

# Digital Static Field Meter Operation and Maintenance



Made in America



Figure 1. Desco EMIT 50590 Digital Static Fieldmeter

## Description

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

The Digital Static Fieldmeter 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 conditions including ionised environments. The conductive case and ground snap facilitate grounding for accurate measurement. Also featured are a zero knob and a push-button 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 or 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.

“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.

“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)

## Packaging

- 1 Digital Static Fieldmeter
- 1 9V Alkaline Battery
- 1 Cord with 2.5mm Mono Plug
- 1 Certificate of Calibration

## Operation

### Controls

The Digital Static Fieldmeter has two switches, one for ON/OFF and one for HOLD/MEASURE plus ZERO adjust knob. The push button is two-position. Pressing the button puts it into the lower (MEASURE) position. Releasing the button places it in its upper (HOLD) position. The ZERO knob is turned to the left or right to change the zero setting of the display.

### Turning the Meter ON and OFF

Slide the switch to the ON position. The meter will turn on. To turn the meter OFF, slide the switch to the OFF position. The meter will now be off.

### Battery Check

After turning on power to the meter, check the display and make sure that the low battery symbol is NOT lit. If the battery symbol appears, replace the battery (see page 2).

### Zero the Meter

Turn on the meter with the ON/OFF slide switch. Press the push button down so that it is in the lower or MEASURE position. Place the meter 1 inch from a GROUNDED metal surface. The red bullseye (ranging lights) should be in focus on the surface and the meter should read “0.00”. If the display does not read “0.00”, adjust the ZERO knob until the display reads “0.00”.

## 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  $\pm 19.99$ ) of the electrostatic field in kilovolts per inch.

**NOTE:** In the MEASURE position, the RANGING LIGHTS are on. These 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.

If the numeral "1" appears on the left side of the display, the meter's range of 20 kV per inch has been exceeded. When this occurs, move the meter farther away from the object and multiply the reading by the distance (in inches) away from the object being measured (as shown in the figure). 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.

**NOTE:** This aspect ratio should be at least 3 for best accuracy, i.e. the object should be at least a 3" square when measuring at a 1" 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", 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" square.

## Holding Last Reading

With the meter positioned 1 inch from the object being measured, press the MEASURE/HOLD pushbutton so that it releases to the upper or HOLD position. This will freeze the reading from the object on the display and allows the operator to move the meter where it may be more easily read, or saved for later reference. In the HOLD position the red LED will illuminate. The analog output signal is also held.



Figure 2. Reading the Digital Static Fieldmeter

**NOTE:** In the HOLD position, the bullseye (ranging lights) will be off. When the push button is returned to the MEASURE position, the bullseye will light.

## Analog Output

The "RECORD" output jack located on the face of the unit accepts a standard 2.5mm monaural phone plug and is provided so the output of the Digital Static Fieldmeter may be connected to an oscilloscope, strip chart recorder, external meter or other device. Use the included cord to achieve a connection between the fieldmeter and alternate measuring instrument.  $\pm 10$  mV at this jack corresponds to  $\pm 1$  kV.

## Battery Replacement

The Digital Static Fieldmeter operates from a standard 9 VDC alkaline battery. Battery life is in excess of 30 hours under normal use. When the battery voltage drops below 6.7 volts, a battery symbol will appear in 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 reinstall 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 Fieldmeter is factory calibrated and no maintenance is required. If for any reason you believe the meter is not working correctly, please contact Desco EMIT Customer Service. CAUTION - There are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

## Specifications

### Display:

3.5 digits, 9.5mm digit height LCD

### Response:

<1 sec., 10% to 90% equivalent to 5Hz output

### Range:

$\pm 0.00$  to  $\pm 19.99$  kV/inch (25mm)

### Accuracy:

$\pm 5\%$  of displayed value

### Environment:

0 - 50°C at 85% RH (non-condensing)

### Analog Output:

2.5mm phone jack/plug  
 $\pm 10$  mV corresponds to  $\pm 1$  kV

### Power:

9 VDC alkaline battery  
Battery life in excess of 30 hours

### Size:

2.4" x 4.2" x 1.3"

### Weight:

5 oz. (with battery)

## Ionization Test Kit Accessories

Desco EMIT offers accessories for the Digital Static Fieldmeter designed to facilitate routine auditing and periodic testing of ionization equipment (Ref: 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 balance level and neutralization efficiency measurements. These accessories are available as the 50591 Test Kit Upgrade which includes the Conductive Plate and Charger.

