

Ionization Test Kit

Operation and Maintenance



Made in the
United States of America



Figure 1. EMIT 50598 Ionization Test Kit

Description

The EMIT Ionization Test Kit allows the 50597 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 50567 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 50598 Ionization Test Kit includes the 50597 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 50597 Digital Static Field Meter is designed to operate only with the 50598 Ionization Test Kit. It is not compatible with other brands.

Although not as accurate, the EMIT 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 EMIT's 50555 / 50561 Charged Plate Analyzer if precise measurements are required.

The Ionization Test Kit includes a slide-on isolated Conductive Plate, a ± 1000 volt Charger and a durable thermoplastic carrying case with custom cut-outs for all of the above components along with the model 50597 Digital Static Field Meter.

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.” (ESD 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, periodically coat with a topical antistat, or replace with a static control protective version of the item.

Packaging

- 1 Digital Static Field Meter
- 1 Conductive Plate
- 1 Charger
- 2 9V Alkaline Batteries
- 1 Data Output Cord
- 1 Carrying Case
- 1 Certificate of Calibration

Features and Components

DIGITAL STATIC FIELD METER

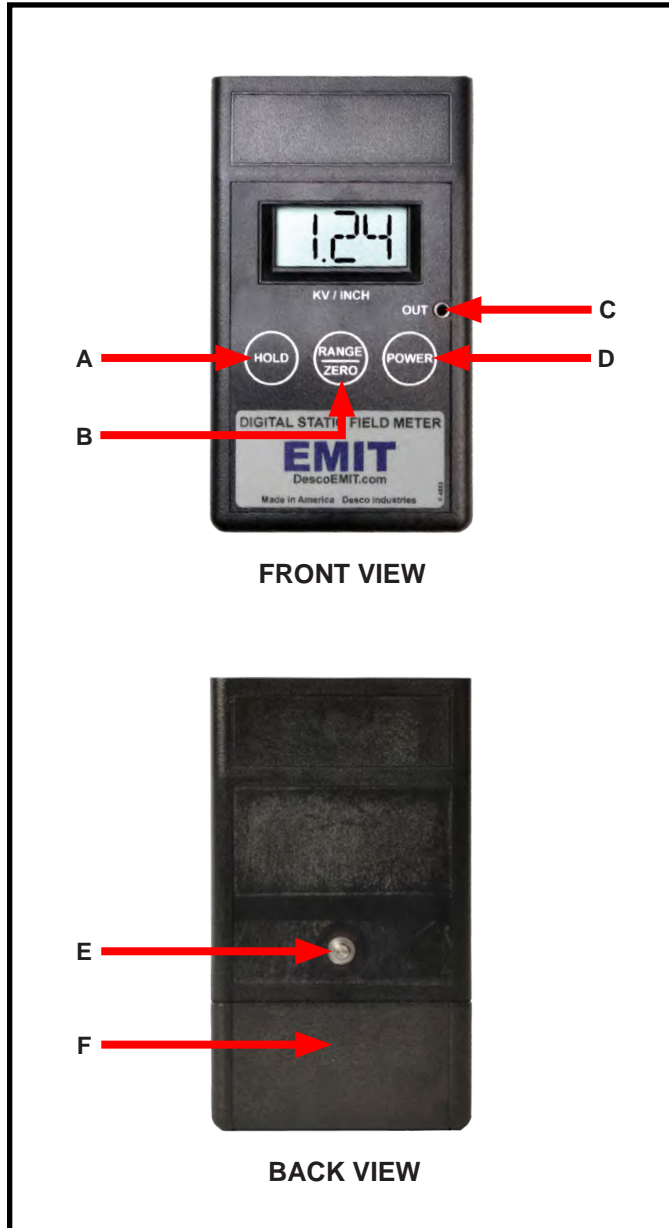


Figure 2. Digital Static Field Meter features and components

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 replica of the measured voltage is provided at this output. The voltage at this output is 1/1000th (± 2 kV range) or 1/10,000 (± 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 a 4mm ground cord (not provided - any standard single wire wrist strap cord can be used).

