



DESCO TECHNICAL BULLETIN TB-3076

Digital Surface Resistance Meter Kit Installation, Operation and Maintenance



Made in the
United States of America



Figure 1. Desco Digital Surface Resistance Meter Kit

Description

The Desco 19290 Digital Surface Resistance Meter Kit is an instrument designed to measure resistance point-to-point (Rtt) or surface to ground (Rtg) in accordance with ESD Association Standard ANSI/ESD S4.1.

Its test functions include:

- Resistance measurement accuracy of $\pm 10\%$
- Resistance range of $< 1 \times 10^3$ ohms to $> 1 \times 10^{12}$ ohms
- Under load voltages of 10 and 100 volts $\pm 5\%$
- Electrification period of approximately 15 seconds

The Digital Surface Resistance Meter also measures ambient temperature and relative humidity. Up to 100 measurements and their temperatures and relative humidities at the time of the test may be stored and recalled from the meter's internal flash memory.

The Surface Resistance Meter is referenced and designed to be used to make measurements in accordance with the test procedures in:

- Compliance Verification - ESD TR53 - Resistance Measurements
- Worksurfaces - ANSI/ESD S4.1 Worksurfaces
- Floors - ANSI/ESD S7.1- Resistive Characterization of Materials Floor Materials
- Foot Grounders - ESD SP9.2 - Foot Grounders Resistive Characterization
- Garments - ANSI/ESD STM2.1 Garments Seating - ANSI/ESD STM12.1- Seating - Resistive Measurement
- Floor/Footwear - ANSI/ESD STM97.1 - Floor Materials and Footwear- Resistance Measurement in Combination with a Person

"A Compliance Verification Plan shall be established to ensure the Organization's fulfillment of the technical requirements of the ESD Control Program Plan. Process monitoring (measurements) shall be conducted in accordance with a Compliance Verification Plan that identifies the technical requirements to be verified, the measurement limits and the frequency at which those verifications shall occur. The Compliance Verification Plan shall document the test methods and equipment used for process monitoring and measurements. If the test methods used by the Organization differ from any of the standards referenced in this document, then there must be a tailoring statement that is documented as part of the ESD Control Program Plan. Compliance verification records shall be established and maintained to provide evidence of conformity to the technical requirements. The test equipment selected shall be capable of making the measurements defined in the Compliance Verification Plan." (ANSI/ESD S20.20 section 7.3)

DESCO WEST - 3651 Walnut Avenue, Chino, CA 91710 • (909) 627-8178
DESCO EAST - One Colgate Way, Canton, MA 02021-1407 • (781) 821-8370 • Website: Desco.com

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Pro-Pack Materials Pte Ltd - No. 9 Bukit Batok Street 22, #01-01, Singapore 659585
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Pro-Pack Materials Pte Ltd

The ESD & Cleanroom Specialist

GST REG No.: M2-0068811-2, Company REG No.: 198404225G



ISO 9001:2008 CERT NO.: 620252

ESD & Cleanroom Product, Packaging, Testing & Equipment, Work Station, Material Handling, Calibration Services, Turnkey Project

The Digital Surface Resistance Meter and its accessories are available in the following item numbers:

Item	Description
19290	Digital Surface Resistance Meter Kit
19291	Digital Surface Resistance Meter
19292	Carrying Case
19293	Electrode Spacers, 10" and 36"
19294	Test Leads
19295	Handheld Electrode
19296	Measurement Location Labels, 25 Pack
50003	Replacement 5 lbs. Electrodes
50004	Replacement T-Handles for 5 lbs. Electrodes
50005	Concentric Ring Probe

Packaging

19290 Digital Surface Resistance Meter Kit

- 1 Digital Surface Resistance Meter
- 2 Test Leads, 5' Length
- 2 5 lbs. Electrodes
- 1 Electrode Spacer, 10"
- 1 Electrode Spacer, 36"
- 4 AA Alkaline Batteries
- 1 Ground Plug Adapter
- 1 Gator Clip
- 25 Measurement Location Labels
- 1 Plastic Carrying Case
- 1 Certificate of Calibration

19291 Digital Surface Resistance Meter

- 1 Digital Surface Resistance Meter
- 4 AA Alkaline Batteries
- 1 Certificate of Calibration



Figure 3. Desco 19291 Digital Surface Resistance Meter



Figure 2. Desco 19290 Digital Surface Resistance Meter Kit

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Features and Components

Digital Surface Resistance Meter



Figure 4. Digital Surface Resistance Meter features and components

A. Test Jacks: The shielded test leads connect here. The black test lead's male SMA connector connects into the meter's female SMA connector, and the red test lead's banana plug connects into the meter's banana jack.

B. Exponent LEDs: These LEDs indicate the surface resistance exponent value. They are color coded for resistance decade quick checks.

