

Digital Surface Resistance Meter Kit Operation and Maintenance



Sales Number: 19290

Brand: DESCO

Manufacturer: Desco Industries Inc

Country of Origin: USA

DESCO

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1. Packaging



Description	Part Number	Quantity
① Digital Surface Resistance Meter	19290	1 EA
② Electrode Spacers, 10" and 36"	19293	2 EA
③ Test Leads, 5'	19300	2 EA
④ Point-to-Point Electrodes	50003	2 EA
⑤ Gator Clip	09750	1 EA
⑥ Ground Plug Adapter	09838	1 EA
⑦ Measurement Location Labels	19296	25 EA
⑧ Concentric Ring Electrode	REM005	1 EA
⑨ Handheld Electrode	19295	1 EA
⑩ Single-Point Pen Probe	SPP1	1 EA
⑪ Two-Point Pen Probe	SPP2	1 EA
⑫ Concentric-Point Pen Probe	SPP3	1 EA
⑬ Glove Constant Area and Force Electrode	19298	1 SET
⑭ Wrist Strap Resistance Test Rack	S11	1 EA
⑮ Plastic Carrying Case	19292	1 EA

Sales Number

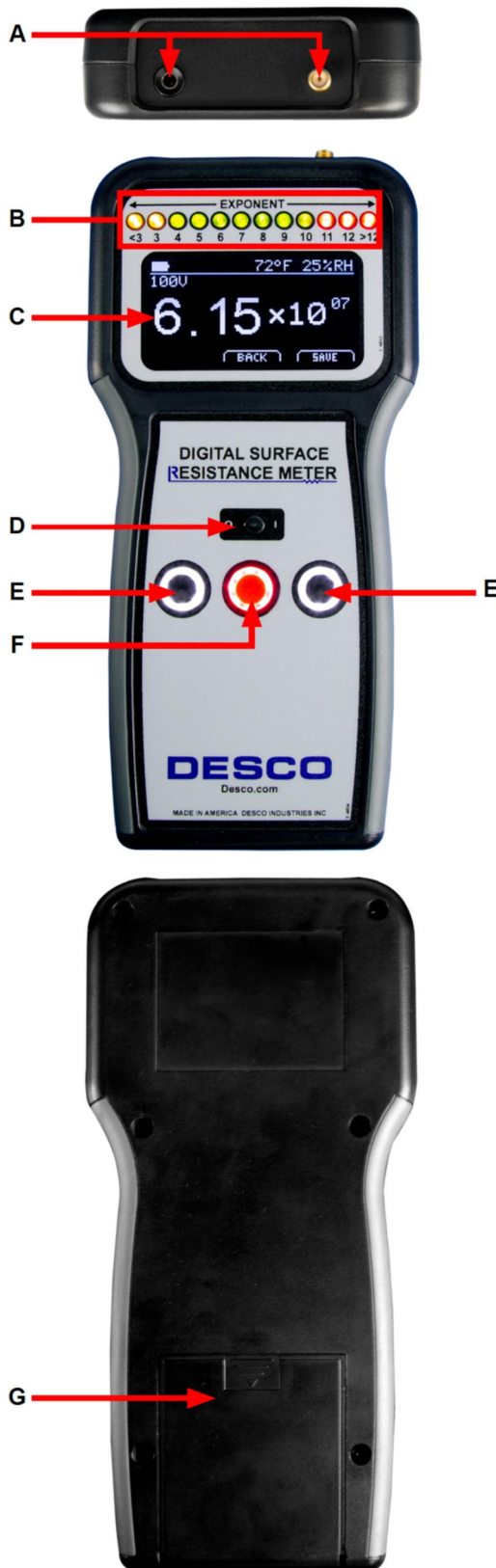
19290 Kit with Standard Accessories: ① + ② + ③ + ④ + ⑤ + ⑥ + ⑦ + ⑭

