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Overhead Zero Volt Ionizer Installation, Operation and Maintenance



Made in the
United States of America



Figure 1. EMIT Overhead Zero Volt Ionizer, 2-Fan



Figure 2. EMIT Overhead Zero Volt Ionizer, 3-Fan

Description

The patented* EMIT Overhead Zero Volt Ionizer (ZVI) is a steady-state DC auto-balancing ionizer with integrated closed-loop feedback. It combines the effectiveness of steady-state DC ionization with ease of adjustability, communication capability and the flexibility of a microcontroller-based design to produce a versatile and stable ionization system. Its fans produce extended ionization coverage and are ideal for areas where bench space is limited.

The Overhead Zero Volt Ionizer utilizes steady-state DC ionization. Steady State DC systems consist of separate negative and positive ion emitters connected by a pair of high-voltage cables to their respective high-voltage power supplies. The spacing between emitters varies depending on the design, and DC power is constantly applied to the emitter points. The ionizer utilizes feedback from the internal sensor grill to continuously adjust the output to maintain balance.

“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 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 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)

The Overhead Zero Volt Ionizer is available in four models:

Item	Fans	Voltage	Power Cord
50664	2	120 VAC	North America
50665	3	120 VAC	North America
50671	2	220 VAC	None
50672	3	220 VAC	None

*US Patent 6,205,408

Packaging

- 1 Overhead Zero Volt Ionizer
- 1 Power Cord, North American Plug (50664, 50665)
- 2 Emitter Point Cleaner Pack (50664, 50671)
- 3 Emitter Point Cleaner Pack (50665, 50672)
- 1 Hanging Kit
- 2 Keys
- 1 Certificate of Calibration

Features and Components

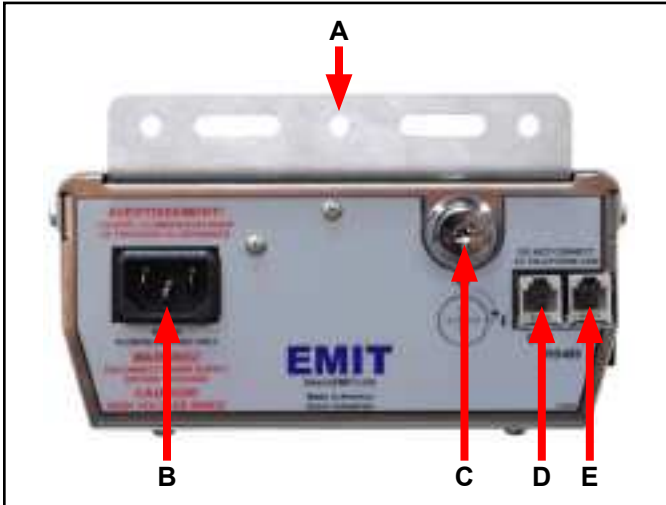


Figure 3. Overhead Zero Volt Ionizer left side view

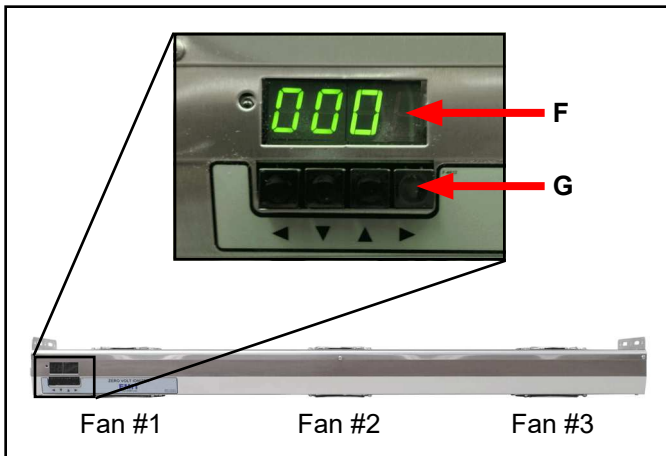


Figure 4. Overhead Zero Volt Ionizer front side view

A. Mounting Bracket: Attach the included hanging kit to these brackets to install the ionizer.

B. Power Cord Inlet: Connect the power cord here to provide power to the ionizer.

C. Key Switch: Use the included keys to turn the ionizer ON or OFF.

D. RS-485 OUT: For manufacturer use only.

E. RS-485 IN: For manufacturer use only.

F. LED Display: Displays the ionizer address, balance, fan speed and maintenance codes.

G. Control Buttons: Use the buttons to modify the ionizer's settings.

Installation

Use the included hanging kit to install the unit at a desired location where the airflow will not be restricted. Verify that the key switch is set to the OFF (0) position. Plug the power cord into the unit and then into the appropriate AC power source.

