

# Ionization Test Kit Operation and Maintenance



Made in the  
United States of America



Figure 1. Desco [19493](#) Ionization Test Kit

## Description

The Desco Ionization Test Kit allows the [19492](#) Digital Static Field Meter to be used to measure the offset voltage (balance) and charge decay of ionization equipment. The Test Kit also includes a Charger used to place a  $\pm 1000V$  charge on the [19441](#) Conductive Plate, making it possible to also measure the discharge times of air ionization equipment per ANSI/ESD SP3.3 Periodic Verification of Air Ionizers. The [19493](#) Ionization Test Kit includes the [19492](#) Digital Static Field Meter, providing a highly portable and cost effective means of verifying the performance of a wide variety of ionization equipment.

**Note:** The Digital Static Field Meter is designed to operate only with the [19493](#) Ionization Test Kit. It is not compatible with other brands.

Although not as accurate, the Desco Ionization Test Kit has been designed to make measurements that correspond to those made by using a charged plate analyzer and ANSI/ESD S3.1. The Ionization Test Kit provides convenience and portability to test per ANSI/ESD SP3.3 Periodic Verification of Air Ionizers or Compliance Verification ESD TR53. We recommend the EMIT [50571](#) Charged Plate Analyzer if precise measurements are required.

The Ionization Test Kit includes a slide-on isolated Conductive Plate, a  $\pm 1000$  volt Charger and a durable thermoplastic carrying case with custom cut-outs for all of the above components along with the Digital Static Field Meter.

“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 Conductive Plate
- 1 Charger
- 2 9V Alkaline Batteries
- 1 Carrying Case
- 1 Certificate of Calibration

## Features and Components

### DIGITAL STATIC FIELD METER

See technical bulletin [TB-3040](#) for information on the Digital Static Field Meter that is included in the [19493](#) Ionization Test Kit.

