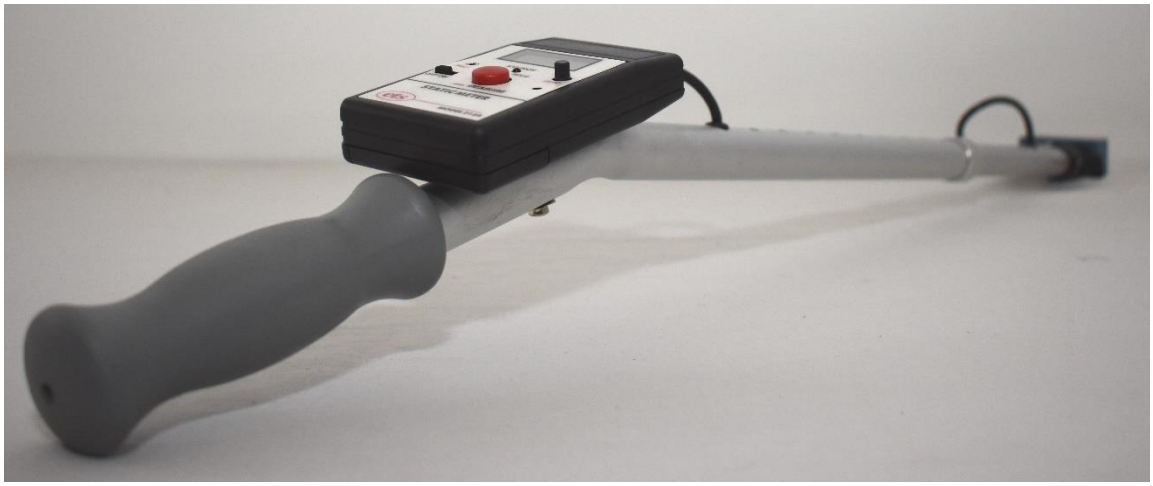
electro-tech systems



ETS STATIC METER - Model 212

SURVEYORSTAT - Model 212XL

Operating Manual

Contents

Revision History

Legacy version	2009-05-01
Revision A	Initial Release 2018-11-28
Revision B	Format & Address change 2020-11-05
Revision C	Add battery instructions 2021-02-17

Already with the new address.

Products described in this manual are designed and assembled in the U.S.A. by

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I. Important Safety Information

SAFETY INSTRUCTIONS

The equipment described in this Manual is designed and manufactured to operate within defined design limits. Any misuse may result in electric shock or fire. To prevent the equipment from being damaged, the following rules should be observed for installation, use and maintenance. **Read the following safety instructions before operating the instrument.**

POWER

POWER CORD: Use only the power cord specified for this equipment and certified for the country of use. If the power (mains) plug is replaced, follow the wiring connections specified for the country of use. When installing or removing the power plug, **hold the plug, not the cord.**

The power cord provided is equipped with a **3-prong grounded plug (a plug with a third grounding pin).** This is both a safety feature to avoid electrical shock and a requirement for correct equipment operation. If the outlet to be used does not accommodate the 3-prong plug, either change the outlet or use a grounding adapter.

FUSES: Replace fuses only with those having the required current rating, voltage and specified type such as normal blow, time delay, etc. **DO NOT** use makeshift fuses or short the fuse holder. This could cause a shock or fire hazard or severely damage the instrument.

OPERATION

CAUTION

DO NOT TOUCH OR COME IN CONTACT WITH THE EQUIPMENT WHILE IN USE. Voltages used in the equipment may cause serious discomfort, injury, or death. ESD testing, by definition, involves hazardous voltage and unenclosed wiring. Power down and discharge all circuitry before contact.

DO NOT OPERATE WITH COVERS OR PANELS REMOVED. Readings may be affected, and internal circuitry may be subjected to moisture or contamination.

DO NOT OPERATE WITH SUSPECTED EQUIPMENT FAILURES. If any odor or smoke becomes apparent turn off the equipment immediately. Failure to do so may result in permanent damage to the equipment. Contact the factory for further instructions.

DO NOT OPERATE IN THE PRESENCE OF A PACEMAKER OR OTHER MEDICAL OR LIFE-SUSTAINING ELECTRONICS. The 212 will not produce an electrical discharge, however it is used to measured HV devices, and accidental zaps may cause malfunction of nearby electronic circuits.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE: The 212 will not produce an electrical discharge, however it is used to measured HV devices, and accidental zaps in the presence of flammable gases or fumes **constitutes a definite safety hazard**.

DO NOT USE IN ANY MANNER NOT SPECIFIED OR APPROVED BY THE MANUFACTURER: Unapproved use may result in damage to the equipment or present an electrical shock or fire hazard.