Optional Accessories: ⑧, ⑨, ⑩, ⑪, ⑫, ⑬, ⑮

Specifications

Resistance Ranges:	$10^3\Omega$ to $<10^6\Omega$ @10V, $10^6\Omega$ to $10^{12}\Omega$ @100V
Resistance Accuracy:	$\pm 10\%$, $\pm 20\%$ for $5 \times 10^3\Omega$ lower and $5 \times 10^{11}\Omega$ greater
Temperature Accuracy:	$\pm 10\%$
Relative Humidity Accuracy:	± 10 integers
Display:	OLED, 2.7" diagonal, 128 x 64 pixel resolution
Memory Capacity:	100 measurements
Power Supply:	4 AA alkaline batteries
Operating Conditions:	5 to 30°C, humidity to 80% non-condensing, altitude to 2000m
Meter Dimension:	210mm H x 100mm W x 32mm D, weight 140g
Meter Weight:	0.4kg
Kit with Carrying Case Weight:	5.9kg

2. Features and Components



A. Test Jacks: The shielded 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.

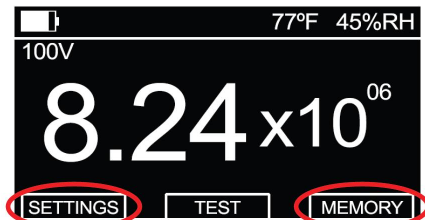
B. Exponent LEDs: These LEDs indicate the surface resistance exponent value. They are color coded for resistance decade quick checks.

Exponent	Color
<3, 3	Yellow
4,5,6,7,8,9,10	Green
11,12, >12	Red
i.e. 8 = 10^8 ohms or 100,000,000 ohms	

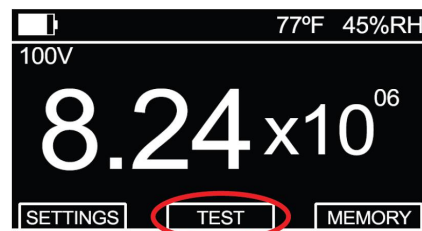
C. OLED Display: Displays the temperature, relative humidity, battery life, test voltage and resistance measurement.

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.

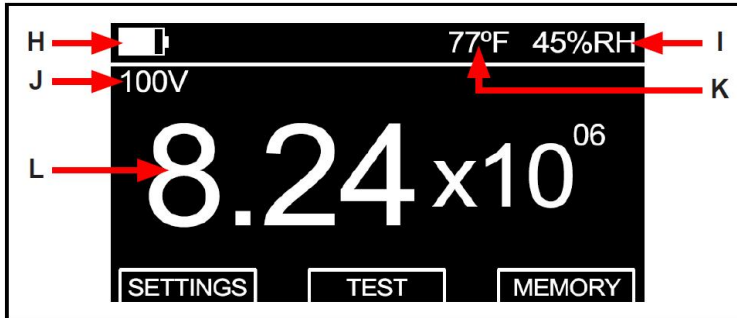


F. Red Pushbutton: Corresponds to the prompts located in the bottom-center of the display. This button is used to perform tests and select menu options. Press and hold this button when in the Settings and Memory Recall menus to exit and return to the home screen.



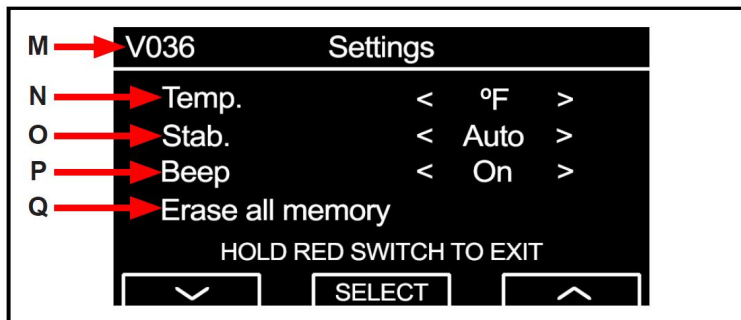
G. Battery Compartment: Open this compartment to install the four AA alkaline batteries needed to power the meter. Replace the batteries once the battery icon on the display is empty.

