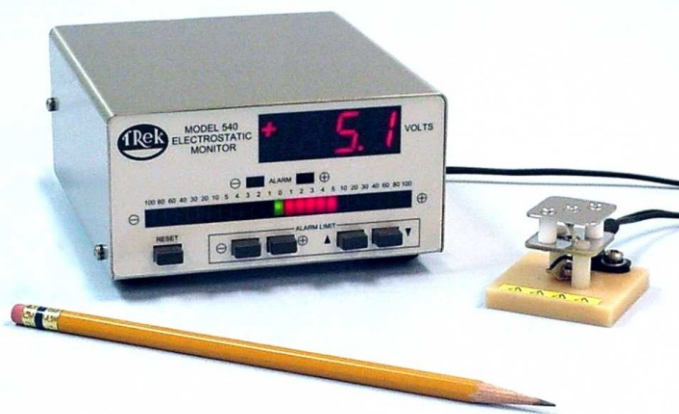


# **EOS/ESD Detection Series**

## **Model 540 Electrostatic Monitor**



The new TREK Model 540 Electrostatic Monitor improves production yields and/or product quality by monitoring air ionizer balance performance. The Model 540 is a versatile microprocessor based electrostatic monitor which is ideally suited to monitor the performance of air ionizers that are used in critical operations associated with semiconductor, LCD, electronic assembly, and other processes where static charge accumulations pose a threat to production yields and/or product quality.

The TREK Model 540 utilizes a new technique which requires less than 0.1 picoampere of ion current to be collected from the ion field to achieve full accuracy, stability and indicate ionizer output balance. Other product designs require up to 2000 times more ion current (0.2 nanoampere) to be unnecessarily drawn from the ion field. The ultra sensitivity of the Model 540 makes this product the only choice in air ionizer monitor applications where small area ion collecting sensors are used to meet the requirement for high accuracy ion balance measurement to levels of less than one volt.

An analog voltage output provides a signal for a facility monitoring system or for use as a feedback signal to control the ion balance of the ionizer. An optional 4-20 mA current output is available to transmit data over long distances in noisy environments.

The Model 540 features a DPM and a bar graph display for local presentation of the monitored voltage. An alarm feature provides audible and visual warnings when the monitored voltage exceeds preset voltage thresholds, which can be set with 1 volt resolution for both positive and negative polarities.

**INFINITE input resistance design**

**Less than 0.1 picoampere ion current required for full accuracy and stability**

**More than 2000 times more sensitive than competing designs**

**3½ Digit DPM displays present voltage readings with 0.1 V resolution**

**LED bar graph displays present voltage and holds most positive (+) and most negative (-) voltage values**

**Programmable audio/visual alarms**

**DC stable in ion fields**

**Bandwidth greater than 2.5 kHz**

**Measurement range ±100 V DC or peak AC**

**CONTROL WITHOUT COMPROMISE**



# Model 540 Electrostatic Monitor Specifications

## Performance

### Monitored Voltage Range

0 to  $\pm 100$  V DC or peak AC.

### Voltage Measurement Accuracy

0.2% of full scale.

### Large Signal Bandwidth (1% distortion)

DC to greater than 200 Hz.

### Small Signal Bandwidth (-3 dB)

DC to 2.5 kHz.

### Stability

#### (referred to floating plate voltage)

##### Self Drift with Time

(no incident ion flow)

Less than 32 mV/s.

##### Self Drift with Time

(with incident ion flow)

Negligible.

##### Drift with Temperature

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

### Floating Plate Self-Discharge Rate

Less than 2 V per minute at 100 V for relative humidity up to 65%.

### Floating Plate Capacitance to Ground

Maintained at  $20 \text{ pF} \pm 5 \text{ pF}$ .  
Capacitance is independent of floating plate connecting cable length.

## Features

### LED Bar Graph Voltage Display

A red LED for each of the following voltages:

-100V, -80V, -60V, -40V, -30V, -20V, -10V, -5V, -4V, -3V, -2V, -1V, 0V (green LED), +1V, +2V, +3V, +4V, +5V, +10V, +20V, +30V, +40V, +60V, +80V, +100V.

The present voltage value is indicated by illumination of all LEDs from zero to the present voltage value (AC response).

#### Peak-hold

The most positive voltage and most negative voltage measured will cause that particular LED to remain illuminated to indicate peak measured values. The peak-hold LEDs are reset by the Alarm Reset.

## Features (cont.)

### 3½ Digit Voltage Display

Displays precise voltage at plate/antenna to 100.0 V.

#### Display Accuracy

0.2% of full scale,  $\pm 1$  count, referenced to output monitor.

#### Display Resolution

0.1 V.

### Alarm Output (Digital Alarm)

The terminal block alarm output is a logic-level output indicating the alarm status of the Model 540. A TTL low (0 to 0.8 volts) signals an alarm condition. A TTL high (2.5 to 5.0 volts) indicates a normal condition.

### Output Monitor

The voltage at this connector is 1/10th or 1/20th (customer specified) of the measured plate voltage. Factory setting is 1/20th. Other ratios are available.

#### Accuracy

0.2% of full scale.

### Current Output (optional)

Provides a current of +4 mA to +20 mA that represents -100 to +100 volts.

### Visible Alarm Indicators

Separate LEDs for positive and negative alarm limit indication. ALARM LEDs flash when the programmed alarm threshold voltages are reached.

### Audible Alarms

A pulsating tone is sounded when the programmed voltage limit is detected. Different tone rates are used for the (+) and (-) alarms. Audio alarms can be disabled.

### Reset Button

A reset button zeros the floating plate/antenna sensor and resets the peak-hold indicators. The alarms (visual and audible) can be user programmed to reset either automatically, upon the measured value falling below the threshold value, or upon manual reset.

## Features (cont.)

### Ground Connector

Banana jack.

### Alarm Limit Programming

The positive and negative alarm limit thresholds can be independently programmed over the range of 1 volt to 100 volts in 1 volt increments.

### Sensor Type (ordered separately) Collecting Plate

(Trek Model 540P)

25 mm x 25 mm (1" x 1").

### Antenna Sensor

Detects the presence of charged objects.

## General

### Dimensions

120 mm W x 71 mm H x 140 mm D  
(4.75" W x 2.8" H x 5.5" D).

### Weight

0.6 kg (1.4 lb).

### Power

The Model 540 requires an AC adapter with a 2.1 mm DC power plug to supply 15 V DC  $\pm 20\%$ , at 500 mA. Other voltage inputs are optionally available.

### Plate/Antenna Input Connector

BNC connector.

### Operating Conditions

#### Temperature

5  $^{\circ}$ C to 35  $^{\circ}$ C.

#### Relative Humidity

To 85%, noncondensing.

### Certification

TREK, INC. certifies that each Model 540 is tested and calibrated to specifications using measurement equipment traceable to the National Institute of Standards and Technology or traceable to consensus standards.

*NOTE: The Model 540 is designed to make electrostatic voltage measurements only! For safety, the Model 540 should never be used to perform measurements of "hard" voltage sources or voltage sources which can deliver currents high enough to cause harmful shocks or personal injury.*