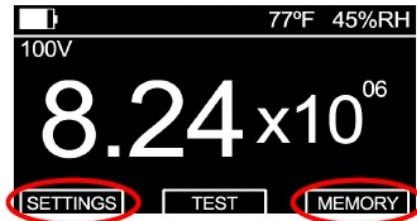
Exponent	Color	Resistive Property
<3, 3	Yellow	Conductive
4, 5, 6, 7, 8, 9, 10	Green	Dissipative
11, 12, >12	Red	Insulative

(i.e. 8 = 10^8 ohms or 100,000,000 ohms).

C. OLED Display: Displays the temperature, relative humidity, battery power, test voltage and resistance measurement.

D. Power Switch: Slide the switch to the left to power the meter OFF. Slide the switch to the right to power the meter ON.

E. Black Pushbuttons: Each black pushbutton corresponds to the prompts on the bottom-left and bottom-right of the display. These buttons are used to access the Settings and Memory Recall menus and scroll up and down between menu options.



F. Red Pushbutton: Corresponds to the prompts located in the bottom-center of the display. This button is used to perform tests and select menu options. Press and hold this button when in the Settings and Memory Recall menus to exit and return to the home screen.



G. Battery Compartment: Open this compartment to install the four AA alkaline batteries needed to power the meter. Replace the batteries once the battery icon on the display is empty.



Home / Test Results Screen

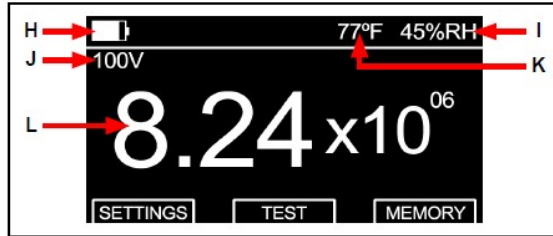


Figure 5. Home / Test Results screen

- H. Battery Life Indicator:** Displays the approximate life of the meter's 4 AA alkaline batteries.
- I. Relative Humidity:** Displays the relative humidity.
- J. Test Voltage:** Displays the test voltage used to complete the measurement.
- K. Temperature:** Displays the ambient temperature.
- L. Resistance Measurement:** Displays the resistance measurement in ohms (Ω).

Settings Menu

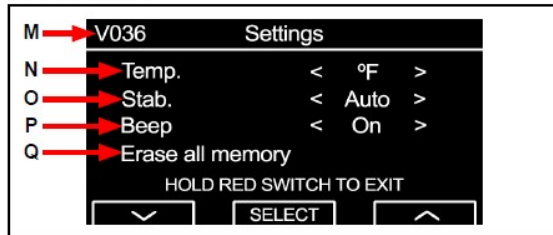


Figure 6. Settings menu

- M. Firmware Revision:** Displays the meter's firmware revision.
- N. Temperature:** Sets the unit of measurement for temperature to either Fahrenheit ($^{\circ}\text{F}$) or Celsius ($^{\circ}\text{C}$).
- O. Stabilization Mode:** Sets the meter's electrification period setting to either Auto and Fixed. Auto Stabilization enables a 15-second electrification period when the measured resistance is 1×10^{10} ohms or greater to maintain test accuracy. Fixed Stabilization complies with ANSI/ESD S4.1 and enables a 15-second electrification period when the measured resistance is 1×10^9 ohms or greater.
- P. Beep:** Enables and disables the audible beep when the meter's pushbuttons are pressed.
- Q. Erase all memory:** Erases all stored measurement transactions saved in the meter's memory.

Memory Recall Menu

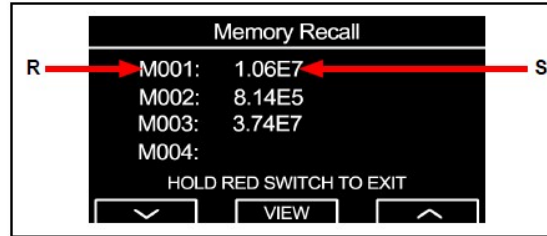


Figure 7. Settings menu

- R. Memory Slot Number:** Indicates the memory slot number.
- S. Resistance Measurement:** Indicates the resistance measurement value for the respective memory slot.

Operation

General Guidelines

Use both 5-pound electrodes for Resistance Point-to-Point (Rtt) measurements.

Use one 5-pound electrode, and connect the black test lead to ground for Resistance-to-Ground (Rtg) measurements.

Ensure that the item being measured is electrically isolated (placed on an insulative surface). The meter will measure the lowest resistance path.

Ensure that the test leads are separated and uncrossed as a best practice.