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

CHARGER

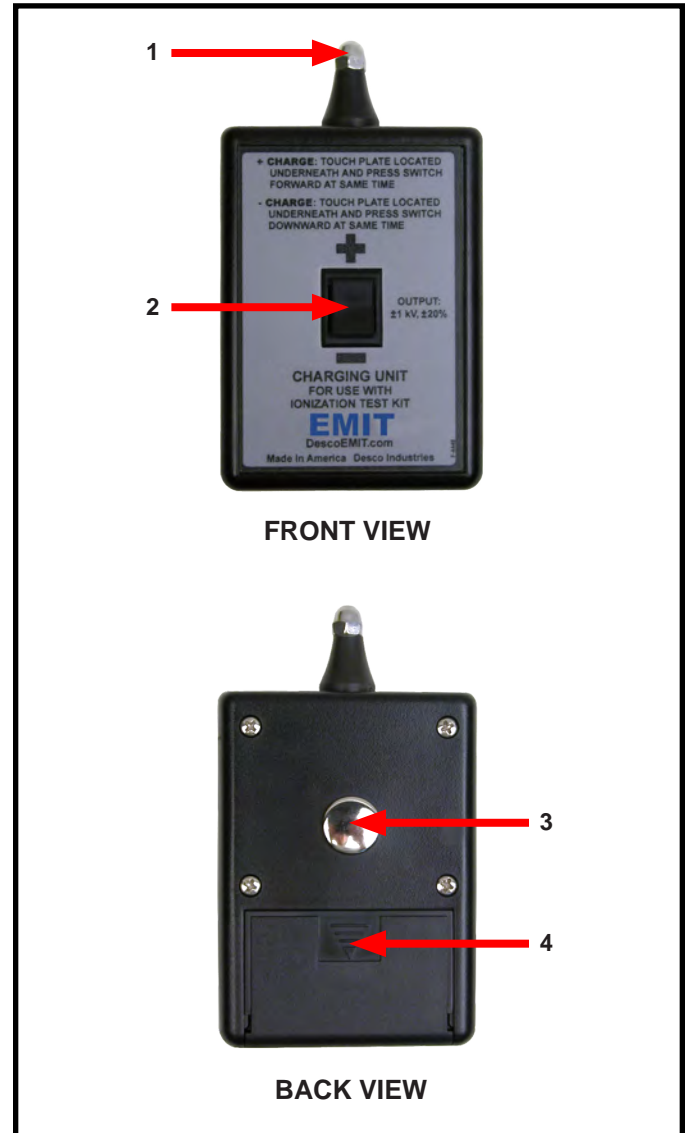


Figure 3. Charger features and components

1. 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.

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

3. 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.

4. 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 50597 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.

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 4).



Figure 4. Installing the 50567 Conductive Plate

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

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. (see Figure 3).

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.

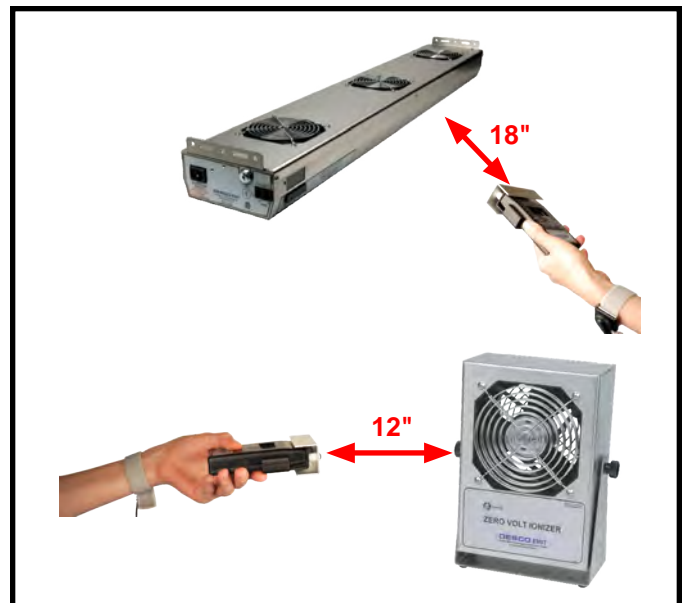


Figure 5. Auditing ionization equipment with the Digital Static Field Meter and Conductive Plate (Ref: ANSI/ESD SP3.3)

HOLDING THE LAST READING

Press the HOLD button to 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.

