Static Sensor & Air Ionizer Test Kit Operation and Maintenance

Made in the United States of America

Figure 1. SCS 770713 Static Sensor

Figure 2. SCS 770714 Air Ionizer Test Kit

Description

The SCS 770713 Static Sensor indicates surface voltage and polarity on objects. The rechargeable meter has a measurement range of 0 to ±40.0 kV. A Time-of-Flight (ToF) distance sensor determines distances from 1 to 200 mm to automatically adjust measured electrostatic voltages. It utilizes a chopper-stablized sensor for use in both normal and ionized environments. The meter has a dissipative enclosure, and it requires no manual zeroing when held by a grounded operator. Automatic Snapshot Hold freezes the measurement on the display when the meter is moved away from the targeted object. Up to 10 measurements may be stored in memory and downloaded via its USB-C port.

The SCS 770714 Air Ionizer Test Kit includes and utilizes the 770713 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 ±1,000V 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.

The Air Ionizer Test Kit may be used to perform periodic verifications of ionizer performance per ANSI/ESD SP3.3 Periodic Verification of Air Ionizers and ESD TR53 Compliance Verification of ESD Protective Equipment and Materials. SCS recommends using the Prostat® CPM-766 Charged Plate Monitor should an ionizer require testing per ANSI/ESD STM3.1 for evaluation and qualification.

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

“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 their accessories are available as the following item numbers:

Item	Description
770713	Static Sensor
770714	Air Ionizer Test Kit
770712	Belt Clip Holster
770719	Conductive Plate and Charger
770009	Carrying Case for Air Ionizer Test Kit

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Packaging

770713 Static Sensor

1 Static Sensor
1 USB-C Charge Cable, 1 m

770714 Air Ionizer Test Kit

1 Static Sensor
1 Conductive Plate
1 Charger
1 USB-C Charge Cable, 1 m
1 Carrying Case

770719 Conductive Plate and Charger

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

Figure 3. SCS 770713 Static Sensor packaging contents

Figure 4. SCS 770714 Air Ionizer Test Kit and Carrying Case

Features and Components

Static Sensor

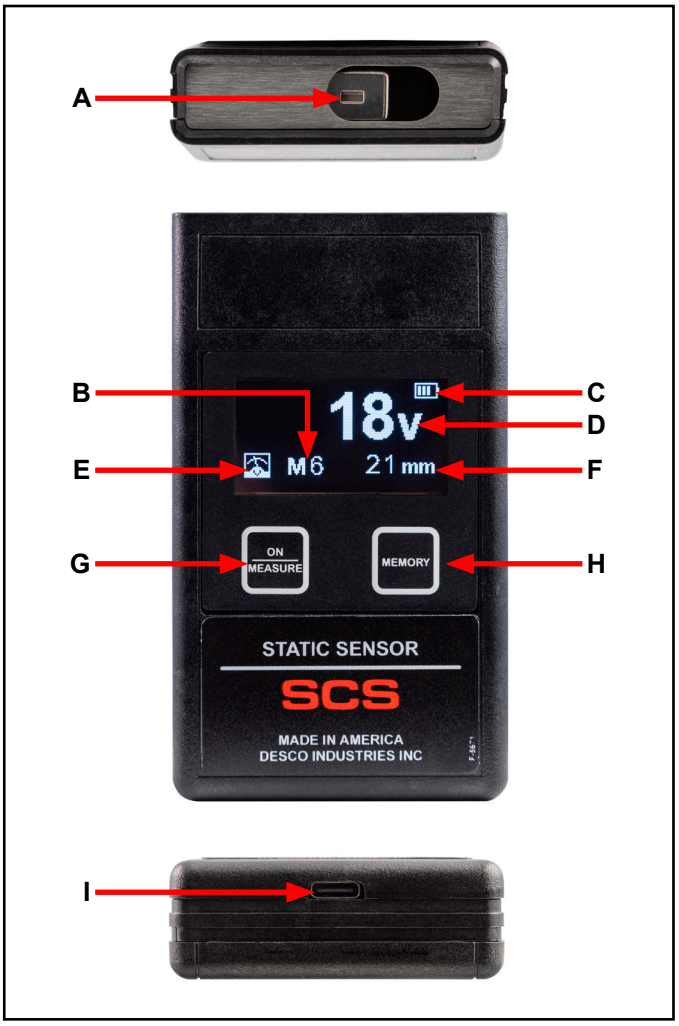

Figure 5. Static Sensor features and components

A. Electrostatic Field Sensor: Point 1 to 200 mm away from the measured object.

B. Memory Location: There are 10 memory locations (M0 to M9). When storing or viewing data, this indicator will show the memory location being utilized.

