

# Bench Top Ionizer Installation, Operation and Maintenance

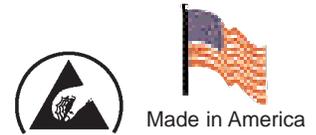


Figure 1. 94020 Bench Top Ionizer

## Description

The SPI Bench Top Ionizer (SP4511) is a compact and lightweight steady state DC auto-balancing bench top ionizer. The unit is normally placed at one end of the workbench or area to be neutralized. It may also be mounted to a wall or shelf. The ionizer's neutralization discharge time will be best approximately 12" to 48" directly in front of the unit and will increase as the distance from the unit increases.

Ionizers are useful in preventing electrostatic charge generation, ElectroStatic Discharge, ElectroStatic Attraction, as well as preventing equipment latch-up and safety related shock. Per ANSI/ESD S20.20 section 6.2.3.1. Protected Areas Requirement states: "Ionization or other charge mitigating techniques shall be used at the workstation to neutralize electrostatic fields on all process essential insulators if the electrostatic field is considered a threat." Air ionization can neutralize the static charge on insulated and isolated objects by producing separate charges in the molecules of the gases of the surrounding air. When an electrostatic charge is present on objects in the work environment, it will be neutralized by attracting opposite polarity charges from the ionized air. Note that ionization systems should not be used as a primary means of charge control on conductors or people. (Reference: EN 61340-5-2:1 paragraph 5.2.9)

"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 TR20.20 Ionization, section 5.3.6.1 Introduction and Purpose / General Information)

The SPI Bench Top Ionizer operates on DC, steady state. Steady 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.

## Ionizer Selection

ANSI/ESD S20.20 paragraph 6.1.1.2. ESD Control Program Plan Guidance states: "The Plan should include a listing of the specific type of ESD protective materials and equipment used in the Program." When selecting an ionizer, life cycle costs should be considered, including:

- equipment cost
- installation cost
- operation and maintenance cost

SPI Ionizers meet the ANSI/ESD S20.20 minimum recommended technical requirement range of less than +/- 50 volts voltage offset tested in accordance with ANSI-EOS/ESD S3.1. All SPI Bench Top Ionizers greatly exceed the requirement providing  $\pm 5$  to  $\pm 25$  volt auto-balancing.

## Packaging

- 1 Bench Top Ionizer
- 1 Power Cord (94020 only)
- 1 Emitter Point Cleaner Pack
- 1 Certificate of Calibration

## Installation

Place the unit at a desired location where that the airflow will not be restricted. Be sure that the ON/OFF 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.

## Operation

### Air Injection Test

I. Set the fan speed switch on the rear of the unit to the LOW, MED, or HI position (See Figure 1). Higher airflow will result in faster neutralization rates.

II. Position the ionizer so that maximum airflow is directed towards the items or area to be neutralized.

III. Turn the unit ON. When the unit is first turned on, it conducts a self-test. The audible alarm will sound and the LED will cycle through the colors red, yellow, and green. The LED will remain green during normal operation.

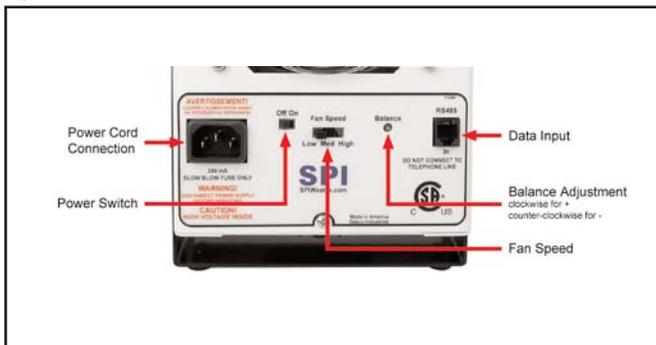


Figure 2. Rear View of the Bench Top Ionizer

## 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 TR 20.20 paragraph 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. The SPI Bench Top Ionizer has a very desirable feature as it will provide visual and audible alarms when an out of balance exists. ANSI/ESD S20.20 paragraph 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."

## Calibration AND Adjustments

### Balance Adjustment

The SPI Bench Top 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 adjustment hole located at the rear of the unit (See Figure 1). To increase the output in a positive direction, turn the potentiometer clockwise. To increase the output in a negative direction, turn the potentiometer counter-clockwise.

