

ESD

**Electrostatic Discharge
Measurement & Control Instruments Catalog**



An Advanced Energy Company

Trek ESD Measurement & Control Instruments - Table of Contents

	AC Feedback Electrostatic Voltmeters	Model 520-1, Model 876 p.1
	AC Feedback Electrostatic Voltmeters	Model 523-1, Model 884 p.1
	DC Feedback Electrostatic Voltmeter / USB	Model 541A-1 p.2
	AC Feedback Electrostatic Voltmeter / USB	Model 542A-1 p.2
	Application Software	Model 541A, 542A p.3
	Hand-Held Contacting Electrostatic Voltmeter	Model 821HH p.3
	Charged Plate Monitor	Model 156A p.4
	Charged Plate Monitor	Model 157 p.4
	Charged Plate Monitor	Model 158A p.5
	ESD Audit Kit	Model 511/1501 p.6
	Electrostatic Field Meter	Model 511 p.6
	Surface Resistance Meter	Model 1501 p.6
	Surface Resistance / Volume Resistance Meter	Model 152-1 p.7
	High Sensitivity ESD Event Detector	Model 901HS p.7
	Nozzle Ionizer	Model 950 p.8
	Electrostatic Voltmeters – Measurement Distance & Measurement Area	p.10
	Theory of Operation – DC Feedback Electrostatic Voltmeter	p.11
	Theory of Operation – AC Feedback Electrostatic Voltmeter	p.11
	Additional Information – Sales & Service	Back Cover

Model 520-1, Model 876

AC Feedback Electrostatic Voltmeters

Features

- Non-contacting voltage measurement
- No need to maintain fixed spacing; accurate at a wide range of spacings
- Portable (battery operated)
- Good for difficult-to-reach locations (Model 876 has probe-on-cable design)
- Drift-free operation in ionized environments
- Low cost

Applications

Static charge measurement for LCD, semiconductor devices, MR heads. Monitor electrostatic levels in IC production processes. Surface potential measurement of silicon wafers, films and papers. Materials testing. Standard static charge measurements.

Specifications

Measurement Range	0 to ± 2 kV
Voltage Display	0 to ± 1999 V
Voltage Resolution	1V
Probe-to-Surface Separation	Range of 5 to 25mm
Accuracy	$\pm 5\%$ (Full Scale)
Speed of Response	400ms
Operating Conditions	
Temperature	15 to 35°C
Relative Humidity	to 85%RH, noncondensing
Power Supply	9V alkaline battery (1)
Dimensions	5.9cm W x 3.1cm H x 14.6cm L (without cable sensor)
Weight	185g



Model 520-1



Model 876

Model 520-2 (with analog output function)

Output Ratio	1/1000 of the measured voltage
Speed of Response	25ms
Output Terminal	1.3mm jack

Model 523-1, Model 884

AC Feedback Electrostatic Voltmeters

Features

- Non-contacting voltage measurement
- No need to maintain fixed spacing; accurate at a wide range of spacings
- Portable (battery operated)
- Good for difficult-to-reach locations (Model 884 has probe-on-cable design)
- Drift-free operation in ionized environments
- Low cost

Applications

Static charge measurement for LCD, semiconductor devices. Monitor electrostatic levels in IC production processes. Surface potential measurement of silicon wafers, films and papers. Materials testing. Standard static charge measurements.

Specifications

Measurement Range	0 to ± 20 kV
Voltage Display	0 to ± 19.99 kV
Voltage Resolution	10V
Probe-to-Surface Separation	Range of 30 to 60mm
Accuracy	$\pm 5\%$ (Full Scale)
Speed of Response	400ms
Operating Conditions	
Temperature	15 to 35°C
Relative Humidity	to 85%RH, noncondensing



Model 523-1



Model 884

Power Supply	9V alkaline battery (1)
Dimensions	5.9cm W x 3.1cm H x 14.6cm L (without cable sensor)
Weight	200g

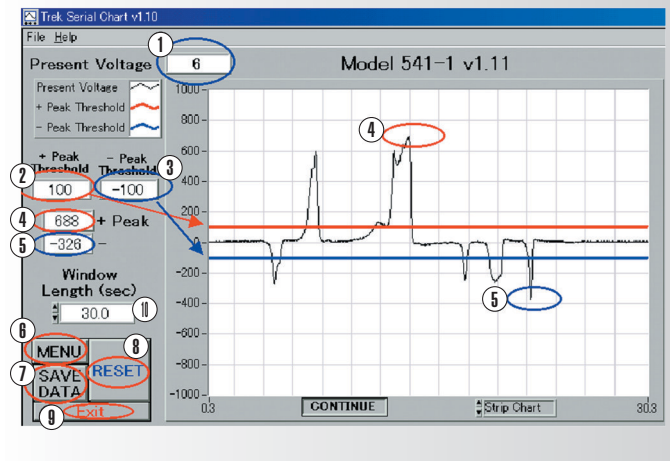
Model 541A-1

Model 542A-1

Model 541A, 542A Application Software

Explanation of the Screen

1. Voltage display (V) Display measured voltage
2. Positive (+) threshold (V) Set the level
3. Negative (-) threshold (V) Set the level
4. Positive (+) peak value (V) Display maximum voltage value of positive (+) side
5. Negative (-) peak value (V) Display maximum voltage value of negative (-) side
6. Menu screen Display the screen setting of the measurement
7. Data save Save measurement value
8. Reset Reset the peak value
9. Exit Terminate the software
10. Length of time Select the length of time for displaying the measurement value (storage time)



To enhance the utility of Model 541A and Model 542A, Trek provides application software (available for download at www.trekinc.com) and a USB or RS-232 serial port on both models for interfacing with a Windows® PC.