Home / Test Results Screen



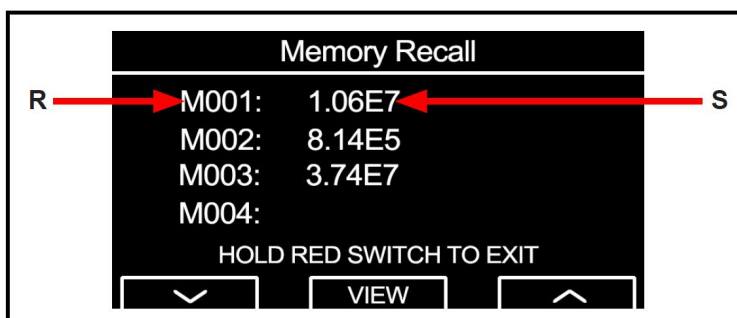
- H. **Battery Life Indicator:** Displays the approximate life of the meter's 4 AA alkaline batteries.
- I. **Relative Humidity:** Displays the relative humidity.
- J. **Test Voltage:** Displays the test voltage used to complete the measurement.
- K. **Temperature:** Displays the ambient temperature.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

Settings Menu



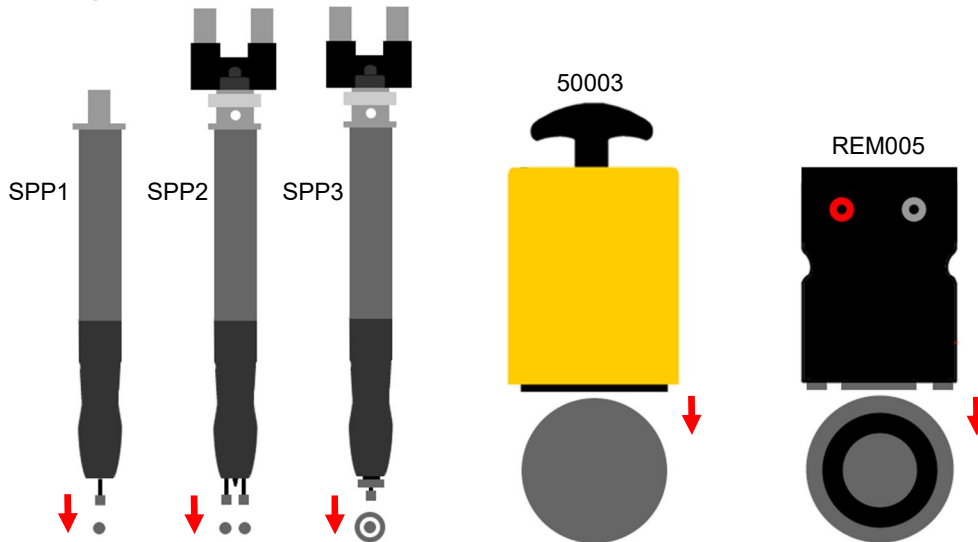
- M. **Firmware Revision:** Displays the meter's firmware revision.
- N. **Temperature:** Sets the unit of measurement for temperature to either Fahrenheit ($^{\circ}\text{F}$) or Celsius ($^{\circ}\text{C}$).
- O. **Stabilization Mode:** Sets the meter's electrification period setting to either Auto and Fixed Stabilization.
Auto - Enables a 15-second electrification period when the measured resistance is 1×10^{10} ohms or greater to maintain test accuracy.
Fixed - Complies with ANSI/ESD S4.1 and enables a 15-second electrification period when the measured resistance is 1×10^6 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



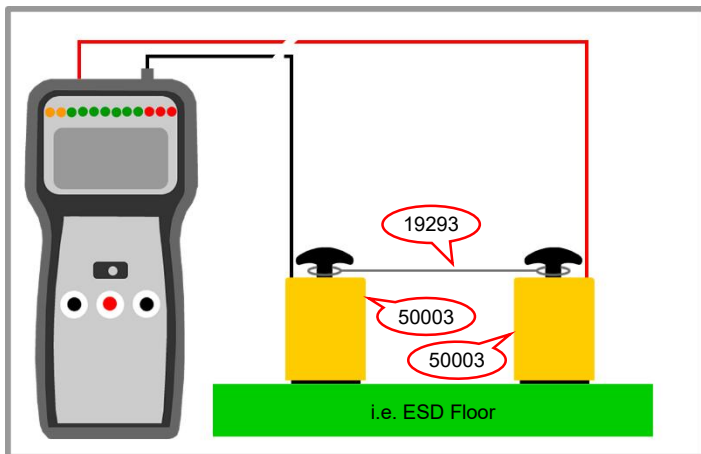
- R. **Memory Slot Number:** Indicates the memory slot number.
- S. **Resistance Measurement:** Indicates the resistance measurement value for the respective memory slot.

