



Made in the  
United States of America

# Ground Gard 4.5 Operation, Installation, and Maintenance



Figure 1. SPI Ground Gard 4.5

## Description

The Ground Gard 4.5 is a wrist strap and ground monitoring device for the electronics work station. It is designed to constantly monitor two single wire wrist straps using a Remote Operator Module for each user.

This unit provides continuous monitoring of:

- Two users wearing a wrist strap
- Ground

**For a SPI Continuous Monitor that also monitors the ESD worksurface see SPI model Ground Gard 5.**

Leading companies use continuous monitors as a cost effective component in satisfying the paragraph 6.1.3 Compliance Verification Plan requirements of ANSI/ESD S20.20. The SPI Ground Gard 4.5 Continuous Monitor provides continuous monitoring of two operators and also functions to ensure connection to ground. If the monitor, using capacitance technology, detects improper grounding of the operator, the monitor will issue an audible alarm alongwith an illuminated red LED to notify the user of a problem.

Many customers are eliminating periodic testing and are utilizing continuous monitoring to better ensure that their products were manufactured in an ESD controlled environment. Continuous monitoring is superior to periodic testing. "While effective at the time of testing, wrist strap checker use is periodic. The failure of a wrist strap between checks may expose products to damage from electrostatic charge. If the wrist strap system is checked at the beginning of a shift and subsequently fails, then an entire shift's work could be suspect." (ESD TR 12-1 Section 1.0 Survey of Constant Monitors for Wrist Straps)

Continuous Monitors eliminate the need for users to test wrist straps and log the results; by their function, these monitors satisfy the ISO 9000 and ANSI/ESD S20.20 Paragraph 6.2.2.2 test logging requirements. Per ESD-S1.1 paragraph 6.1.3 Frequency of Functional Testing "Daily (Wrist Strap) testing may be omitted if constant monitoring is used."

"Because wrist straps have a finite life, it is important to develop a test frequency that will guarantee integrity of the system. Typical test programs recommend that wrist straps that are used daily should be tested daily. However, if the products that are being produced are of such value that knowledge of a continuous, reliable ground is needed, and then continuous monitoring should be considered or even required." (ESD Handbook TR 20.20 section 5.3.2.4.4)

The Ground Gard 4.5 is available in two models. The item numbers are listed below:

| Item                  | Description  |
|-----------------------|--|
| <a href="#">94392</a> | Ground Gard 4.5 with Buzzer, 120V                  |
| <a href="#">94390</a> | Ground Gard 4.5 with Buzzer, Building Ground, 120V |

\*Contact manufacturer for quote on 220V models

The Ground Gard 4.5 will alarm if preset values are exceeded for capacitance, high resistance and ground loss conditions. The grounding system is redundant and will still provide limited grounding even if the utility ground is lost and the system is in an alarm state.

## Capacitance Type Continuous Monitors

"This type of monitor is used with a single wire (single conductor) wrist strap. Monitors in this category operate by "sensing" body capacitance. For capacitance monitors, an AC voltage is applied to the wrist strap through the single conductor ground cord. Due to capacitive coupling of the person to ground based on the surroundings, the monitor will indicate either good or bad depending on the manual adjustment or preset tolerance. Since a capacitor or capacitive network responds like a resistor to an AC current, the single conductor wrist strap monitor only provides an estimate of the wrist strap wearer's apparent resistance." (ESD Handbook TR 20.20 section 5.3.9.2 Types of Continuous Monitors)

## Packaging

- 1 Ground Gard 4.5 Monitor
- 2 [94340](#) Remote Operator Modules
- 2 10 Foot Phone Cords
- 1 12 Foot Ground Cord ([94390](#) only)
- 1 Velcro® Set
- 1 Power Adapter
- 2 Prong, 12 Volts (for [94390](#))
- 3 Prong, 12 Volts (for [94392](#))

## Installation

### 1. GROUND GARD 4.5 Monitor Head:

The Ground Gard 4.5 Monitor Head is designed to maximize valuable work area and should be mounted at eye level above the workstation, either on a post or shelf support. A double-sided adhesive Velcro® attachment is provided to hold the lightweight head in place.

### 2. GROUND CONNECTION:

The green wire extending from the monitor head (item [94390](#)) must be attached to equipment ground. This wire can be connected directly or looped through the conductive table top or mat to ground. There is no green wire on item [94392](#). For this item, the ground connection is made through the third prong of the 3-wire Power Adapter.

