

# 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 indicates surface voltage and polarity on objects. The meter can measure ranges of 0 to  $\pm 1.999$  kV or 0 to  $\pm 19.99$  kV at a distance of 1 inch with an accuracy of  $\pm 5\%$  of the displayed value. The automatic zero button allows adjustment to zero with no screws or dials to turn. The hold button allows the user to “freeze” a displayed measurement for evaluation. A LED range finder helps the operator to place the meter at the correct distance from the surface being measured. The meter will automatically turn off after 20 minutes to conserve battery power (9V). The Digital Static Field Meter is calibrated with accepted procedures and standards traceable to the National Institute of Standards and Technology.

“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)

“All nonessential insulators such as coffee cups, food wrappers and personal items shall be removed from the EPA.

The ESD program shall include a plan for handling process-required insulators in order to mitigate field-induced CDM damage.

If the field measured on the process required insulator is greater than 2000 volts/inch and the process required insulator is less than 30 cm (12 inches) from the ESDS item, steps shall be taken to either:

- A) Separate the required insulator from the ESDS item by a distance of greater than 30 cm (12 inches); or
- B) Use ionization or other charge mitigating techniques to neutralize the charge.

If the field measured on the process required insulator is greater than 125 volts/inch and the process required insulator is less than 2.5 cm (1 inch) from the ESDS item, steps shall be taken to either:

- A) Separate the required insulator from the ESDS item by a distance of greater than 2.5 cm (1 inch); or
- B) Use ionization or other charge mitigating techniques to neutralize the charge.

NOTE: The accurate measurement of electrostatic fields requires that the person making the measurement is familiar with the operation of the measuring equipment. Most hand held meters require that the reading be taken at a fixed distance from the object. They also normally specify that the object has a minimum dimension of fixed size in order to obtain an accurate reading.” (ANSI/ESD S20.20-2014 section 8.3.1 Insulators)

## Packaging

- 1 Digital Static Field Meter
- 1 9V Alkaline Battery
- 1 Certificate of Calibration

## Features and Components

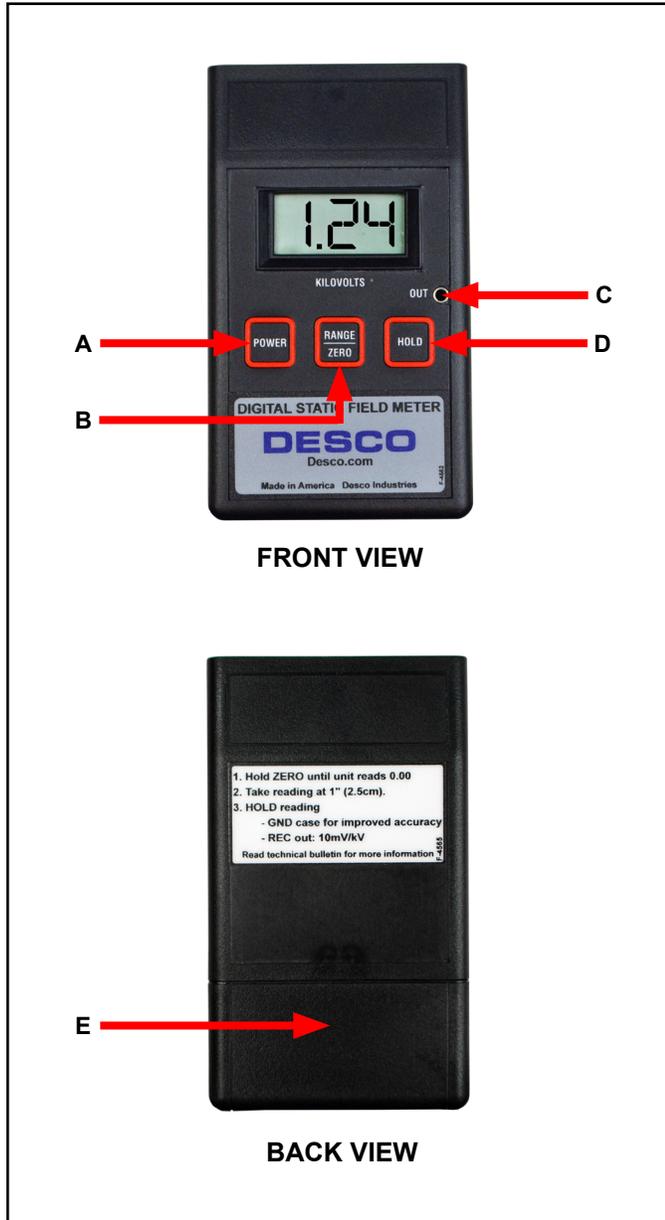


Figure 2. Digital Static Field Meter features and components

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

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

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

## Operation

**Note:** The 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 wearing a wrist strap and grounded to achieve more 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  $\pm 2.00$  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