Operation

1. Use the included keys to set the ionizer's key switch to the ON (I) position. The ionizer will conduct a self-test. The audible alarm will sound, and the LED display will turn on. The default address is "000".

2. Press the ◀ and ▶ buttons simultaneously to enter Setup Mode. The ionizer will beep once and "Prog" will momentarily appear on the display. The display will then show the fan speed setting.

Prog

3. Press the ▼ or ▲ button to adjust the fan speed from "Spd1" (lowest) to "Spd9" (fastest). Higher airflow will result in faster neutralization rates. Press the ▶ button to proceed to the balance adjustment settings.

Spd 1

4. Use a charged plate analyzer to monitor the balance of each fan. Place it under fan #1 and press the ▼ button to increase the negative output and ▲ button to increase the positive output. Press the ▶ button to proceed to fan #2.

BAL 1

5. Move the charged plate analyzer underneath fan #2. Press the ▼ button to increase the negative output and ▲ button to increase the positive output. Press the ▶ button to proceed to fan #3.

BAL 2

6. Move the charged plate analyzer underneath fan #3. Press the ▼ button to increase the negative output and ▲ button to increase the positive output. Press the ▶ button to proceed to alarm threshold settings.

BAL 3

7. The alarm threshold controls the sensitivity of the alarm circuit in the ionizer. Press the ▼ or ▲ button to adjust the sensitivity from from “AL 5” (highest) to “AL25” (lowest). “ALno” turns disables the alarm. Press the ► button to proceed to save your settings and exit Setup Mode.

A L 2 0



8. “SAVE” will momentarily appear on the display to confirm that all settings have been saved to the ionizer. “On b” will then briefly appear to indicate that the buttons are enabled. The ionizer will then display its address during normal operation. Simultaneously press the ◀ and ▶ buttons at any time during Setup Mode to save and exit the settings menu.

S A V E



O n b



ALARM CONDITIONS

The Overhead Zero Volt Ionizer is able to detect various problems that may occur through normal use. The ionizer will alarm when the input voltage is too high or low. It will also alarm should failure occur with one of its high voltage power modules. The buzzer sounds continuously during all alarm conditions.

Input voltage is too low

A C L



Input voltage is too high

A C H



High voltage module or sensor failure. The number represents the fan number that was shut down.

S H d 1



Maintenance

“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 TR20.20 section 5.3.6.7 Maintenance / Cleaning)

EIA-625, recommends checking ionizers every 6 months, but this may not be suitable for many programs particularly since an out-of-balance may exist for months before it is checked again. ANSI/ESD S20.20 section 6.1.3.1 Compliance Verification Plan Requirement states: “Test equipment shall be selected to make measurements of appropriate properties of the technical requirements that are incorporated into the ESD program plan.”

CLEANING THE EMITTER POINTS

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

The emitter points should be cleaned using the included Emitter Point Cleaners or a swab dampened with Isopropyl alcohol.

1. Turn the unit OFF and unplug the power cord.
2. Open the top screen by loosening the screw and swinging the grill to one side.
3. Clean the emitter points using the included Emitter Point Cleaners or a swab dampened with Isopropyl alcohol.
4. Reattach the top screen.
5. Plug in the power cord and turn the unit ON.
6. Verify the performance of the ionizer by using a charged plate monitor, or ionization test kit.



With normal handling, the emitter points should not require replacement during the life of the unit with normal handling. If necessary, item 60507 Replacement Emitter Points are available for purchase.