When using 5-pound electrodes:

- Place them no closer than 2" from the edge of the surface being measured.
- Place them no closer than 3" to any groundable point.
- Place them about 10" apart from each other for Rtt measurements of a worksurface.
- Place them about 3' apart from each other for Rtt measurement of a floor.

Preferable electrode placements include:

- Most commonly used area of a surface
- Most worn area
- Center of surface
- Furthest area from a grounded point

If the surface to be measured has sections (i.e. floor tiles, garment panels), place the 5-pound electrodes on different sections for Rtt measurements.

Clean the material's surface for test lab measurements, but do not clean the surface for materials that are already installed. Only clean and re-test the installed material if failure occurs.



Measure Resistance-to-Ground (Rtg)

Test Procedure in accordance with ANSI/ESD S4.1 section 6.4 Periodic Worksurface Testing:

1. Do not clean the surface.
2. Remove from the surface only those items that might interfere with the test. ESD sensitive devices shall also be removed.
3. Connect the black test lead to a grounded point.
4. Connect the red test lead to one 5-pound electrode, and place the electrode on the furthest convenient point on the surface.
5. Push the red pushbutton to perform a measurement. Should the 15-second electrification period appear, it may be bypassed by pushing the red pushbutton a second time.
6. Push the right black pushbutton to save the measurement, and apply an included measurement location label if desired.
7. Perform additional measurements by placing the electrode on the most commonly used or worn area.

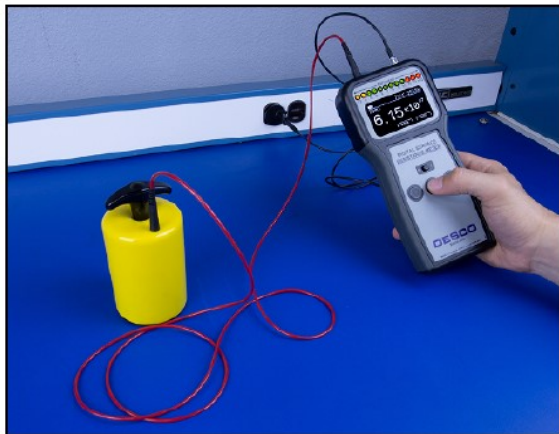


Figure 8. Measuring the Resistance-to-Ground (Rtg) of a worksurface mat



Figure 9. Applying a measurement location label to the edge of a workstation



Figure 10. Using the Desco 19295 Handheld Electrode to measure the Resistance-to-Ground (Rtg) of an operator wearing foot grounders

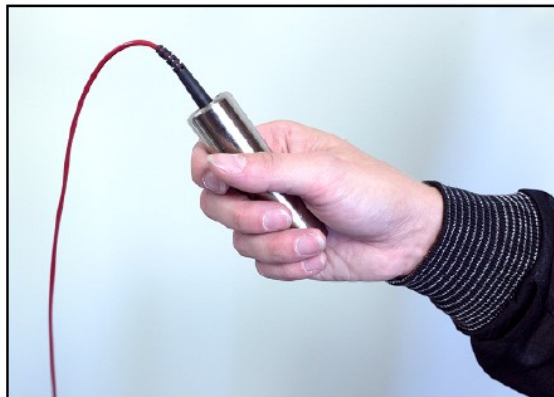


Figure 11. Using the Desco 19295 Handheld Electrode



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Specifications

Resistance Ranges	1 x 10 ³ to 1 x 10 ¹² ohms @ 10 Volts, complies with ANSI/ ESD S4.1 1 x 10 ³ to 1 x 10 ¹² ohms @ 100 Volts, complies with ANSI/ESD S4.1
Resistance Accuracy (@ 23°C, 40% R.H.)	Resistance measurements within ±10%, complies with ANSI/ESD S4.1. Under load voltages of 10 Volts ±5% and 100 Volts ±5% exceeds requirements of ANSI/ESD S4.1
Temperature Accuracy	±10%
Relative Humidity Accuracy	±10 integers
Power Supply	4 AA alkaline batteries
Battery Life	Approximately 1,500 measurements
Display	OLED, 2.7" diagonal, 128 x 64 pixel resolution
Memory Capacity	100 measurements
Operating Temperature	41°F to 85°F (5°C to 30°C)
Environmental Requirements	Indoor use only at altitudes less than 6500 ft. (2 km) Maximum relative humidity of 80% up to 85°F (30°C)
Dimensions (meter)	3.94" x 8.27" x 1.26" (100 mm x 210 mm x 32 mm)
Dimensions (carrying case)	15.0" x 14.5" x 3.5" (381 mm x 368 mm x 89 mm)
Weight (meter with batteries)	0.9 lbs (0.4 kg)
Weight (populated carrying case)	13.0 lbs (5.9 kg)
Country of Origin	United States of America

Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See the Desco Limited Warranty
Desco.com/Limited-Warranty.aspx

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