### CHARGER

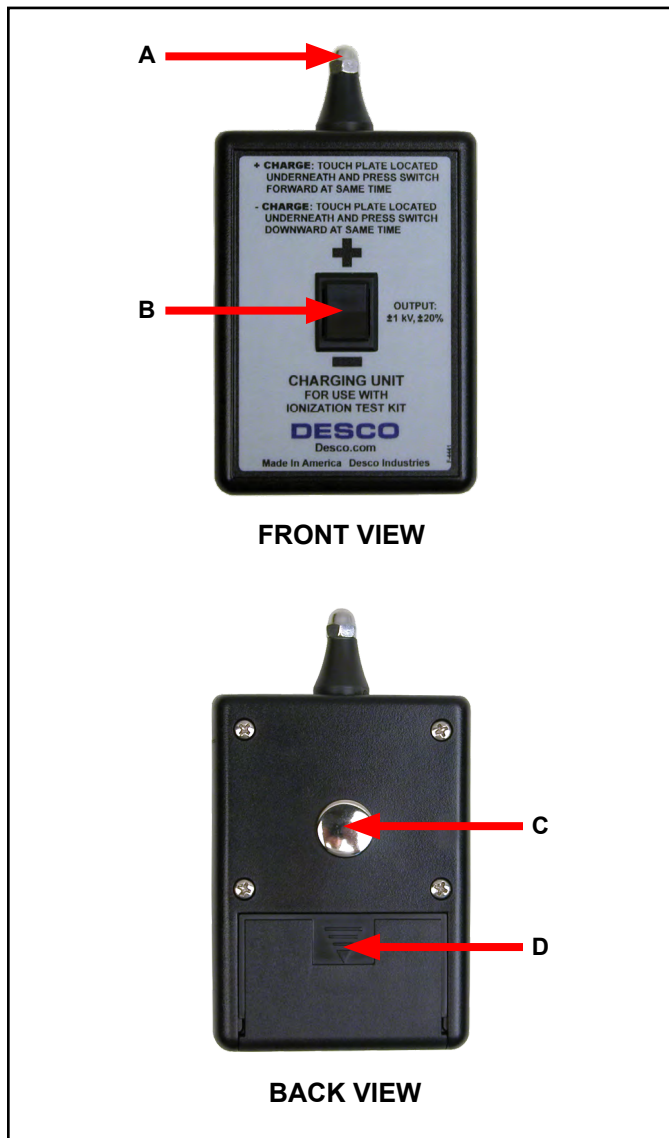


Figure 2. Charger features and components

**A. Output Contact:** The output contact is connected to an internal power source. When the touch plate located underneath the unit is connected to ground, the output contact will provide a charge of the indicated polarity. The charger is designed so that an operator can press the rocker switch and touch the plate simultaneously with the fingers of the same hand.

**B. Rocker Switch:** Press and hold to select the polarity that will be provided at the Output Contact.

**C. Touch Plate:** Make contact with the touch plate while pressing down the rocker switch to provide voltage to the Output Contact. The operator must be properly grounded during use.

**D. Battery Compartment:** Slide the cover down to open the 9V battery compartment.

## Operation

### TAKING OFFSET VOLTAGE (BALANCE) MEASUREMENTS

The Ionization Test Kit has been designed to match the compact size and hand held convenience of the Digital Static Field Meter. Use the following procedure to verify the offset voltage (balance) of air ionization equipment. This quick and easy procedure will help determine if the piece of ionization equipment is working within the manufacturer's specifications or user requirements.

**It is extremely important that ionizers be checked regularly for offset voltage (balance) and discharge times. An ionizer operating in an out-of-balance state can place a charge on sensitive electronic components or assemblies.**

**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.

### INSTALLING THE ISOLATED PLATE ASSEMBLY

The Digital Static Field Meter's case has two slots along its sides. The top slot is closest to the face of the instrument. Slide down the tabs of the Conductive Plate into the top slot of the Meter's case as far as they go (see Figure 3).



Figure 3. Installing the [19441](#) Conductive Plate

#### 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. Make contact between the top of the Conductive Plate and a grounded surface. Press and hold the RANGE / ZERO button until the Meter displays “.000”.

#### MAKING A MEASUREMENT

Locate the Test Kit in an ionized environment at the appropriate distance from the device under test. The static field displayed is the actual balance of the ionizer or voltage offset. The display will indicate “1” or “-1” when the Meter is over-ranged. Change the range of the unit if necessary.

**Note:** When testing pulsed ionizer systems, the voltage displayed is constantly changing. This pulse rate may be faster than the display update rate of the Field Meter, therefore the displayed voltage is an average of the actual voltage. The output of the Field Meter is useful in this situation for more accurate measurements.



Figure 4. Reading the Digital Static Field Meter while in the  $\pm 20$  kV range