Trek's software thereby enables touchscreen setting of threshold values and preservation of data. The data can be viewed graphically (screen shot above), in real time. Other PC-friendly adjustments include threshold setting, alarm ON/OFF, and storage time.

Model 821HH InfiniTron® Hand-Held Contacting Electrostatic Voltmeter

Features

- Portable, battery-operated, compact design
- Trek contacting technology enables precise surface voltage measurements
- Measure conductive and insulative objects/surfaces with virtually zero charge transfer to the measurement probe
- Save test data to internal memory
- Data graphing capabilities (via connection with PC)

Specifications

Input Characteristics.....	Resistance $>10^{14}$, Capacitance $<10^{-14}$ F
Measurement Range.....	0 to ± 2 kV DC or peak AC
Bandwidth.....	1kHz (-3dB)
Accuracy.....	$\pm 1\%$ (Full Scale)
Operating Conditions	
Temperature.....	15 to 35°C
Relative Humidity.....	5 to 75%RH, noncondensing
Power Supply	Internal NiMH battery (approx. 8 hours continuous usage from a full charge) or external 15V @ 1A supply/charger for line operation
Dimensions.....	14.0cm W x 24.0cm H x 5.25cm D
Weight	1.13kg (includes battery)



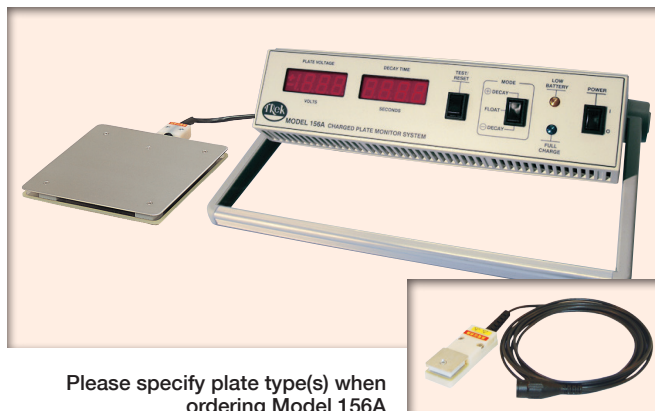
Model 156A Charged Plate Monitor

Features

- Compliance to IEC 61340-5-1 and ANSI/ESD STM3.1
- Mode of operation is easy to select via three-position toggle switch
- Standard ion collection plate, 6" x 6"

Specifications

Measurement Range..... 0 to $\pm 1100V$ DC or peak AC
 Small Signal Bandwidth..... 1kHz (-3dB)
 Output Monitor..... 1/200 of the plate voltage
 Accuracy $\pm 0.1\%$ (Full Scale)
 Offset Voltage..... $\pm 10mV$
 Output Noise 10mV rms
 Operating Conditions
 Temperature..... 5 to 35°C
 Relative Humidity..... to 80%RH, noncondensing
 Power Supply Built-in rechargeable battery (approx. 8 hours of continuous usage from a full charge) or by using a recharge/operating AC adapter. AC power adapter for all global areas is available.



Please specify plate type(s) when ordering Model 156A

Dimensions..... 31.8cm W x 8.3cm H x 28.0cm D
 Weight 2.0kg

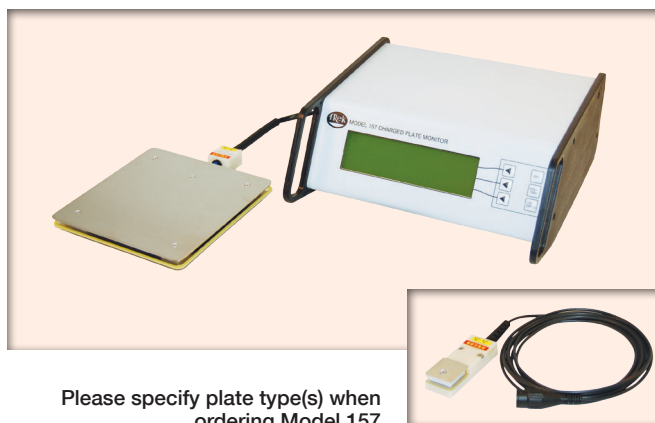
Model 157 Charged Plate Monitor

Features

- Compliance to IEC 61340-5-1 and ANSI/ESD STM3.1
- Store & retrieve data as data points or graphs; internal memory
- USB connection (to PC) enables real time data
- Connect to the optional Thermohygrometer Kit (Omega Model HH331)
- Bar code wand also available

Specifications

Measurement Range 0 to $\pm 1020V$ DC or peak AC
 Large Signal Bandwidth..... 80Hz (-3dB)
 Monitor Output..... 1/200 of the plate voltage
 Accuracy $\pm 0.1\%$ (Full Scale)
 Offset Voltage..... under $\pm 10mV$
 Output Noise 10mV rms
 Operating Conditions
 Temperature..... 5 to 35°C
 Relative Humidity..... to 80%RH, noncondensing
 Power Supply Built-in rechargeable battery (approx. 8 hours of continuous usage from a full charge) or by using a recharge/operating AC adapter. AC power adapter for all global areas is available.