Measurement Figures



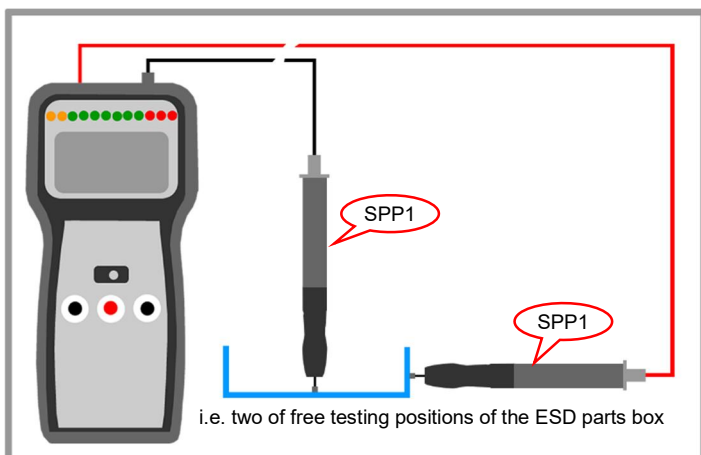
- SPP1 Single-Point Pen Probe: Measure point to point resistance for small materials
- SPP2 Two-Point Pen Probe: Measure two points resistance for small materials
- SPP3 Concentric-Point Pen Probe: Measure surface resistance for small materials
- 50003 Point-to-Point Electrode: Measure point to point resistance for large materials
- REM005 Concentric Ring Electrode: Measure surface resistance for large materials

Measure Point to Point Resistance for Large Materials



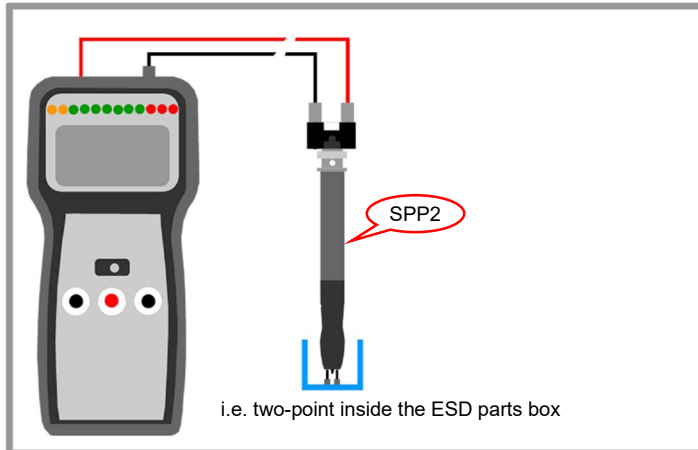
- Connect the meter to 2 of 50003 electrodes
- Place two electrodes apart from 10" for measurement for a worksurface, use the 10" spacer to ensure the distance
- Place two electrodes apart from 36" for measurement for a floor, use the 36" spacer to ensure the distance
- Push the red pushbutton to perform a measurement

Measure Point to Point Resistance for Small Materials



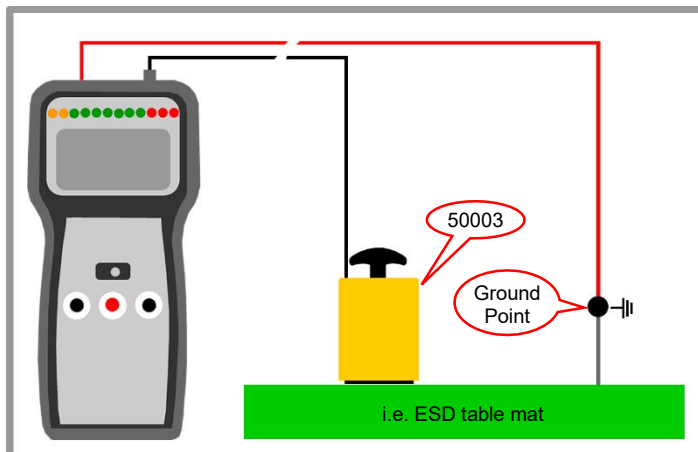
- Connect the meter to 2 of SPP1 Pen Probes
- Hold the Pen Probes vertically and place the rubber tips on the material
- Apply pressure and compress the pogo pin to the bottom, this would provide the sufficient pressure for correct contact force
- Push the red pushbutton to perform a measurement

