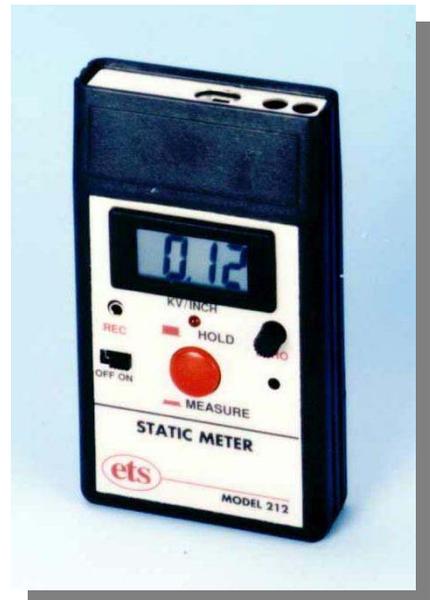


STATIC METERS

Models 211 & 212

SURVEYORSTAT

Models 211XL & 212XL



Operating Manual

5/09



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1.0 GENERAL DESCRIPTION

The Model 211 and 212 Static Meters, shown in Figures 1.0-1a and b, are accurate, compact electrostatic field meters used for locating and measuring static charge potentials. They are functionally the same except the Model 211 utilizes a 10-segment LED bar graph display that is best suited for those measurements where an easy-to-read indication of the static charge is desired. The Model 212 utilizes a 3½-digit LCD digital display that provides maximum measurement accuracy. Their small size makes them handy and easy to use.



a. Model 211



b. Model 212

Figure 1.0-1: Static Meters

The XL version shown in Figure 1.0-2 incorporates a separate sensor mounted on the end of an adjustable aluminum arm for taking measurements at hard to reach locations. The XL meter and sensor can be supplied without the extender arm for fixed remote mounting as an option.



Figure 1.0-2: Model 212 Suveyorstat

The Meters feature both **MEASURE** and **HOLD** modes that allow measurements to be made in locations that are difficult to reach or see. Ranging lights incorporated into the Models 211 and 212 assure accurate and repeatable measurements when measuring flat surfaces. A conductive case plus a separate ground snap provides grounding for accurate measurement.

An analog signal output provides an output corresponding to the meter display. An output cable with 2.5mm jack and flying leads is available from ETS. The chopper-stabilized sensor allows the instrument to make accurate measurements in areas using air ionization.

Optional Charged Plate Adapters are also available for both the Model 211 and 212.

2.0 SPECIFICATIONS

2.1 Model 211

Display	10-segment, multicolor, LED bargraph in analog meter arc format. Automatic polarity, "HOLD", and low battery ("BAT") indicators.
Range	0 to $\pm 1\text{kV}$ / 0- $\pm 10\text{kV}$ at a distance of 1 inch (25mm). Higher voltages may be measured at distances greater than 1 inch (Refer to Section 5, OPERATION).
Accuracy:	$\pm 10\%$
Controls:	ON/OFF slide switch. MEASURE/HOLD pushbutton (latching standard, momentary optional). ZERO knob.
Analog Output:	2.5mm subminiature jack. $\pm 10\text{mV}$ corresponds to $\pm 1\text{ kV}$
Power:	9 VDC alkaline battery. Battery life in excess of 30 hours.
Size:	2.4"W x 4.2"L x 1.3"D (61x107x33mm)
Weight:	5 oz. (14.2g) with battery
Environmental:	Operates at 0 - 50°C and 0 – 85% RH (non-condensing). Accuracy unaffected by air ionization.

2.2 Model 212

Display	LCD. 3½-digit, 0.375" digit height. Automatic polarity, "HOLD", and low battery, "BAT" indicators.
Range	0 to $\pm 19.99\text{ kV}$ at a distance of 1 inch (25mm). Higher voltages may be measured at distances greater than 1 inch (Refer to Section 5, OPERATION).
Accuracy:	$\pm 5\%$
Controls:	ON/OFF slide switch. MEASURE/HOLD pushbutton (latching standard, momentary optional). ZERO knob.
Analog Output:	2.5mm subminiature jack. $\pm 10\text{mV}$ corresponds to $\pm 1\text{ kV}$
Power:	9 VDC alkaline battery. Battery life in excess of 30 hours.
Size:	2.4"W x 4.2"L x 1.3"D (61x107x33mm)
Weight:	5 oz. (14.2g) with battery
Environmental:	Operates at 0 - 50°C and 0 – 85% RH (non-condensing). Accuracy unaffected by air ionization.