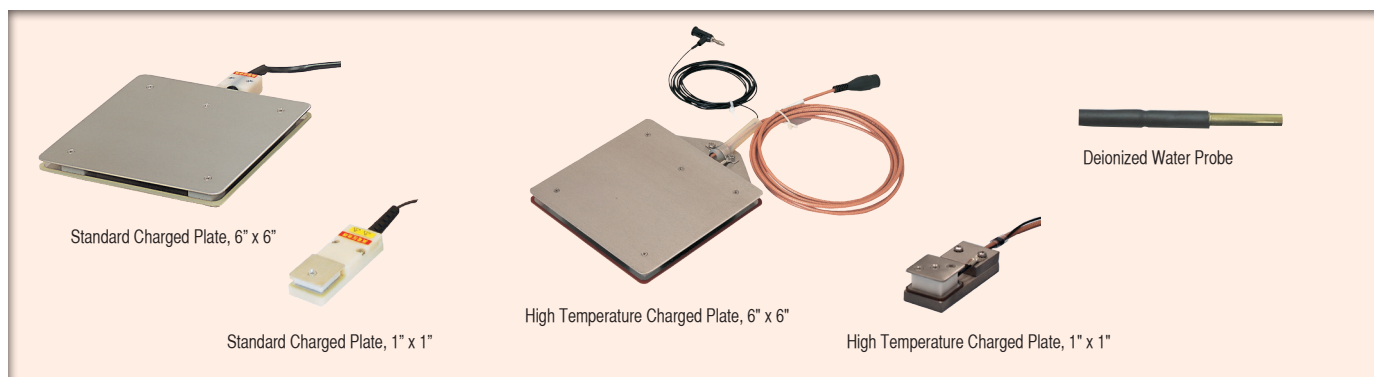
Please specify plate type(s) when ordering Model 157

Dimensions..... 25.4cm W x 10.2cm H x 24.1cm D
 Weight 2.0kg

Ion Collecting Plates (can be used with Model 156A and 157)

Standard Charged Plate, 15cm x 15cm (6" x 6") - Model 156AP-C150x150-R3M**; Standard Charged Plate, 25mm x 25mm (1" x 1") - Model 156P-C25x25-S3M; High Temperature Charged Plate, 15cm x 15cm (6" x 6") - Model 156P-HT-150x150-R3M**; High Temperature Charged Plate, 25mm x 25mm (1" x 1") - Model PD04002AP

** Complies with IEC 61340 Standard Note: Other sizes and shapes of charge plates are available. Deionized water probes are also available (PM08035)



Standard Charged Plate, 6" x 6"

Standard Charged Plate, 1" x 1"

High Temperature Charged Plate, 6" x 6"

High Temperature Charged Plate, 1" x 1"

Deionized Water Probe

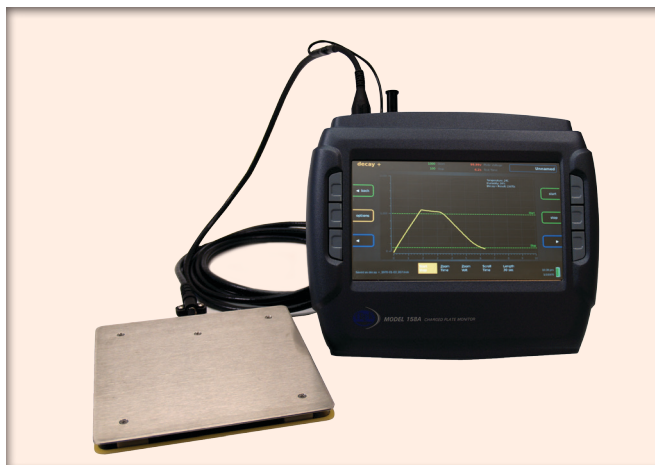
Model 158A

Charged Plate Monitor

Trek Model 158A Charged Plate Monitor is the premier instrument to evaluate the performance of air ionization systems. Its design includes a color graphics display for viewing of discharge waveforms and offset voltage in the time domain and the ability to store test data and waveforms for hundreds of ionizer tests. This unit employs Trek's patented voltage-follower technique to provide accuracy, stability and bandwidth well beyond the performance capabilities of field meter technology.

