

# Ionization Test Kit Operation and Maintenance



Figure 1. Desco EMIT 50592 Ionization Test Kit

## Description

The Desco EMIT Ionization Test Kit allows the 50590 Digital Static Field Meter to be used to monitor the offset voltage (balance) of ionization equipment. The test kit also includes a Charger used to place a  $\pm 1000V$  charge on the 50593 Conductive Plate, making it possible to also measure the discharge time of air ionization equipment per ANSI/ESD SP3.3 Periodic Verification of Air Ionizers. The 50592 Ionization Test Kit was designed to be used in conjunction with the 50590 Digital Static Field Meter (included), providing a highly portable and cost effective means of verifying the performance of a wide variety of ionization equipment.

**NOTE:** The 50590 Digital Static Field Meter is designed to operate only with the 50592 Ionization Test Kit. It is not compatible with other brands.

The Desco 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 per ANSI/ESD SP3.3 Periodic Verification of Air Ionizers. We recommend Desco EMIT's 50555 / 50561 Charged Plate Analyzer if precise measurements are required.

The Ionization Test Kit includes a slide-on 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 model 50590 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)

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:

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

## Packaging

- 1 Digital Static Field Meter
- 1 Conductive Plate
- 1 Charger
- 2 9V Alkaline Batteries
- 1 Cord with 2.5mm Mono Plug
- 1 Carrying Case
- 1 Certificate of Calibration

## 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 damage sensitive electronic components or assemblies.***

### INSTALLING THE ISOLATED PLATE ASSEMBLY

The Digital Static Field Meter's case has two slots along its slides. The top slot is closest to the front of the instrument. Slide down the tabs of the Conductive Plate into the top slot of the meter case as far as they go (see Figure 2).



Figure 2. Installing the 50593 Conductive Plate

### ZERO THE DIGITAL STATIC FIELD 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. Make a connection between the Conductive Plate and the meter case either through your finger or a test lead. Point the meter toward a GROUNDED metal surface. If the display does not read "0.00", adjust the ZERO knob until the display reads "0.00". Although you must be careful not to contact the recessed sensor plate, the amount of spacing between the instrument and the target is not critical when zeroing the instrument.

**NOTE:** For accurate measurements, the Field Meter should be grounded. The meter has a conductive case that provides a ground reference for the measuring circuit. Alternatively, the person holding the meter should be properly grounded.

### 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. If the numeral "1" appears on the left side of the display, the meter's range of 20 kV per inch has been exceeded. (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 fieldmeter is useful in this situation for more accurate measurements.

### HOLDING LAST READING

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.

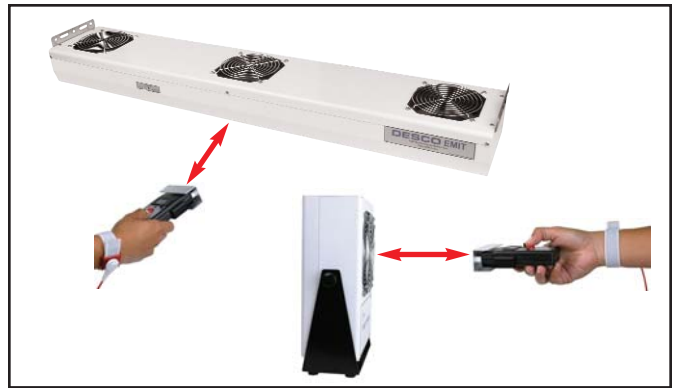


Figure 3. Auditing ionization equipment with the Digital Static Field Meter and Conductive Plate

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."



Figure 4. Reading the Digital Static Field Meter

### ANALOG OUTPUT

The "RECORD" output jack located on the face of the meter accepts a standard 2.5mm 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.  $\pm 10$  mV at this jack corresponds to  $\pm 1$  kV.

