SCS TB-9111 Static Sensor and Air Ionizer Test Kit User Guide

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SCS USER GUIDE TB-9111

Static Sensor & Air Ionizer Test Kit Operation and Maintenance

Made in the United States of America

Figure 1. SCS 770716 Static Sensor

Figure 2. SCS 770717 Air Ionizer Test Kit

Contents

Description

The SCS 770716 Static Sensor indicates surface voltage and polarity on objects. The meter has a measurement range of 0 to ±19.99 kV at a distance of 1 inch and a measurement accuracy of ±5%. It utilizes a chopper-stabilized sensor for use in both normal and ionized environments. The meter's enclosure is dissipative and features a 7 mm snap and ground cord for bonding to equipment ground. A rotary zero knob sets the zero-reference point with finely tuned precision, and a Hold button allows the user to "freeze" a displayed measurement for evaluation. A LED range indicator assists with placing the meter at the correct distance from the object being measured.

The SCS 770717 Air Ionizer Test Kit includes and utilizes the 770716 Static Sensor to measure the offset voltage (balance) and charge decay of ionization equipment. The Air Ionizer Test Kit also includes a charger used to place a ±1000V charge on the conductive plate, making it possible to also measure the discharge times of air ionization equipment per ANSI/ ESD SP3.3 Periodic Verification of Air Ionizers.

Although not as accurate, the SCS Air Ionizer Test Kit is designed to make measurements that correspond to those made by using a charged plate monitor and ANSI/ESD STM3.1. The Air Ionizer Test Kit provides convenience and portability to test per ANSI/ESD SP3.3 Periodic Verification of Air Ionizers or Compliance Verification ESD TR53. SCS recommends using the 770004 or 770005 Charged Plate Analyzer if precise measurements are required.

All Static Sensors and Air Ionizer Test Kits are calibrated to NIST standards and include a certificate.

“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)

The Static Sensor, Air Ionizer Test Kit, and its accessories are available as the following item numbers:

Item Description
770716 Static Sensor
770717 Air Ionizer Test Kit
770719 Conductive Plate and Charger
770009 Carrying Case for Air Ionizer Test Kit

Packaging

770716 Static Sensor

- 1 Static Sensor
- 1 Coiled Ground Cord, 12′ length
- 1 9V Alkaline Battery
- 1 Certificate of Calibration

770717 Air Ionizer Test Kit

- 1 Static Sensor
- 1 Conductive Plate
- 1 Charger
- 1 Coiled Ground Cord, 12′ length
- 2 9V Alkaline Battery
- 1 Carrying Case
- 1 Certificate of Calibration