Features

- Compliance to IEC 61340-5-1 and ANSI/ESD STM3.1
- User-friendly compact design
- Superior data collection and storage capability
- Large LCD color graphic display
- Navigate via touch screen or function keys
- Standard ion collecting plates available (see below)
- Operate in Float Mode, (+) Decay Mode, or (-) Decay Mode
- Programmable voltage balance and (+) and (-) discharge time
- Performs float voltage and discharge time EOS/ESD measurements
- Allows multiple operational and programing options
- Can be pre-set to perform automated tests
- Can store/retrieve previously defined test parameters
- Test data can be saved for future reference/retrieval
- Long battery life
- USB port enables data transfer
- Optional barcode scanner with bluetooth technology



Please specify plate type(s) when ordering Model 158A.
A Model 158A Charged Plate Monitor Kit is also available.
See details below.

Specifications

Measurement Range 0 to $\pm 1100\text{V}$ DC or peak AC
Large Signal Bandwidth..... 80Hz (-3dB)
Monitor Output..... 1/200 of the plate voltage
Accuracy..... $\pm 0.1\%$ (Full Scale)
Offset Voltage..... $\pm 10\text{mV}$
Output Noise..... 10mV rms²
Operating Conditions
Temperature..... 5 to 35°C
Relative Humidity..... to 80%RH, non-condensing

Power Supply Built-in rechargeable battery (approx. 6 hours of continuous usage from a full charge); can also be operated using the supplied AC adapter.
Dimensions..... 22.6cm W x 5.3cm H x 18.7cm D
Weight 2.2kg

Ion Collecting Plates

Standard ion collecting plates are ordered separately; standard 6" x 6" plate and standard 1" x 1" plate are available. Refer to relevant photos on prior page.

Model 158A Charged Plate Monitor Kit

This kit includes Model 158A charged plate monitor, standard 6" x 6" collecting plate, standard 1" x 1" collecting plate, charged plate handle, walking test adapter assembly, mini-tripod, and custom carrying case.

Model 511/1501 ESD Audit Kit



Trek's Model 511/1501 ESD Audit Kit includes the Model 511 Ionizer Kit (electrostatic field meter, charger, and charge plate) and Model 1501 (surface resistance meter) in a compact carrying case. Please refer to specifications below. Most items can be ordered individually. Refer to details below.



The carrying case and all of its contents are shown (far left). The kit as packaged for delivery is also shown (near left). Orders in the USA include ground plug adaptor, AC receptacle tester, and 2.75W charger/USB adaptor. (below).



USA only

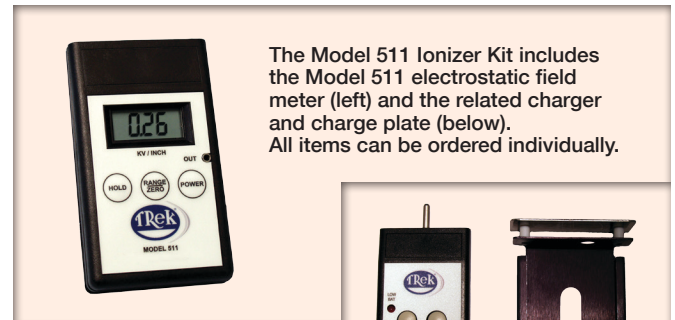
Model 511 Electrostatic Field Meter

Features

- Switch selectable measurement range
- Hand-held, portable, non-contacting
- Chopper-stabilized technology
- Reliable in ionized or non-ionized environments
- Complies with ANSI/ESD SP3.3

Specifications

Measurement Range (per inch).....0 to $\pm 2\text{kV}$...OR... 0 to $\pm 20\text{kV}$
 Measurement Accuracy
 Voltage Monitor Output.....better than $\pm 5\%$ of reading, $\pm 10\text{mV}$
 Voltage Display.....better than $\pm 5\%$ of reading, ± 2 counts
 Operating Conditions
 Temperature.....10 to 30°C
 Relative Humidity.....to 80%RH, non-condensing
 Power Supply9V alkaline battery (1), included



The Model 511 Ionizer Kit includes the Model 511 electrostatic field meter (left) and the related charger and charge plate (below). All items can be ordered individually.



Dimensions.....2.4cm H x 7.0cm W x 12.6cm L
 Weight140g (with battery)

Model 1501 Surface Resistance Meter

Features

- Auto-ranging
- Lightweight, hand-held
- Displayed values can be stored in internal memory
- Records temperature and relative humidity
- Built-in electrodes with conductive rubber
- Appropriate electrodes can be externally connected for tests (IEC 61340: -4-1, -2-3, -4-5; ANSI/ESD: S4.1-2006; ANSI/ESD STM: 11.11-2006, 11.12-2007, 11.13-2004, 12.1-2006, 97.1-2006)

Specifications

Measuring Range 10^3 to 10^{12}
 Display Range 1×10^z to 9×10^z where z = measuring range exponent
 Accuracy10% to 25% of reading (depends on measuring range)
 Operating Conditions
 Temperature..... -5 to 40°C
 Relative Humidity.....to 75%RH, non-condensing



Power SupplyRechargeable lithium battery, 3.6V 900mAh
 Dimensions.....14.5cm H x 8.0cm W x 3.5cm D
 Weight290g