### Maintenance / Alarms

#### **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.

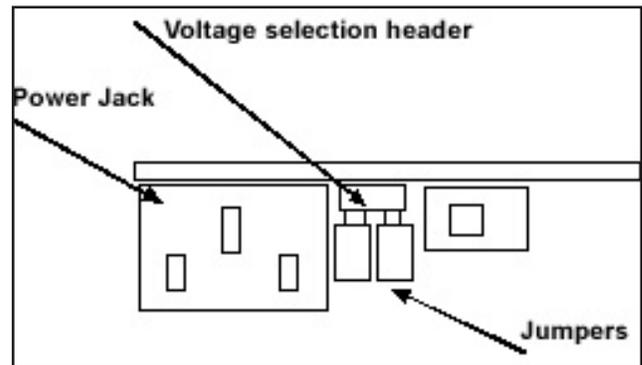


Figure 3. 110 Volt Jumper Setting

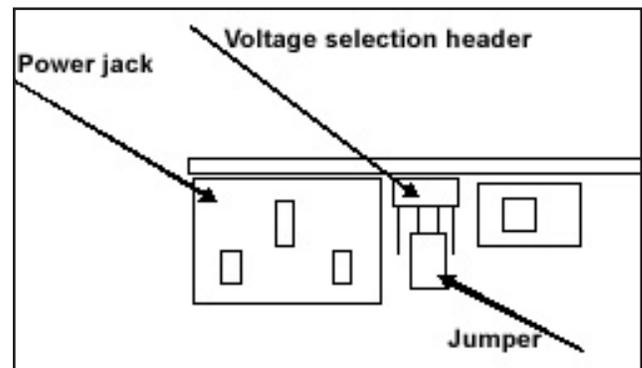


Figure 4. 220 Volt Jumper Setting

The input voltage may be verified or reset by removing the 3 screws located on the back of the unit then removing the back case.

The input voltage can be selected using the two internal jumpers shown in Figures 2 and 3.

If the supply voltage drops from 110 Volts to below 85

Volts or from 200 Volts to below 170 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.

### **Cleaning the Emitter Points**

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.

In the event of circuit failure, the unit will enter shutdown mode.

When the unit enters shutdown mode, ionization will be stopped, the LED on the front of the unit will illuminate a constant red, and the audible alarm will continuously sound. The user must then reset the unit by turning it OFF and back ON.

The emitter points should be cleaned using the included 94013 Emitter Point Cleaners or a swab dampened with Isopropyl alcohol.

- I. Turn the unit OFF and unplug the power cord.
- II. Remove the rear screen by removing the 4 screws.
- III. Clean the emitter points using the included 94013 Emitter Point Cleaners or a swab dampened with Isopropyl alcohol
- IV. Reattach the rear screen.
- V. Plug in the power cord and turn the unit ON.
- VI. Verify the balance of the ionizer by using a charge plate monitor.

The emitter electrodes should not require replacement during the life of the unit with normal handling. If necessary, item 94014 Replacement Emitter Points are available for order.

### **Specifications**

The comparative efficiency of bench top ionizers is determined by a standard test published by the ESD Association: Standard S3.1. Typical positive and negative decay times (1000 V - 100 V) 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.

### **Health**

There are no known health risks associated with our devices. The emitters work at about 4-6 kV and can create ozone, but there have been no significant measurement of ozone from our emitter sets as all our existing units test well below the OSHA limit of 0.05 ppm ozone. For additional safety information, see "Dispelling an Old Myth" written by William Metz of Hewlett-Packard published in Evaluation Engineering magazine September 2001.

## Neutralization (Decay) Time Table

Distance	12"	24"	36"	48"	
Time (seconds)	+101	+18	+13	+19	12"
	-125	-23	-17	-23	
	+2	+4	+7	+13	Center Line
	-2	-5	-9	-15	
	+23	+14	+15	+21	12"
	-36	-15	-16	-22	

- **Air Flow**

Three speed fan (125 fpm - 250 fpm, 50 cfm -100 cfm)

- **Balance**

±3 Volts Typical

±5 Volts Maximum

(Temperature Range: 65oF - 80oF, Relative Humidity: 15% - 65%)

- **Chassis**

Powder coated aluminum housing

- **Dimensions (with stand)**

9.5" x 6.0" x 3.1"

- **Emitter Points**

.050" diameter

Made of pure tungsten for improved mechanical strength and ionization stability

- **Fuse**

250 mA slow blow

- **High Voltage Power Supply**

5.5 kV DC nominal

- **Input Power**

AC line power

Internally selectable for 110/115 VAC - 50/60Hz or 220/230 VAC - 50/60Hz

- **Ion Emission**

Steady-state DC with sense feedback

- **Mounting**

Bench Top tilt adjust frame

- **Ozone**

< 0.05 ppm

- **Weight**

4.5 lbs.

## **Contact and Warranty**

ESD Systems  
432 Northboro Road Central  
Marlboro, MA 01752  
Tel: (508) 485-7390  
Fax: (508) 480-0257

### **Limited Warranty**

SPI expressly warrants that for a period of one (1) year from the date of purchase, SPI Bench Top Ionizers will be free of defects in material (parts) and workmanship (labor). Within the warranty period, the product will be tested, repaired, or replaced at our option, free of charge. Call our Customer Service Department at 909-664-9986 for a Return Material Authorization (RMA) and proper shipping instructions and address. Include a copy of your original packing slip, invoice, or other proof of purchase date. Any unit under warranty should be shipped prepaid to the SPI factory. Warranty repairs will take approximately two weeks.

If your unit is out of warranty, call Customer Service at 909-664-9986 for a Return Material Authorization (RMA) and proper shipping instructions and address. SPI 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 SPI 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.