

ELECTROSTATIC VOLTMETER SOLUTIONS



CONTROL WITHOUT COMPROMISE



When you can't touch the surface you're measuring, no one can touch TREK electrostatic voltmeters for accuracy.

The whole idea behind an electrostatic voltmeter is voltage measurement without charge transfer or measured source loading. For instance, being able to accurately measure the surface potential (voltage) on any kind of material surface, without physical contact and therefore no charge transfer or loading of the material/surface, is required in many applications.

In these sensitive applications, it's not possible to make accurate voltage measurements using conventional contacting voltmeters because they require charge transfer to the voltmeter, which causes loading and modification of the source voltage. For example, when measuring the voltage distribution on a dielectric surface, any measurement technique that requires charge transfer, no matter how small, will modify or destroy the actual data.

But, unlike conventional designs, TREK electrostatic voltmeter probes can be placed extremely close to, but separated from, the surface being measured. Driving the potential of the probe body to the same potential as the measured unknown achieves a high-accuracy measurement virtually insensitive to variations in probe-to-surface distances, while preventing arc-over between the probe and measured surface, virtually eliminating any capacitive loading effects on the probe.

Patented TREK technology makes us the only choice for accurate, noncontacting surface potential measurements.

Because TREK Electrostatic Voltmeters deliver DC-stable

voltage measurement without having to touch the test surface, it's possible to measure any surface, even moving surfaces, with no charge transfer from the surface. This translates to no modification of the measured voltage.

Patented TREK technology delivers measurement accuracy over a wide range of probe-to-surface distances.

The patented design of TREK probes delivers a large signal output that reduces noise and instability. Because the sensing electrode is located on a vibrating reed, the electrode is in motion in the aperture, close to the surface for the maximum possible sensitivity.

Patented TREK technology provides DC stability and high accuracy where probe-to-surface spacing can change.

TREK's field-nulling technique for noncontacting measurements enables you to measure both stationary and moving surfaces with total accuracy without having to establish a fixed spacing. This also minimizes potential problems with arcing between the probe and test surface, even at very tight spacing, virtually eliminating any capacitive loading effects.

Patented TREK technology makes us the only choice for accuracy in high-contamination, high-humidity situations.

TREK's patented probe design, eliminates the need for close-tolerance components. So noise and drift performance are significantly improved, even in the presence of contaminating particulates, high humidity and wide temperature ranges.



Whether you're doing electrophotographic process research and development, photoreceptor light decay measurement, contact potential measurements, material evaluation, LCD production process charge accumulation monitoring, surface potential monitoring in electrostatic painting, electrostatic potential measurement on moving objects or surfaces, clean room charge accumulation monitoring, radiation effect studies or general research, you can settle for nothing less than total accuracy. Which is why you should settle for nothing less than TREK. We're a recognized leader in both EOS/ESD and high-voltage solutions, certified to ISO 9001:2000 international quality assurance system standards, with an unsurpassed reputation for product innovation and engineering excellence.



All of which makes TREK your best resource to meet all your most demanding electrostatic measurement needs.

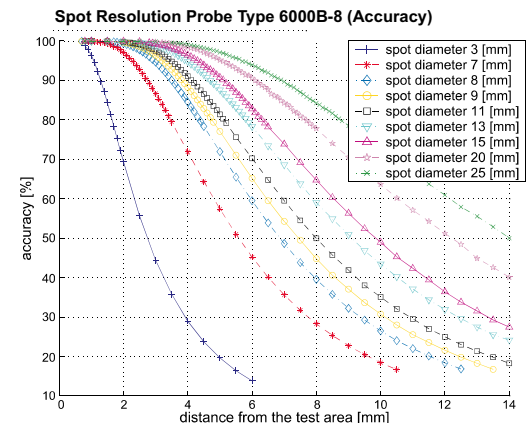
TREK probes work like no other because they're designed like no other.

The patented design of TREK probes provides the largest possible signal strength to reduce noise and drift, and to maintain performance at wide probe-to-surface distances. In TREK probes, the electrode is located on a vibrating reed. This places the electrode in motion, in the aperture, close to the surface for maximum possible signal strength.

The benefits of TREK probe technology are clear to see:

- Exclusive, patented, low-impedance design significantly improves noise and drift performance for accurate measurements under extreme humidity, temperature and contamination conditions
- Probe design eliminates the need for close-tolerance components
- Available in both side and end aperture locations/orientations
- Select from miniature, high-resolution, high-temperature and general purpose probe types

TREK probes provide the largest possible signal strength to maintain the highest possible performance at wide probe-to-surface distances.



When it comes to probe selection considerations, we've already considered everything for you.

Aperture Size

The various TREK probe aperture sizes enable you to select spatial resolution and noise performance. Smaller aperture sizes provide finer spatial resolution. Larger aperture sizes provide lower noise.

