

# Model 325

## High-Sensitivity , DC Stable Electrostatic Voltmeter



The Trek Model 325 Electrostatic Voltmeter is a versatile instrument used for performing noncontacting electrostatic voltage measurements in applications which include contact potential (surface work function) determination, materials evaluation and electret studies. The Model 325 was specifically designed for high sensitivity applications to allow highly accurate, low noise, noncontacting measurement of electrostatic voltages of 0 to  $\pm 40$  V over a wide range of probe-to-surface distances.

Special features of the Model 325 allow adjusting the performance of the unit to compensate for specific test conditions. A calibrated Null Voltage supply of 0 to  $\pm 10$  volts nulls measured surface contact potential when measuring voltages on test surfaces. A response Speed Control adjusts the AC response of the Model 325. A Drift/Spacing Null Adjustment minimizes the variation in monitored voltage values as the probe to test surface spacing changes.

A dual range front panel 3½ digit LED display resolves  $\pm 10$  mV. The measured voltage can also be monitored through a precision 1:1 voltage monitor output and/or a 10:1 voltage monitor output.

Trek's patented low impedance probe sensor assures measurement accuracy which is essentially independent of probe-to-test-surface spacing while eliminating the external environmental effects of high humidity and contamination, such as airborne dust, toner, ions and chemicals, on measurement accuracy.

The Model 325 is bench top operable or, with optional hardware, in a half 9½-inch or standard 19-inch rack.

- **Measurement Range:**  
0 to  $\pm 40$  V DC or Peak AC
- **Sensitivity:** 1 mV
- **Noise:** Less than 1 mV rms, Referenced to Measured Voltage
- **High Speed of Response:**  
Less Than 3 ms for a 10 V Step
- **Voltage Monitor Accuracy:** Better Than 0.05% of Full Scale
- **Null Voltage Source:**  
0 to  $\pm 10$  Volt Calibrated Supply (nulls measured surface contact potential in reference to probe's gold sensing electrode)
- **Drift Spacing/Null Adjustment** (minimizes measured variations in voltage as probe to test surface spacing changes)
- **Voltage Monitor Outputs:**  
1:1 and 10:1 of measured voltage

# Model 325 Specifications

All specifications are with a Model PD1216P probe with a probe-to-surface separation of 0.4 mm.

## Performance

### Measurement Range

0 to  $\pm 40$  V DC or peak AC.

### Sensitivity

1 mV.

### Accuracy

#### Voltage Monitor Output

Better than  $\pm 0.05\%$  of full scale.

#### Voltage Display

Better than or equal to  $\pm 2$  counts, referred to the voltage monitor.

### Speed of Response (10% to 90%)

#### At Fastest Speed Setting

Less than 3 ms for a 10 V step.

#### At Slowest Speed Setting

Less than 5 ms for a 10 V step.

### Noise (typical)

Less than 1 mV rms, referenced to measured voltage.

### Stability

#### Drift with Time

Less than 50 ppm/hour, noncumulative.

#### Drift with Temperature

##### 1:1 monitor output

Less than 50 ppm/ $^{\circ}$ C.

##### 10:1 monitor output

Less than 100 ppm/ $^{\circ}$ C.

## Features

### Null Voltage Source

A calibrated 10-turn dial representing a 0 to  $\pm 10$  volt supply with switch selectable polarity, is used to produce zero volts output when the probe is coupled to a known zero volt surface. It is also used to null contact potentials on measured surfaces relative to the probe's gold sensitive reference electrode.

#### Range

$\pm 10$  volts

#### Accuracy

1%

#### Resolution

10 mV.

## Features (cont.)

### Drift/Spacing Null Adjustment

This back panel adjustment minimizes the variation in monitored voltage values as the probe to test surface spacing changes.

### Voltage Display

#### 3½ digit LED display.

##### Range

Switch selectable for  $\pm 10$  V or  $\pm 40$  V full scale.

##### Resolution

###### 10 V Range

0.01 V.

###### 40 V Range

0.1 V.

##### Zero Offset

$\pm 2$  counts, referred to the voltage monitor.

##### Sampling Rate

3 readings per second.

### Voltage Monitor Output (1:1)

A buffered 0 to  $\pm 40$  V output provides a replica of the measured voltage.

#### Scale Factor

1:1 of the measured voltage.

#### Output Noise

Less than 1 mV rms (measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter).

#### Output Current

5 mA minimum.

#### Output Impedance

100  $\Omega$ , nominal.

### Voltage Monitor Output (10:1)

A buffered 0 to  $\pm 4$  V output providing a replica of the measured voltage.

#### Scale Factor

10:1 of the measured voltage

#### Output Current

5 mA minimum.

#### Output Impedance

0.1  $\Omega$ , nominal.

## Features (cont.)

### Response Speed Control

A front panel potentiometer that adjusts the AC response of the Model 325.

## Probe

During operation, the metallic surfaces of the probe are driven to voltage levels equal to the measured surface voltage value, therefore, the probe holding fixture must be of an insulating material of approximately  $10^7$  to  $10^{11}$  ohms/square. Phenolic or other dissipative type material is recommended to avoid any fixture charge retention.

### Probe-to-Surface Separation

0.2 mm to 2 mm (recommended).

### Model PD1216P Sensor Probe

#### Aperture Orientation

Side viewing.

#### Aperture Size

4.6 mm (0.18").

#### Probe Body Type

Round body.

#### Dimensions

10 mm Diameter x 56 mm L (0.4" Diameter x 2" L).

### Probe Cable Length

2743 mm  $\pm 127$  mm (9 ft  $\pm 5$ ").

## General

### Dimensions

108 mm H x 223 mm W x 370 mm D (4.25" H x 8.75" W x 14.5" L).

### Weight

3.6 kg (8 lb).

### Voltage Monitor Connector

BNC connector.

### Ground Receptacle

Banana jack.

### AC Line Cord Receptacle

Standard three-prong line cord with integral fuse holder.

### Line Supply

90 to 127 V AC at 48 to 63 Hz (optionally available at 180 to 250 V AC at 48 to 63 Hz).

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## Model 325 Ordering Information

### Item

Model 325-L (90 to 127 V AC) ..... 325-L  
Model 325-H (180 to 250 V AC) ..... 325-H

### Part No.

## Probe

Model PD1216P High-Sensitivity Probe ..... PD1216P

## Trek Certification

TREK, INC. certifies that each Model 325 is tested and calibrated to specifications using measurement equipment traceable to the National Institute of Standards and Technology or traceable to consensus standards.



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