BALANCE OFFSET VOLTAGE ADJUSTMENT

The Overhead Zero Volt Ionizer is an auto-balancing unit. However, tuning or manual adjustment can be accomplished by using the ionizer's control buttons. See "Operation" for more information.

INPUT VOLTAGE CONFIGURATION

WARNING - Risk of electric shock

These servicing instructions are for use by qualified personnel only. Do not perform any servicing of internal parts unless you are qualified to do so.

NOTE: The AC power cord MUST always be disconnected before the unit is disassembled.

The input voltage may be verified or reset by opening the ionizer's enclosure. This can be accomplished by removing the 10 screws that secure the cover to the base.

The input voltage can be selected using the two internal jumpers shown in Figures 5 and 6.

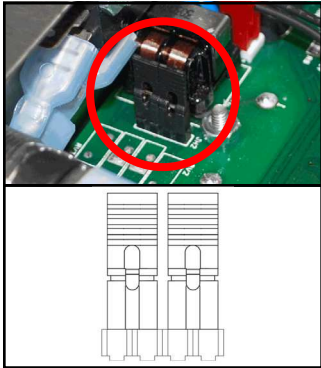


Figure 5. 110V jumper setting

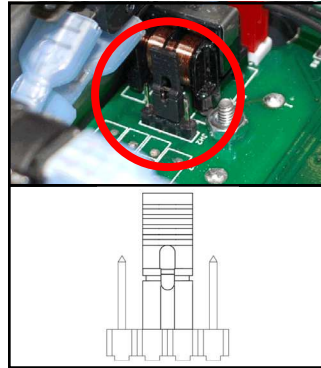


Figure 6. 220V jumper setting

If the supply voltage drops from 110 Volts to below 85 Volts or from 200 Volts to below 170 Volts, the unit will alarm and display "AC L". The unit will automatically reset when the minimum voltage is restored.

Calibration

Auto-balancing closed-loop feedback technology can save money and extend the maintenance interval of the ionizer. What the sensor detects is that the offset voltage (balance) has shifted and the circuits will attempt to compensate. In the case of corona ionizers, one of the reasons for a shift in offset voltage is frequently the particle buildup, commonly called a "fuzz ball", observed on the emitter points.

Compliance Verification should be per ESD TR53. Offset voltage (balance) and both polarity's discharge time should be checked on every ionizer periodically using an Ionization Test Kit or a Charged Plate Analyzer. Measure offset voltage (balance) and both polarity's discharge times. Clean the emitter points (with electrical power off), adjust offset voltage (balance) to zero and then re-test for offset voltage (balance) and discharge times recording the measurements.

Neutralization (Discharge) Times

All data was taken with the fan speed set to high. All time measurements are in seconds. The distance between the overhead ionizer and charged plate is 18" per ANSI/ESD STM 3.1.

NOTE: Discharge times in seconds are representative only and are not a guarantee. Discharge times are actual measurements recorded in a factory ambient environment.

Per ANSI/ESD S20.20, the test method for Product Qualification test is ANSI/ESD STM3.1, and for Compliance Verification is ESD TR53 which advises "Measurements should be made at the location where ESD sensitive items are to be ionized." A larger area may require additional ionizers. Per S20.20 the required limit for ionizer discharge time is user defined. Use Table to determine the number of ionizers to achieve ionization of area to be neutralized to meet your company's ESD control plan specified discharge times.