Model 152-1 Surface Resistance / Volume Resistance Meter

Features

- Accuracy, stability and repeatability in a lightweight, portable design
- Complies with IEC 61340-5-1 for Surface Resistance Measurements
- Complies with IEC 61340-2-3 for Volume Resistance Measurements
- Technique used to measure surface resistance and volume resistance conforms to ANSI/ESD Association standards (STM2.1, 4.1, 7.1, 9.1, 11.11, 11.12, 12.1, 11.13, 97.1)
- Wide measurement ranges of 10^3 to 10^{13}
- Variety of probes available (see photo at right)
 - Model 152P-CR-1 Surface resistance/volume resistance (center top)
 - Model 152P-2P Two-point surface resistance (center bottom)
 - Model 152BP-5P Point-to-point surface resistance (lower right)
 - Model 152AP-3mm x 25.4mm Miniature resistance probe (pair)
 - Part CN 1K039 Walking test adapter kit (lower left)

Specifications

Measurement Range 10^3 to 10^{13}
 (using probe 152BP-5P, 152P-2P, or 152P-CR-1)
 Test Voltage Select 10V or 100V ($\pm 2\%$) using the selection switch
 Power Supply Two 9V alkaline batteries provide approx. 6 hours of power for portable operation. AC line adapter available for all global areas.



Operating Conditions

Temperature 15 to 35°C
 Relative Humidity 5 to 80%RH, noncondensing
 Dimensions 10.0cm W x 18.0cm H x 4.4cm D
 Weight 500g (includes battery)

Model 901HS High-Sensitivity ESD Event Detector

Features

- Sensitive to ESD voltage levels as low as 10V at 50mm
- Well-suited for Charge Device Model (CDM) and discharge between metallic electrodes
- ESD event detection conveyed through visual and audible alert systems
- Good for difficult-to-reach locations (antenna-on-cable design)
- Compact, lightweight design and highly accurate data
- Operates on four AA batteries; AC power adapter for continuous
- Alternate antenna for less sensitive detection (50V @ 90mm)

Specifications

Indicators Audible alarm and 5 color-coded LEDs to visually indicate intensity
 Alarm Automatic or manual reset control
 Dimensions 8.0cm W x 11.0cm H x 4.5cm D
 Weight 500g (includes battery)



Model 950 Nozzle Ionizer

The Model 950 is a nozzle type air ionizer which removes dust contamination and eliminates static electricity by use of high pressure ionized air flow. The compact nozzle body contains a built-in high-voltage power supply and an abnormal operation detection/warning output circuit. Model 950 is operated by connecting a compressed air supply and a 24V power supply to the unit.

Using a high-frequency corona discharge, Model 950 enables the efficient elimination of static electricity. Selection of specific nozzles (from a variety of options, as shown on p.7) to transfer ionized air provides utility for Model 950 in a wide range of applications. The Model 950 uses an LED display and contact output to indicate abnormal conditions. The high voltage supply and ionizing electrode can be replaced easily through the back of the unit. These features facilitate easy cleaning and maintenance at the production line site, thereby reducing downtime.



Features

- Ultra-small compact body
- High voltage failure and emitter needle contamination detector function
- Outputs a relay signal when abnormal operating conditions occur
- Optional tubes allow transfer of ionized air to remote or difficult-to-reach locations
- Easy maintenance – built-in power supply with a replaceable emitter unit makes for easy cleaning and replacement
- Excellent ion balance
- A wide range of optional nozzles and tubes for various applications

How to replace or clean the discharge needle



LED Display (displays the information shown in the chart below)



Rear of the unit showing the discharge needle access and the connector for power input, output signal, and failure alarm output relay signal

Operating Conditions – LED Indicators

Condition	“Power” Green LED	“H. V.” Green LED	“C. C.” Yellow LED	“Alarm” Red LED
Normal Operation	●	●		
H.V. Malfunction	●			●
Maintenance Needed (clean the needle)	●	●	●	
H.V. Output Off	●			
Power Off				

Specifications

Discharge MethodHigh-frequency AC corona discharge method
Input Power Supply Voltage24V DC±10%
Power2.4VA
Air Purge-Operation Pressure 0.05 to 0.6MPa
Dimensions.....8.65cm D x 1.8cm W x 5.0cm H (main unit only)
WeightApprox. 80g (main unit only)
Operating Conditions
Temperature.....0 to 40°C
Relative Humidity..... 15 to 65%RH, noncondensing

Ozone Density 0.05ppm or less (at a distance of 300mm from air outlet)
Ion Balance.....±15V or less (0.05 to 0.5MPa)
MaterialEnclosure: ABS
Cover: stainless steel
Discharge needle: tungsten
Air Piping Dimension 6mm O.D.