II. Description of Components

Included:

Item	***Qty.***	***Description***
212XL or 212	1	Static meter (212XL includes separate sensor and extension arm)
Cable	1	Black 10’ coiled cord with clip
Battery	1	(Installed)
Case	1	(212 only – Black vinyl case)

III. Set-Up Guide

Inspection and Power Up.

- Tools Needed: None
- Make sure all power is OFF.

Step 1 – Inspect Equipment

For the 212XL, be sure all cables are securely fastened..

Step 2 – Power ON

Slide the power switch to the ON position and verify activity on the display.

Step 3 – Battery check

With power ON, check the display. Battery low is indicated by all 4 of the decimal points illuminated. If Battery Low is indicated, replace the battery before use.

Step 4 – Zero Adjust

With the Meter ON, press the pushbutton down so that it clicks 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.

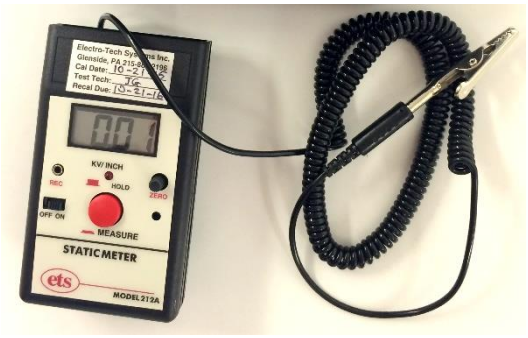
NOTE: The chopper-stabilized sensor that is used in these meters is prone to shock. Extreme care must be taken in handling and transporting these instruments. Keep in supplied case when not in use.

IV. Quick Start Guide

□ Tools Needed: None

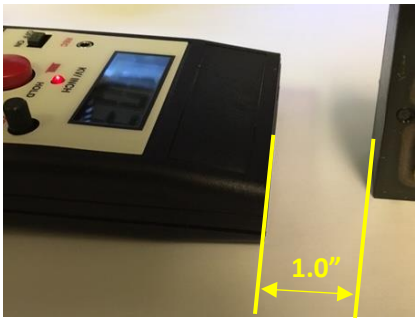
Step 1 – Turn on Power

Turn on Power. Take note of display showing 0.00 and no battery low indication.



Step 2 – Ground the 212.

Attach the Ground Cable to the snap on the back of the case. Connect the other end to a known ground. If holding the 212 in your bare hand, discharge by touching ground.



Step 3 – Set 1 inch distance

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 of the electrostatic field in kilovolts per inch, from -19.99kV to +19.99kV.

Step 4 – LED Distance assist.

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.

Step 5 – HOLD last reading

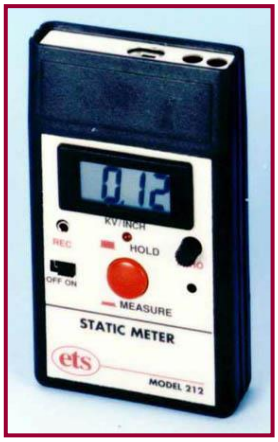
With the Meter positioned 1 inch from the object being measured, press the **MEASURE/HOLD** pushbutton so that it releases to the upper or **HOLD** position. This will freeze the reading and allows the operator to move the Meter where it may be more easily read, or saved for later reference. In the **HOLD**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

V. Operating Instructions

The 212 Product Family

The Model 212 and 212XL Static Meters are accurate, compact electrostatic field meters used for locating and measuring static charge potentials.

The Model 212 is a handy, compact handheld unit which utilizes a 3½-digit LCD digital display readout. Ranging lights assure accurate and repeatable measurements when measuring flat surfaces. A conductive case plus a separate ground snap provides grounding for accurate measurement.



Model 212 Static Meter

The XL version features the 212 control unit and incorporates a separate sensor mounted on the end of an adjustable aluminum arm for taking measurements at hard to reach locations.

Model 212XL Static Meter

The Meters feature **MEASURE** and **HOLD** modes that allow measurements to be made in locations that are difficult to reach or see.

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 the Model 212. See Appendix A.

MAKING A MEASUREMENT

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 of the electrostatic field in kilovolts per inch from minus 19.99kV to plus 19.99kV.

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. This aspect ratio should be at least 4:1 for best accuracy, i.e. the surface should be at least a 4” (102mm) 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. Observing the aspect ratio guideline above, the object being measured at this distance should be at least 12” (305mm) square. Measuring the charge on an object smaller than the recommended aspect ration will result in lower reading on the Meter.

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.