2.3 XL Versions

Refer to Sections 2.1 and 2.2 for the appropriate meter specifications.

Meter size	2.4"W x 4.2"L x 1.3"D (61x107x33mm)
Sensor size	2"Lx1"Wx1"H (51x25x25mm). Adjustment angle: 0- 90°
Mounting	¼-20 threaded insert, 6-32 tapped holes on side
Cable	Coiled cord, extends to 6' (1.8m)
Extender	Continuously adjustable from 22-36" (560-920mm)
Weight	1.33 lbs (605g)
Power	9V alkaline battery. Optional 9V universal power module available
Charged. Plate Adapter	Custom design available

NOTE: The chopper-stabilized sensor that is used in most static meters/locators is prone to shock. Extreme care must be taken in handling and transporting these instruments. Keep in supplied case when not in use.

3.0 CONTROLS

The Meters have two switches, one for **ON/OFF** and one for **MEASURE/HOLD** plus a **ZERO** adjust knob. The pushbutton is two-position. Pressing the button puts it into the lower (**MEASURE**) position. Releasing the button activates the **HOLD** function. The **ZERO** adjust knob is turned to the left or right to change the zero setting of the display.

2.1. Turning Meter ON and OFF

Slide the switch to the **ON** position. The Meter will turn on. To turn the Meter off, slide the switch to the **OFF** position. The Meter will now be off.

2.4 Battery Check

After turning on power to the Meter, check the display and make sure that the low battery symbol is NOT lit. If the battery symbol appears, replace the battery as described below before use.

2.5 Zeroing The Meter

Turn on the Meter with the **ON/OFF** slide switch. Press the pushbutton down so that it is in the lower or **MEASURE** position. Hold the Meter in one hand away from any static generation object or machine and cover the front of the Meter with the other hand. This essentially shields the sensor from external fields. If the display does not read "0.00", adjust the **ZERO** knob until the display reads "0.00". Once set, the zero should not have to be reset unless the control has moved.

Important: The Model 212 is housed in a conductive case that provides the ground reference for the measuring circuit. For accurate measurement it is necessary that the person holding the Meter is discharged by touching ground, or that the Meter is grounded using the supplied ground cord connected to the ground snap on the rear of the case.

4.0 MAKING A MEASUREMENT

4.1 Model 211/212 Static Meters

Hold the Meter 1 inch (25mm) from the object to be measured. This distance is measured from the front edge of the Meter case to the surface of the object. The Meter will display a reading (from 0-±1/10kV for the Model 211 or 0 to ±19.99kV for the Model 212) of the electrostatic field in kilovolts per inch.

NOTE: In the **MEASURE** position, the RANGING LIGHTS are on. These lights help place the Meter at the correct distance from the object. The lights are factory adjusted to produce a concentric ring RED BULLSEYE pattern on a flat opaque surface 1 inch (25mm) from the front edge of the Meter. This can be checked by aiming the Meter at a sheet of white paper.

If the numeral “1” appears on the left side of the Model 212 display, the Meter’s range of 20 kV per inch has been exceeded. When this occurs, move the Meter farther away from the object and multiply the reading by the distance away from the object being measured. For example If the Meter is 2” (51mm) from a surface with a 30kV charge the display will indicate 15kV. The measurement accuracy is dependent on a stable ground reference and the measuring distance plus the “aspect ratio” that relates the size of the object to be measured to the measurement distance.

NOTE: This aspect ratio should be at least 6:1 for best accuracy, i.e. the surface should be at least a 6” (152mm) square when measuring at a 1” (25mm) distance. Accurate measurements may be made at other measurement distances by scaling the meter range and observing the proper aspect ratio. For example, at a measurement distance of 3” (76mm), multiply the Model 212 meter 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 18” (457mm) square.

Measuring the charge on an object smaller than the recommended aspect ration will result in lower reading on the Meter.

4.1.2 HOLDING LAST READING

With the Meter positioned 1 inch (25mm) from the object being measured, press the **MEASURE/HOLD** pushbutton so that it releases to the upper or **HOLD** position. This will freeze the reading from the object on the display and allows the operator to move the Meter where it may be more easily read, or saved for later reference. In the **HOLD** position the red LED will light. The analog output signal is also held.

