

# Digital Static Field Meter Operation and Maintenance



Made in the  
United States of America



Figure 1. Desco [19492](#) Digital Static Field Meter

## Description

The Desco Digital Static Field Meter is a high quality, portable non-contacting static field meter which consistently produces accurate readings with ease and provides years of trouble-free operation.

The Digital Static Field Meter indicates surface voltage and polarity on objects up to  $\pm 19.99$  kV at a distance of 1 inch with an accuracy of  $\pm 5\%$  of the displayed value. It is chopper-stabilized for use under almost any condition including ionized environments. The conductive case and ground snap facilitate grounding for accurate measurement. Also featured are a zero button and a display hold function. A unique LED rangefinder system provides accurate positioning of the Meter from the target.

Its accuracy is dependent upon three factors:

- Grounding of the Meter via a ground cord (not included) (Meter is also grounded when held by a grounded operator).
- The instrument must be properly zeroed.
- The distance from the front edge of the case to the target or surface under examination must be accurately defined.

Charged insulators in the ESD protected area can adversely impact quality, productivity, and reliability.

“When any object becomes electrostatically charged, there is an electrostatic field associated with that charge. If an ESDS (ESD sensitive) device is placed in that electrostatic field, a voltage may be induced on the device. If the device is then momentarily grounded, a transfer of charge from the device occurs as a CDM (Charged Device Model) event. If the device is removed from the region of the electrostatic field and grounded again, a second CDM event will occur as charge (of opposite polarity from the first event) is transferred from the device.” (Handbook ESD TR20.20 section 2.7.5 Field Induced Discharges)

Compliance verification should include periodic checks with a static field meter to determine if high charging material is present in the ESD protected area. All packaging and other materials that may be electrostatic generative to 2,000 volts must be kept a minimum of 12" from ESD sensitive items at all times. It is proper to rub an item and measure that it can charge.

“In order to mitigate field-induced CDM (Charged Device Model) damage, the ESD program shall include a plan for the handling of process-required insulators. If the field exceeds 2,000 volts/inch, steps shall be taken to either:

- A. Separate the insulator from the ESD-sensitive device by a distance of 30 cm (12 inches); or
- B. Use ionization or other charge mitigating techniques to neutralize the charge.” (ANSI/ESDS20.20 section 8.3)

Other steps that can be taken are to remove the item from the ESD protected area or replace with a static control protective version of the item.

## Packaging

- 1 Digital Static Field Meter
- 1 9V Alkaline Battery
- 1 Ground Coil Cord
- 1 Data Output Cord
- 1 Certificate of Calibration

