

ESD

**Electrostatic Discharge
Measurement & Control Instruments Catalog**



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 NEW p.3 |
|  | Benchtop Ionizer | Model 930 p.4 |
|  | Nozzle Ionizer | Model 950 p.6 |
|  | Charged Plate Monitor | Model 156A p.8 |
|  | Charged Plate Monitor | Model 157 p.8 |
|  | Hand-Held Charged Plate Monitor | Model 159HH p.9 |
|  | High-Sensitivity ESD Event Detector | Model 901HS NEW p.10 |
|  | Electrostatic Field Meter | Model 511 NEW p.10 |
|  | Surface Resistance / Volume Resistance Meter | Model 152-1 p.11 |
|  | Combo Tester X3 <i>(for wrist straps and footwear)</i> | Model 920 p.11 |
| | Electrostatic Voltmeters – Measurement Distance & Measurement Area | p.12 |
| | Theory of Operation – DC Feedback Electrostatic Voltmeter | p.13 |
| | Theory of Operation – AC Feedback Electrostatic Voltmeter | p.13 |
| | Additional Information – Sales & Service | Back Cover |

***Note: Trek products are not rated for use in an explosive atmosphere**

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 |



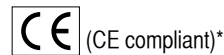
Model 520-1



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 |



(CE compliant)*

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 |

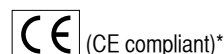


Model 523-1



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 |



(CE compliant)*

Model 541A-1 DC Feedback Electrostatic Voltmeter - USB Supported

Features

- USB or RS-232 serial port enables computer-based control & monitoring
- Visual and audible alarms
- LCD screen displays present voltage and offers peak data hold function
- Very small probe-to-test surface distances, excellent spot resolution and accuracy
- Chopper probe is DC stable with/without incident air ion flow

Applications

Static charge measurement of semiconductor devices. Monitor electrostatic levels in IC production processes, semiconductor production processes and various production lines.

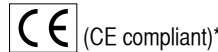
Specifications

| | |
|----------------------------------|--|
| Measurement Range..... | 0 to ± 1 kV (Model 541A-2: 0 to ± 100 V) |
| Output Monitor | |
| Output Voltage..... | 0 to ± 10 V (1/100) |
| Output Current..... | 4 to 20mA |
| Probe-to-Surface Separation..... | Range of 1 to 10mm |
| Accuracy..... | $\pm 1\%$ (Full Scale) or better |
| Speed of Response..... | 50ms for 1kV step (10 to 90%) |
| Operating Conditions | |
| Temperature..... | 15 to 35°C |
| Relative Humidity..... | 5 to 85%RH, noncondensing |
| Power Supply..... | Line to 15V DC adapter |
| Dimensions..... | 15.2cm W x 10.2cm H x 21.6cm D |
| Weight..... | 770g |



Please specify probe type(s) when ordering Model 541A-1 or 541A-2.

- Probes for Model 541A..... Model 541PR-S (side view)
 Model 541PR-E (end view)
 Model 541P-S (side view)
 Vacuum application probes also available
- Walking Test Adapter..... For analysis of charge levels on the human body
 Compliant with ANSI/ESD STM 97.2; IEC 61340-4-5



Model 542A-1 AC Feedback Electrostatic Voltmeter - USB Supported

Features

- USB or RS-232 serial port enables computer-based control & monitoring
- Visual and audible alarms
- LCD screen displays present voltage and offers peak data hold function
- Drift-free measurements
- Chopper probe is DC stable with/without incident air ion flow
- Voltage output monitor for remote monitoring or control

Applications

Static charge measurement of plastic and polymer film. Monitor electrostatic levels in LCD production processes and for various production lines.

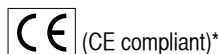
Specifications

| | |
|----------------------------------|---|
| Measurement Range..... | 0 to ± 10 kV (Model 542A-2: 0 to ± 20 kV) |
| Output Monitor | |
| Output Voltage..... | 0 to ± 10 V (1/1000); Model 542A-2: (1/2000) |
| Output Current..... | 4 to 20mA |
| Probe-to-Surface Separation..... | Range of 15 to 30mm (Model 542A-2: 30 to 60mm) |
| Accuracy..... | $\pm 5\%$ (of Reading); $\pm 0.2\%$ (Full Scale) |
| Speed of Response..... | 50ms for 1kV step (10 to 90%) |
| Operating Conditions | |
| Temperature..... | 15 to 35°C |
| Relative Humidity..... | 5 to 85%RH, noncondensing |
| Power Supply..... | Line to 15V DC adapter |
| Dimensions..... | 15.2cm W x 10.2cm H x 21.6cm D |
| Weight..... | 770g |



Please specify probe type(s) when ordering Model 542A-1 or 542A-2.