Model 950 Optional Parts (length, material type and part numbers as noted)



Seamless carrier pipe nozzle
(950-C200 in photo)
100mm 950-C100
200mm 950-C200
300mm 950-C300
400mm 950-C400
500mm 950-C500



Bar nozzle
(950-200B in photo)
100mm 950-100B
200mm 950-200B
300mm 950-300B



Carrier tube nozzle
(950-TT in photo)
Teflon carrier tube nozzle 950-TT
Silicon carrier tube nozzle 950-ST



Shower nozzle
950-60S



Flat nozzle
950-F

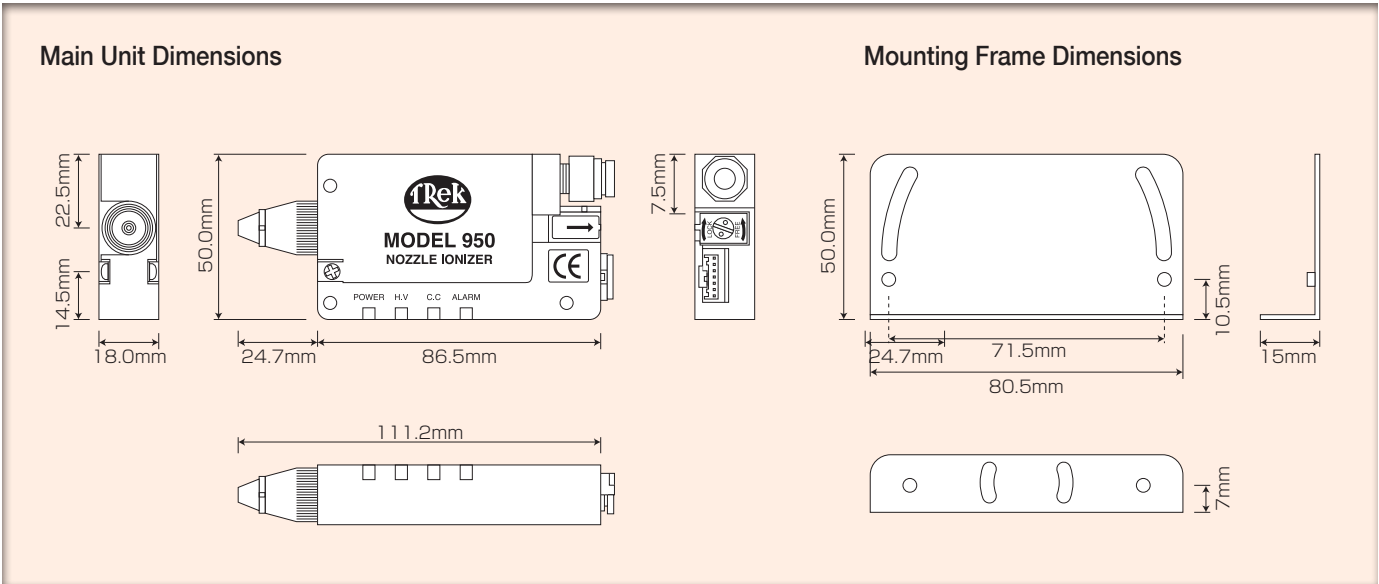


AC Adapter (950-24VA in photo)
950-24VA AC Adapter
(power supply + signal cable + grounding wire)
950-24V AC Adapter
(power supply only)



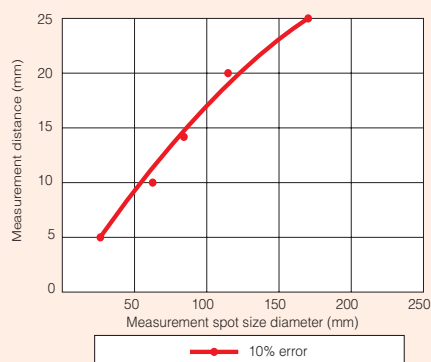
Model 950 Other Optional Parts (part numbers as noted)

Bar nozzle L-type	Pipe nozzle	Mounting Frame
950-100BL	950-120PSP	950-FM
950-200BL		

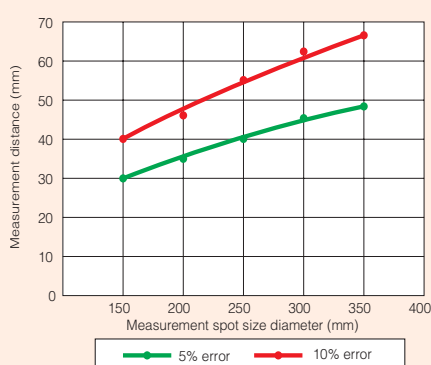


Electrostatic Voltmeters: Measurement Distance & Measurement Area

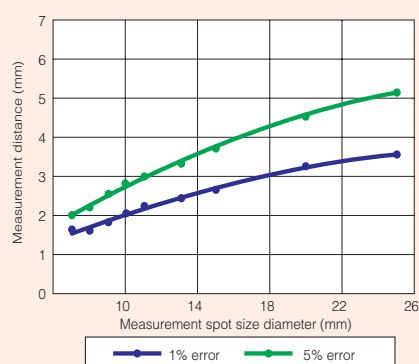
Model 520, 876



Model 523, 884



Model 541



Model 542P-45D probe

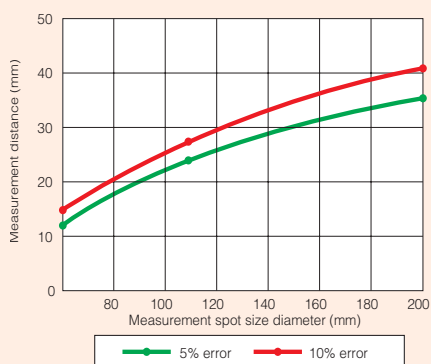


Figure 1. Spatial Resolution, Trek AC Feedback Electrostatic Voltmeter (i.e. Model 520)

