Digital Surface Resistance/Resistivity Test Kit Operation and Maintenance

Figure 1. ESD Systems.com Item 41273

Description
The Digital Surface Resistance/Resistivity Test Kit is a portable instrument designed to measure resistance between two points (RTT), surface to ground (RTG), and surface resistivity in accordance with ANSI EOS/ESD Association Standard S 4.1. This unit is suitable for evaluating the electrical properties of ESD protective work surfaces and flooring products.

The LCD Surface Resistance/Resistivity Test Kit is calibrated to NIST traceable standards and is available in three models.

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<th>Model</th>
<th>Description</th>
<th>Voltage/Hz</th>
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<tr>
<td>41273</td>
<td>Test Kit</td>
<td>120V/50-60</td>
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<td>41274</td>
<td>Test Kit</td>
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<td>41276</td>
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<td>41275</td>
<td>Replacement Electrode 5lb</td>
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<td>41280</td>
<td>Replacement Cord Lead for 5lb Electrode</td>
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Figure 2. Parallel Resistivity Electrodes on bottom of meter.

The meter has two parallel probes on the bottom of the case which measure surface resistivity. These parallel electrodes allow for quick and easy testing of a variety of surfaces and materials without the use of external probes. The 5-pound electrodes (item 41275), and test leads (item 41280) can be purchased separately.

The Test Kit displays a measurement per ESD S4.1-1997 proving the proper electrification period of 15 seconds during which numerous readings and calculations are executed. NOTE: Testing in accordance with ESD S4.1-1997 requires 15 seconds of electrification; in contrast, most analog type meters display measurements instantaneously.

Recommended Literature
ESD Systems.com recommends that you read the following standards from the ESD Association:

- ANSI/ESD S20.20 - Development of ESD Control Program
- ESD ADV1.0 - Glossary of Terms
- ESD S4.1 - Worksurfaces
- ANSI EOS/ESD S6.1 - Grounding
- ANSI ESD S7.1 - Floor Materials
- ANSI EOS/ESD S11.11 - Surface Resistivity

These documents can be obtained directly from the ESD Association, 7902 Turin Rd., Suite 4, Rome, NY 13440-2069, (315) 339-6937.

In addition to the Association Standards listed previously, anyone testing the electrical properties of ESD protective surfaces should also obtain copies of:

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

These standards are available from the agencies who produce them. If you need help in obtaining these documents contact our customer service department.
Inspection
Remove the meter from the carton and inspect for damage. Each unit should include the following:

1 Protective carrying case
1 LCD display meter
2 Test leads
2 5-pound weighted electrodes
1 Grounding clip
1 AC adapter/charger
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 will reduce the life of the battery.

Features
A. Scale: 1/2” high digital LCD display provides easy to read resistivity/resistance measurements. Values are expressed with a mantissa and exponent power. For example, if the display reads “2.9 E 9”, 2.9 is the mantissa, 9 is the exponent power; the reading is 2.9 x 10^9 ohms.

B. Test Button: This button turns on the power to the meter. The operator needs to hold the button down for 10-20 seconds for the unit to make numerous readings and calculations. When released the measured reading will remain illuminated for at least 10 seconds.

C. Test Range Voltage Switch:
10 Volts for 10^3 - 10^11 ohms
100 Volts for 10^5 - 10^12 ohms

D. Jacks: 2.5mm plugs will fit the megohmmeter jacks. Banana plugs will fit 5 lb. electrodes.

E. AC-Battery Charger Jack:
12 volts DC - 200mA.

F. 9 Volt Battery Compartment.

G. Parallel Electrodes: For surface resistivity measurements only.

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

Figure 4.
If the value of the measurement is below 1000 ohms on the 10 volt scale or 1x10^6 on the 100 volt scale an “L” will appear on the LCD display.

Figure 5.
If the value of the measurement is over 5x10^12 ohms an “H” will appear on the LCD display.

Figure 6.
A “P” will appear on the LCD display if there is too much electrical 60Hz noise in the area or if a test is performed on a high open resistance.

Figure 7.
When the unit’s batteries need recharging a “BAL” will appear on the LCD display as the meter is being operated. 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 ESD Systems.com Rezore™ Surface and Mat Cleaner, Item #16030. Be sure the surface is dry before testing.

Power Requirements
The unit is powered by a rechargeable 9 volt DC Nickel/Cadmium battery, an alkaline battery, or a special 12 volt DC, 200mA adapter. The AC to DC adapter is also used to recharge the 9 volt battery.

Surface Resistance Measurements (RTT)
Complies with ESD S4.1
Point to point surface resistance measurements are made using the meter along with both of the 5 pound weight electrodes. This test will determine the resistance between two points, independent of a groundable point. The charge dissipation rate of all ESD protective materials is related directly to electrical resistance to ground. To perform surface resistance tests you must first determine what test procedure you will be using. The test procedure will help 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 weighted electrode and the mini phone plug end into the meter.

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 unit will be making numerous measurements and calculations.) The measured resistance value will appear on the display. This reading is expressed in ohms. You may want to record the temperature, humidity and test voltage.

Surface-to-Ground Measurements (RTG)
Complies with ESD S4.1
The Surface-to-Ground measurements will 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. When making Surface-to-Ground measurements, follow this procedure:

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

B. Using the other lead connect one end to the meter. Insert the grounding clip included with the test clip 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 the red test button for 10-20 seconds. The measured resistance value will appear on the display. This reading is expressed in ohms. You may want to record the reading, humidity, temperature, and test voltage.

Repeat procedure on the other points on the material under test.
Limited Warranty
ESD Systems.com expressly warrants that for a period of one (1) year from the date of purchase, our 41273 Test Kits will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a unit will be tested, repaired or replaced at our option, free of charge. Call Customer Service at 508-485-7390 for a Return Material Authorization (RMA) and proper shipping instructions. You should include a copy of your original packing slip, invoice, or other proof of purchase date. Any unit under warranty should be shipped prepaid to the ESD Systems.com factory. Warranty repairs will take approximately two weeks.

If your unit is out of warranty, ESD Systems.com will quote repair charges necessary to bring your unit to factory standards. Call Customer Service at 508-485-7390 for a Return Material Authorization (RMA) and proper shipping instructions and address.

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 will 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 will ESD Systems.com or any seller be 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.