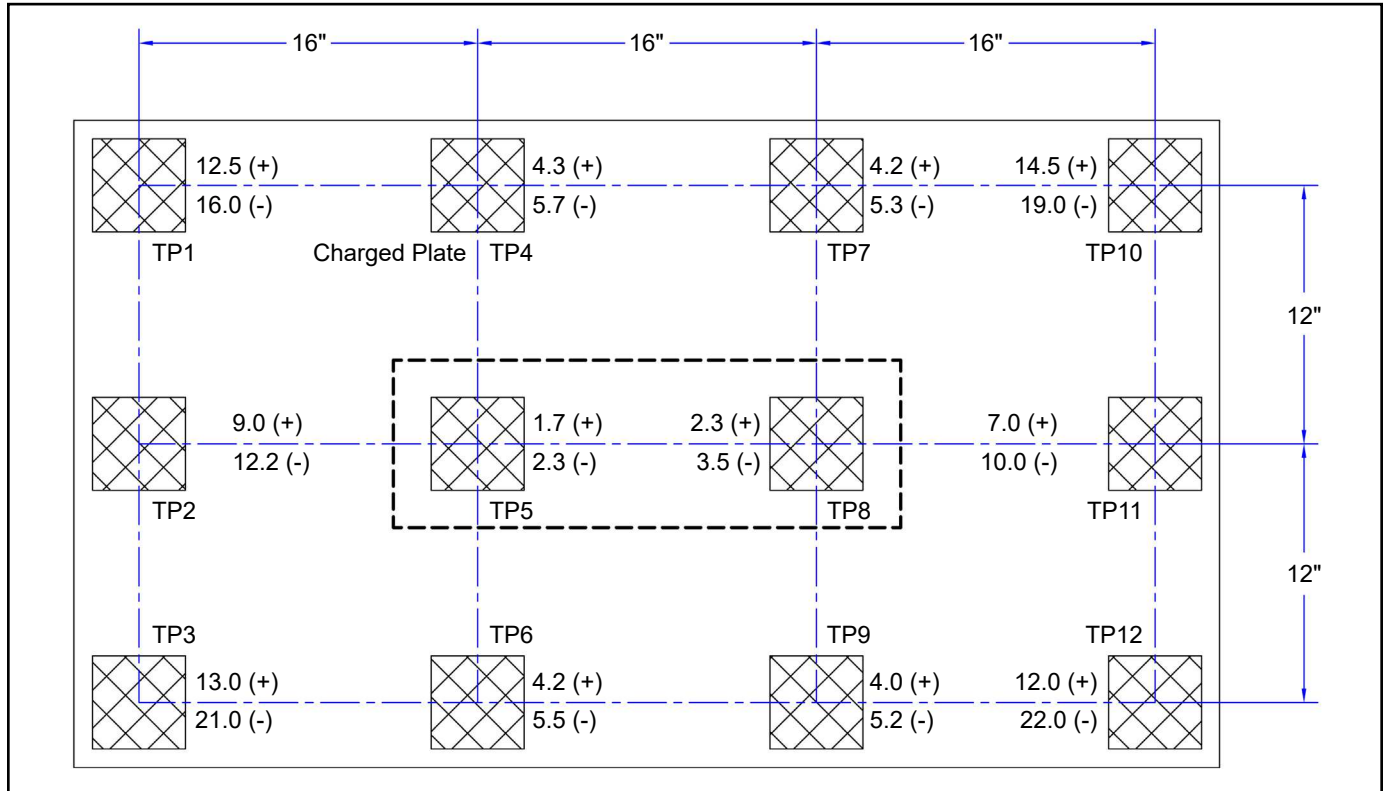


Figure 7. 50664 Neutralization (Discharge) Times at 100VAC, 50Hz input

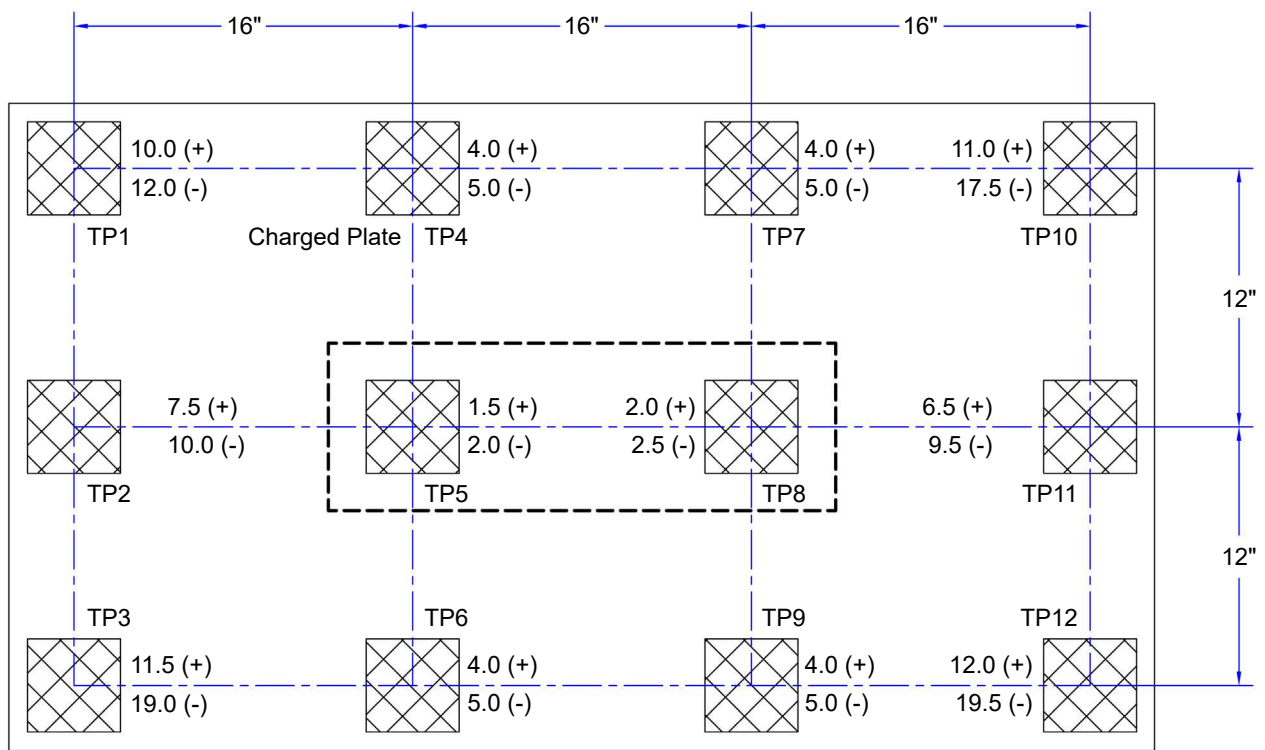


Figure 8. 50664 Neutralization (Discharge) Times at 120VAC, 60Hz input

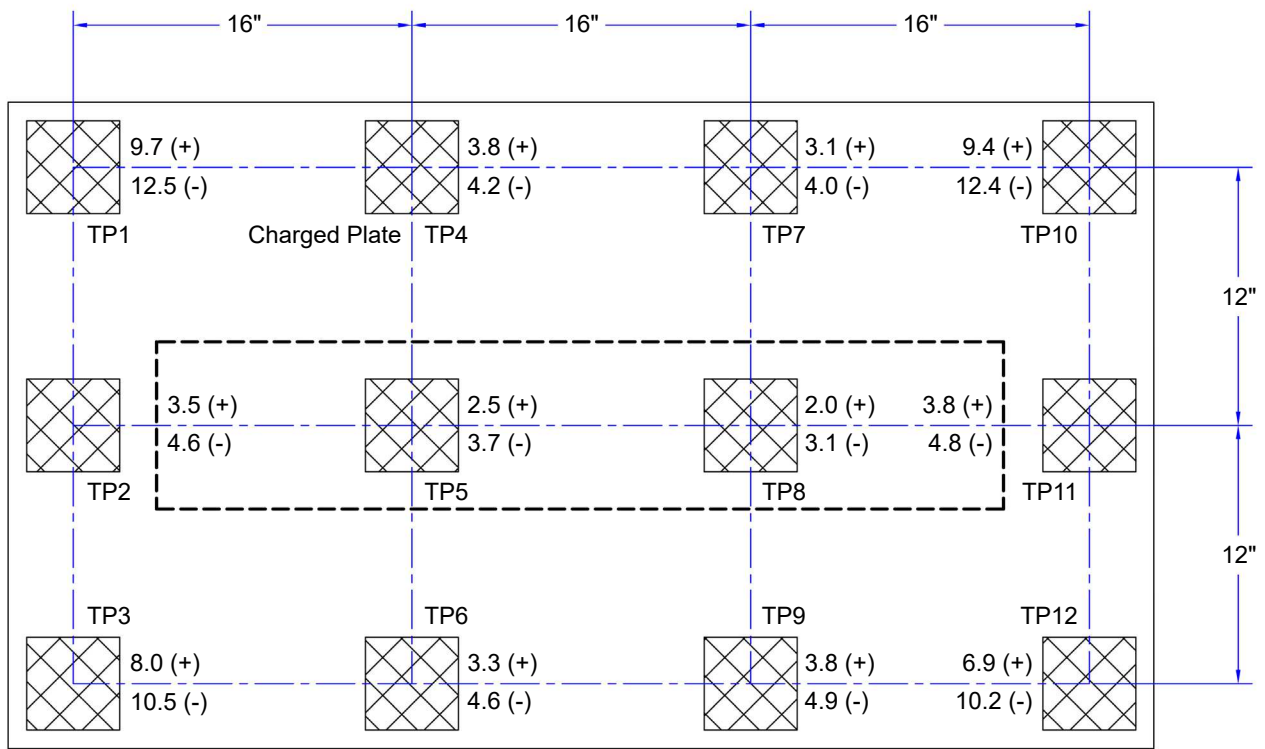


Figure 9. 50665 Neutralization (Discharge) Times at 100VAC, 50Hz input

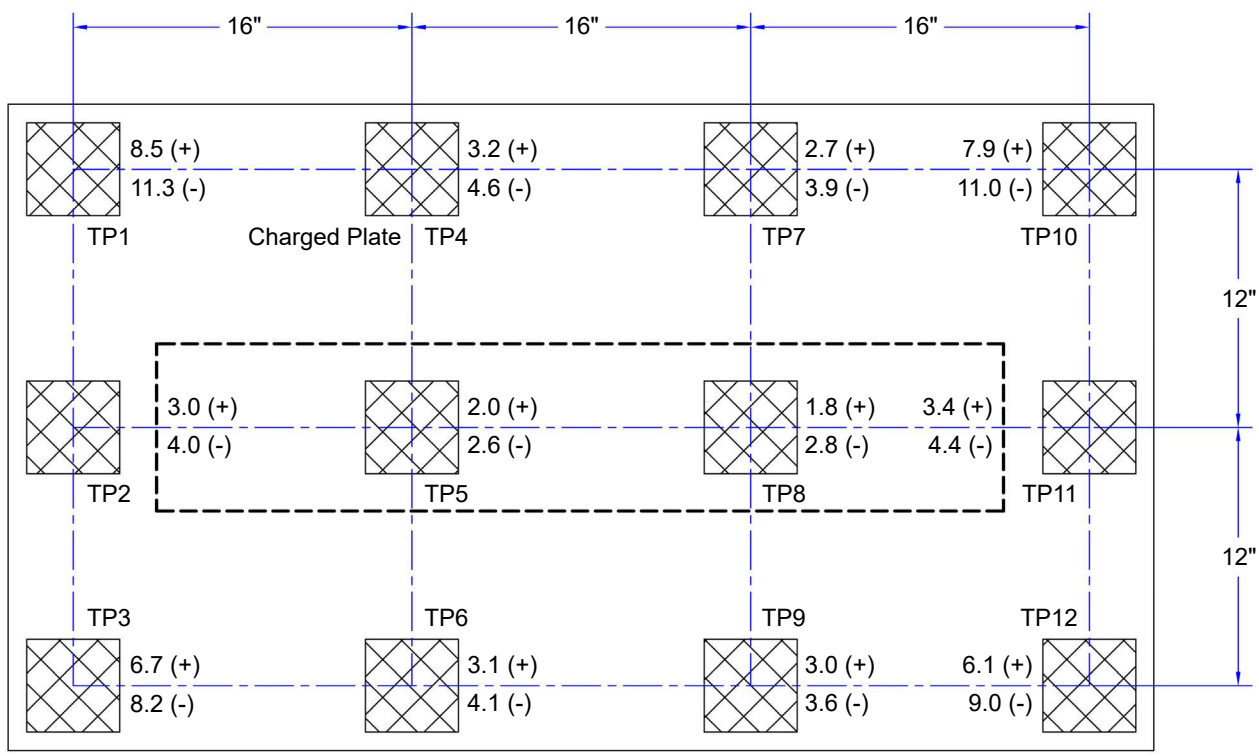