C. Battery Icon: Indicates the rechargeable battery's power level.

D. Electrostatic Field Voltage: Displays the measured voltage in volts (V) or kilovolts (kV).

E. Mode Icon: Indicates the mode of operation. A gauge icon indicates Measure Mode. A notepad icon indicates Memory Mode.

F. Distance Indicator: Displays the distance between the meter's sensor and targeted object. This information is used to calculate the electrostatic field voltage. The meter's distance range is 1 to 200 mm.

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G. ON/MEASURE Button: Short press powers the meter ON and sets it to Measure Mode. Short press while in Measure Mode to toggle the meter between Standard Mode and Conductive Plate Mode (CPM). Use Conductive Plate Mode when the Conductive Plate is installed onto the meter. Use Standard Mode otherwise. Long press powers the meter OFF.

H. MEMORY Button: Short press sets the meter to Memory Mode. Long press while in Measure Mode stores the displayed measurement into the displayed memory location.

I. USB-C Port: Use the included USB-C cable to charge the battery and download data from the meter's memory.

CHARGER

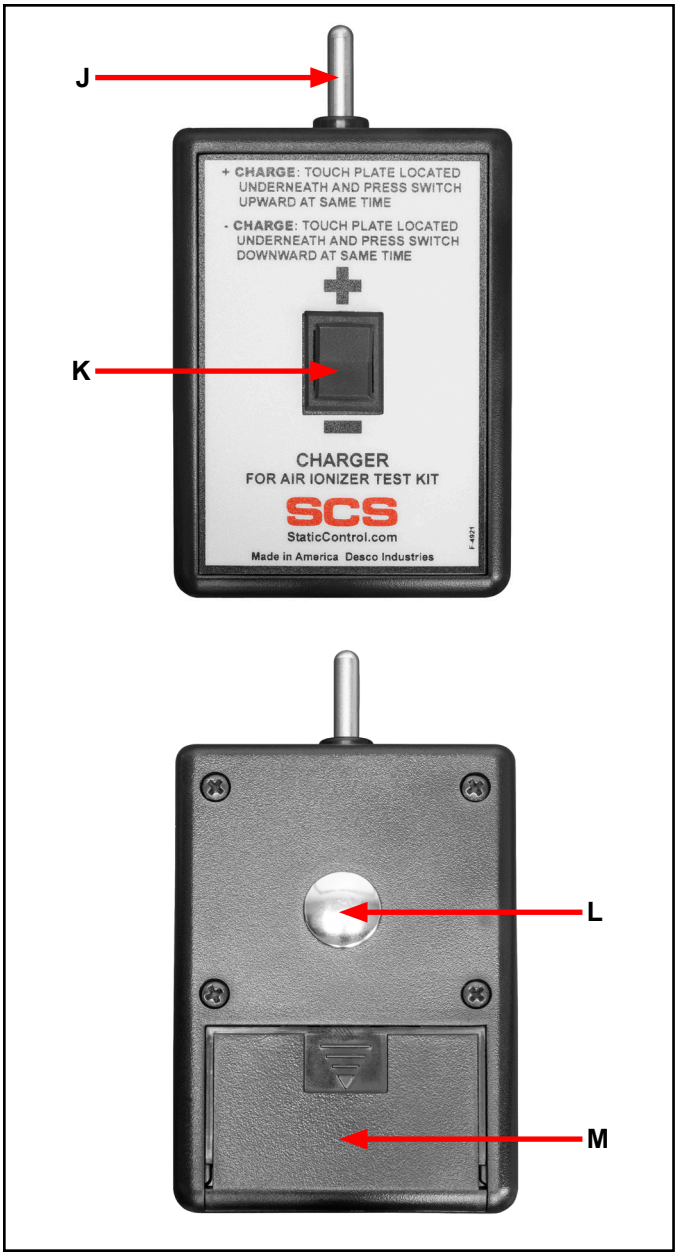

Figure 6. Charger features and components

J. 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.

K. Rocker Switch: Press and hold to select the polarity that will be provided at the Output Contact.

L. 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.

M. Battery Compartment: Slide the cover down to open the 9 V battery compartment.

Operation

Static Sensor

Setting the Date and Time

The Static Sensor can store up to 10 measurements in memory, each time and date stamped for downloading via the USB-C port.