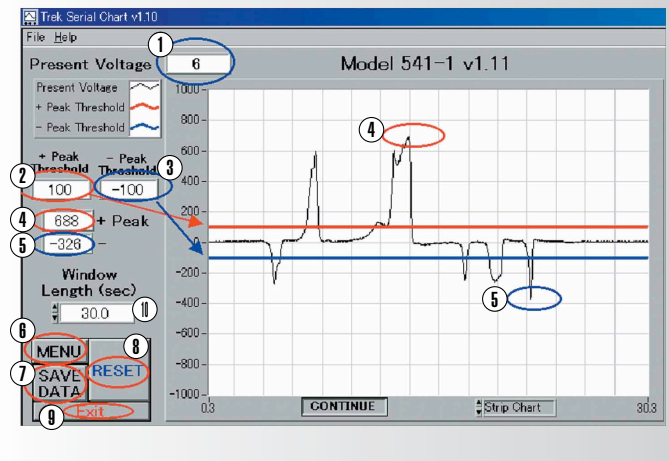
- Probes for Model 542A..... Model 542P-S (side view)
 Model 542P-45D (45 degree angle)
 Vacuum application probes also available
- Walking Test Adapter..... For analysis of charge levels on the human body
 In support of EN 1815; Assessment of Static Electrical Propensity on Resilient and Textile Floor Coverings



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.

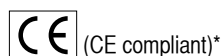
Model 821HH **NEW** InfiniTron® Hand-Held Contacting Electrostatic Voltmeter

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 >10¹⁴Ω, Capacitance <10⁻¹⁴F
 Measurement Range..... 0 to ±2kV DC or peak AC
 Bandwidth.....1kHz (-3dB)
 Accuracy..... ±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 930 Benchtop Ionizer

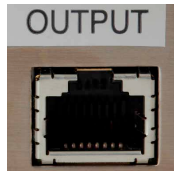
The Model 930 Benchtop Ionizer helps to solve static problems in the workshop or on the production floor by neutralizing static charges that can cause ESD damage to semiconductor and LCD devices, dust attraction and product “sticking” issues. Model 930’s compact size, high voltage power supply, high air volume flow rate using a built-in fan with adjustable air volume, automatic ion balance capability and high performance discharge electrode, enable it to perform in a variety of applications. A built-in electrode cleaning brush offers user-friendly maintenance. Correct operation is easy to confirm by use of front panel indicator lights.

Features

- Eliminates electrostatic in ≤ 1 second (conforms to IEC 61340)
- Provides accurate automatic ion balance within $\pm 5V$
- LED lights indicate status of ion balance, power ON, fan stop, abnormal voltage or abnormal ion levels
- Employs titanium electrodes and stainless steel housing
- Air duct design and built-in cleaning brush help prevent electrode contamination build-up
- High voltage AC operation supports stable and consistent ion balance
- AC line power supply voltage: 100 to 240V at 50 to 60Hz

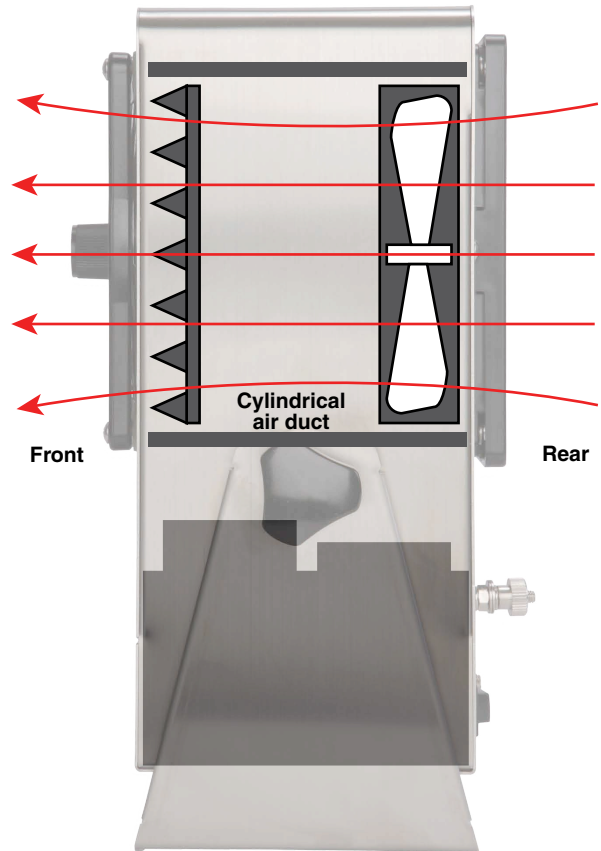


Abnormal operation output connector



Front Panel Operation Status LED Indicators

| Display | Abnormal Operation Indicator LED | Abnormal Operation Output (Contact Output) |
|--------------|----------------------------------|--|
| Ion Balance | ● $\pm 30V$ or below | OFF |
| | ● $\pm 50V$ or below | OFF |
| | ● $\pm 50V$ or above | ON |
| Fan Stalled | ● | ON |
| System Fault | ● | ON |
| Power Off | Power LED OFF | ON |



Side view schematic



Built-in electrode cleaning brush offers easy maintenance. The operator can perform periodic cleaning by turning the center knob on the cleaning brush to sweep the ionization electrodes clean.