End View/Side View

TREK probes are available with end-viewing or side-viewing detectors to accommodate the constraints of an installation.

Round and Square Bodied Probes

Round and Square Bodied TREK Probes accommodate a wide variety of different mounting requirements.

High Temperature/High Vacuum

TREK probes are available with enhanced operating ranges for high temperature (to 100° C) and high vacuum applications.

High Resolution

TREK offers probes with high spatial resolution for small areas of charge (to 200 μm).

Transparent Probes

TREK transparent probes are used in applications where light must pass through the probe, such as photoconductor testing. This allows illumination and measurement of the same spot on the surface. The housing and sensitive electrode of the probe are made of a special optically transparent, electrically-conductive glass.

Special Purpose Probes

TREK application engineers can help solve many problems with custom designs and innovative solutions. Please contact TREK for more information.

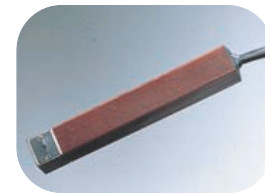
Probes used with the TREK Models 344, 347, and 323 ESVM



6000B-15C
End-View



6000B-8
Side-View



6000B-16
Side-View



6000B-7C
End-View

For high-voltage applications, it's one rock-solid solution.

Model 341B High-Voltage DC-Stable Electrostatic Voltmeter

The TREK Model 341B is a DC-stable, precision electrostatic voltmeter for making noncontacting surface voltage measurements in the range of 0 to ± 20 kV DC or peak AC. A precision voltage monitor provides a low-voltage replica of the measured electrostatic potential for monitoring purposes, or for use as a feedback signal in a closed-loop system. The Model 341B's probe assembly includes the sensitive electrode and preamplifier. Its three (3) meter cable permits remote probe positioning. And the Model 341B can be operated on a bench top or, with optional hardware, in a standard 19-inch rack. Model 341B features include:

- Accuracy better than 0.1% of full scale
- Speed of response less than 200 μ s for a 1 kV step
- Probe-to-surface separation 3 mm, ± 1 mm (recommended)
- Probes available for voltage measurements of high-temperature surfaces
- Easy-to-read LED display



The stable measurement choice for:

- Electrophotographic research and development
- Charge accumulation monitoring of LCD production processes
- Monitoring surface potentials in electrostatic painting processes
- Measuring electrostatic potential on polymers, rubber, fabrics and paper

When you're looking for absolute sensitivity, look no further.

Model 320C High-Sensitivity Electrostatic Voltmeter

The TREK Model 320C Electrostatic Voltmeter is a versatile instrument specifically designed for high-sensitivity applications, delivering highly accurate, noncontacting measurement of electrostatic potentials of 1 mV to 100 V over a wide range of probe-to-surface distances. The Model 320C has adjustments to compensate for many sensitive testing conditions. A calibrated Null Voltage source may be used to null different work function voltages of the test surface or to serve as a zero suppression voltage source. A Drift/Spacing Null Adjustment minimizes monitored voltage value variations as the probe to test surface spacing changes. Model 320C features include:

- Speed of response less than 300 ms for a 100 V step
- Probe-to-Surface separation 1 mm (recommended)



High sensitivity makes it ideal for:

- Contact potential measurements
- Materials evaluation
- Electret studies

Your semiconductor voltage applications demand nothing less than its extreme sensitivity.

Model 323 High-Sensitivity DC Stable Electrostatic Voltmeter

The TREK Model 323 Electrostatic Voltmeter is specifically designed for high-sensitivity applications and has adjustments to compensate for many sensitive testing conditions. The detected output voltage can be monitored through a 1:1 voltage monitor output and a switch selectable ratio of 10:1 or 20:1 voltage monitor output. A variety of user specified vacuum compatible sensor probe configurations can be used, like side view, end view, round or square body types. The Model 323 features a $3\frac{1}{2}$ digit LED display, as well as analog outputs for external monitoring at various scale factors and for controlling an ionization system to enable measured surface discharging. Model 323 features include:

- Measurement Range ± 100 V DC or peak AC
- Speed of response less than 300 ms for a 100 V step
- Available Monitor Outputs: 1:1 of voltage monitor output and 10:1 or 20:1 of voltage monitor output (switch selectable)



The ultra-reliable choice for:

- Semiconductor wafer surface voltage measurement
- Surface work function measurements
- Disk drive charge accumulation measurements

A level of sensitivity that will take your contact potential measurements to a new level.

