

# Chargebuster Overhead Ionizer Installation, Operation, and Maintenance



Made in America



Figure 1. EMIT [50680/50681](#) Overhead Ionizer

## Description

The ([50680](#) / [50681](#)) Chargebuster® overhead ionizers are steady state DC ionizers for use in ESD sensitive work areas: calibration, test, final assembly, or repair procedures. The specially designed 3-speed fan modules create better coverage, consistent offset voltage ( $\pm 10$  Volts), and superior discharge times ( $< 3$  seconds) tested per ANSI/ESDSTM 3.1. The Chargebuster® overhead ionizers are equipped with an Auto-Feedback system, that continually optimizes the performance and will automatically shut down and alarm if/when supply voltage drops to the ionizer. The ionizers can be used with 110V or 220V power sources.

“Necessary non-conductors in the environment cannot lose their electrostatic charge by attachment to ground. Ionization systems provide neutralization of charges on these necessary non-conductive items (circuit board materials and some device packages are examples of necessary non-conductors). Assessment of the ESD hazard created by electrostatic charges on the necessary nonconductors in the work place is required to ensure that appropriate actions are implemented, commensurate with risk to ESDS [ESD sensitive] items”. (ANSI/ESD S20.20-2007 Foreword)

“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/ESD S20.20-2007 section 8.3)

“The primary method of static charge control is direct connection to ground for conductors, static dissipative materials, and personnel. A complete static control program must also deal with isolated conductors that cannot be grounded, insulating materials (e.g., most common plastics), and moving personnel who cannot use wrist or heel straps or ESD control flooring and footwear.

Air ionization is not a replacement for grounding methods. It is one component of a complete static control program. Ionizers are used when it is not possible to properly ground everything and as backup to other static control methods. In clean rooms, air ionization may be one of the few methods of static control available.” (ESD Handbook ESD TR20.20 Ionization, section 5.3.6.1)

“All ionization devices will require periodic maintenance for proper operation. Maintenance intervals for ionizers vary widely depending on the type of ionization equipment and use environment. Critical clean room uses will generally require more frequent attention. It is important to set-up a routine schedule for ionizer service. Routine service is typically required to meet quality audit requirements.” (ESD Handbook ESD TR20.20 section 5.3.6.7 Maintenance / Cleaning)

## Packaging

- 1 Chargebuster Overhead Ionizer
- 1 Hanging Kit
- 1 Power Cord
- 3 Emitter Point Cleaners
- 1 Certificate of Calibration

## Installation

Input voltage is selected with the two internal jumpers on JH1. For 110 volt jumper setting, a jumper must be in place shorting pin 1 to 2 and another shorting pin 3 to 4 (see Figure 2). For 220 volt jumper setting, a single jumper must be in place shorting pin 2 to 3 only (see figure 3). Make sure setting is correct before applying power.

**Note:** Unit shipped set at 110V

Before installing the unit, verify that the AC outlet is properly connected to ground. The unit must have a good ground to maintain proper offset voltage balance. Install the unit in the desired location, making sure that the airflow will not be restricted. Be sure the “OFF / ON” switch located on the rear of the unit is in the OFF position. Plug the power cord into the unit and then into the appropriate AC power source.

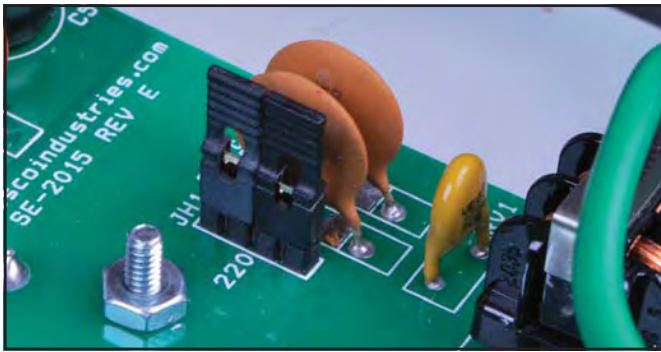


Figure 2. 110 volt jumper setting

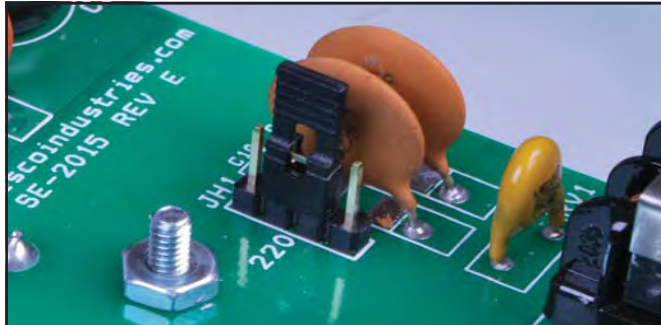


Figure 3. 220 volt jumper setting

## Operation

Set the fan speed switch on the rear of the unit to the LOW, MED, or HIGH position. Higher airflow will result in faster discharge times. Position the unit so that the maximum airflow is directed at the items or area to be neutralized. Turn the unit ON.