To access the Date and Time screen, short press both the ON/MEASURE and MEMORY buttons at the same time. Once in the Date and Time screen, use the MEMORY button to navigate through the values and change them. Long press the MEMORY button to advance the cursor. Short press the MEMORY button to increment the highlighted digit. Short press the ON/MEASURE button at any time to save the settings and return to Measure Mode.

Grounding

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 the hand of a grounded operator to achieve accurate measurements. Manual zeroing is not required.

Performing a Measurement

The Static Sensor incorporates an advanced Time-of-Flight (ToF) distance sensor. This technology uses invisible, eye-safe laser pulses to precisely measure the distance to a target. This allows the firmware to automatically adjust the voltage measurement and ensure accurate readings across a dynamic range of 1 to 200 mm. Measurements are no longer limited to a fixed 1-inch (25 mm) distance.

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The measurement accuracy depends on both a stable ground reference and the aspect ratio between the size of the measured object and the measurement distance. For best accuracy, the aspect ratio should be at least 4:1 — meaning the measured surface should be at least a 4-inch (102 mm) square when measuring from a 1-inch (25 mm) distance. Measuring an object smaller than the recommended 4:1 aspect ratio will result in a lower reading on the meter.

Figure 7. Using the Static Sensor to measure foam

Snapshot Hold

When measuring, quickly pull or flick the meter away from the object. The last measurement will remain on the screen as long as the meter is not pointed at another measurable object within 200 mm (8 inches). This allows time to read the measurement and store it into memory if desired.

Memory Mode

The Static Sensor stores up to 10 measurements in memory. Short press the MEMORY button to enter Memory Mode. The Mode Icon will change to a notepad to indicate Memory Mode. While in Memory Mode, short press the MEMORY button to toggle through the 10 memory locations. Set the desired memory location for the next stored measurement to save. Long press the MEMORY button, and the meter will clear the selected memory location. Short press the ON/MEASURE button to return to Measure Mode.

Downloading Stored Measurements

Use a USB-C cable to connect the Static Sensor to a Windows PC. Press the ON/MEASURE button to power the meter ON.

Figure 8. Connecting the USB-C cable to the Static Sensor

The meter will appear as a USB serial device, and Windows will assign it a COM port (e.g. COM5). To find the COM port number, open Windows Device Manger. Look under “Ports (COM & LPT)” to find the USB Serial Device.

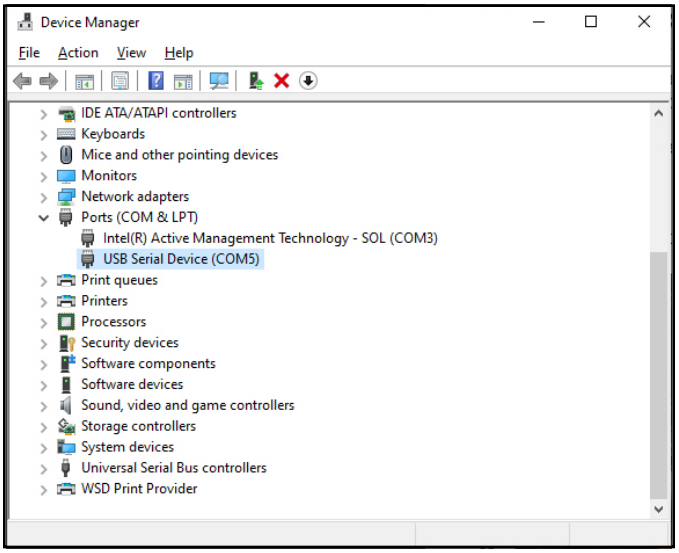

Figure 9. Locating the Static Field Meter in Windows Device Manager

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Open a serial terminal application of choice. Examples include PuTTY, Tera Term, and MobaXterm. The following screenshots are for PuTTY.