## Features and Components

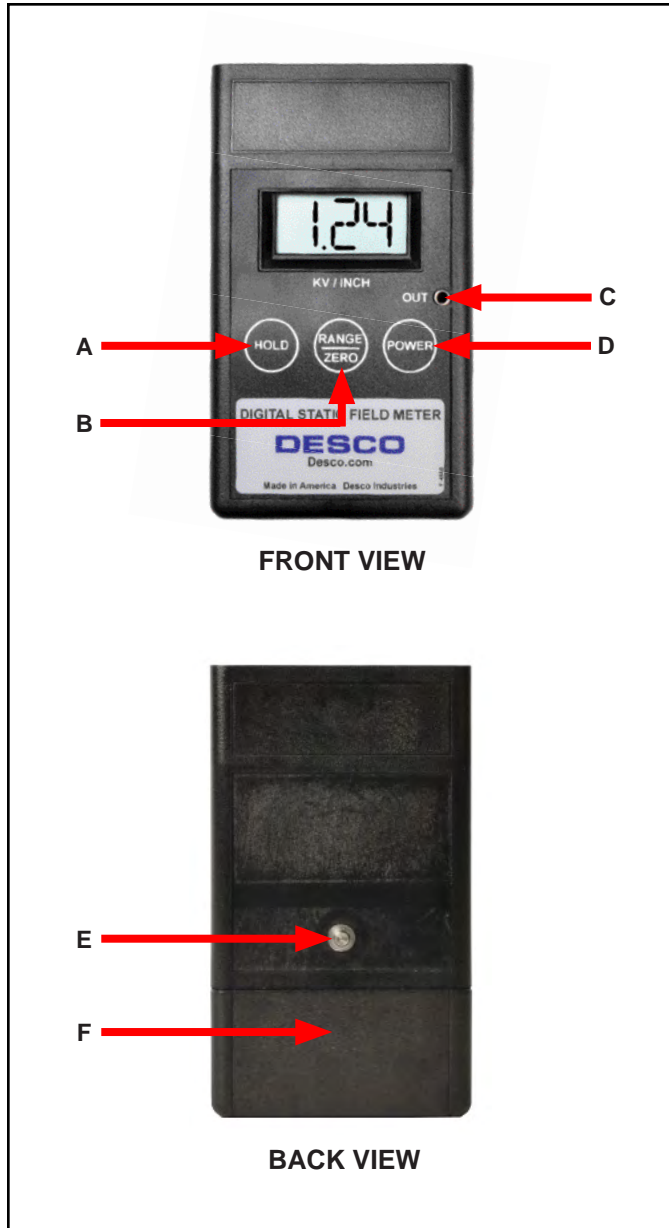


Figure 2. Digital Static Field Meter features and components

**A. HOLD Button:** Press to freeze the reading on the display. Press again to return to normal measurement operation.

**B. RANGE / ZERO Button:** Press to select the measurement range. Press and hold to zero the meter.

**C. Analog Output Jack:** A low-voltage signal of the measured voltage is provided at this output. The voltage is 1/1000th ( $\pm 2$  kV range) or 1/10,000 ( $\pm 20$  kV range) of the measured voltage.

**D. POWER Button:** Press to turn the unit ON and OFF.

**E. 4mm Stud:** Use this stud to ground the Meter using the included Ground Coil Cord.

**F. Battery Cover:** Slide the cover down to open the 9V battery compartment.

## Operation

**Note:** The [19492](#) Digital Static Field Meter is built in a conductive case. The instrument senses the difference in potential between the case (and the person holding the case / ground connection) and the surface under test. Ensure that the person using the instrument is grounded or that the rear panel ground snap connection is utilized to achieve accurate measurements.

### BATTERY CHECK

The battery should be replaced when “BAT” is indicated on the display. Always replace the battery with a 9V alkaline or equivalent battery in order to remain CE compliant.

### ZERO THE METER

Turn the meter on by pressing the POWER button. Press the RANGE / ZERO button to set the meter to the 2 kV (3 decimal places) range. Point the top of the Meter approximately 1 inch away from a grounded metal surface. Use the red LED range guide. The Meter is properly positioned when the projected red bullseyes are centered on top of each other. Press and hold the RANGE / ZERO button until the meter displays “.000”.

### MAKING A MEASUREMENT

Place the meter 1 inch from the object to be measured. This distance is measured from the front edge of the meter case to the surface of the object. The meter now displays a reading (from 0 to  $\pm .200$  or  $\pm 2.00$ ) of the electrostatic field in kilovolts per inch.

**Note:** The red ranging lights are provided to help place the meter at the correct distance from the object. The lights are set to produce a concentric red bullseye pattern on a flat opaque surface 1 inch from the front edge of the meter. This can be practiced by aiming the meter at a sheet of white paper.

The display will indicate “1” or “-1” when the meter is over-ranged. Change the range of the unit if necessary. If the measurement exceeds 20 kV, move the meter farther away from the object and multiply the reading by the distance (in inches) away from the object being measured. The measurement accuracy is dependent on

a stable ground reference and the 1 inch measuring distance. It is also dependent on the “aspect ratio”, relating the size of the object to be measured to the measurement distance.