Figure 10. 50665 Neutralization (Discharge) Times at 120VAC, 60Hz input

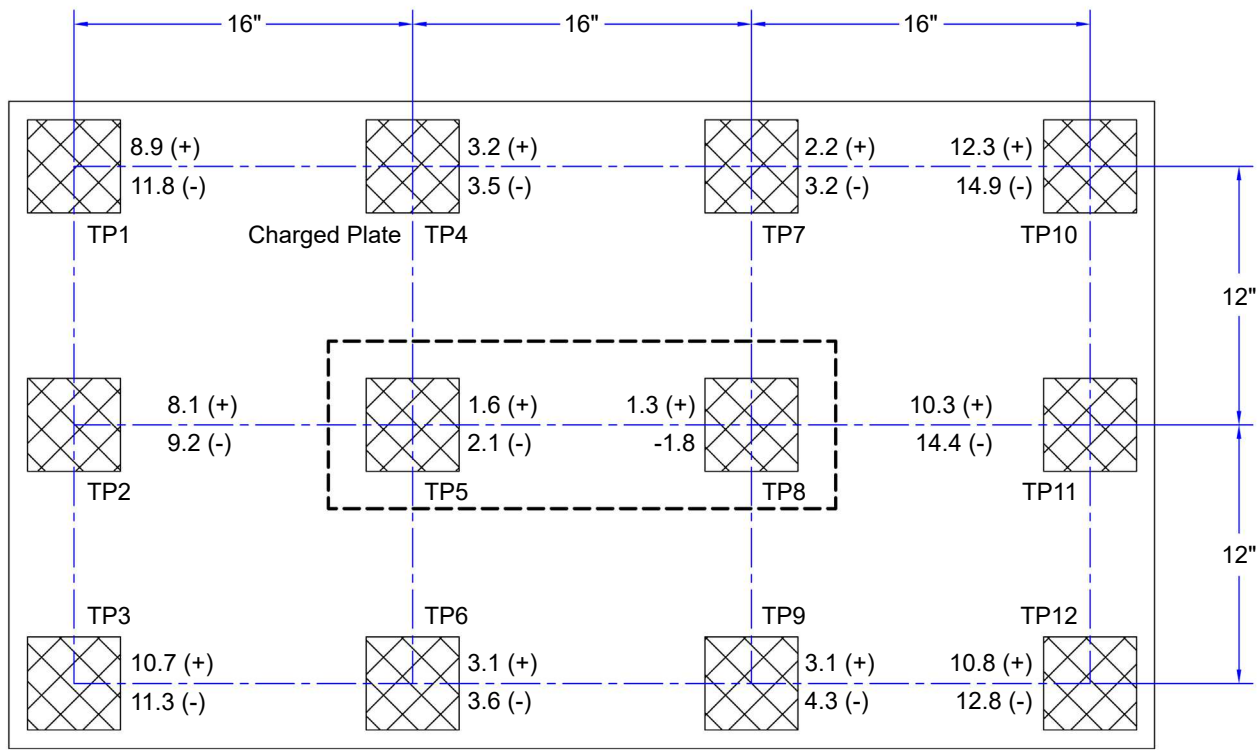


Figure 11. 50671 Neutralization (Discharge) Times at 220VAC, 50Hz input

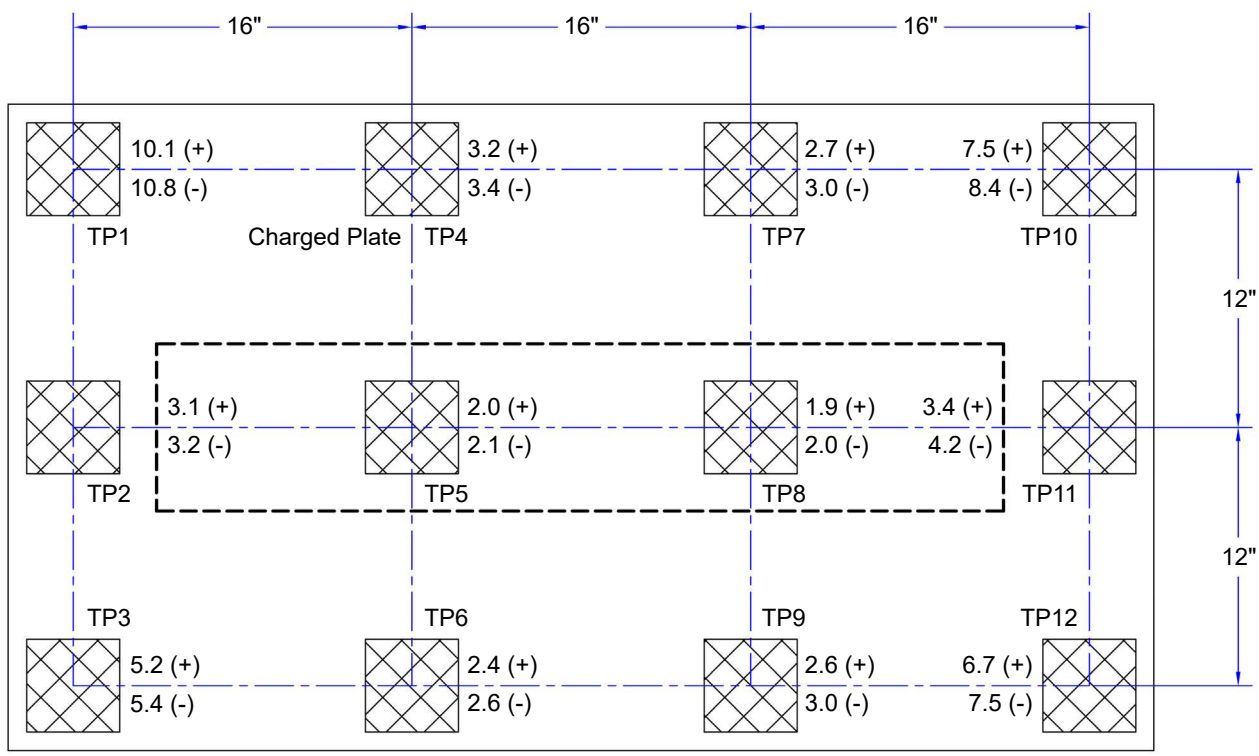


Figure 12. 50672 Neutralization (Discharge) Times at 220VAC, 50Hz input

Specifications

The comparative efficiency of overhead ionizers is determined by a standard test published by the ESD