Within the warranty period, product is tested, repaired or replaced at Monroe option, free of charge. Any unit under warranty should be shipped prepaid to Monroe, call Customer Service at 716-765-2254 for proper shipping instructions and address. Include a copy of your original packing slip, invoice, or other proof of purchase date. Warranty repairs take approximately two weeks.

If your unit is out of warranty, Monroe quotes repair charges necessary to bring your unit up to factory standards. Call Customer Service at 716-765-2254 for proper shipping instructions.

WARRANTY EXCLUSIONS

THE FOREGOING EXPRESS WARRANTY IS MADE IN LIEU OF ALL OTHER PRODUCT WARRANTIES, EXPRESSED AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE SPECIFICALLY DISCLAIMED. The express warranty does not apply to defects or damage due to accidents, neglect, misuse, alterations, operator error, or failure to properly maintain, clean or repair products.

LIMIT OF LIABILITY

In no event is Monroe or any seller responsible or liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, users shall determine the suitability of the product for their intended use, and users assume all risk and liability whatsoever in connection therewith.

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