### 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 CHARGING UNIT

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

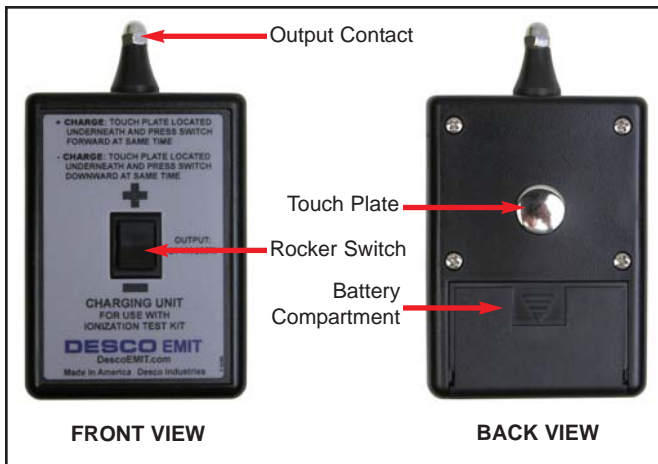


Figure 5. Charger features and components

### OUTPUT CONTACTS

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 power button and touch the touch plate simultaneously with the fingers of the same hand.

### 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.

### GROUNDING - **IMPORTANT!**

For the charger to work correctly, the operator and the 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 MEASUREMENT

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 +1.10kV. By using a stop watch or other timing device, determine the time needed for the voltages to decrease from +1.10kV to +0.10kV. 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 -1.10kV. By using a stop watch or other timing device, determine the



Figure 6. Taking decay measurements

time needed for the voltages to decrease from -1.10kV to -0.10kV. 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 and Conductive Plate. This is normally provided by holding the Charger in one hand and the Field Meter with Conductive Plate in the other.

### Calibration

The overall accuracy of the Ionization Test Kit and the Digital Static Field Meter is  $\pm 5\%$  nominal. The Digital Static Field Meter is factory calibrated. 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.

### Maintenance

#### BATTERY REPLACEMENT

The Digital Static Field Meter and 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.

The battery in the Charger should be replaced annually and whenever you plan an extended period of unattended monitoring.

#### CLEANING

It is important to keep the insulators on the adapter plate clean and free of contaminates that may cause surface leakage. To test the performance of the adapter plate,

charge the plate and note the discharge rate in a non-ionized 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

Display:	3.5 digits, 9.5mm digit height LCD
Response:	<1 sec., 10% to 90% equivalent to 5Hz output
Range:	±0.00 to ±19.99 kV/inch (25mm)
Accuracy:	±5% of displayed value
Environment:	0 - 50°C at 85% RH (non-condensing)
Analog Output:	2.5mm phone jack/plug ±10 mV corresponds to ±1 kV
Power:	9 VDC alkaline battery Battery life in excess of 30 hours
Size:	2.4" x 4.2" x 1.3" (6.1 cm x 10.7 cm x 3.3 cm)
Weight:	5 oz. (with battery) 0.14 kg (with battery)

### Conductive Plate

Plate Capacitance:	13 picofards ± 2 picofards
Range:	0 to ± 2kV, higher voltages may be measured
Grounding:	Connection through conductive case of Digital Static Field Meter
Weight:	1.5 oz. (0.04 kg)

### Charger

Output:	1100VDC monimal, <1:A Max.
Output Terminals:	Banana / acorn assembly
Load Regulation:	Better than 8% NL to FL where FL = 10E9 Ohms
Environment:	10 - 30°C (50 - 86°F) at 10-80% RH (non-condensing)
Power:	9 VDC alkaline battery 30 hours battery life
Size:	3.5"L x 2.5"W x 1"D (8.9 cm x 6.4 cm x 2.5 cm)
Weight:	2.8 oz. (0.079 kg)

### Limited Warranty

Desco EMIT expressly warrants that for a period of five (5) years from the date of purchase Desco 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 Desco EMIT Ionization Test Kits, or, at Desco 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 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.