Specifications

Power Supply Voltage 24V DC $\pm 10\%$, from AC/DC adapter
lock type connector provided

Discharge Performance 1000V - 100V decay time less than 1 sec.
At a distance of 300mm with maximum airflow
Based upon test methods of IEC 61340 5-1

Ozone Generation 0.02ppm or less

Air Volume Max. 4.4m³/min. (without the filter attached)

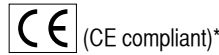
Emitter Cleaner Manual nylon brush is built-in

Materials Discharge needle: titanium
Casing & stand: SUS304 stainless steel

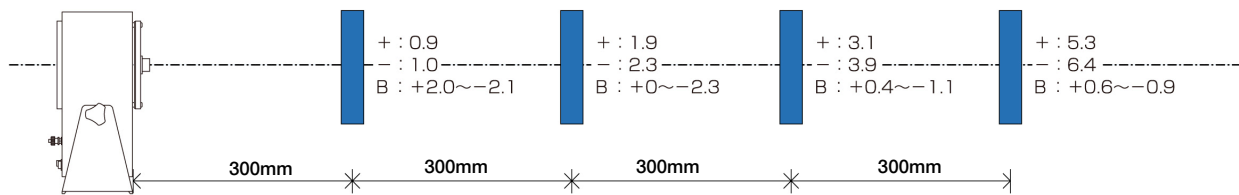
Dimensions 15.0cm W x 23.6cm H x 9.4cm D (housing only)
Weight Approximately 1.9kg (stand included)

AC/DC adapter (standard accessory)
Input Voltage 100 to 240V AC, 47 to 63Hz, IEC 320 C6 connector,
24V DC output

Dimensions Approx. 4.4cm W x 2.8cm H x 9.6cm L (without plug & cord)
Weight Adapter approx. 150g, AC input cord approx. 160g



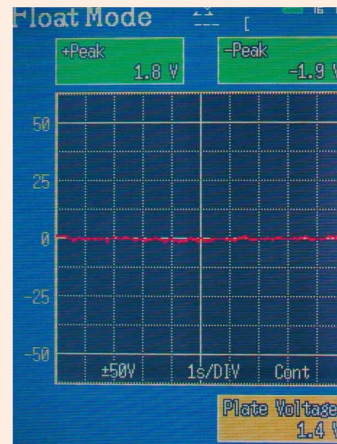
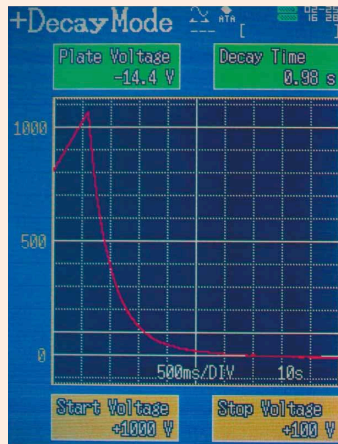
Typical Test Results (discharged time and discharged voltage balance at various distances from the Model 930 ionizer)



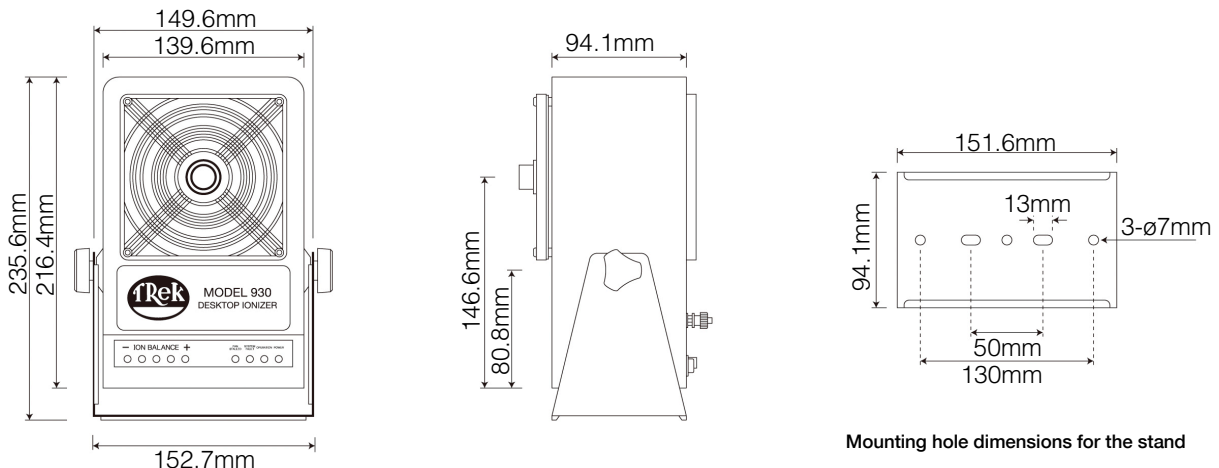
Legend: Position of charged plate monitor from the front face of Model 930 ionizer