Configure the connection settings as follows:

- **Connection Type:** Serial
- **Serial Line:** The COM port from the prior step
- **Speed (Baud Rate):** 115200

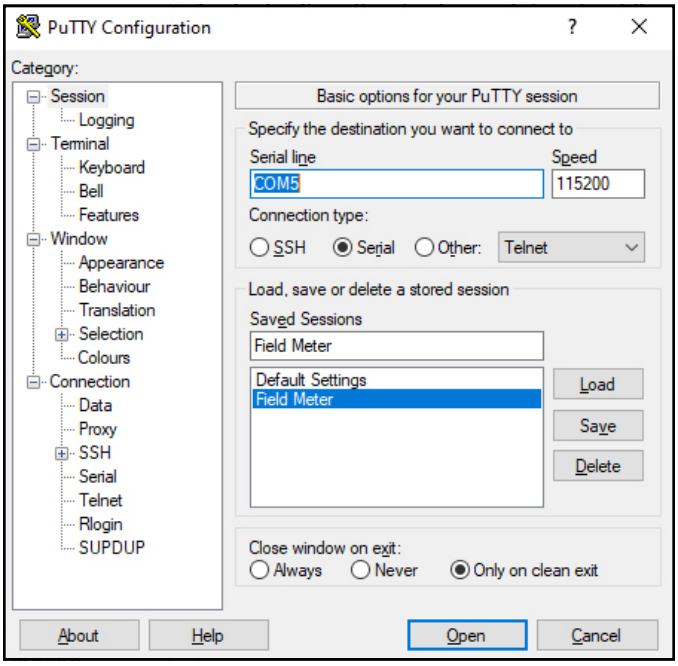

Figure 10. Session settings using PuTTY

For correct output visibility, click the Termainl settings and enable “Implicit CR in every LF”. Click the Open button to establish the connection.

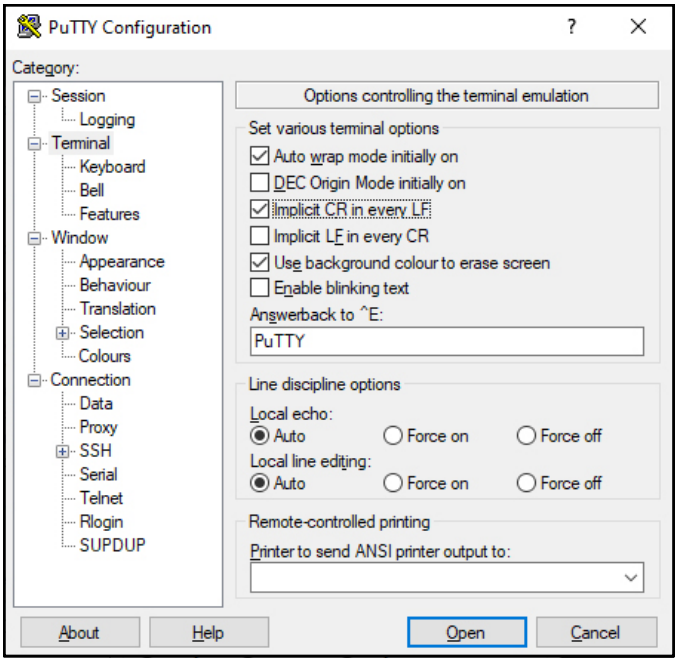

Figure 11. Terminal settings using PuTTY

Use the keyboard to type “m” into the terminal. The meter’s 10 values stored in memory will appear on the display. This text may then be copied and pasted into another document. Memory locations without measurements will appear as 0 V, 0 mm.

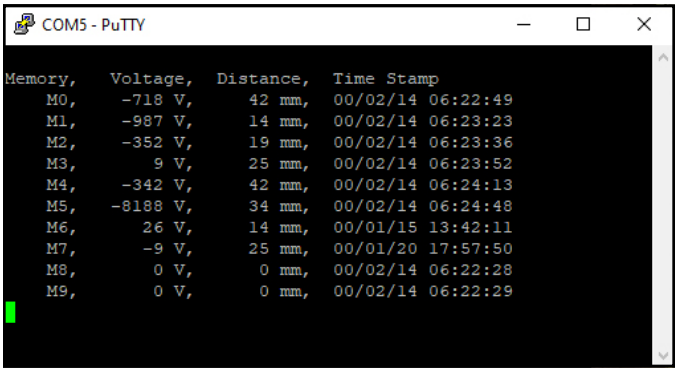

Figure 12. Downloading stored measurements

Air Ionizer Test Kit

The Air Ionizer Test Kit is designed to match the compact size of the Static Sensor. Use the following procedures to verify the offset voltage (balance) and discharge times of air ionization equipment. They will help determine if the ionizer is working within the manufacturer’s specifications or user requirements. It is 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.

