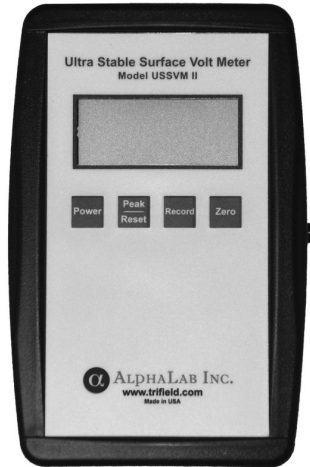# AlphaLab Inc.

## Ultra Stable Surface DC Voltmeter Model USSVM2 Instructions

Overview:
The Ultra Stable Surface Voltmeter 2, utilizes a sensor shutter/switcher technology which provides long term stability without drift or the need to frequently re-zero the meter. This technology also eliminated false or offset readings due to charged air molecules/ air ions. The sensor has a 29 inch detachable cable which can be extended by an additional six feet.

The meter measures the magnitude and polarity of static charge on objects or surfaces. The sensor is calibrated for measuring a surface at 1" from the sensor. On a metallic or conductive surface, the meter measures the voltage on the surface. (As with any electrostatic voltmeter, the displayed reading depends somewhat on the size of the object being measured and the distance between the object and the sensor.) On insulating surfaces, "voltage" is not a well-defined number. In this case, the meter reads a number proportional to the static charge present. The SVM2 has high sensitivity (resolution), and can detect even a 1/10 volt change anywhere within its full range of +19,999.9 to -19,999.9 volts.

An analog output jack provides a DC output voltage of +/- 0 to 2 volts which proportionally corresponds to the display and measurement of 0 to 20K volts.

An optional USB port allows reading to be recorded and uploaded to a PC. Real-time data streaming is also supported via the USB Port. Note the "Record" has no function without the USB option installed.
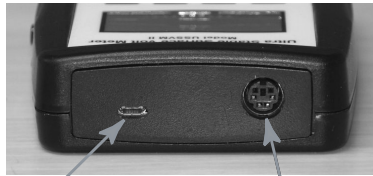
Optional USB Port   Probe Connector
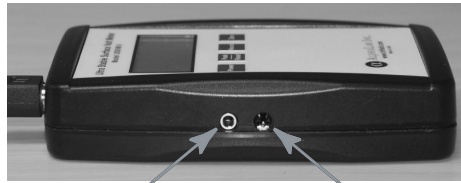
Analog Output   Power Adapter Jack

Meter Ground Wire

Measuring Surface Voltages: To use, first ground the meter with the 10 foot ground cable (supplied). This defines the "zero" voltage. With the black cap installed on the probe, press the "Zero" pad. Remove the cap and hold the end of the probe at a distance of one inch from the surface being measured. At 1", the display shows voltage (+/-2%) of a conductive surface. At 2" it is approximately 60% as sensitive (that is, a reading of 1500 means the voltage is actually 2500 volts). These are correct numbers if the conductor is wide; that is, if it covers most of the "horizon" as seen by the probe. The above numbers are also correct if the surface is an insulator that is coated onto a (large) metal surface (that is, the insulator has a "ground plane". However, if the surface is a bare insulator (without a ground plane or metal backing) that is charged, then the insulator will emit an electric field (but will not have a well-defined voltage). The electric field will be approximately the same at all distances from the charged sheet, and will not be 60% at 2", etc. The electric field in volts per meter is approximately 30 times the reading on the display. For example if the display reads 1000.0, the electric field is 30 KV/m. This is correct if the sheet covers a majority of the "horizon" and if the sheet has a uniform amount of charge per area. If less than the full "horizon" is covered, the display will read a lower number. (This also works when measuring the atmospheric electric field; point the sensor upward. Remember that nearby conductive objects that are above the horizon will reduce the unobstructed electric field).

SPECIFICATIONS	
Range at 1":	0 to +/- 19,999.9 V
Resolution at 1":	0.1 Volt
Accuracy:	+/- 2% of the reading
Outputs:	1. Analog Output 2. USB (Optional)
Environmental:	-1 C to 43 C (30°F to 110°F), 0-90% RH non-condensing
Meter Size:	4.5 X 3 X 1.2 inches; 115 X 72 X 30 mm
Probe Size:	1.2 diameter x 2.5 inches; 31 x 63.5 mm
Probe Cable Length:	29 inches; 74 cm (detachable 6 pin mini din connector)
Weight:	5.5 oz
Power:	1. Battery 9 Volt Alkaline ~6 hour life (included) 2. External 9VDC Power adapter (included) 3. USB port (optional). When connected to a PC/Laptop power comes from the PC

Optional accessories include a detachable rubber boot with a folding stand, a six foot probe extension cable and a protective case.