When the unit is first turned on, it will conduct a self-test. The audible alarm will sound and then the LED will cycle through RED, YELLOW, and GREEN. The LED will remain GREEN during normal operation.

## BALANCE (OFFSET VOLTAGE) ADJUSTMENT

The Chargebuster Overhead Ionizer is an auto-balancing unit. However, tuning or manual adjustment can be accomplished by inserting a small screwdriver or trimmer adjustment tool into the balance (offset voltage) adjustment hole located on the front of the unit. To increase the output in a positive direction, turn the potentiometer in a clockwise direction. Conversely, to increase the output in a negative direction, turn the potentiometer in a counter-clockwise direction. Once the desired balance point has been achieved, the alarm reset button must be pressed to set the balance point.

## MAINTENANCE / ALARMS

If the supply voltage drops from 120 Volts to below 85 Volts, the unit will shut down, the audible alarm will beep, and the LED will blink RED. The unit will automatically reset when the minimum voltage is restored.

Under normal conditions the ionizer will attract dirt and dust (especially on the emitter electrodes). To maintain optimum neutralization efficiency and operation, cleaning should be performed on a regular basis.

When the unit enters shutdown mode, ionization will be stopped, the LED on the front of the unit will change to a steady RED, and the audible alarm will sound continuously. If the ionizer enters shutdown mode, it must be turned OFF and then back ON to reset the unit.

**NOTE: The AC power cord MUST be disconnected before the unit is disassembled for maintenance.** The emitter electrodes should be cleaned using the included cleaners or a swab damp with isopropyl alcohol. First, turn the unit OFF and unplug the power cord. Then remove each fan grill located on the top-side of the ionizer by disengaging all 4 screws per grill. Clean all emitter electrodes. After cleaning the emitter electrodes, re-attach all the removed grills. Plug in the power cord and turn the unit back ON.

The emitter electrodes should not require replacement during the life of the unit with normal handling. Replacement emitter electrodes can be ordered if necessary.

The best practice would be to verify the balance (offset voltage) of the unit with a charged plate monitor after cleaning.

## NEUTRALIZATION (DISCHARGE) TIMES

The comparative efficiency of overhead ionizers is determined by a standard test published by ANSI/ESD S3.1. Typical positive and negative discharge times (in seconds from 1000 volts to 100 volts and from -1000 volts to -100 volts) measured using this standard are shown below. The performance of the ionizer was measured with the unit positioned as shown, with the fan speed on high, and without a filter.

The typical discharge times measured using this standard for the ionizer are shown in the following diagram. They are not guaranteed maximum discharge times.

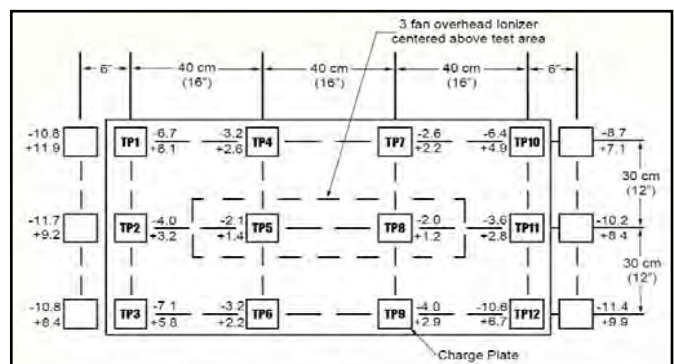


Figure 4. Neutralization (discharge) times

Note: Reference ANSI/ESD STM 3.1. The distance from the ionizer to the charged plate is 18".