Model 325 High-Sensitivity/Low-Noise Electrostatic Voltmeter

The TREK Model 325 Electrostatic Voltmeter is specifically designed for a variety of high-sensitivity applications, delivering noncontacting low-noise surface voltage measurements in the range of 0 to ± 40 V DC or peak AC over a wide range of probe-to-surface distances. And the Model 325 can be adjusted to handle many sensitive testing conditions. Model 325 features include:

- Measurement accuracy better than 0.05% of full scale
- Speed of response less than 5 ms for a 40 V step
- AC response adjusted for SPEED/NOISE

The need for speed and accuracy make this voltmeter the top choice for R&D applications.

Model 370 High-Speed Electrostatic Voltmeter

The TREK Model 370 is a precision electrostatic voltmeter with the ability to make noncontacting surface voltage measurements in the range of 0 to ± 3 kV DC or peak AC.

A buffered output providing a low voltage replica of the measured voltage is available with a variety of output ratios. The Model 370 also features one-step, push-button zeroing. The Model 370TR works with our transparent probe. Model 370 Features include:

- Speed of response less than 50 μ s for a 1 kV step
- Measurement Range 0 to ± 3 kV
- Voltage Monitor Output
- Automatic Gain Control
- Optional IEEE-488 Data Acquisition module
- Digital Enable to enable or disable the measurement remotely
- A 4 character, 7 segment LED display

This compact R&D tool's speed and accuracy prove that the best things come in small packages.

Model 368A High-Speed Electrostatic Voltmeter

The TREK Model 368A is a precision electrostatic voltmeter for making noncontacting surface voltage measurements in the range of 0 to ± 2 kV DC or peak AC. A stand-alone version is available for bench-top operation. Full-rack and half-rack enclosures are available, permitting up to four 368A modules to be mounted together for multichannel service. A user-selectable dual range precision voltage monitor provides a low-voltage replica of the measured electrostatic voltage for external monitoring purposes or use as a feedback signal in a closed loop control system. Model 368A features include:

- Accuracy better than 0.1% of full scale
- Speed of response less than 200 μ s for a 1 kV step
- Up to four independent channels in full rack mount configuration
- Easy-to-read $3\frac{1}{2}$ digit DPM display



Delivering high sensitivity for:

- Contact potential measurements
- Material evaluation
- Electret studies



The super-fast choice for:

- Electrophotographic research and development
- Research and development of photoreceptors
- Charge accumulation monitoring of semiconductor production processes
- Measuring electrostatic potential on moving objects or surfaces
- Radiation effect studies



The super fast, super accurate choice for:

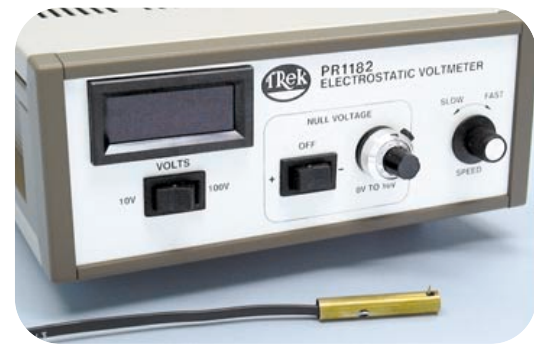
- Research and development applications
- Electrostatic potential measurement on film, polymers and paper
- Electrophotographic research and development

All the spatial resolution you'll ever need for your most demanding materials handling applications.

Model PR1182 High-Spatial Resolution Electrostatic Voltmeter

The TREK Model PR1182 Electrostatic Voltmeter is designed to measure small areas of charge with ease, delivering noncontacting surface voltage measurements in the range of 0 to ± 40 V DC or peak AC over a wide range of probe-to-surface distances. And the Model PR1182 can be adjusted to handle many sensitive testing conditions. Model PR1182 features include:

- Spot Spatial Resolution of 200 μm (at 50 μm spacing)
- Speed of response less than 4 ms for a 40 V step
- Measurement accuracy better than 0.1% of full scale



The unquestioned leader for:

- Contact potential measurements
- Material evaluation
- Electret studies

The voltmeter of choice for electrophotography applications.

Model 344 Electrostatic Voltmeter

The TREK Model 344 is a precision electrostatic voltmeter for making noncontacting surface voltage measurements in the range of 0 to ± 2 kV DC or peak AC. The Model 344's precision voltage monitor provides a low-voltage representation of the measured electrostatic potential for monitoring purposes, or for use as a feedback signal in a closed-loop system. Model 344 features include:

- Accuracy better than 0.05% of full scale
- Speed of response less than 3 ms for a 1 kV step
- Superb noise and drift performance
- A variety of available probes for different installation requirements
- Easy-to-read LED display



The leading choice for:

- Research and development for electrophotographic processes
- Charge accumulation monitoring in semiconductor production
- Radiation effect studies

Precisely what you need for surface voltage measurement.