**Caution:** The total amount of resistance through all monitored parts should not exceed 10.0 megohms total.

### 3. REMOTE OPERATOR MODULES:

The remote operator modules can be mounted at the front of the work surface, usually under the tabletop and flush with the front edge. Two screws for each unit are provided for mounting. Connect each remote to the monitor unit using the telephone cable with RJ11 connectors.



### 4. POWER UP TEST

After installing the Monitor Head, remote units, and making the necessary connections without the wrist straps connected, the unit should POWER UP with the wrist strap LED's OFF and the audible alarm SILENT. If you have no response to power or a red LED, check AC outlet for proper ground or refer to trouble shooting section.

### PARK SNAP

The audible alarm is designed to alert both operator and supervisor. The Park Snap feature provides a means for an operator to disconnect when normally leaving the work area, without the audible alarm sounding, and it provides a means of wrist cord storage (visual red LED will illuminate). You may also disconnect coil cord by unplugging banana plug from the Remote Operator Module. Both a 7mm and 4mm Park Snap is provided on each module.

## Remote Module Description

Inside both remote modules are infrared sensors that react to the insertion of a wrist strap wire with a banana plug. When the banana plug is inserted, the base unit is activated for that remote module. The Monitor Head LED for the left or right wrist strap will light showing the condition of that strap. If correct, the LED should be GREEN.

Should the wrist strap fail, be worn incorrectly or removed by the operator, the red indicator will flash, calling attention to a problem. Should the ground connection be lost, the red light and alarm will be activated. The monitors are continuous and even a momentary break will cause alarms. The remote modules are set at the factory to allow for sensitivity of the "average" human body model.

## Calibration Procedure Using 94335 Tester

With coiled wires connected to test unit and each remote, observe the following: both lights should illuminate green on the head module, with no buttons depressed on the tester. Pressing buttons one or four should cause the left or right wrist strap to go red simulating a high resistance condition on the wrist strap. This shows that the Remote Operator Module is properly calibrated.

If the above conditions are not met, complete the following adjustment:

With buttons one and four not depressed, the LED display on the head module should be in a green condition. If not, find the adjusting port on the remote. Inside there is an adjusting trim pot. Turn the trim pot slightly until the head module LED turns green.

**Step One:** Turn the pot until the green LED triggers red, then ease back until LED triggers green.

**Step Two:** Press the corresponding button on the test unit and the LED will go red on the head module. This shows the Ground Gard remote is in a proper calibration.

**Note:** If the unit does not go red, go back to step one and repeat procedure.

### Installation Adjustments

Should your system alarm without obvious cause, first troubleshoot and verify all connections. If all the connections are correct, the base unit should be adjusted to compensate for a different HBM (human body model). We preset the units at the factory at 100pF and your operator might be out of the tolerance range caused either by body chemistry, bulk capacitance or impedance differences.

Follow these steps to adjust and personalize the base unit:

Locate the small hole in the face of the remote module (factory adjustment label my cover hole). Inside this hole is a trim pot device that is adjustable by using a small flat-head screwdriver.

With the system set up and operating, and the operator's wrist strap connected to the remote module:

1. Turn the pot until the green light activates. Disconnect the wrist wire from the band. The unit should alarm and activate the red light. If not, turn the trim pot until the red light activates. Reconnect the wire to the wrist band and the alarm should cease and the green light should activate.

2. Turn the pot until the green light begins. Disconnect the wrist wire from the band. The unit will alarm and activate the red light. If not, turn the trim pot until the red light activates. Reconnect the wire to the wristband and the alarm will cease, the green light will activate.

### **Safety Issues**

With regards to the safety issue, it is hard to conceive of a safer situation than exists with the Ground Gard 4.5 as designed.

1. The Ground Gard 4.5 has a built-in safety resistance of no less than 500k ohms at each remote unit.
2. The transformer is wound on a split bobbin with 1500 volt insulation to assure no possible line leakage.
3. The circuits are double insulated by virtue of the insulated plastic boxes.
4. 500k ohms internal to the Ground Gard and one megohm in the wrist strap isolate the operator.

This may be varified by using a miltimeter set on ohms. Connect the telephone type wire to the head monitor and to the remote unit. Place one end of the probe into the banana receptacle at the remote, and the other to the collar (power supply jack) located at the head monitor.

### **Limited Warranty**

ESD Systems.com expressly warrants that for a period of one (1) year from the date of purchase, SPI Ground Gards 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 ESD Systems.com factory. Warranty repairs will take approximately two weeks.

If your unit is out of warranty, call Customer Service at 508-485-7390 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 MERCHANT-ABILITY 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 ESD Systems.com 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.