Figure 3. Reading the Digital Static Field Meter while in the  $\pm 20$  kV range



Figure 4. Reading the Digital Static Field Meter while in the  $\pm 2$  kV range

**Note:** This aspect ratio should be at least 3 for best accuracy, i.e. the object should be at least a 3 inch square when measuring at a 1 inch distance. Accurate measurements may be made at other measurement distances by scaling the meter range and observing the proper aspect ratio. For example, at a measurement distance of 3 inches, multiply the meter reading by 3 to give a range of 0 to 60 kilovolts. For accuracy, the object being measured at this distance should be at least a 9 inch square.

#### HOLDING THE LAST READING

With the meter positioned 1 inch from the object being measured, press the HOLD button. This will freeze the reading from the object on the display and the analog output signal. This feature allows the operator to move the meter where it may be more easily read or saved for later reference.

**Note:** The red ranging lights will be off while the meter is in HOLD mode. It is advised to do this between measurements to prolong battery life.

#### ANALOG OUTPUT

The analog output jack labeled “OUT” on the face of the meter accepts a standard 2.5 mm monaural phone plug and is provided so the output of the Digital Static Field Meter may be connected to an oscilloscope, strip chart recorder, external meter or other device. Use the included cord to achieve a connection between the field meter and alternate measuring instrument. The voltage at this output is 1/1000th ( $\pm 2$  kV range) or 1/10,000 ( $\pm 20$  kV range) of the measured voltage.

#### BATTERY REPLACEMENT

The Digital Static Field Meter operates from a standard 9 VDC alkaline battery. Battery life is in excess of 50 hours under normal use. When the battery voltage drops below 6.5 V, “BAT” will appear on the display. To change the battery, slide the battery cover down at the back of the Meter and remove the battery from the battery clip. Replace the battery with a fresh one and re-install the battery cover. The battery should be removed from the Meter if its is to be stored for an extended period of time.

#### Maintenance

The Digital Static Field Meter is factory calibrated and no maintenance is required. If for any reason you believe the Meter is not working correctly, please contact Desco Customer Service. CAUTION - There are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

**Note:** This Meter is a precision instrument and should not be subjected to dropping as that would void the warranty.

## Specifications

### Measurement Range (switch selectable)

Low Range: 0 to  $\pm 1.99$  kV / inch  
High Range: 0 to  $\pm 19.99$  kV / inch

### Measurement Accuracy

Voltage Monitor Output:  $\pm 5\%$  of reading  $\pm 10$  mV  
Voltage Display:  $\pm 5\%$  of reading  $\pm 2$  counts

### Measurement Stability

$\pm 10$  counts

### Automatic Shutoff

Unit will shut off after 20 minutes after last switch activity

### Power Requirements

One (1) 9V alkaline battery

### Operating Time

Greater than 50 hours, with new battery at 21°C continuous usage

### Operating Conditions

Temperature: 10°C to 30°C  
Relative Humidity: Up to 80%, non-condensing  
Altitude: Up to 2,000 meters

### Dimensions

0.94" H x 2.75" W x 4.94" L  
(23.9mm H x 69.9mm W x 125.5mm L)

### Weight (with battery)

4.9 oz  
(140 g)

### Voltage Monitor Connection

2.5mm audio jack

### CE Certified

## Ionization Test Kit Accessories

Desco offers accessories for the Digital Static Field Meter designed to facilitate routine auditing and periodic testing of ionization equipment (Ref: ANSI/ESD SP3.3). The Meter and accessories combination can be used to test an ionizer's overall performance. This highly portable test kit allows the user to make quick and accurate offset voltage balance level and neutralization discharge time measurements (counting or using stopwatch). These accessories are available as Desco item [19440](#) Test Kit Upgrade which includes the Conductive Plate and Charger.