Operation:

Normal Power Up Mode

On power up, 0.0 will be displayed until the rotating shutter in the probe reaches its proper rotation speed, which typically takes no more than four seconds. If "Probe Error" is displayed, verify that the probe is plugged in and that nothing is obstructing the shutter's rotation.

To power off the meter, hold down the "Power" pad for one second.

Zeroing the Meter

Depressing the "Zero" pad will zero the meter. Typically this will be done with the black (conductive) cap installed on the probe. If the meter detects a large residual voltage the meter will alternately display the words "CAP, PROBE, PRESS, ZERO". This provides a reminder to make sure that the cap is in place. There are applications when it would be advantageous to zero the meter with the cap off, such as when you wish to subtract out a background level in a test setup. Even though the cap reminder message is displaying, depressing zero a second time will zero the meter and remove any residual/ background voltage.

Measuring a Surface Voltage

Surface voltages of +/-19999.9 volts can be measured with an accuracy of +/-2%. The measured voltage will be with respect to the meters ground connection which would usually be connected to earth ground. When holding the probe, if the meter is not grounded the displayed values will be with respect to the operators body.
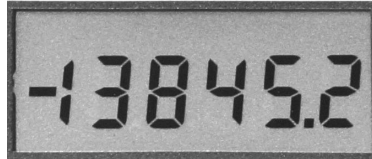
Calibrated Distance

The meter is factory calibrated for a distance of 1" (25.4mm) between the end of the probe and the surface being measured. Measurements can be made at other distances. On conductive surfaces, the reading is approximately inversely proportional to the distance if at <1". However, at >1" the reading falls off more slowly.
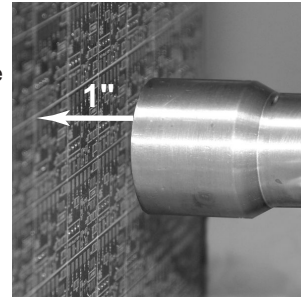
Three Power Options

The meter may be powered from an internal 9V battery, the USB port or with an external wall adapter. Battery operation with an Alkaline battery is typically 6 hours of continuous use. The LOBAT" indicates a remaining battery life of approximately 30 minutes. The meter may be operated with a 9 or 12VDC 100mA regulated or unregulated power adapter with a 2.1mm barrel plug, (positive center). Whenever the meter is plugged into a USB port, the meter's power is derived from the PC/Laptop.

Peak Hold

Depressing the "Peak Hold" pad places the meter in the peak hold mode. In this mode the display shows the highest positive or negative value measured by the meter since the last time the peak hold was reset. While in this mode, momentarily depressing the "Peak Hold" pad resets the peak value. Holding the "Peak Hold" pad down for one second turns off the peak hold mode. When peak hold mode is off the meter continues to capture the highest positive or negative value measured, which will be shown when peak hold mode is activated.

Record / USB Option

The "Record" pad only functions if the meter has the USB option.
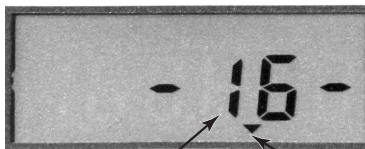
Record or Set #   Arrow above the "Record" pad indicates a recording function.

When in the record stream mode, the arrow indicates that the recording is active.

With the USB option, measurements may be recorded for later upload to a PC/Laptop. When the "Record" pad is depressed, the current displayed measurement is saved into non-volatile memory. A record number will then be displayed for three seconds. Up to 9,999 records or record sets may be saved. The software application "AlphaApp" provides the user with the ability to retrieve recorded data and delete saved data. The "AlphaApp" application also allows the option of configuring the meter to record a stream of measurements at a specified interval. When configured to record a stream of measurements, depressing the "Record" pad turns on the record function (as indicated by the arrow symbol above the "Record" pad); measurements are continually saved at the configured interval until the "Record" pad is depressed a second time, at which time the recorded set number will be momentarily displayed. When attached to a PC/Laptop, the "AlphaApp" application also allows for the real-time streaming of the meters measurements. The software application "AlphaApp" may be downloaded at: http://www.trifield.com/content/alpha-app/