NOTE: In the **HOLD** position, the bullseye (ranging lights) will be off. When the pushbutton is returned to the **MEASURE** position, the bullseye will light.

4.2 XL Measurements

The Surveyorstat is designed specifically to measure static charges on moving webs or hard to reach locations.

CAUTION: When taking measurements around moving machinery extreme care must be taken to ensure the sensor probe does not interfere or get caught in the process. The sensor used in most static meters is very fragile and sensitive to mechanical shock. Dropping or hitting a hard object could damage to the sensor.

4.2.1 Moving Web

To make a measurement on a moving web, proceed as follows:

1. Determine the surface to be measured. **NOTE:** The measurement must performed be in free space (not backed by a metal surface).

2. Adjust the length of the extender arm by loosening the knurled ring, extend the arm to the desired length and then retighten the ring.
3. Adjust the angle of the sensor probe, using the lever on the pivot to loosen and tighten the assembly as shown in Figure 4.2-1. Place the sensor so that it is 1 inch (25mm) from the surface being measured and the arm is at some angle such as 30° from the surface. This will reduce the possibility of the Surveyorstat making contact with the web.



Figure 4.2-1: Surveyorstat Sensor assembly

4. If the meter reads over scale move it back to 2" (5.1 cm). The calibration will then be 40 kV full scale for the Model 212 Meter and 2/20 kV for the Model 211 Meter (double the reading on the meter scale). Moving the Meter back to 3" (7.6 cm) triples the reading etc.
5. With the **MEASURE/HOLD** button up (red LED off) take a measurement. Depress the button to **HOLD** the reading (red LED on). Remove the unit from the area and record the meter reading.

4.2.2 Other Measurements

To make a measurement on any other object, follow the normal guidelines for measuring static fields. The Surveyorstat just makes it easier to reach distant and hard to access places.

CAUTION: The sensor used in all chopper stabilized static meters are prone to shock. Exercise care when making measurements, handling or storing the Static Meters and Surveyorstat.

4.2.3 Separate Sensor Configuration

When configured with only the sensor probe and meter unit (without the extender arm) the same operating procedure described above is used.

The sensor probe has both a ¼-20 tapped hole where it attaches to the Surveyorstat pivot mechanism and a pair of 6-32 tapped holes on the side. Either configuration can be used to mount it at the appropriate distance from the surface being measured. If any spacing other than the calibrated 1" distance is used then the system should be calibrated to the prevailing installation. **The length of the threaded stud or screw must be no more than 1/8" (3mm).**

3.0 MAINTENANCE

The Meters are factory calibrated and no maintenance is required. If for any reason the Meter is not working correctly, contact ETS at 215-887-2196 ext. 220 for assistance. **NOTE:** There are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

3.1 BATTERY REPLACEMENT

The Model 212 operates from a standard 9 VDC alkaline battery. Battery life is in excess of 30 hours under normal use. When the battery voltage drops below 6.7 volts, a battery symbol will appear in the display. To change the battery, slide the battery cover down at the back of the Meter 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 Meter if it is to be stored for an extended period of time.

3.2 Field Calibration

The calibration of the Static Meters can be checked using the set up shown in Figure 3.2-1. A calibrated high voltage power supply such as the ETS Model 208B-1 (1 kV min), and a minimum 6x6" (152x152mm) metal plate are required. A 12x12" (305x305mm) is preferred.)