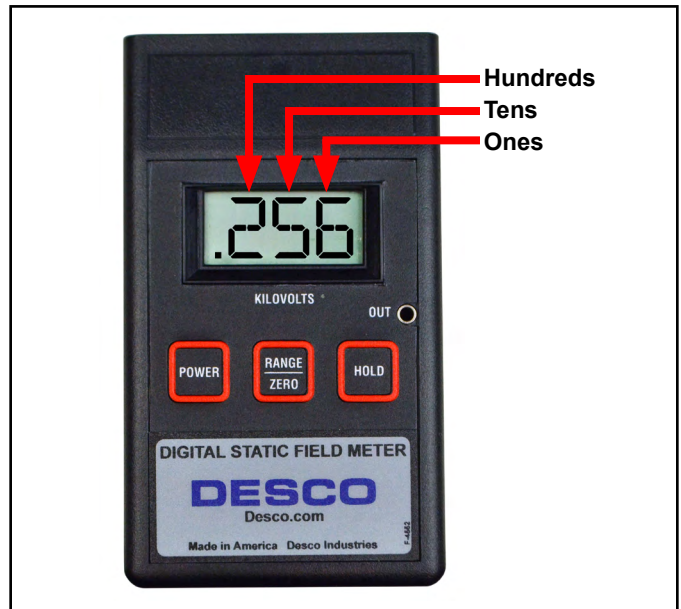


Figure 5. Reading the Digital Static Field Meter while in the  $\pm 2$  kV range



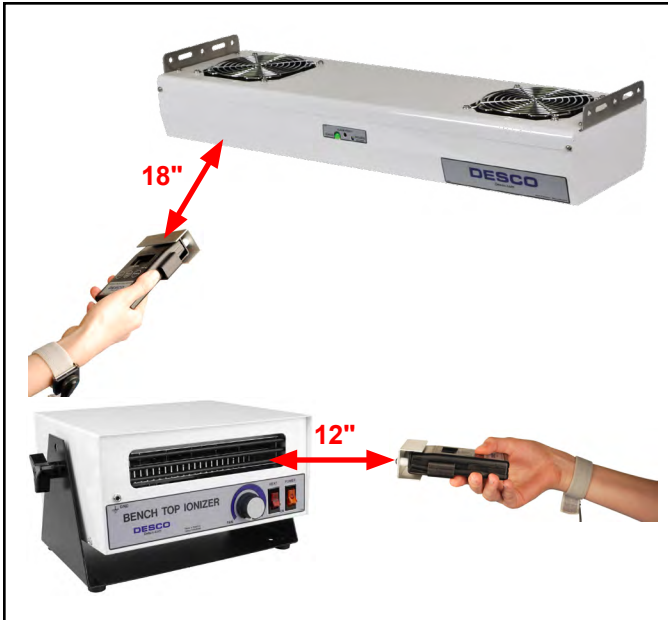


Figure 6. Auditing ionization equipment with the Digital Static Field Meter and Conductive Plate (Ref: ANSI/ ESD SP3.3)

### 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.

### TAKING DISCHARGE TIME MEASUREMENTS

In order to verify that an ionizer is operating properly it is also important that its ability to neutralize or discharge static electricity is measured. The following procedure will measure an ionizer’s discharge time:

### OPERATING THE CHARGER

The Charger has a momentary rocker-switch that powers the unit. Holding the switch forward / backward supplies power to the output terminals.

### POLARITY SELECTION

The top of the rocker switch is labeled “+”, and the bottom is labeled “-”. To provide a POSITIVE voltage output, touch the plate located underneath the charger, and press the switch forward at the same time. To provide a NEGATIVE voltage output, touch the plate located underneath the charger, and press the switch downward at the same time.

**Note:** For the Charger to work correctly, the operator and Field Meter must be properly grounded. A ground path to the touch plate must exist.

### IONIZER DISCHARGE TIME MEASUREMENTS

Use the Field Meter with the conductive plate in the appropriate location for measurements.

### POSITIVE DISCHARGE TIME MEASUREMENTS

To provide a POSITIVE voltage output, touch the plate located underneath the Charger, and press the switch forward at the same time. Momentarily touch the Charger’s output terminal to the conductive plate attached to the Field Meter. The meter reads approximately +1.10 kV. By using a stop watch or other timing device, determine the time needed for the voltages to decrease from +1.10 kV to +0.10 kV. This is the positive discharge time.



Figure 7. Charging the Conductive Plate on the Digital Static Field Meter

### NEGATIVE DISCHARGE TIME MEASUREMENTS

To provide a NEGATIVE voltage output, touch the plate located underneath the Charger, and press the switch downward at the same time. Momentarily touch the Charger’s output terminal to the conductive plate attached to the Field Meter. The meter reads approximately -1.10 kV. By using a stop watch or other timing device, determine the time needed for the voltages to decrease from -1.10 kV to -0.10 kV. This is the negative discharge time.

**IMPORTANT:** A ground path must be provided between the touch plate of the Charger and the ground reference of the Field Meter. This is normally provided by holding the Charger in one hand and the Field Meter with Conductive Plate in the other.

## 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.

### EQUIPMENT NEEDED

- 1 High Voltage Power Supply (10,000 V)
- 1 Voltmeter (with > 50 kilohms input impedance)
- 1 Cable with a 2.5 mm mono plug and secondary connector to interface with voltmeter.