Test Results:
+ = Positive charge decay time (sec)
- = Negative charge decay time (sec)
B = Bandwidth of ion balance voltage (most positive to most negative voltages)

Test Conditions:
Without fan filter
Airflow: Max.
Test data are typical measurement values



Displays of discharged time and voltage balance characteristic data at a distance of 300mm from the front side of the Model 930 ionizer, using Trek Model 158 charged plate monitor



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.



Please specify nozzle type(s) when ordering Model 950

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

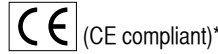
Operating Conditions – LED Indicators

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



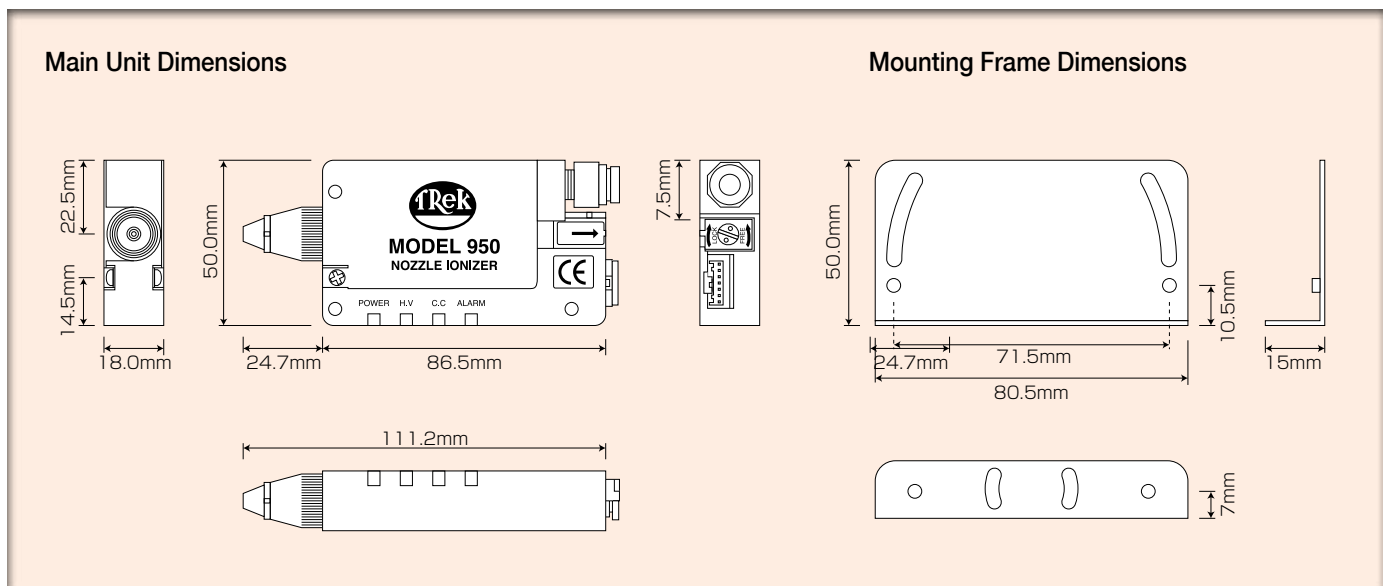
Shower nozzle
 950-60S



Flat nozzle
 950-F

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 | | |



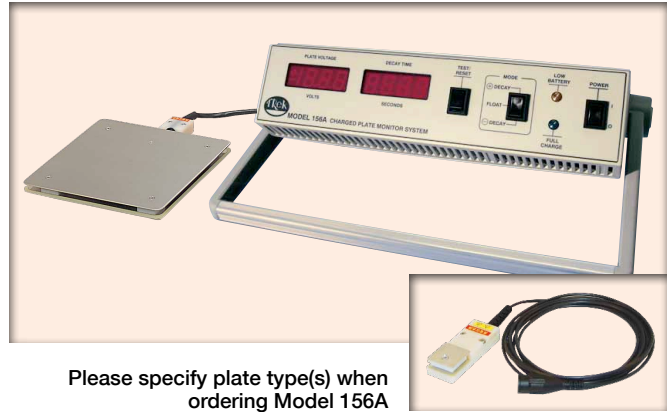
Model 156A Charged Plate Monitor

Features

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

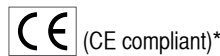
Specifications

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



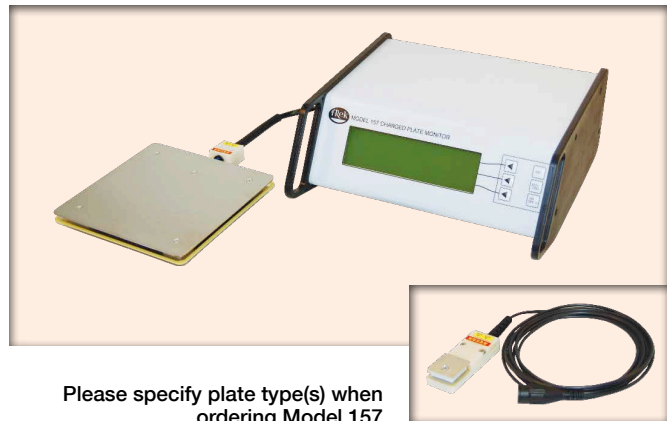
Model 157 Charged Plate Monitor

Features

- Compliance to IEC 61340 5-1
- 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

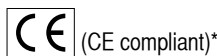
Specifications

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.



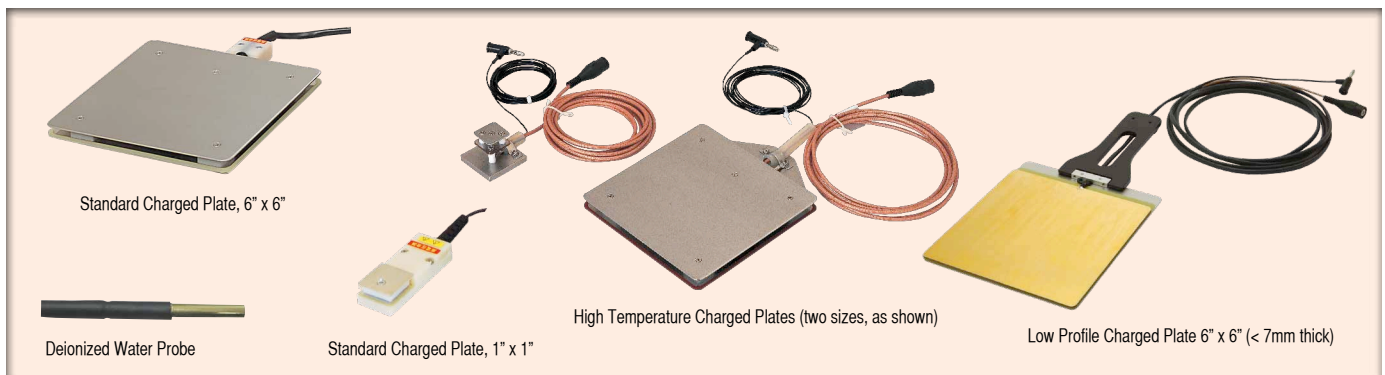
Please specify plate type(s) when ordering Model 157