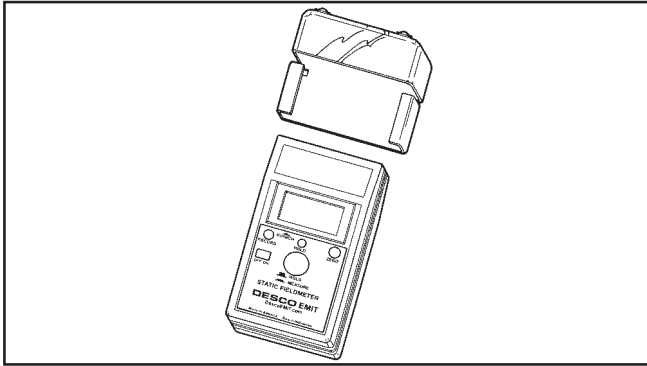


Figure 3. Installing the 50593 Conductive Plate

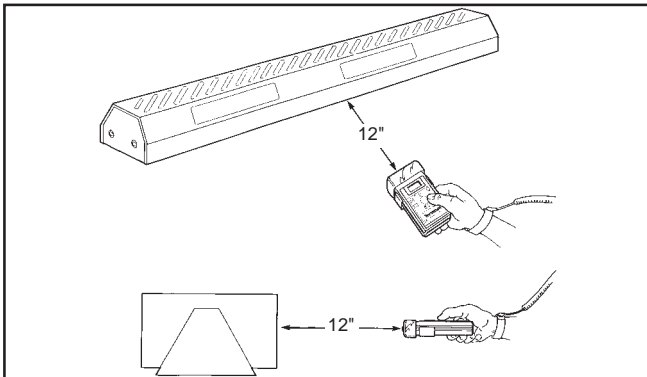


Figure 4. Auditing ionization equipment with the Digital Static Fieldmeter and Charging Plate

## Personal HBM Test Fixture (Desco EMIT 50553) (Requires the 50593 Conductive Plate to be installed first)

The Desco EMIT 50553 Personal HBM Test Fixture turns your model 50590 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 and Removal

If the fixture needs to be removed to allow use of the Field Meter alone, see Figure 5.

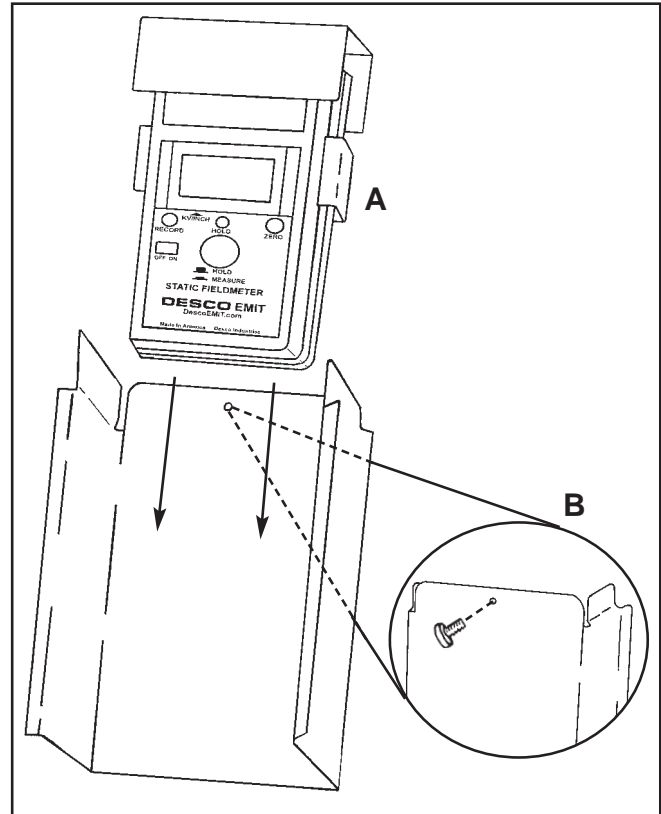


Figure 5. Installing the 50553 Personal HBM Test Fixture on the Digital Static Fieldmeter with Charging Plate

**A:** Slide the Digital Static Fieldmeter down into the Personal HBM Test Fixture. **NOTE:** The Charging 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 Fieldmeter and attached to a utility or common ground point.

## Method of 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 Fieldmeter, the 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 or raise a foot, 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 Fieldmeter, 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 Fieldmeter, 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.

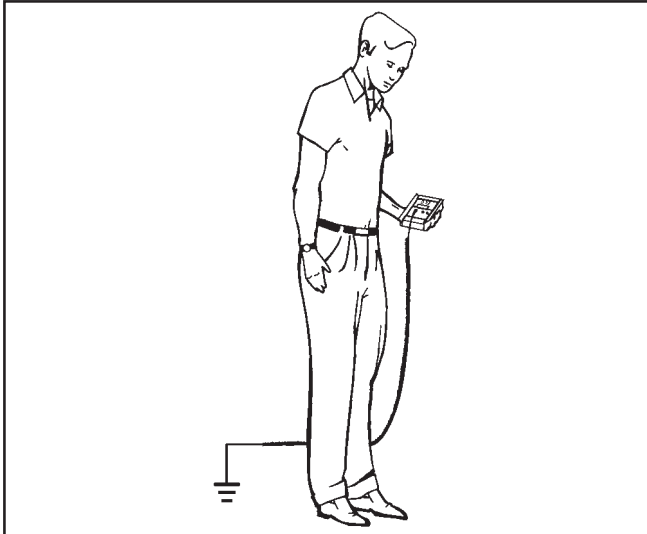


Figure 6. Using the Personal HBM Test Fixture to measure charges on the body

#### Limited Warranty

Desco EMIT expressly warrants that for a period of five (5) years from the date of purchase Desco EMIT Digital Static Fieldmeters will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a credit for purchase of replacement Desco EMIT Digital Static Fieldmeters, or, at Desco EMIT's option, the Digital Static Fieldmeters 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 five 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 EMIT 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 EMIT 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 EMIT 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.