Figure 5. Installing the [19441](#) Conductive Plate

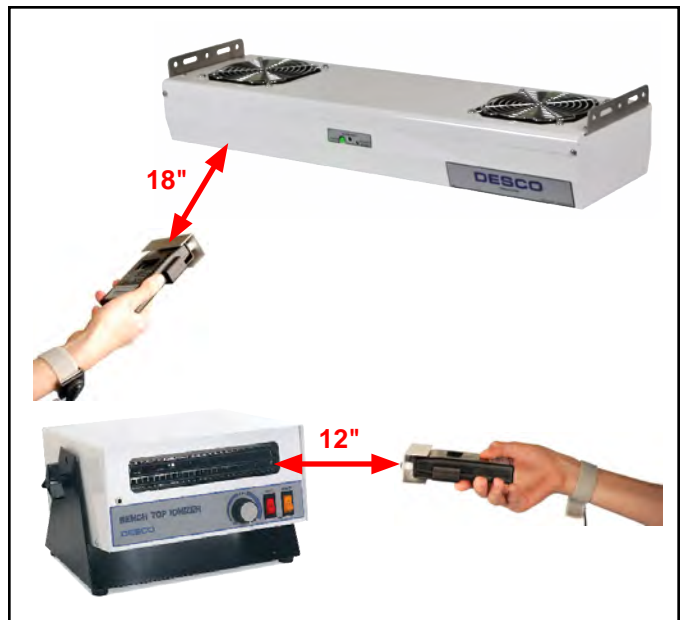


Figure 6. Auditing ionization equipment with the Digital Static Field Meter and Conductive Plate (Ref: ANSI/ ESD SP3.3)

## Desco 19448 Personal HBM Test Fixture

**Note:** Desco [19441](#) Conductive Plate required

The Desco [19448](#) Personal HBM Test Fixture turns your model [19492](#) Digital Field Meter into a Human Body Model tribo-electric charging tester. This kit will allow you to measure electrical charges generated on the human body while walking or moving across an insulative or conductive surface.

It has been specially designed to measure static charges produced by walking across substrates such as carpeting, vinyl floor tile, and sealed concrete. It can also be used to detect charge generation on surfaces such as conductive or dissipative floor tiles and carpeting. An ESD technician may also use this tool to verify proper grounding between a conductive or dissipative floor surface and a person wearing personal grounding devices such as foot grounders.

The amount (or size) of the charge generated will vary from one human body to another. Other factors such as humidity, contamination between the foot and flooring surface, as well as human body capacitance will also affect the amount of charge generated.

### Installation

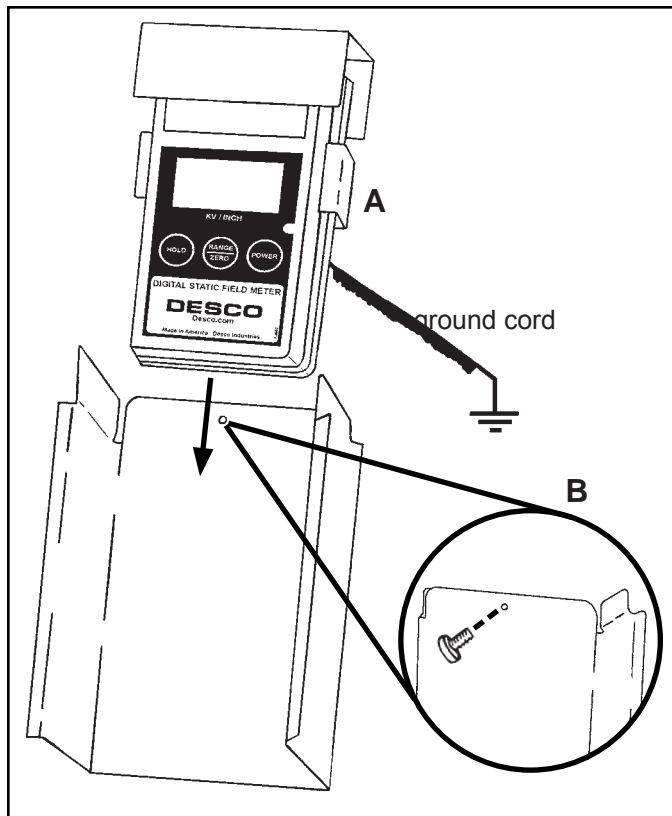


Figure 7. Installing the [19448](#) Personal HBM Test Fixture on the Digital Static Field Meter with Conductive Plate

- A. Slide the Digital Static Field Meter down into the Personal HBM Test Fixture.