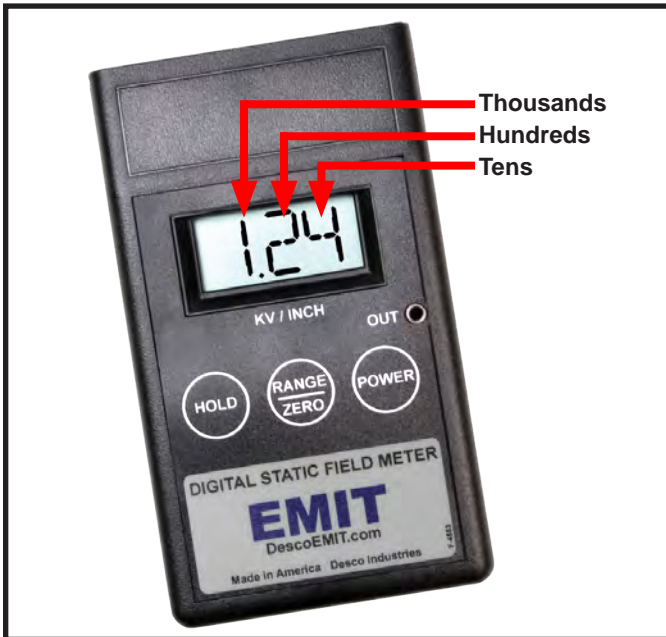


Figure 6. Reading the Digital Static Field Meter while in the ± 20 kV range

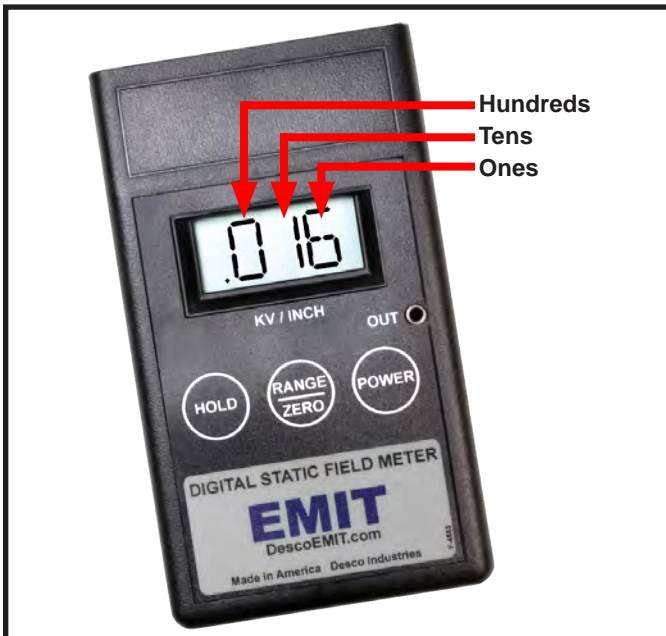


Figure 7. Reading the Digital Static Field Meter while in the ± 2 kV range

Per ESD TR53-2006 Compliance Verification of ESD Protective Equipment and Materials Air Ionizer Test Procedure Initial Test Setup "Measurements should be

made at the location where ESD sensitive items are to be ionized. Air ionizer heaters and air filters (if so equipped) should be left in their normal conditions during test."

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 (± 2 kV range) or 1/10,000 (± 20 kV range) of the measured voltage.

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.

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.



Figure 8. Taking decay measurements

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 EMIT 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 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 it 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

DIGITAL STATIC FIELD METER

Measurement Range (switch selectable)

Low Range: 0 to ± 1.99 kV / inch
High Range: 0 to ± 19.99 kV / inch

Measurement Accuracy

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

Measurement Stability

± 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: 10-30°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
(153 g)

Voltage Monitor Connection

2.5mm audio jack

CE Certified

CHARGER

Output

1100 VDC nominal, < 5 μ A max

Output Terminal

Banana / Acorn assembly

Power Requirements

One (1) 9V alkaline battery

Operating Conditions

Temperature: 10-30°C

Relative Humidity: 10-80%, non-condensing

Dimensions

4.5" L x 2.6" W x 1.1" H

(114.3mm L x 66.0mm W x 27.9mm H)

Weight (with battery)

4.9 oz

(153 g)

CE Certified

CONDUCTIVE PLATE

Plate Capacitance

13 pF (\pm 2 pF)

Range

0 to \pm 2 kV

Weight

2.4 oz

(75 g)

Limited Warranty

EMIT expressly warrants that for a period of five (5) years from the date of purchase EMIT Ionization Test Kits will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a credit for purchase of replacement EMIT Ionization Test Kits, or, at EMIT's option, the Ionization Test Kit 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 909-664-9980 (Chino, CA) 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 EMIT factory. Warranty replacements will take approximately two weeks.

If your unit is out of warranty, call our Customer Service Department at 909-664-9980 (Chino, CA) for a Return Material Authorization (RMA) and proper shipping instructions and address. 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 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.