## Specifications:

### AIR VOLUME

150-300cfm

### BALANCE (OFFSET VOLTAGE)

±10 volt, typical; ±20 volts maximum at 65°F to 80°F, R.H.:  
15% to 65%

### CHASSIS

White powder coated steel housing

### DIMENSIONS

3.5" H x 6.5" W x 37" L (8.9cm H x 16.5cm W x 94.0 cm L)

### EMITTER POINTS

.050" diameter pure tungsten for improved mechanical strength and ionization stability

### FUSE

400mA slow blow

### HIGH VOLTAGE POWER SUPPLY

5.5 kV DC nominal

### INPUT POWER

AC line power, 120 VAC, 50/60Hz (can be changed internally to 220V)

### ION EMISSION

Steady state DC with sense feedback

### MOUNTING

May be rigid-mounted or suspended from ceiling

### OZONE

Less than 0.05ppm

### WEIGHT

10 lbs. (4.54 kg)

## Compliance Verification

ANSI/ESD S20.20-2007 added Compliance Verification columns to the Tables. The test method for Compliance Verification is ESD TR53. Ionizers should be tested periodically for both polarity's discharge times, and for offset voltage balance per ESD Association Technical Report ESD TR53 Compliance Verification of ESD Protective Equipment and Materials. The most accurate tool to use for this is a Charged Plate Monitor. Alternatively, a portable battery operated Ionization Test Kit can be used.

Per ESD TR 53 ANNEX A "Test Frequency, The objective of the periodic test procedures listed in this document is to identify if significant changes in ESD equipment and materials performance have occurred over time.

Test frequency limits are not listed in this document, as each user will need to develop their own set of test frequencies based on the critical nature of those ESD sensitive items handled and the risk of failure for the ESD protective equipment and materials.

Per ESD TR53, all the test locations of @3.1 are not required; rather "Measurements should be made at the location where ESD sensitive items are to be ionized. For many EPA ESD Control items sampling is appropriate for Compliance Verification, however, best practice is to test each ionizer.

## Calibration

When an alarm sounds, most users will clean emitter pins (see Maintenance / Alarms section) and calibrate the ionizer. Per ESD TR 53 section 5.3.6.7.1 "The best practice is to measure the offset voltage and discharge times, clean the unit, including emitter points and air filters if present, offset voltage to zero (if adjustable), and then repeat offset voltage and discharge time testing. If the unit does not meet offset voltage specifications or minimum established discharge time limits, further service is indicated. Manufacturers should provide details on service procedures and typical service intervals."

Most companies will assign a number or otherwise identify each ionizer and setup a compliance Verification / Maintenance / Calibration schedule. If the ionizers all test good, the data can justify lengthening the calibration period. If ionizers require adjustment the calibration period should be shortened. Although ESD TR53 does not advise a test frequency, JESDD625-A (Revision of EIA-625) recommends ionizers be tested semiannually, noting to use "S3.1 except the number of measurement points and locations may be selected based on the application."

NOTE: A charged plate analyzer or monitor should be used in order to properly calibrate the Chargebuster Overhead Ionizer. EMIT offers the [50555](#) Charged Plate Analyzer.

- I. Properly setup the ionizer as described Installation procedure on page 1.
- II. Turn the unit ON and set the FAN SPEED to HIGH.
- III. Position the charged plate analyzer 18 inches underneath one of the fans of the Chargebuster Overhead Ionizer.
- IV. Push and hold the ALARM RESET button on the ionizer until the STATUS LED turns red (see Figure 5). Release the button and the LED should switch back to green. This allows the user to calibrate the balance (offset voltage) of the ionizer without setting off the alarm.



Figure 5. Calibration controls

- V. The balance (offset voltage) of each fan should be within 0 and  $\pm 15$  volts. The required limits per ANSI/ESD S20.20 is less than  $\pm 50$  volts. To increase the output in a positive direction, turn the BALANCE ADJUST potentiometer in a clockwise direction. To increase the output in a negative direction, turn the BALANCE ADJUST potentiometer in a counterclockwise direction.
- VI. Test the neutralization (discharge) time by applying  $\pm 1,000$  volt on the charged plate. The neutralization (discharge) time should be less than 3 seconds when charged plate analyzer is directly under a fan. See figure 4 for typical discharge times. The required limit per ANSI/ESD S20.20 is "user defined."
- VII. Submit the balance (offset voltage) to the ionizer's control circuit by quickly pressing the ALARM RESET button. The STATUS LED should turn off and then illuminate green to verify that the control circuit was successfully programmed.

- VIII. Test each fan's alarm by shorting its two grills located on the bottom side of the ionizer (see Figure 6). The alarm should sound and the STATUS LED should illuminate red.



Figure 6. Shorting the ionizer's three fan grills

### Limited Warranty

EMIT expressly warrants that for a period of five (5) years from the date of purchase, EMIT Overhead Ionizers will be free of defects in material (parts) and workmanship (labor). Within the warranty period, a credit for purchase of replacement EMIT products, or, at EMIT's option, the product 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 909-669-9980 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 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

Electronic ionizers use high voltage corona discharge and should not be used in or near flammable or explosive environments. 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.