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** ; Low Profile Charged Plate, 15cm x 15cm (6" x 6") - Model 156P-LP-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 156P-HT-25x25-S3M ** 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"

Deionized Water Probe

Standard Charged Plate, 1" x 1"

High Temperature Charged Plates (two sizes, as shown)

Low Profile Charged Plate 6" x 6" (< 7mm thick)

Model 901HS **NEW** 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)



CE (CE compliant)*

Model 901HS ESD Event Discharge Voltage vs. Detection Distance (Actual Test Situation)

| Distance (mm) | Discharge Voltage | | | | | | | | | |
|---------------|-------------------|-----|-----|-----|-----|-----|-----|------|------|------|
| | 10V | 20V | 30V | 40V | 50V | 60V | 80V | 100V | 150V | 200V |
| 50 | 1 | 1 | 2 | 2 | 4 | 5 | 5 | 5 | 5 | 5 |
| 60 | - | 1 | 1 | 2 | 3 | 4 | 5 | 5 | 5 | 5 |
| 70 | - | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 5 | 5 |
| 80 | - | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 5 |
| 90 | - | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 5 |
| 100 | - | - | 1 | 1 | 1 | 1 | 2 | 2 | 5 | 5 |
| 120 | - | - | - | 1 | 1 | 1 | 2 | 2 | 3 | 4 |
| 140 | - | - | - | 1 | 1 | 1 | 1 | 1 | 2 | 3 |
| 160 | - | - | - | - | 1 | 1 | 1 | 1 | 2 | 2 |
| 180 | - | - | - | - | - | 1 | 1 | 1 | 2 | 2 |
| 200 | - | - | - | - | - | 1 | 1 | 1 | 1 | 2 |
| 250 | - | - | - | - | - | - | 1 | 1 | 1 | 2 |
| 300 | - | - | - | - | - | - | 1 | 1 | 1 | 1 |
| 350 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| 400 | - | - | - | - | - | - | - | 1 | 1 | 1 |
| 450 | - | - | - | - | - | - | - | - | - | 1 |
| 500 | - | - | - | - | - | - | - | - | - | - |