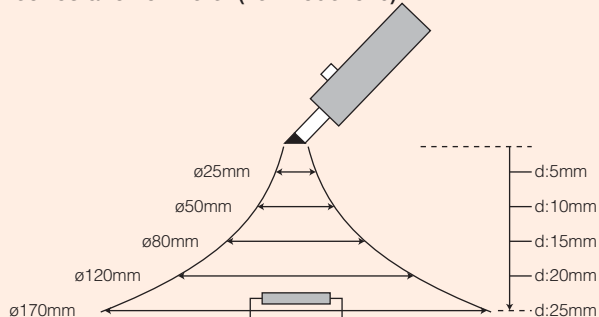


Figure 2. Spatial Resolution, Trek DC Feedback Electrostatic Voltmeter (i.e. Model 541)

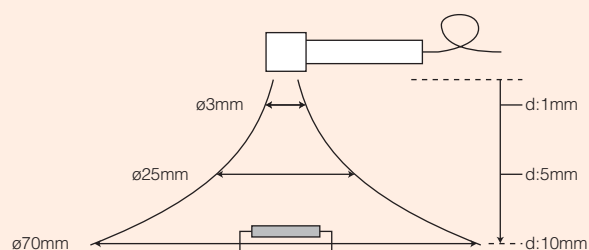


Figure 3. Measurement Accuracy vs. Measurement Distance

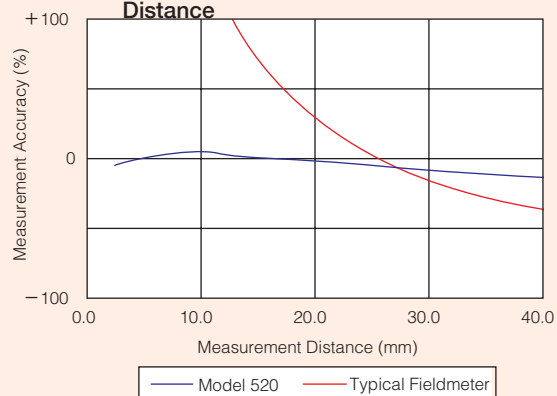
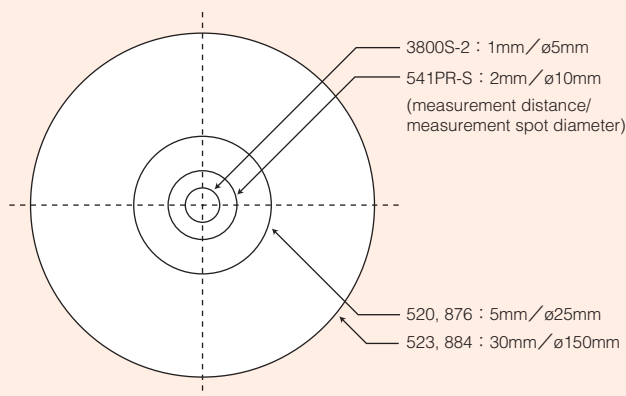