Measure Two-Point Resistance for Small Materials



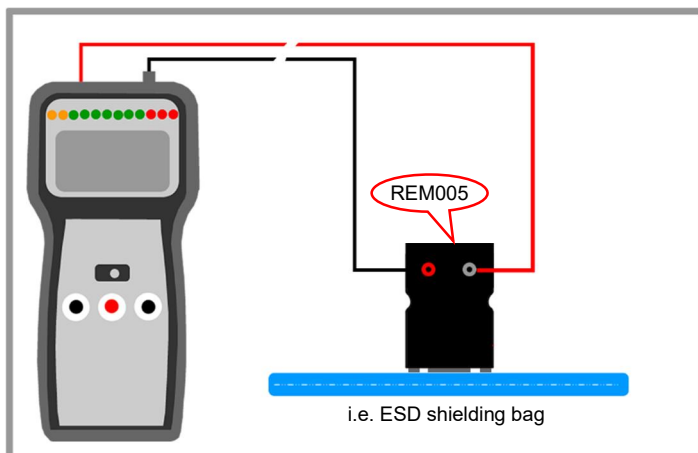
- Connect the meter to 1 of SPP2 Pen Probe
- Hold the Pen Probe vertically and place the rubber tips on the material
- Apply pressure and compress the pogo pins until the probe runs against the dead stop. This would provide the sufficient pressure for correct contact force
- Push the red pushbutton to perform a measurement

Measure Resistance to Ground



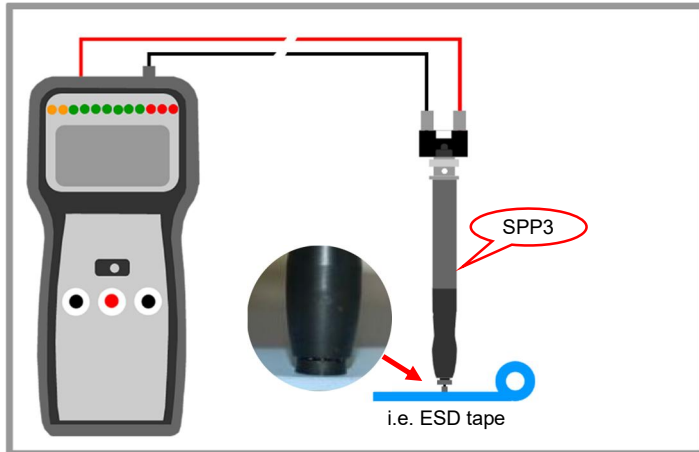
- Connect one test lead to 1 of 50003 electrode, and place it on the material
- Connect another test lead to a ground point, use the Gator Clip or Ground Plug Adapter
- Push the red pushbutton to perform a measurement

Measure Surface Resistance for large Materials



- Connect the meter to REM005 electrode and place the electrode on the material
- Push the red pushbutton to perform a measurement
- The reading of meter is the value of surface resistance
- To convert a resistance obtained by this test method to an equivalent resistivity, multiply the reading by ten (x 10)

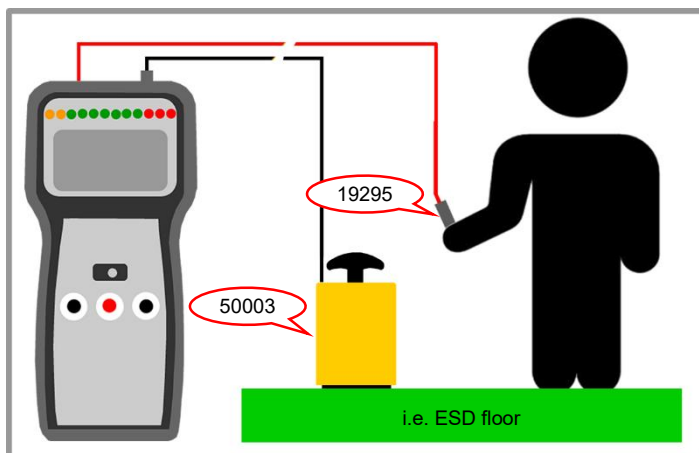
Measure Surface Resistance for Small Materials