Model 511 **NEW** Electrostatic Field Meter

Features

- Switch selectable measurement range
- Hand-held, portable, non-contacting
- Chopper-stabilized technology
- Reliable in ionized or non-ionized environments

Specifications

Measurement Range (per inch).....0 to ±2kV...OR... 0 to ±20kV

Measurement Accuracy

Voltage Monitor Output..... better than ±5% of reading, ±10mV

Voltage Display..... better than ±5% of reading, ±2 counts

Operating Conditions

Temperature..... 10 to 30°C

Relative Humidity..... to 80%RH, non-condensing

Power Supply..... 9V alkaline battery (1), included

Dimensions..... 2.4cm H x 7.0cm W x 12.6cm L

Weight..... 140g (with battery)



CE (CE compliant)*

An optional Ionizer Test Kit is available for Model 511. Please specify when ordering.

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 $10^{13} \Omega$
- 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

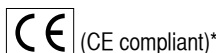
Measurement Range 10^3 to $10^{13} \Omega$
 (using probe 152BP-5P, 152P-2P, or 152P-CR-1)
 Test Voltage Select 10V or 100V ($\pm 2\%$) using the selection switch
 Power Supply Two 9V alkaline batteries provide approx. 6 hours of power for portable operation. AC line adapter available for all global areas.



Please specify probe type(s) when ordering Model 152-1

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 920 Combo Tester X3 (for wrist straps and foot wear)*

Features

- Simultaneous testing of operator's wrist strap and foot wear
- Test footwear on both feet independently
- Test single wire and double wire wrist straps
- Output function (relay contact for door operation or other control function)
- Select range values via DIP switch for IEC 61340 5-1, JIS and ANSI standards

Specifications

Upper and Lower Limit Setting
 Footwear Upper Limit 10, 35, 100, 1000M Ω
 Footwear Lower Limit 100, 750k Ω
 Wrist Strap Upper Limit 10, 35M Ω
 Wrist Strap Lower Limit Fixed to 750k Ω
 Measurement Voltage 30V
 Accuracy Less than 1M $\Omega \pm 5\%$, more than 1M $\Omega \pm 10\%$
 Operating Conditions Altitudes below 2000m
 Temperature 5 to 40°C
 Relative Humidity 80%RH max, up to 31°C
 (Lower than RH50% at 1G Ω measurements)
 Power Supply 1 universal AC/DC adapter (90 to 265VAC at 50 to 60Hz)
 Dimensions
 Main unit 14.0cm W x 3.0cm D x 8.7cm H
 Backplate (yellow) 30.7cm W x 0.6cm D x 25.6cm H
 Dual footplate 41.0cm W x 1.2cm D x 36.0cm H
 Weight
 Main unit plus backplate 700g
 Dual footplate Approx. 3.4kg