Association: ANSI/ESD STM 3.1. Typical positive and negative discharge times (1000V - 100V) measured using this standard are shown in the "Neutralization (Discharge) Times" section. The performance of the ionizer was measured with the unit positioned as shown, with the fan speed on high and without a filter.

Airflow (50664, 50671)	Nine speed fan 130 to 200 CFM
Airflow (50665, 50672)	Nine speed fan 195 to 300 CFM
Balance (Offset Voltage)	±3V typical ±5V maximum (65 to 80°F, 15 to 65% RH)
Chassis	Stainless Steel
Dimensions (50664, 50671)	3.9" H x 6.6" W x 27.3" L (9.9 cm x 16.8 cm x 69.3 cm)
Dimensions (50665, 50672)	3.9" H x 6.6" W x 42.3" L (9.9 cm x 16.8 cm x 107.4 cm)
Emitter Points	0.05" diameter, pure tungsten
Fuse	400 mA slow blow
High Voltage Power Supply	5.5 kVDC nominal
Input Power	AC line power
Ion Emission	Steady-state DC with sense feedback
Mounting	May be rigid-mounted or suspended from ceiling
Ozone	<0.05 ppm
Weight (50664, 50671)	7 lbs. (3.2 kg)
Weight (50665, 50672)	10 lbs. (4.5 kg)
Country of Origin	United States of America

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

See the Desco Warranty -
[Desco.com/Limited-Warranty.aspx](https://www.desco.com/Limited-Warranty.aspx)