

# Static Sensor Operation and Maintenance



Made in the  
United States of America



Figure 1. SCS 718 Static Sensor

## Description

The SCS Static Sensor indicates surface voltage and polarity on objects. The meter can measure ranges of 0 to  $\pm 1.999$  kV or 0 to  $\pm 19.99$  kV at a distance of 1 inch with an accuracy of  $\pm 5\%$  of the displayed value. The automatic zero button allows adjustment to zero with no screws or dials to turn. The hold button allows the user to “freeze” a displayed measurement for evaluation. A LED range finder helps the operator to place the Static Sensor at the correct distance from the surface being measured. The Static Sensor will automatically turn off after 20 minutes to conserve battery power (9V). The Static Sensor is calibrated with accepted procedures and standards traceable to the National Institute of Standards and Technology.

“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 and its accessories are available as the following item numbers:

Item	Description
<a href="#">718</a>	Static Sensor
<a href="#">770718</a>	Air Ionizer Test Kit
<a href="#">770719</a>	Conductive Plate and Charger
<a href="#">770009</a>	Air Ionizer Test Kit Carrying Case

## Packaging

- 1 Static Sensor
- 1 9V Alkaline Battery
- 1 Certificate of Calibration

## Features and Components

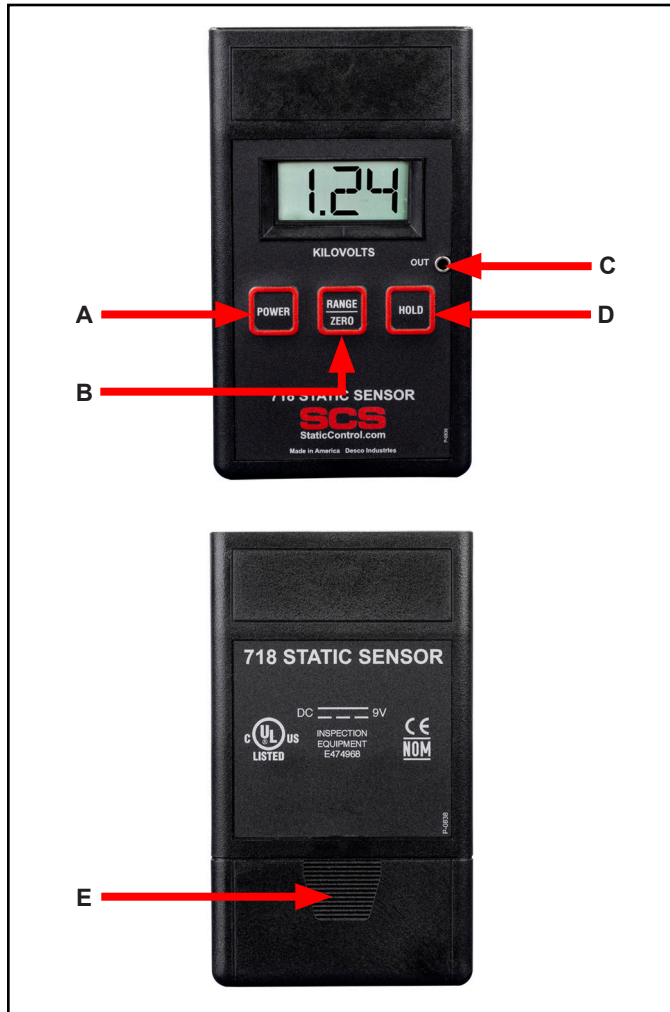


Figure 2. Static Sensor features and components

**A. POWER Button:** Press to turn the unit ON and OFF.

**B. RANGE / ZERO Button:** Press to select the measurement range. Press and hold to zero the Static Sensor.

**C. Analog Output Jack:** A low-voltage signal of the measured voltage is provided at this output. The voltage is 1/1000th ( $\pm 2$  kV range) or 1/10,000 ( $\pm 20$  kV range) of the measured voltage.