770719 Conductive Plate and Charger

- 1 Conductive Plate
- 1 Charger
- 1 9V Alkaline Battery
- 1 Carrying Case

Figure 3. Air Ionizer Test Kit and Carrying Case

Features and Components

Static Sensor

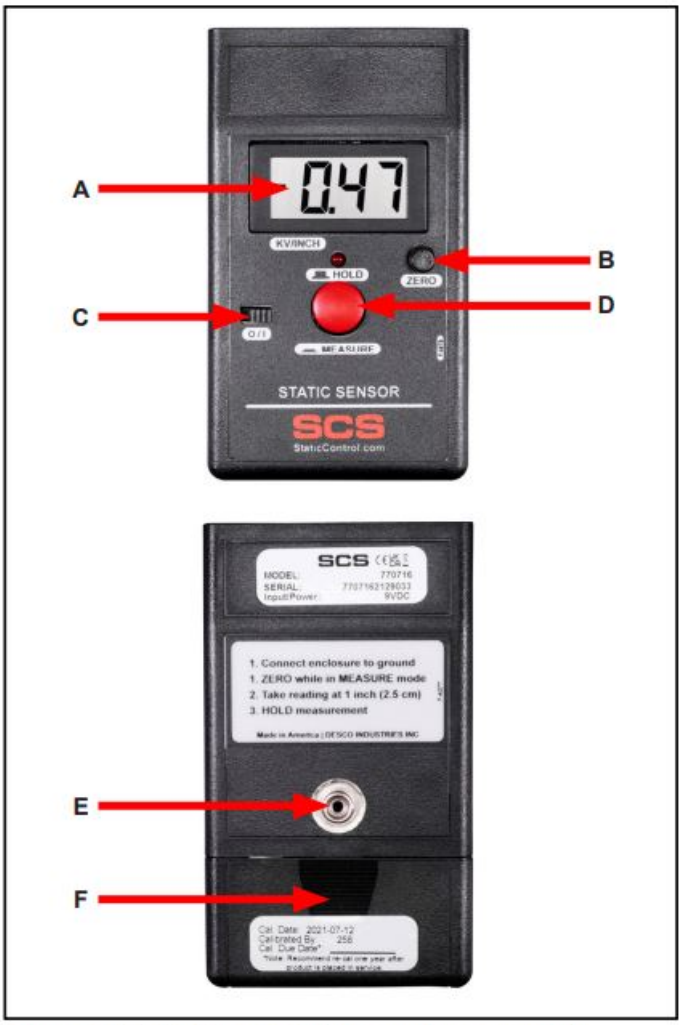

Figure 4. Static Sensor features and components

- **A. Display:** Displays the measured value in kV/inch.
- **B. Rotary Zero Knob:** Sets the 0 volt reference point.
- **C. Power Switch:** Slide to the left to power the meter off. Slide to the right to power the meter on.
- **D. Measure/Hold Pushbutton Switch:** Press the pushbutton to display live measurements. Release the pushbutton to freeze the measurement on the display. The red LED above the pushbutton will illuminate when HOLD is enabled.
- **E. 7 mm Ground Snap:** Connect the included 7 mm coiled ground cord here to ground the meter.
- **F. Battery Cover:** Slide the cover down to open the 9V battery compartment.

Charger

Figure 5. Charger features and components

- **A. Output Contact:** 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 rocker switch and touch the plate simultaneously with the fingers of the same hand.
- **B. Rocker Switch:** Press and hold to select the polarity that will be provided at the Output Contact.
- **C. Touch Plate:** Make contact with the touch plate while pressing down the rocker switch to provide voltage to the Output Contact. The operator must be properly grounded during use.
- **D. Battery Compartment:** Slide the cover down to open the 9V battery compartment.

Operation

Static Sensor

NOTE: The Static Sensor's enclosure is conductive. The instrument senses the difference in potential between the enclosure and the tested surface. The meter must be grounded by either the hand of a grounded operator or the included coiled ground cord to achieve accurate measurements.

Zeroing the Static Sensor

Slide the power switch to the right to power the Static Sensor. Point the top of the Static Sensor approximately 1 inch (2.5 cm) away from a grounded metal surface. Proper spacing is indicated when the two red bullseyes emitted LED range indicator become cantered on top of each other. Turn the rotary zero knob until the Static Sensor's display reads 0.00.

Figure 6. Pointing the Static Sensor to a grounded surface

Figure 7. Aligning the two bullseyes emitted by the LED range indicator

Performing a Measurement

Use the LED range indicator to position the top of the Static Sensor 1 inch (2.5 cm) from the object to be

measured. The Static Sensor will display a reading (from 0 to ±19.99) of the electrostatic field in kilovolts per inch.

NOTE: The display will indicate “1” or “-1” when the Static Sensor is over-ranged. Change the range of the unit if necessary. If the measurement exceeds 20 kV, move the Static Sensor farther away from the object and multiply the reading by the distance (in inches) away from the object being measured. The measurement accuracy is dependent on a stable ground reference and the 1 inch measuring distance. It is also dependent on the “aspect ratio”, relating the size of the object to be measured to the measurement distance.

NOTE: This aspect ratio should be at least 3 for best accuracy. In other words, the object should be at least a 3 inch square when measuring at a 1 inch distance. Accurate measurements may be made at other measurement distances by scaling the Static Sensor range and observing the proper aspect ratio. For example, at a measurement distance of 3 inches, multiply the Static Sensor reading by 3 to give a range of 0 to 60 kilovolts. For accuracy, the object being measured at this distance should be at least a 9 inch square.

Holding the Last Reading
With the Static Sensor positioned 1 inch (2.5 cm) from the object being measured, press the red pushbutton switch into the HOLD position. This will freeze the measurement on the display and illuminate the red LED located above the pushbutton switch. This feature allows the operator to move the Static Sensor where it may be more easily read or saved for later reference.

NOTE: The LED range indicator will disable while the Static Sensor is in HOLD mode. Use the HOLD feature between measurements to prolong the battery’s life.

Air Ionizer Test Kit

Performing Offset Voltage (Balance) Measurements
The Air Ionizer Test Kit has been designed to match the compact size and hand held convenience of the Static Sensor. 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 place a charge on sensitive electronic components or assemblies.

NOTE: The Static Sensor’s enclosure is conductive. The instrument senses the difference in potential between the enclosure and the tested surface. The meter must be grounded by either the hand of a grounded operator or the included coiled ground cord to achieve accurate measurements.

Installing the Conductive Plate
The Static Sensor’s case has two slots along its sides. The top slot is closest to the face of the instrument. Slide down the tabs of the Conductive Plate plate into the top slot of the Static Sensor’s case as far as they go.

Figure 8. Sliding the Conductive Plate onto the Static Sensor

Zeroing the Static Sensor
Slide the power switch to the right to power the Static Sensor. Make contact between the top of the Conductive Plate and a grounded surface. Turn the rotary zero knob until the Static Sensor's display reads 0.00.

Performing 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. The display will indicate "1" or "-1" when the Static Sensor is over-ranged. Change the range of the unit if necessary.