MEASUREMENTS USING THE 212XL

The 212XL 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 these meters is very fragile and sensitive to mechanical shock. Dropping or hitting a hard object could damage to the sensor.

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.

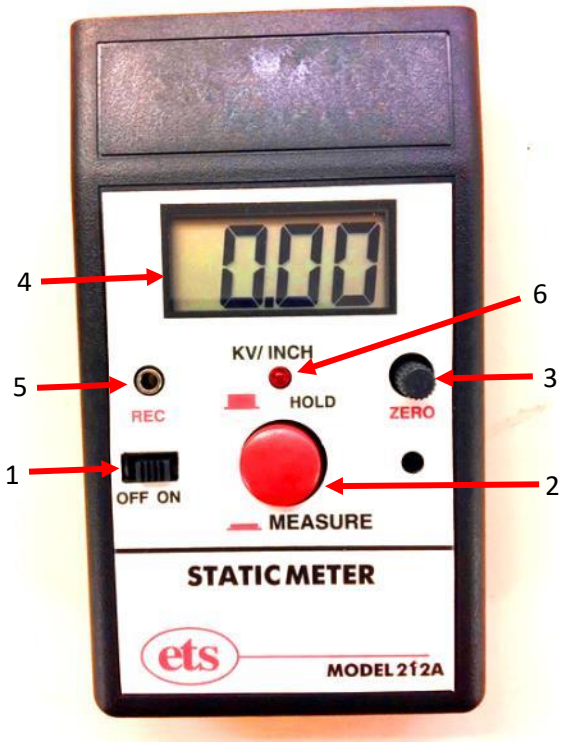
3. Adjust the angle of the sensor probe, using the lever on the pivot to loosen and tighten the assembly as shown below. Place the sensor so that it is 1 inch (25mm) from the surface being measured and the arm is at some angle such as 30° from the surface. This will reduce the possibly of the Surveyorstat making contact with the web.

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 (double the reading on the meter scale). Moving the Meter back to 3” (7.6 cm) triples the scale factor, 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.

Front Panel Description and function



Device	Description	Functionality
1	ON-OFF Switch	This switch disconnects the battery.
2	MEASURE Button	This is a “click-ON/click OFF” type of pushbutton
3	ZERO adjustment	Rotary knob used for fine adjustment of the 0.00 level.
4	Display	3-1/2 digit LCD digital display.
5	REC connector	2.5mm phone jack for analog recorder output.
6	Red LED	HOLD indicator

SPECIFICATIONS

Model 212

Display	**LCD. 3½-digit numeric display, 0.375" digit height.** Displays measured voltage in kV when measurement distance is 1".
Range	**-19.99 kV to +19.99 kV at a distance of 1 inch (25mm)**. Higher voltages may be measured at distances greater than 1 inch
Accuracy:	±5%
Controls:	ON/OFF slide switch. MEASURE/HOLD pushbutton (latching push-ON/push-OFF). ZERO adjustment knob.
Analog Output:	2.5mm subminiature jack. Scaling is 100mV per kV. Full scale is -2V to +2V.
Power:	9 VDC alkaline battery. Battery life in excess of 30 hours. Reversal protected.
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.

Model 212XL

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Display	**LCD. 3½-digit numeric display, 0.375" digit height.** Displays measured voltage in kV when measurement distance is 1".
Range	**-19.99 kV to +19.99 kV at a distance of 1 inch (25mm).** Higher voltages may be measured at distances greater than 1 inch
Accuracy:	±5%
Controls:	ON/OFF slide switch. MEASURE/HOLD pushbutton (latching push-ON/push-OFF). ZERO adjustment knob.
Analog Output:	2.5mm subminiature jack. Scaling is 100mV per kV. Full scale is -2V to +2V.
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)
Power	9VDC alkaline battery.
Size:	2.4"W x 4.2"L x 1.3"D (61x107x33mm) meter, 22-36" (560-920mm) extender.
Weight	1.33 lbs (605g)
Charged. Plate Adapter	Available

VI. Calibration and Maintenance

CALIBRATION is not required**.** The Meters are factory calibrated.

MAINTENANCE

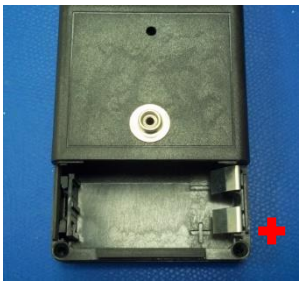
No routine maintenance is required. If for any reason the Meter is not working correctly, contact ETS at 215-887-2196 ext. 220 for assistance. **NOTE:** There are no user serviceable parts. Any unauthorized service will void the warranty and result in additional repair charges.