**D. HOLD Button:** Press to freeze the reading on the display. Press again to return to normal measurement operation.

**E. Battery Cover:** Slide the cover down to open the 9V battery compartment.

## Operation

**NOTE:** The Static Sensor is built in a conductive case. The instrument senses the difference in potential between the case (and the person holding the case / ground connection) and the surface under test. Ensure that the person using the instrument is wearing a wrist strap and grounded to achieve more accurate measurements.

### Low Battery Indicator

The battery should be replaced when “BAT” is indicated on the display. Always replace the battery with a 9V alkaline or equivalent battery in order to remain CE compliant.

### Zeroing the Static Sensor

Turn the Static Sensor on by pressing the POWER button. Press the RANGE / ZERO button to set the Static Sensor to the 2 kV (3 decimal places) range. Point the top of the Static Sensor approximately 1 inch away from a grounded metal surface. Use the red LED range guide. The Static Sensor is properly positioned when the projected red bullseyes are centered on top of each other. Press and hold the RANGE / ZERO button until the Static Sensor displays “.000”.

### Performing a Measurement

Place the Static Sensor 1 inch from the object to be measured. This distance is measured from the front edge of the Static Sensor case to the surface of the object. The Static Sensor now displays a reading (from 0 to  $\pm .200$  or  $\pm 2.00$ ) of the electrostatic field in kilovolts per inch.

**NOTE:** The red ranging lights are provided to help place the Static Sensor at the correct distance from the object. The lights are set to produce a concentric red bullseye pattern on a flat opaque surface 1 inch from the front edge of the Static Sensor. This can be practiced by aiming the Static Sensor at a sheet of white paper.

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.



Figure 3. Reading the Static Sensor while in the  $\pm 20$  kV range

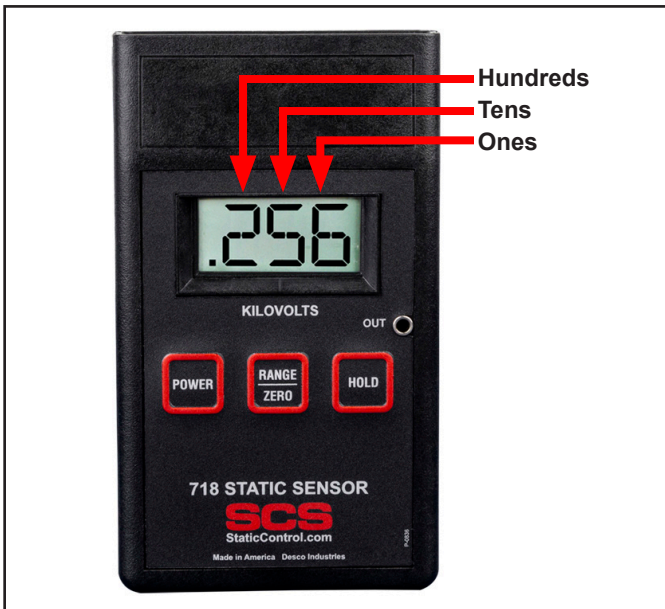


Figure 4. Reading the Static Sensor while in the  $\pm 2$  kV range

NOTE: This aspect ratio should be at least 3 for best accuracy, i.e. 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 from the object being measured, press the HOLD button. This will freeze the reading from the object on the display and the analog output signal. This feature allows the operator to move the Static Sensor where it may be more easily read or saved for later reference.

NOTE: The red ranging lights will be off while the Static Sensor is in HOLD mode. It is advised to do this between measurements to prolong battery life.

### Analog Output

The analog output jack labeled “OUT” on the face of the Static Sensor accepts a standard 2.5 mm monaural phone plug and is provided so the output of the Static Sensor may be connected to an oscilloscope, strip chart recorder, external meter or other device. The voltage at this output is 1/1000th ( $\pm 2$  kV range) or 1/10,000 ( $\pm 20$  kV range) of the measured voltage. Contact Customer Service for more information.

### Maintenance

The Static Sensor is factory calibrated and no maintenance is required. If for any reason you believe the Static Sensor is not working correctly, please contact [SCS Customer Service](http://StaticControl.com). CAUTION - There are no user serviceable parts. 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 operates from a standard 9 VDC alkaline battery. Battery life is in excess of 50 hours under normal use. When the battery voltage drops below 6.5 V, “BAT” will appear on the display. To change the battery, slide the battery cover down at the back of the Static Sensor and remove the battery from the battery clip. Replace the battery with a fresh one and reinstall the battery cover. The battery should be removed from the Static Sensor if it is to be stored for an extended period of time.