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. Short press the ON/MEASURE button to configure the meter to Conductive Plate Mode. This mode is indicated when “CPM” is displayed on the bottom right corner.

Figure 13. Sliding the Conductive Plate onto the Static Sensor

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Performing Offset Voltage (Balance) Measurements
While grounded, hold the Static Sensor so the ionized airflow touches the top of the Conductive Plate at the appropriate distance from the device under test. The Static Sensor will display the offset voltage (balance).

Figure 14. Measuring the offset voltage (balance) of an ionizer with the Air Ionizer Test Kit

Performing Discharge Time Measurements
Use the Charger to apply both positive and negative charges onto the Conductive Plate, so discharge time measurements can be performed. Follow the procedures listed below. The operator and Static Sensor must be properly grounded for the Charger to work properly.

Positive Discharge Time Measurements
Position the Static Sensor with Conductive Plate in the airflow of the ionizer. To provide a POSITIVE voltage output, touch the metal button located on the backside of the Charger, and rock the switch towards the + symbol at the same time. Momentarily touch the Charger's output terminal to the Conductive Plate attached to the Static Sensor. The Static Sensor will display a voltage greater than +1.00 kV. Use a stop watch to estimate the time needed for the voltages to decrease from +1.00 kV to +100 kV. This is considered the positive discharge time.

Figure 15. Using the Charger to apply a positive charge onto the Conductive Plate

Negative Discharge Time Measurements
Position the Static Sensor with Conductive Plate in the airflow of the ionizer. To provide a NEGATIVE voltage output, touch the metal button located on the backside of the Charger, and rock the switch towards the - symbol at the same time. Momentarily touch the Charger's output terminal to the Conductive Plate attached to the Static Sensor. The Static Sensor will display a voltage greater than -1.00 kV. Use a stop watch to estimate the time needed for the voltages to decrease from -1.00 kV to -100 kV. This is considered the negative discharge time.

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Maintenance

The Static Sensor is factory calibrated and no maintenance is required. Contact SCS Customer Service should the product 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.

Batteries

The Static Sensor operates using a lithium-ion battery. The battery can be recharged 300 to 500 times before noticeable performance degradation. The battery is accessible and replaceable if necessary. Battery life is more than 20 hours under normal use. The meter has a battery indicator. To recharge the battery, connect the meter to any standard USB-C charger or laptop via a USB-C cable.

The battery in the Charger should be replaced annually or when it is unable to provide approximately ±1100V. Always replace the batteries with a 9 V alkaline 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 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.

Calibration

Funcitionality of the Static Sensor may be verified using a calibrated Charge Plate Monitor (CPM). Utilizing the CPM controls, apply approximately 1,000 volts to the charge plate and position the static meter approximately 25 mm (1 inch) away from the plate. The meter should read the applied voltage ±5%. A significant difference in reading indicates that the Static Meter is out of calibration and it should be returned to SCS for repair and/or calibration.

Specifications

Static Sensor

Display	OLED display, 128 x 64
Ports	USB-C supports USB 2.0 and USB 3.1
Battery	Lithium-Ion 1080 Mah, 3.7 V, 3.99 Wh. UN 38.3 certified
Battery Life	Approximately 60 hours of continuous operation
Size	2.4" W x 4.2" L x 1.3" D (61 x 107 x 33 mm)
Weight	4 oz. (109 g) with battery
Operating Conditions	Operates at 0 to 50° C and 0 to 85% RH (non-condensing). Accuracy unaffected by air ionization.
Measurement Range	-40.0 kV to +40.0 kV
Distance Range	1 to 200 mm
Resolution	1 V for 0 to 999 V, 10 V for 1.00 kV to 9.99 kV, 100 V for 10.0 kV and above
Sample Rates	Distance Sensor: 5 Hz Voltage Sensor: 20 Hz
Accuracy	±5% (stand-alone) ±25% (with conductive plate)
Country of Origin	United States of America

Air Ionizer Test Kit

Conductive Plate Construction	Aluminum bracket, bare aluminum plate, 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 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
Country of Origin	United States of America

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

See the SCS Warranty - StaticControl.com/Limited-Warranty.aspx

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