Model 347 Electrostatic Voltmeter

The TREK Model 347 is a precision DC stable electrostatic voltmeter for making noncontacting surface voltage measurements in the range of 0 to ± 3 kV DC or peak AC. The Model 347's Digital Enable feature provides a connection for a remote device to turn on and off the internal high-voltage power supply, making it suitable for automated or computer-controlled systems. And its precision voltage monitor provides a low-voltage representation of the measured electrostatic potential for monitoring purposes, or for use as a feedback signal in a closed-loop system. Model 347 features include:

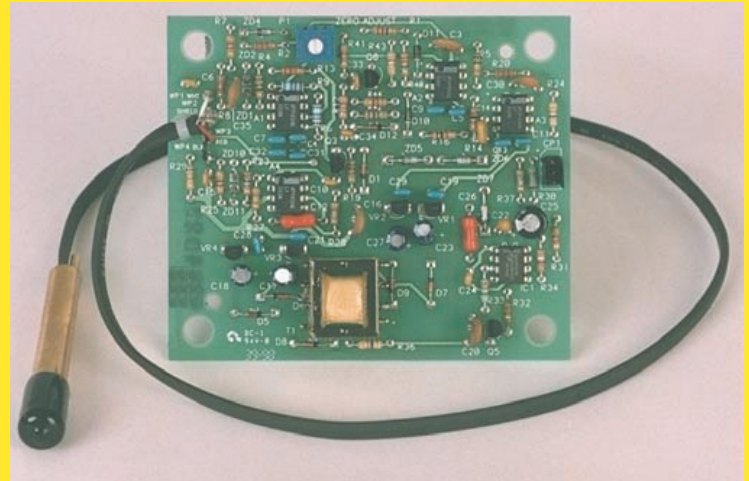
- Accuracy better than 0.05% of full scale
- Speed of response less than 3 ms for a 1 kV step
- Superior noise and drift performance
- Precision voltage monitor output
- Easy-to-read LED display



The ultra-reliable choice for:

- Photoconductor or dielectric surface voltage measurements
- Charge accumulation monitoring in semiconductor production
- Electrostatic potential measurement on film, polymers and paper

You can even put TREK electrostatic voltmeter accuracy in your product.



TREK's unparalleled reputation as a world-class manufacturer of Electrostatic Voltmeters has led many manufacturers to turn to us for world-class custom ON-BOARD CONTROLLERS (OBCs) for electrostatic voltmeter applications inside their own products. TREK OBC features include:

- Measurement ranges from 0 to ± 1.2 kV DC or peak AC
- Speed of response to less than 5 ms for a 1 kV step change
- DC accuracies to better than $\pm 1\%$ of full scale
- Customer-specified voltage monitor output ratios
- Probe-to-surface separation spacing independence
- Customer-specified OBC size
- Custom designs for probe mounting fixtures
- Spatial Resolutions to less than 8 mm
- Excellent stability

There's nothing like TREK laboratory-grade power amplifiers, either.

In 1987, TREK, Inc., introduced the world's first all-solid-state, high-voltage linear power amplifier for medium current ion beam deflection applications. Since then, our world-class reputation has made us the high-voltage power amplifiers of choice for over 90% of the world's silicon wafer processing operations using medium-current ion beam implantation for precision ion beam sweeping and positioning. Little wonder that when failure was not an option, a TREK amplifier was chosen to fly on the Space Shuttle in 1996 to provide precise electrostatic fields for microgravity bubble drop experiments.

TREK high-voltage power amplifiers employ unique, proprietary circuitry to produce a closed-loop amplifier system, delivering exceptional DC stability and excellent wideband performance. Their extremely high slew rates permit rapid rise and fall times. They employ four-quadrant operation to sink and source current anywhere within the output voltage range. Their advanced optoisolation circuitry provides high linearity. And their dynamic response of the active output stage makes TREK amplifiers a better choice than power supplies in many applications.

TREK EOS/ESD solutions put you in total control.

Innovative, rock solid TREK technology delivers the information you need to make your invisible EOS/ESD problem visible. So you can make it go away. With total confidence for a change.

The quality of TREK products is only exceeded by the quality of our service.

Exceeding expectations around the world.

Our extensive network of product service and application support personnel worldwide, all committed to delivering nothing less than first-class service, ensures that prompt, courteous help is always just a phone call away.

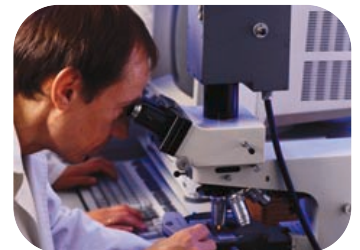
Ready with answers for your toughest challenges.

With application experience in a wide variety of industries and research fields, TREK Application Engineers are devoted to helping you solve your most challenging application questions. Before and after the sale.

Represented by:

Due to our continuous product quality improvement and customer satisfaction programs, TREK, Inc. reserves the right to change specifications listed in this brochure without notice.

CE compliant for most products



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