The battery in the Charger should be replaced annually or when it is unable to provide approximately  $\pm 1100$ V.

### Cleaning

It is important to keep the insulators on the adapter plate clean and free of contaminants that may cause surface leakage. To test the performance of the adapter plate, charge the plate and note the discharge rate in a nonionized area. The self discharge rate to 10% of original voltage should not be less than five minutes.

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

## Calibration

Frequency of recalibration should be based on the critical nature of those ESD sensitive items handled and the risk of failure for the ESD protective equipment and materials. In general, SCS recommends that calibration be performed annually.

### Equipment Needed

- 1 High Voltage Power Supply (10,000 V)
- 1 Voltmeter (with > 50 kilohms input impedance)
- 1 Cable with a 2.5 mm mono plug and secondary connector to interface with voltmeter.

### Test Fixture

- 1 Metal Plate with 5 in<sup>2</sup> area or greater
- 1 Metal Stand for supporting the Static Sensor and holding its top face 1 inch away from the metal plate
- 2 Connectors on the metal plate with which it can interface with the high voltage power supply
- 1 Connector on the metal stand with which it can be connected to electrical ground

### Procedure

1. Place the Static Sensor on the metal stand, and verify that its top face is placed exactly one inch away from the center of the metal plate.
2. Connect the stand to equipment ground.
3. Power the Static Sensor and set it to the low range.
4. Ground the metal plate, and zero the Static Sensor's display.
5. Disconnect the metal plate from equipment ground, and connect it to the high voltage power supply.
6. Apply a +1,000 V charge to the plate.
7. The Static Sensor should now display 1.000.
8. If the Static Sensor does not display 1.000, remove the battery door and use a screwdriver to turn the small trimpot located inside the battery compartment. Turn the trimpot until the display reads 1.000. This will calibrate the low range of the Static Sensor.
9. Repeat steps 6-8 for the high range on the Static Sensor and use a test voltage of 5,000 V.

## Specifications

### Performance

Measurement Range (switch selectable)

*Low Range* 0 to ±2kV / inch

*High Range* 0 to ±20 kV / inch

Measurement Accuracy

*Voltage Monitor Output* Better than ±5% of reading, 10mV

*Voltage Display* Better than ±5% of reading, ±2 counts

Measurement Stability ±10 counts

### Voltage Monitor

Output 2 volts output at full scale

Ratio

*Low Range* 1/1000 of the measured electrostatic field

*High Range* 1/10000 of the measured electrostatic field

### Front Panel Meter

Voltage Display 3-1/2 digit LED display

Range

*Low* 0 to ±1.999 kV / inch

*High* 0 to ±19.99 kV / inch

Display Resolution

*Low Range* 1 V / inch

*High Range* 10 V / inch

Sampling Rate 3 readings per second

### Features

Automatic Shutoff Unit will shut off after 20 minutes from last activity

Ranging System LED distance indicator; aligned targets indicate one (1) inch

Range / Zero Switch LED distance indicator. Resets the instrument to zero and selects the measurement range.

Low Battery Indicator An LCD display message 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

Voltage Monitor Connection 2.5 mm jack (3/32")  
monophone

Tip Signal

Sleeve Ground

## Operating Conditions

Temperature 50 to 86°F (10 to 30°C)

Relative Humidity To 80%, non-condensing

Altitude To 2000 m

Certifications UL, CE, RoHS3

## Power Requirements

Power One (1) 9-volt alkaline battery

Power Rating 45 mW

Operating Time Greater than 50 hours,  
with a new battery at 21°C  
continuous

Power Switch A membrane switch that  
is designed to prevent  
accidental turn on. Powers  
the instrument on and off.

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

See the SCS Warranty -

[StaticControl.com/Limited-Warranty.aspx](http://StaticControl.com/Limited-Warranty.aspx)

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