Model 920-1 Calibration Box for Model 920

Electrostatic Voltmeters: Measurement Distance & Measurement Area

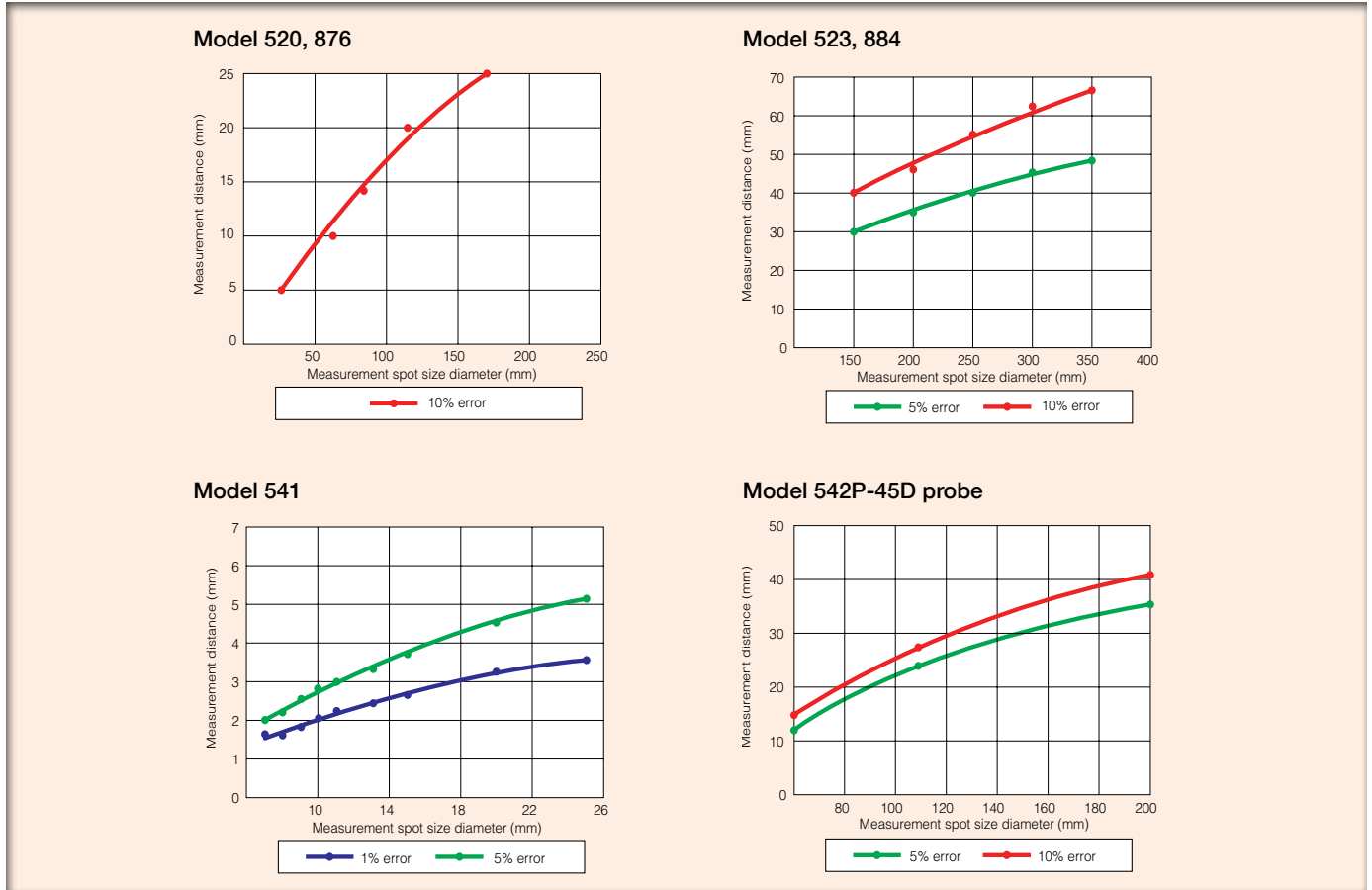


Figure 1. Spatial Resolution, Trek AC Feedback Electrostatic Voltmeter (i.e. Model 520)

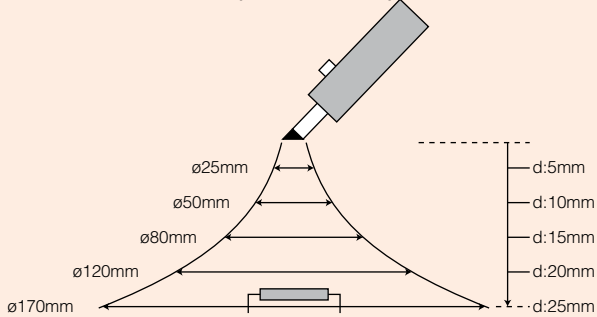


Figure 2. Spatial Resolution, Trek DC Feedback Electrostatic Voltmeter (i.e. Model 541)

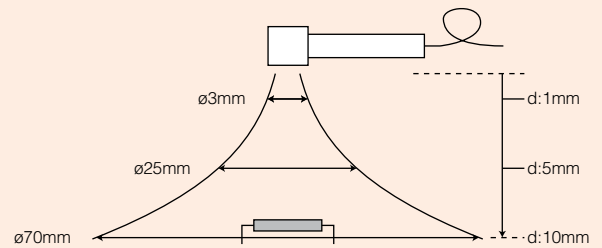


Figure 3. Measurement Accuracy vs. Measurement Distance

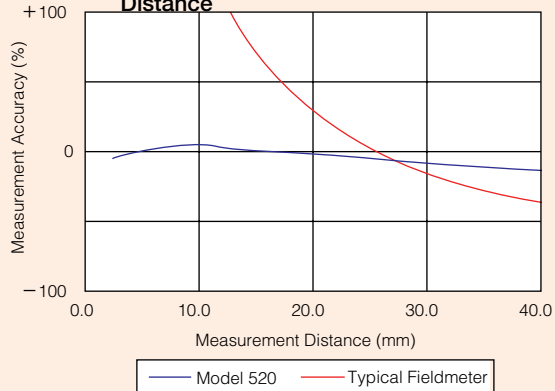
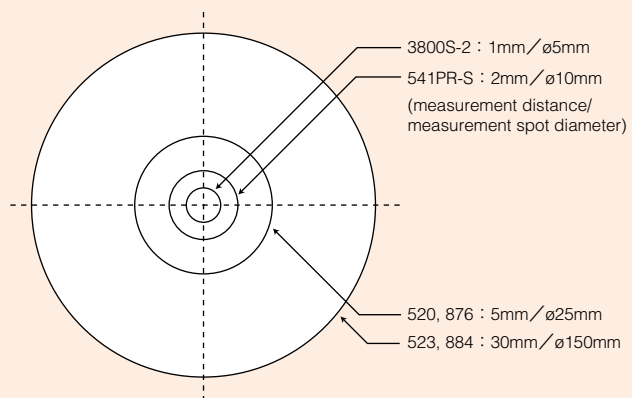