**Note:** The Conductive Plate is required to use the Personal HBM Test Fixture

- B. Insert the screw from the back of the Personal HBM Test Fixture.

To obtain the desired result, a ground cord must be installed onto the 4mm snap on the back of the Field Meter and attached to a equipment ground or common ground point.

### Operation

In order to obtain the desired test results, the Meter must be properly grounded as stated in the Installation and Removal section. Once installed on the Field Meter, the HBM Test Fixture itself is isolated from the meter case and ground and should remain that way.

Cradle the Test Fixture in the palm of your hand. Once the Meter is grounded and you are standing on the substrate to be tested, simply walk around, shuffle your feet, raise a foot or use the walking pattern per Figure 1 of ANSI/ESD STM 97.2 to determine if the combination of footwear and substrate produces an electrical charge. If an electrical charge is generated and induced onto the human body, the Test Fixture will transfer that charge onto the Field Meter, and the amount of the charge will be registered. If it is necessary to record the amount of charge, you can save the result by simply pressing the Hold button on the front of the Field Meter, and pressing the button with an insulated object. This test can be done regardless of the type of footwear or substrate combination. Other items in your ESD Control Program may also be tested such as conductive or dissipative chairs. Simply sit in the chair on the desired substrate and move the chair back and forth to determine if the chair and human body combination produces and electrical charge.

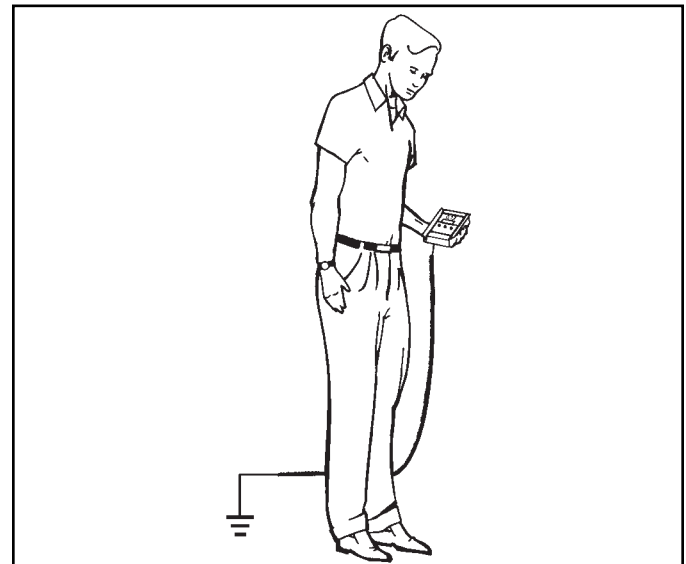


Figure 8. Using the Personal HBM Test Fixture to measure charges on the body

**Limited Warranty**

Desco expressly warrants that for a period of one (1) year from the date of purchase Desco Digital Static Field Meters will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a credit for purchase of replacement Desco Digital Static Field Meters, or, at Desco's option, the Digital Static Field Meter will be repaired or replaced free of charge. If product credit is issued, the amount will be calculated by multiplying the unused portion of the expected one year life times the original unit purchase price. Call our Customer Service Department at 909-627-8178 (Chino, CA) or 781-821-8370 (Canton, MA) for a Return Material Authorization (RMA) and proper shipping instructions and address. Please include a copy of your original packing slip, invoice, or other proof of date of purchase. Any unit under warranty should be shipped prepaid to the Desco factory. Warranty replacements will take approximately two weeks.

If your unit is out of warranty, call our Customer Service Department at 909-627-8178 (Chino, CA) or 781-821-8370 (Canton, MA) for a Return Material Authorization (RMA) and proper shipping instructions and address. Desco will quote repair charges necessary to bring your unit up to factory standards.

**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 Desco 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.