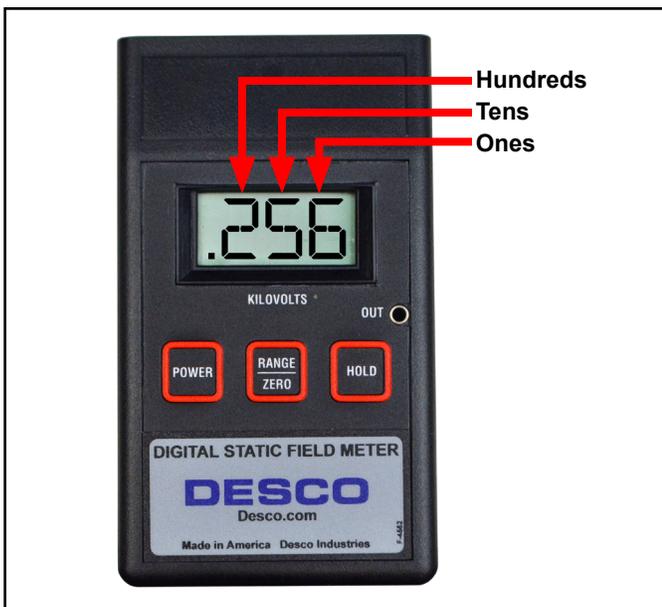


Figure 4. Reading the Digital Static Field Meter while in the  $\pm 2$  kV range

**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. The voltage at this output is 1/1000th ( $\pm 2$  kV range) or 1/10,000 ( $\pm 20$  kV range) of the measured voltage. Contact Customer Service for more information.

### 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 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 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 damage would not be covered by the limited warranty.

## Specifications

### Performance

Measurement Range (switch selectable)

*Low Range* 0 to  $\pm 2$  kV / inch

*High Range* 0 to  $\pm 20$  kV / inch

Measurement Accuracy

*Voltage Monitor Output* Better than  $\pm 5\%$  of reading, 10mV

*Voltage Display* Better than  $\pm 5\%$  of reading,  $\pm 2$  counts

Measurement Stability  $\pm 10$  counts

### Voltage Monitor

Output 2 volts output at full scale

Ratio

*Low Range* 1/1000 of the measured electrostatic field

*High Range* 1/10000 of the measured electrostatic field

### Front Panel Meter

Voltage Display 3-1/2 digit LED display

Range

*Low* 0 to  $\pm 1.999$  kV / inch

*High* 0 to  $\pm 19.99$  kV / inch

Display Resolution

*Low Range* 1 V / inch

*High Range* 10 V / inch

Sampling Rate 3 readings per second

### Features

Automatic Shutoff Unit will shut off after 20 minutes from last activity

Ranging System LED distance indicator; aligned targets indicate one (1) inch

Range / Zero Switch LED distance indicator. Resets the instrument to zero and selects the measurement range.

Low Battery Indicator An LCD display message indicates when the battery is low

Hold Switch Retains the LCD display reading when depressed

### General

Dimensions 0.9" H x 2.8" W x 4.9" L  
(24 mm x 70 mm x 126 mm)

Weight 4.9 oz. (140 g) with battery

Voltage Monitor Connection 2.5 mm jack (3/32")  
monophone

*Tip* Signal

*Sleeve* Ground

Operating Conditions

*Temperature* 50 to 86°F (10 to 30°C)

*Relative Humidity* To 80%, non-condensing

*Altitude* To 2000 m

Certifications CE

### Power Requirements

Power One (1) 9-volt alkaline battery

Operating Time Greater than 50 hours, with a new battery at 21°C continuous

Power Switch A membrane switch that is designed to prevent accidental turn on. Powers the instrument on and off.

## 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 a stopwatch). These accessories are available as Desco item [19440](#) Test Kit Upgrade which includes the Conductive Plate and Charger.

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

See the Desco Warranty - [Desco.com/Limited-Warranty.aspx](http://Desco.com/Limited-Warranty.aspx)



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

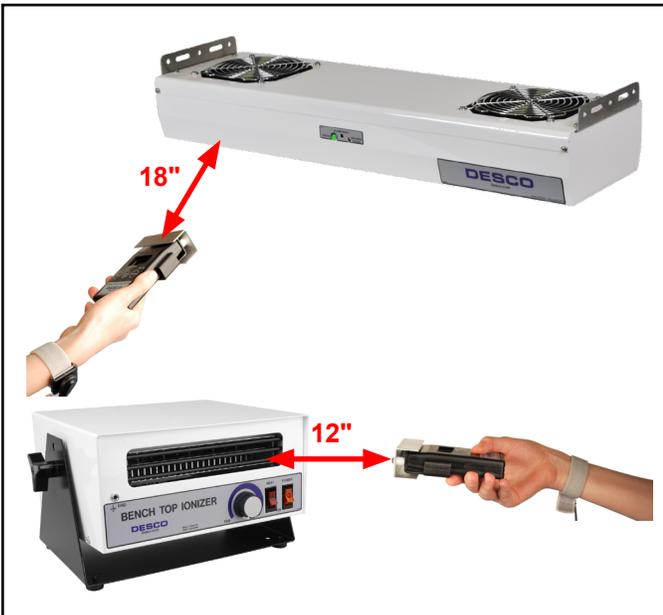


Figure 6. Auditing ionization equipment with the Digital Static Field Meter and Conductive Plate (Ref: ANSI/ ESD SP3.3)