Figure 4. Spot Resolution at Selected Distances

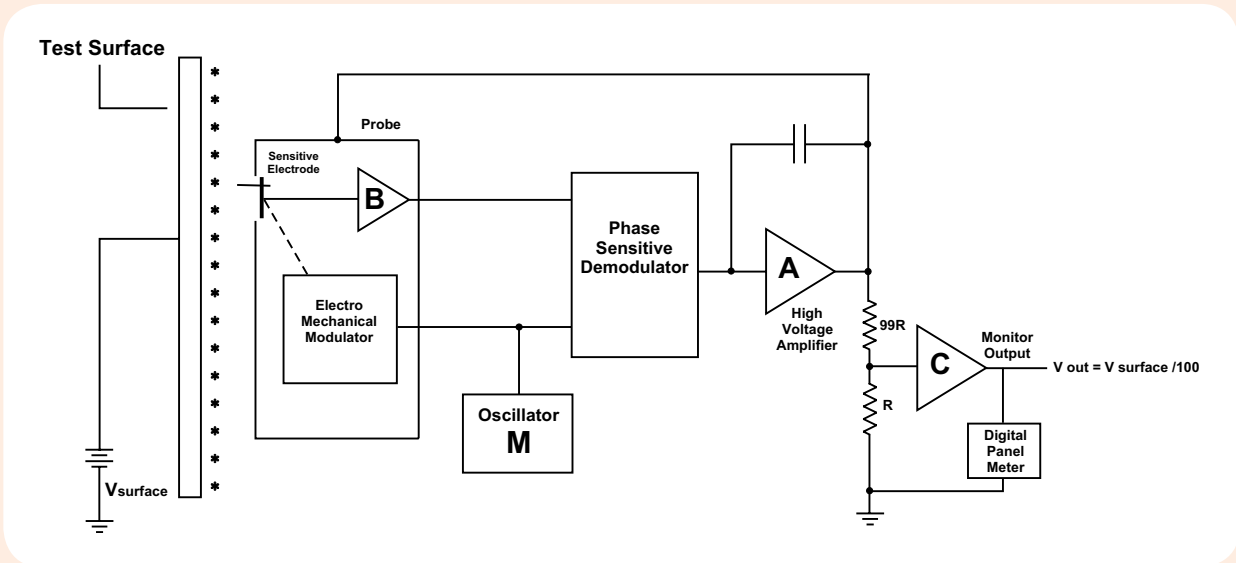


Theory of Operation – DC Feedback Electrostatic Voltmeter

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 40 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.

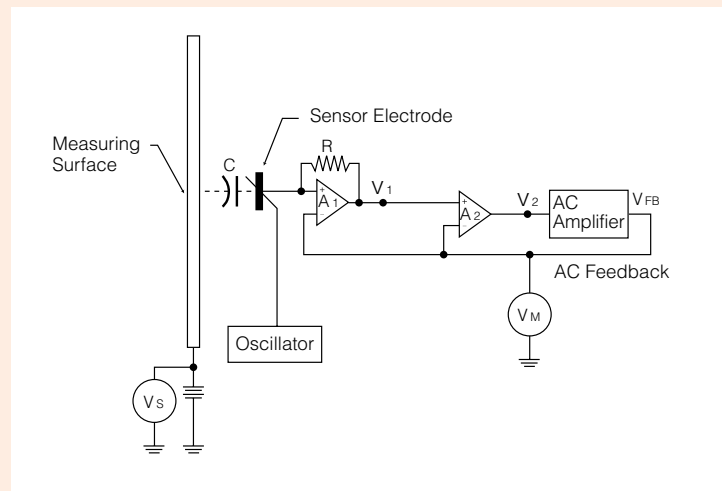
Figure 5. Theory of Operation – DC Feedback Electrostatic Voltmeter



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.

Figure 6. Theory of Operation – AC Feedback Electrostatic Voltmeter



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

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.

Updates from Trek

Trek sends out updates about the company's new products and other developments via email. Please send an email to Trek's Marketing Department to be added to the distribution list.

For Assistance

Sales Department: sales@trekinc.com
Customer Service Department: custserv@trekinc.com
Marketing Department: marketing@trekinc.com



TREK, INC.
11601 Maple Ridge Road
Medina, New York 14103 USA
Tel: 1 800 FOR-TREK (1 800 367-8735)
or (585) 798-3140
Fax: (585) 798-3106
Web: www.trekinc.com
Email Sales: sales@trekinc.com

TREK JAPAN KK
10F Aobadai Hills
4-7-7 Aobadai, Meguro-Ku
Tokyo, 153-0042, Japan
Tel: 81-3-3460-9800
Fax: 81-3-3460-9801
Web: www.trekj.com
Email Sales: sales@trekj.com



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