Figure 4. Spot Resolution at Selected Distances

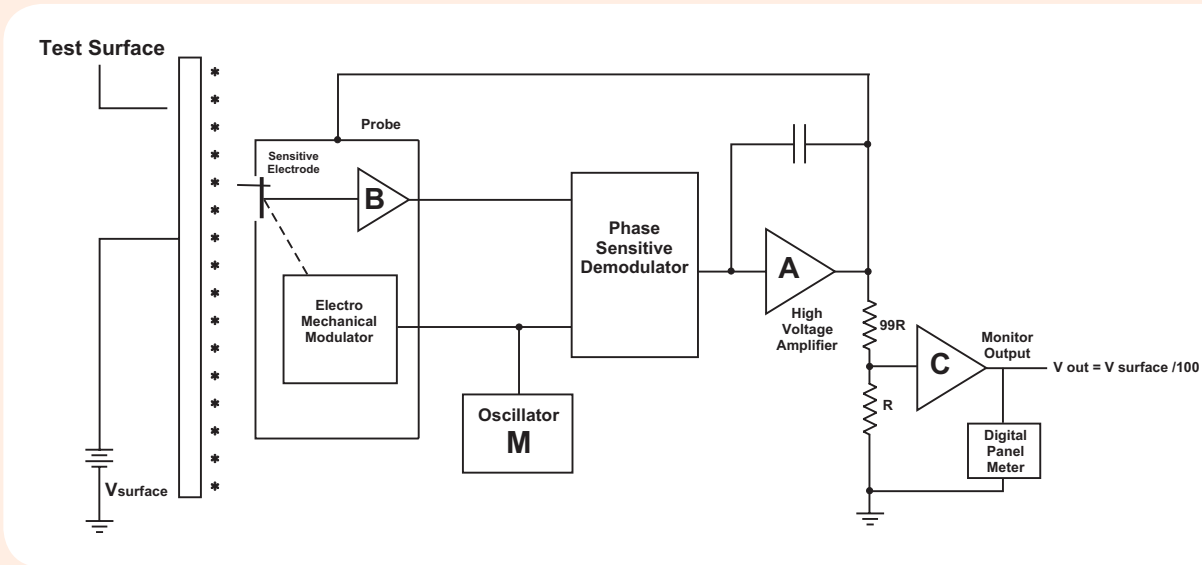


Theory of Operation – DC Feedback Electrostatic Voltmeter

Trek offers two types of technology in the company's Electrostatic Voltmeters. One product line utilizes DC feedback technology while the other product line is based on Trek's novel approach to electrostatic measurement via patented AC feedback technology.

The DC Feedback Electrostatic Voltmeters use a well-known technology that Trek has employed for over 45 years (diagram below). The design utilizes a field-nulling method where the body of the probe is driven to the voltage being measured. This provides very high accuracy and fast speed of response. Since the probe is spaced relatively close to the surface being measured (1-2 mm typical) it is capable of measuring very small surface areas, with no arc over.

Figure 5. Theory of Operation – DC Feedback Electrostatic Voltmeter

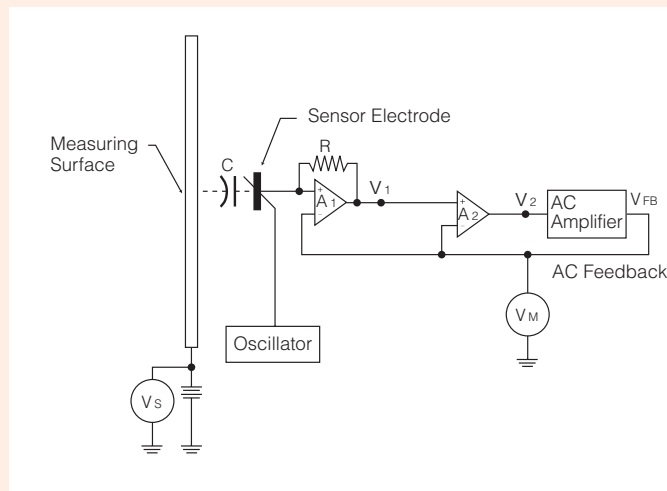


Theory of Operation – AC Feedback Electrostatic Voltmeter

The AC Feedback Electrostatic Voltmeters are based on a unique design developed and patented by TREK, INC. to address some of the problems associated with electrostatic fieldmeter technology. The AC feedback technology (diagram at right) delivers accurate measurements over a wide range of probe-to-surface spacings without the need to generate high voltage. Compare this to fieldmeter technology which requires a specific fixed spacing in order to provide useful measurements. In addition, the AC feedback electrostatic voltmeter can measure smaller surface areas than fieldmeters because Trek's technology allows the probe to be placed closer to the surface.

For a complete technical description of the DC Feedback Technology and AC Feedback Technology please contact Trek.

Figure 6. Theory of Operation – AC Feedback Electrostatic Voltmeter



Notes

Notes

Trek Sales & Service

Warranty

A ONE (1) YEAR Warranty applies to Trek's products. TREK, INC. agrees to correct, either by repair, or in the company's sole discretion, by replacement, any defect of material or workmanship which develops within one year from date of original purchase by the customer (user), provided that investigation and factory inspection by the company discloses that such defect developed under normal and proper use.

Calibration & Repair

TREK, INC. provides calibration and repair services for all Trek products. We have Authorized Service Organizations located around the world. Please contact Trek's Customer Service Department for assistance or go to www.trekinc.com to locate a service facility.

Rental Service

Trek's rental program provides cost-effective access to equipment for short-term projects or emergencies. For more information, please contact Trek's Sales Department.

Pricing & Specifications

Product pricing and specifications are subject to change. Please contact Trek's Sales Department for the most up-to-date information before placing an order.

Custom Solutions & OEM Applications

Trek can provide custom solutions for applications needing more than an "off-the-shelf" product. Trek utilizes its decades of experience and technical expertise to design, develop and manufacture custom products which address the specific needs of an OEM application. Please contact Trek's Sales Department about custom design services

Demonstration Units

Trek has a variety of demonstration instruments available to introduce products to customers interested in verifying operation for specific applications. To learn more about demo equipment please contact Trek's Sales Department.

For Assistance

Sales Department: TREK-CA@aei.com
Customer Service Department: TREK-CA@aei.com

In early 2018 Advanced Energy Industries, Inc. acquired Trek. Later in 2018, AE acquired Monroe Electronics' Electrostatic & ESD product line and relocated production and sales to AE's Trek facilities in Lockport, NY.

www.trekinc.com

www.trekinc.com/monroe/

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Trek products generate high voltage. Please read the instruction manual and notes carefully before using the instruments.