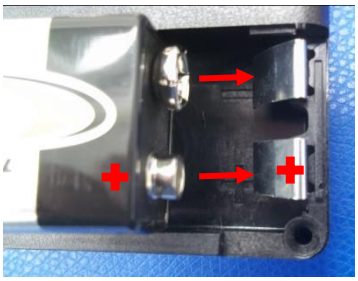
To return equipment to ETS for repair it is first necessary to obtain an RMA number, please call 215-887-2196 or email service@ets2.com

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, the 212 will indicate low battery by illuminating all of the decimal points on the display.

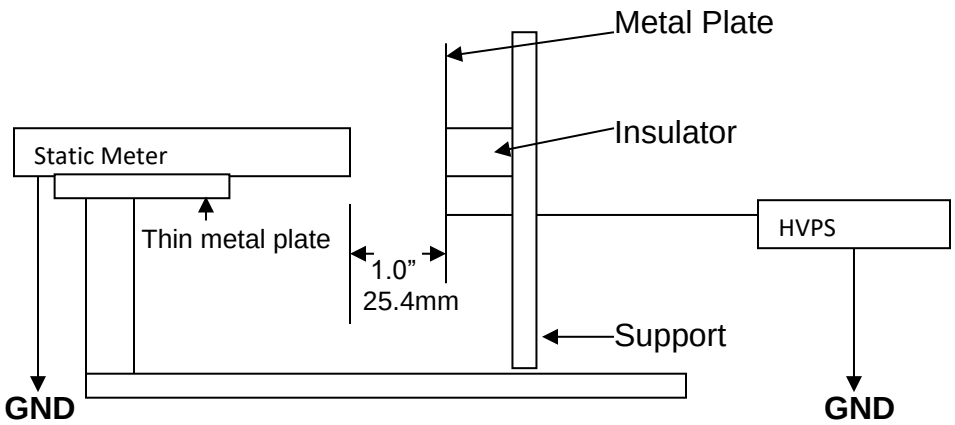
To change the battery, slide the battery cover down at the back of the Meter and remove the battery from the battery clip. Replace the battery with a fresh one, observing the position of the "+" terminal, and reinstall the battery cover. The battery should be removed from the Meter if it is to be stored for an extended period of time.





FIELD CALIBRATION

The calibration of the Static Meters can be checked using the set up shown below. 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.)



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 ±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.

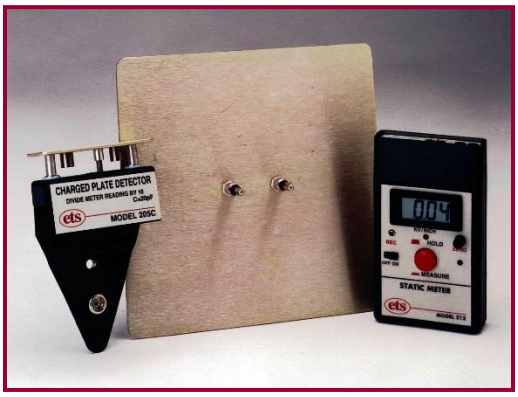
VII. Warranty

Limited Warranties. Seller warrants that all goods manufactured and delivered hereunder shall (a) conform to any samples, drawings, specifications or other written documents provided to Seller by Buyer, or approved by Buyer to Seller and (b) be free from all defects in workmanship and material. Buyer’s sole remedy against Seller for breach of either of the specifically mentioned warranty shall be the repair or replacement, at Seller’s sole option, of the defective workmanship or material. Seller expressly disclaims all other warranties, express and/or implied, including but not limited to those of merchantability and fitness for a particular purpose. In no event shall Seller be liable, under either warranty or otherwise, to Buyer in excess of the purchase price of the products paid to Seller by Buyer. In no event shall Seller be liable for any loss or damage arising directly or indirectly from the use of the product or for consequential or incidental damages. Seller’s specified warranties will expire and lapse (i) for renewable items (such as gloves, iris ports and desiccants), sixty (60) days from date of shipment and (ii) for all standard equipment and otherwise nonrenewable items, one year from date of shipment.

APPENDIX A – Probes and Detectors

Model 205C, 205C-x1 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 is shown in below **increases the sensitivity** of the measurement system by a factor of 10 and is designed for low voltage measurements up to 2kV with a resolution of 1V. The Model 205C-x1 offers a **direct 1:1** conversion and is useable for measurements up to10kV with 10V resolution. The Model 205C-x10 **decreases the sensitivity** of the measurement system by a factor of 10. It is designed for high voltage measurements up to 20 kV with a resolution of 100V.



Model 205C

Model 205C-x1

Model 205C-x10