- Connect the meter to SPP3 Pen Probe
- Hold the Pen Probe vertically and place the rubber tips on the material
- Apply pressure and compress the pogo pins until the rubber ring on the probe runs against the probe body. This would provide the sufficient pressure for correct contact force
- Push the red pushbutton to perform a measurement

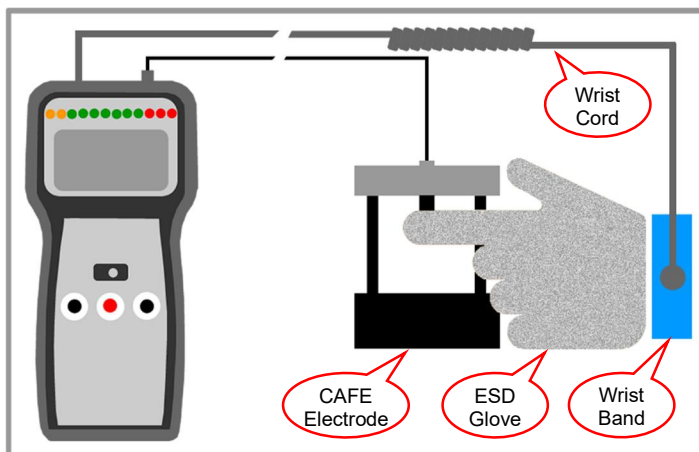
- The reading of meter is the value of surface resistance
- To convert a resistance obtained by this test method to an equivalent resistivity, multiply the reading by ten (x 10)

Measure Floor Material and Footwear in Combination with a Person



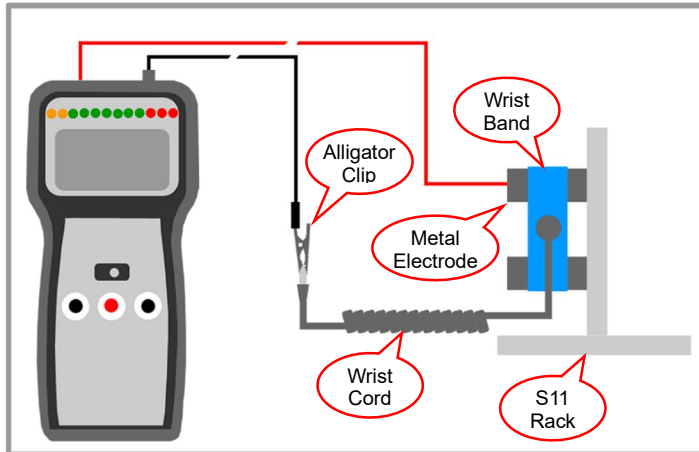
- Connect one test lead to 1 of 50003 electrode, and place it on the material
- Connect another test lead to the 19295 handheld electrode
- The person wears the ESD shoe and stands on the ESD floor
- Push the red pushbutton to perform a measurement

Measure Resistance for Glove and Finger Cots



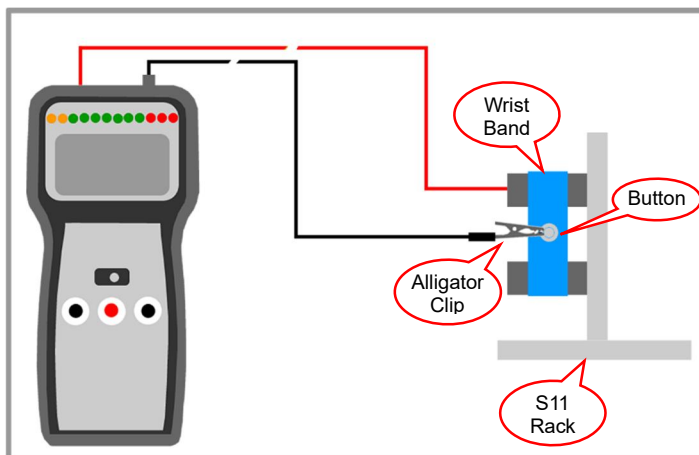
- Fit a wristband snugly onto the wrist
- Snap the wrist cord to the wrist band
- Plug the wrist cord into one input of the meter
- Attach the Glove CAFE to the other input of the meter
- Wear the glove on the same hand as the wrist band
- Balance the Glove CAFE on the fingerprint side of the thumb or first finger of choice on the hand wearing the glove
- Push the red pushbutton to perform a measurement