### TEST FIXTURE

- 1 Metal Plate with 5 in<sup>2</sup> area or greater
- 1 Metal Stand for supporting the Digital Static Field Meter and holding its top face 1 inch away from the metal plate
- 2 Connectors on the metal plate with which it can interface with the high voltage power supply
- 1 Connector on the metal stand with which it can be connected to electrical ground

### PROCEDURE

1. Place the Digital Static Field Meter on the metal stand, and verify that its top face is placed exactly one inch away from the center of the metal plate.
2. Connect the stand to equipment ground.
3. Power the Digital Static Field Meter and set it to the low range.
4. Ground the metal plate, and zero the Digital Static Field Meter's display.
5. Disconnect the metal plate from equipment ground, and connect it to the high voltage power supply.
6. Apply a +1,000 V charge to the plate.
7. The Digital Static Field Meter should now display 1.000.
8. If the Digital Static Field Meter does not display 1.000, remove the battery door and use a screwdriver to turn the small trimpot located inside the battery compartment. Turn the trimpot until the display reads 1.000. This will calibrate the low range of the Digital Static Field Meter.
9. Repeat steps 6-8 for the high range on the Digital Static Field Meter and use a test voltage of 5,000 V.

## 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.

### 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.

### 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.

The battery in the Charger should be replaced annually or when it is unable to provide approximately  $\pm 1100V$ .

### CLEANING

It is important to keep the insulators on the adapter plate clean and free of contaminants that may cause surface leakage. To test the performance of the adapter plate, charge the plate and note the discharge rate in a nonionized area. The self discharge rate to 10% of original voltage should not be less than five minutes.

The area around the aperture of the Digital Static Field Meter must be kept clean to ensure accurate, drift-free readings. Never touch the aperture with anything. To remove dust or other particulate matter, use low-pressure instrument-grade air. To remove more severe contamination, spray or flush with the smallest practical amount of clean technical-grade of isopropyl alcohol. Then allow the instrument to air dry for several hours.

# Specifications

## STATIC FIELD METER

### Performance

Measurement Range (switch selectable)	
<i>Low Range</i>	0 to ±2kV / inch
<i>High Range</i>	0 to ±20 kV / inch
Measurement Accuracy	
<i>Voltage Monitor Output</i>	Better than ±5% of reading, 10mV
<i>Voltage Display</i>	Better than ±5% of reading, ±2 counts
Measurement Stability	±10 counts

### Voltage Monitor

Output	2 volts output at full scale
Ratio	
<i>Low Range</i>	1/1000 of the measured electrostatic field
<i>High Range</i>	1/10000 of the measured electrostatic field

### Front Panel Meter

Voltage Display	3-1/2 digit LED display
Range	
<i>Low</i>	0 to ±1.999 kV / inch
<i>High</i>	0 to ±19.99 kV / inch
Display Resolution	
<i>Low Range</i>	1 V / inch
<i>High Range</i>	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
<i>Tip</i>	Signal
<i>Sleeve</i>	Ground
Operating Conditions	
<i>Temperature</i>	50 to 86°F (10 to 30°C)
<i>Relative Humidity</i>	To 80%, non-condensing
<i>Altitude</i>	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

Charge Plate Assembly	Aluminum bracket, bare aluminum plate and teflon spacers isolate plate from bracket
Voltage Output	1/1,000 of measured voltage @ low range 1/10,000 of measured voltage @ high range
Charge Plate Area	2.95" W x 1.18" L (7.5 x 3.0 cm)
Charge Plate Assembly Weight	2.4 oz. (68 g)
Charger Dimensions	1.1" H x 2.6" W x 4.5" L (2.8 x 6.6 x 11.4 cm)
Charger Weight	5 oz. (140 g) with battery
Charger Power Requirements	One 9-volt alkaline battery
Charger Output (using Static Field Meter with charge plate)	1.1 kV minimum for ± voltage
Certifications	CE

**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)

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