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 Static Sensor, therefore the displayed voltage is an average of the actual voltage. The output of the Static Sensor is useful in this situation for more accurate measurements.

Figure 9. Using the Static Sensor with Conductive Plate to measure the offset voltage of a benchtop ionizer

Holding the Last Reading
Press the red pushbutton switch into the HOLD position. This will freeze the measurement on the display and illuminate the red LED located above the pushbutton switch. This feature allows the operator to move the Static

Sensor where it may be more easily read or saved for later reference.

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

Polarity Selection
The top of the rocker switch is labelled "+", and the bottom is labelled "-". 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.

NOTE: For the Charger to work correctly, the operator and Static Sensor must be properly grounded. A ground path to the touch plate must exist.

Ionizer Discharge Time
Use the Static Sensor with the Conductive Plate in the appropriate location for measurements.

Positive Discharge Time Measurements
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 Static Sensor. The Static Sensor reads approximately +1.10 kV. By using a stop watch or other timing device, determine the time needed for the voltages to decrease from +1.10 kV to +0.10 kV. 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 Static Sensor. The Static Sensor reads approximately -1.10 kV. By using a stop watch or other timing device, determine the time needed for the voltages to decrease from -1.10 kV to -0.10 kV. This is the negative discharge time.

NOTE: A ground path must be provided between the touch plate of the Charger and the ground reference of the Static Sensor. This is normally provided by holding the Charger in one hand and the Static Sensor with Conductive Plate in the other.

Figure 10. Using the Charger to apply a charge onto the Conductive Plate

Maintenance

The Static Sensor and Charger are factory calibrated and no maintenance is required. Contact SCS Customer Service should the products behave abnormally. Any unauthorized service will void the warranty and result in additional repair charges.

NOTE: This Static Sensor is a precision instrument and should not be subjected to dropping as that would void the warranty.

Replacing the Battery

The Static Sensor's battery should be replaced when a battery symbol appears on the display. The battery in the Charger should be replaced annually or when it is unable to provide approximately ±1100V. Always replace the batteries with a 9V alkaline or equivalent battery.

Cleaning

The area around the aperture of the Static Sensor must be kept clean to ensure accurate, drift-free readings. Never touch the aperture. Use low-pressure instrument grade air to remove dust or other debris. To remove more severe contamination, spray or flush with the smallest practical amount of clean technical-grade of isopropyl alcohol. Allow the instrument to air dry for several hours afterward.

Keep the insulators on the Aluminum Conductive Plate clean and free of contaminates that may cause surface leakage. To test the performance of the Conductive Plate, charge the plate and note the discharge rate in a non-ionized area. The self discharge rate to 10% of original voltage should be greater than five minutes.

Specifications

Static Sensor

Performance	
Measurement Range	0 to ±19.99 kV / inch
Measurement Accuracy	Better than ±5% of reading, ±2 counts
Measurement Stability	±10 counts
Front Panel Meter	
Voltage Display	3-1/2 digit LED display
Sampling Rate	3 readings per second
Features	
Ranging System	LED distance indicator; aligned targets indicate 1"
Range	LED distance indicator
Rotary Zero Knob	Sets the zero-reference point
Low Battery Indicator	An LCD icon indicates when the battery is low
Hold Switch	Retains the LCD display reading when depressed
General	
Dimensions	0.9" H x 2.8" W x 4.9"L (24 mm x 70 mm x 126 mm)
Weight	4.9 oz. (140 g) with battery
Operating Conditions	
Temperature	50 to 86ºF (10 to 30ºC)
Relative Humidity	To 80%, non-condensing
Altitude	To 2000 m
Certifications	CE
Power Requirements	
Power	One (1) 9-volt alkaline battery
Operating Time	Greater than 50 hours, with a new battery at 21ºC continuous

Air Ionizer Test Kit

Conductive plate Assembly	Aluminum bracket, bare aluminum plate and teflon spacers isolate plate from bracket
Voltage Output	1/10,000 of measured voltage
Conductive plate Area	2.95" W x 1.18" L (7.5 x 3.0 cm)
Conductive plate Assembly Weight	2.4 oz. (68 g)
Charger Dimensions	1.1" H x 2.6" W x 4.5" L (2.8 x 6.6 x 11.4 cm)
Charger Weight	5 oz. (140 g) with battery
Charger Power Requirements	One 9-volt alkaline battery
Charger Output (using Static Sensor with conductive plate)	1.1 kV minimum for ± voltage
Certifications	CE

Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions
See the SCS Warranty StaticControl.com/Limited-Warranty.aspx

SCS – 926 JR Industrial Drive, Sanford, NC 27332 East: (919) 718-0000 | West: (909) 627-9634 · Website: StaticControl.com

Documents / Resources

	SCS TB-9111 Static Sensor and Air Ionizer Test Kit [pdf] User Guide TB-9111, Static Sensor and Air Ionizer Test Kit, TB-9111 Static Sensor and Air Ionizer Test Kit