Measure Resistance for Complete Wrist Strap



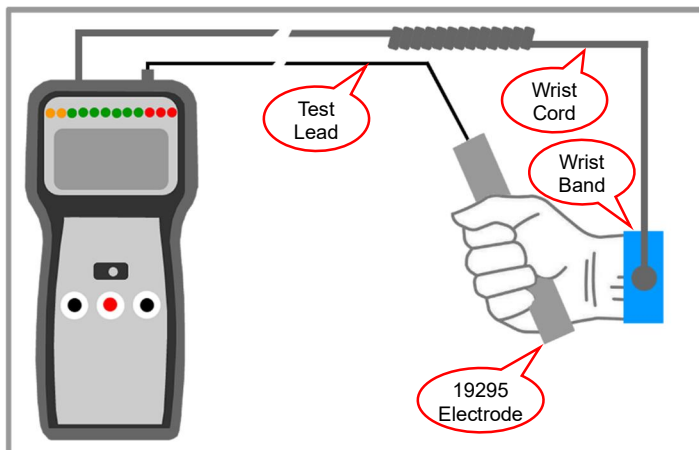
- Fasten the wrist band on the two metal electrodes of the SP11 rack
- Plug one of test lead into upper metal electrode
- Snap the wrist cord to the wrist band
- Clip connects another test lead to the ground end of wrist cord
- Push the red pushbutton to perform a measurement
- Resistance should be between $0.8M\Omega$ to $1.2M\Omega$

Measure Resistance for Wrist Band Only



- Fasten the interior side of wrist band on the two metal electrodes of the SP11 rack
- Plug one of test lead into upper metal electrode
- Clip connects another test lead to the button of wrist band
- Push the red pushbutton to perform a measurement
- Turn over the wrist band, fasten the exterior side on the two metal electrodes of SP11 rack, make same test leads connection as above, then perform a measurement
- Interior side resistance should be less $100K\Omega$
- Exterior side resistance should be larger $10M\Omega$

Measure System Resistance for Wrist Strap



- Fit a wrist band snugly onto the wrist
- Snap the wrist cord to the wrist band, then plug the wrist cord into one input of the meter
- Connect the meter to 19295 handheld electrode
- Hold the handheld electrode then perform a measurement
- The system resistance should be less $35M\Omega$

3. Maintenance

The Digital Surface Resistance Meter requires little maintenance. There are no user serviceable parts. If the meter requires service beyond cleaning the electrodes or replacing the batteries, please contact the [Desco Customer Service](#).

Battery Replacement

Replace the batteries once the battery life indicator is empty. Open the compartment located on the back of the meter to replace the batteries. The meter uses four AA alkaline batteries. Ensure that the batteries' polarities are oriented in the correct fashion to avoid any possible circuit damage.

Cleaning the Digital Surface Resistance Meter

The area surrounding the test jacks at the top end of the meter should be wiped with a clean, isopropanol-alcohol moistened cloth to remove skin oils that will accumulate and affect the meter's accuracy at high resistances. The frequency of cleaning will depend on usage. Desco recommends cleaning this area once a month. Cable jackets should also be cleaned in this fashion.

Cleaning the 5 lbs. Electrodes

Per ANSI/ESD S4.1 "Clean the electrodes with a minimum 70% isopropanol-water solution. Make sure the 5 pound electrodes' conductive pads are dry prior to use."