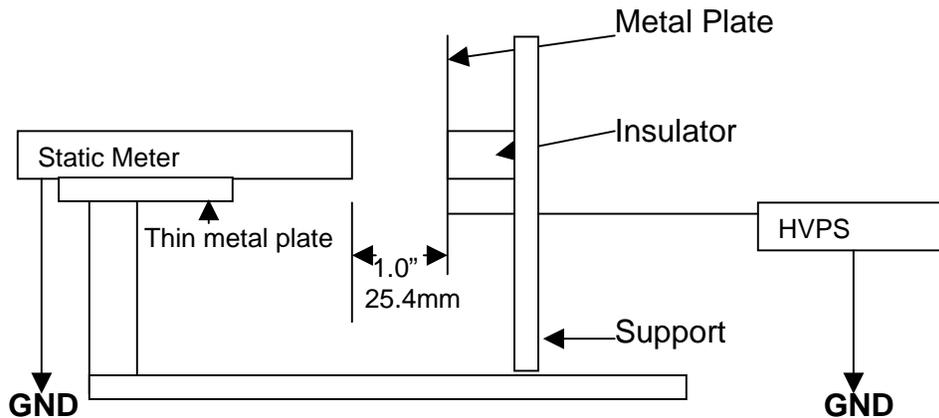


Figure 3.2-1: Field calibration set up

Place the Static Meter on the support and locate it exactly 1" (25.4mm) from the metal plate. Turn on the Static Meter and adjust the ZERO if necessary. Turn on the calibrated power supply. The Meter should read the applied voltage $\pm 5\%$ for the Model 212. For the Model 211, the correct indicator should light. Small adjustments of the Meter distance from the plate will change the reading.

A significant difference in readings indicates the Static Meter is out of calibration and it should be returned to ETS for repair and/or recalibration.

4.0 Model 205C and 205C-x10 Charged Plate Detectors

These charged plate detectors attach to the front of the Model 211 and 212 Static Meter. The standard Model 205C along with the optional 6"x6" Detector Plate and shown in Figure 4.0-1a **increases the sensitivity** of the measurement system by a factor of 10 and is designed for low voltage measurements up to 2kV. Resolution is 1V. The Model 205C-x10 shown in Figure 4.0-1b **decreases the sensitivity** of the measurement system by a factor of 10. It is designed for high voltage measurements up to 20 kV. Resolution is 100V.

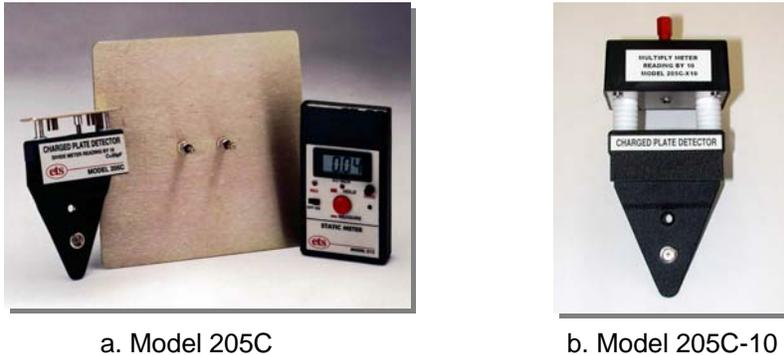


Figure 4.0-1: Charged Plate Adapters

5.0 WARRANTY

Electro-Tech Systems, Inc. warrants its equipment, accessories and parts of its manufacture to be and remain free from defects in material and workmanship for a period of one (1) year from date of invoice. ETS will, at its discretion, either replace or repair without charge, F.O.B. Glenside, similar equipment or a similar part to replace any equipment or part of its manufacture that, within the above stated time, is proved to have been defective at the time it was sold. All equipment claimed defective must be returned properly identified to the Seller (or presented to one of its agents for inspection). This warranty only applies to equipment operated in accordance with Seller's operating instructions.

Seller's warranty with respect to those parts of the equipment that are purchased from other manufacturers shall be subject only to that manufacturer's warranty.

The Seller's liability hereunder is expressly limited to repairing or replacing any parts of the equipment manufactured by the manufacturer and found to have been defective. The Seller shall not be liable for damage resulting or claimed to result from any cause whatsoever.

This warranty becomes null and void should the equipment, or any part thereof, be abused or modified by the customer or if used in any application other than that for which it was intended. This warranty to replace or repair is the only warranty, either expressed, or implied or provided by law. It is in lieu of all other warranties. The Seller denies any other promise, guarantee, or warranty with respect to the equipment or accessories. In particular, as to its or their suitability for the purposes of the buyer or its or their performance, either quantitatively or qualitatively or as to the products which it may produce and the buyer is expected to expressly waive rights to any warranty other than that stated herein.

ETS must be notified before any equipment is returned for repair. ETS will issue an RMA (Return Material Authorization) number for return of equipment.

Equipment should be shipped prepaid and insured in adequate packaging. The RMA number, description of the problem along with the contact name and telephone number must be included in formal paperwork and enclosed with the instrument. Round trip freight and related charges are the owner's responsibility.