See specific product test standards for test lab specimen cleaning instructions. Per ANSI/ESD S4.1 Worksurfaces "The test specimens and electrodes shall be cleaned twice with a minimum 70% isopropanol-water solution using a clean, low-linting cloth each time." (Note: The item should then be conditioned for 72 hours minimum)

4. Calibration

Frequency of recalibration should be based on the critical nature of those ESD sensitive items handled and the risk of failure for the ESD protective equipment and materials. In general, Desco recommends that calibration be performed annually.

In-house calibration can be performed by using $\pm 1\%$ tolerance resistors in each of the meter's decade ranges. Connect the resistors to the test leads using clips and record the meter's display. Minimize crossing the test leads when possible. Contact [Desco Customer Service](#) should adjustments be necessary. Special equipment is required to adjust the meter.

Required Equipment

- Digital Multimeter ($\pm 1.25\%$ accuracy @10VDC and 100VDC)
- Resistance Decade Box with a range of 10^3 to 10^{12} ohms ($\pm 2\%$ accuracy @ 10^3 to 10^{10} ohms; $\pm 5\%$ accuracy @ 10^{11} to 10^{12} ohms)
- Thermometer ($\pm 1^\circ\text{F}$ accuracy)
- Relative Humidity Meter ($\pm 2\%$ accuracy)
- 99% Isopropyl Alcohol and Cleaning Wipes

Setup

- **Test Area** - needs to be free of any high voltage transformers or power supplies and away from any type of fluorescent lighting or high power lighting.
- **Worksurface** - needs to be covered with a grounded conductive mat at 1.0×10^3 or less.
- **Technician** - needs to be connected to equipment ground with a 0 ohm resistor in the ground cord.
- **Decade Box** - needs to be connected to equipment ground.

Normalization of the Meter

The temperature inside the testing area needs to be $75^{\circ}\text{F} \pm 3^{\circ}\text{F}$ ($23.9^{\circ}\text{C} \pm 1.7^{\circ}\text{C}$) at a relative humidity no greater than 60%. The meter needs to stay at a temperature of $75^{\circ}\text{F} \pm 3^{\circ}\text{F}$ ($23.9^{\circ}\text{C} \pm 1.7^{\circ}\text{C}$) for approximately 1 hour for proper readings. The meter cannot be normalized inside objects, enclosed boxes, containers or cases. The temperature inside an enclosed case will differ from the outside temperature. These cases will act as insulators. The meter must remain stationary in the testing area for about 1 hour without any significant changes to the temperature.

NOTE: Accuracy is measured after normalizing the meter for a minimum of 1 hour.

Calibration Verification Procedure

1. Use only the test leads that were supplied with the meter.
2. Use 99% isopropyl alcohol to clean the two test jacks located at the top of the meter. Oil from human fingers can affect the accuracy of the meter.
3. Connect the test leads to the test jacks located at the top of the meter. Connect the opposite end of the test leads to a DC voltmeter.
4. Press the red pushbutton. The measured voltage should start at $10\text{V} \pm 5\%$ and increase to $100\text{V} \pm 5\%$ at the end of the test cycle.
5. Connect the test leads to the Resistance Decade Box. Apply the load resistance values indicated in the table below. The meter should display accuracy within $\pm 10\%$ of the loaded resistance value.

Load Resistance (Ω)	Accuracy	Display Value	Exponent LED
1×10^{12}	+20%	1.20×10^{12}	12
	-20%	8.00×10^{11}	11
1×10^{11}	+10%	1.10×10^{11}	11
	-10%	9.00×10^{10}	10
1×10^{10}	+10%	1.10×10^{10}	10
	-10%	9.00×10^9	9
1×10^9	+10%	1.10×10^9	9
	-10%	9.00×10^8	8
1×10^8	+10%	1.10×10^8	8
	-10%	9.00×10^7	7
1×10^7	+10%	1.10×10^7	7
	-10%	9.00×10^6	6
1×10^6	+10%	1.10×10^6	6
	-10%	9.00×10^5	5
1×10^5	+10%	1.10×10^5	5
	-10%	9.00×10^4	4
1×10^4	+10%	1.10×10^4	4
	-10%	9.00×10^3	3
1×10^3	+20%	1.20×10^3	3
	-20%	$< 1.0 \times 10^3$	<3