TSI’s Aerosol Electrometer Model 3068B provides accurate measurements of the total net charge on aerosol particles with a sensitivity of better than ±1 femto Ampere (fA) RMS with a one-second averaging time. It is used for the calibration of submicrometer particle detection devices in reference institutes around the world. Compared to other electrometers, it has a huge dynamic range with no range-switching necessary. It also includes temperature stabilization circuitry that allows it to have very low temperature drift over its operational temperature range.

**Applications**
- Instrument calibrations such as Condensation Particle Counter calibration
- Particle concentration measurements
- Particle charge and charge ratio experiments
- Submicrometer filter-efficiency tests
- Certain types of submicrometer size-distribution measurements

**Features and Benefits**
- Provides readings in real time
- High sensitivity: ±1 fA
- Wide dynamic range with no range settings (±12,500 fA)
- Temperature stabilized to significantly reduce drift
- Automatic flow control (0.3 to 10 L/min) when used with external vacuum source
- Fundamental particle concentration measurement when used with a TSI Electrostatic Classifier
- Wide particle size range (0.002 to 5.0 µm)
When paired with a TSI Electrostatic Classifier, the Aerosol Electrometer measures the number concentration of monodisperse aerosol. This configuration is used primarily for calibrating and testing particle instruments like Condensation Particle Counters. Data are presented as an analog voltage output, on the front-panel display in real time, or through the RS-232 serial or USB interfaces. This electrometer is supported by the Aerosol Instrument Manager® software to allow data to be collected, stored, and exported.

**Operation**

Aerosol is drawn into the Model 3068B by an external pump. A built-in thermal flowmeter and proportional valve controlled by a microprocessor maintain the user-set volumetric aerosol sample rate, \( q \). An electrically-isolated, high-efficiency filter collects the charged particles. Then, a highly sensitive electrometer measures the electrical current, \( I \), draining from the filter.

A front-panel display and membrane switches provide an easy-to-use interface. The two-line display provides a real-time readout of total current and flow. If a classifier is used and the average particle charge is known, the display will also provide an indication of particle concentration, avoiding a manual calculation. The calculation is based on the equation below.

User menus allow the flow to be set anywhere between 0.3 and 10 L/min and then controlled automatically. Averaging time can be set on the display from 1 to 60 seconds, and the analog output can be configured for a variety of ranges. In addition, other parameters, including temperature and pressure, may be displayed (refer to instrument schematic on next page).

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**Operational Calculations**

\[
N = \frac{I}{e \times n_p \times q_e}
\]

Where:
- \( N \) = particle number concentration (particles/cm\(^3\))
- \( e \) = elementary unit of charge, \( 1.602 \times 10^{-19} \) Coulombs
- \( n_p \) = number of charges per particle
- \( q_e \) = flow rate (cm\(^3\)/sec)
- \( I \) = electrical current (Amps)
Instrument Schematic for Aerosol Electrometer Model 3068

- Model 4140 Flowmeter
- Proportional Solenoid Valve
- External Vacuum Pump
- Exhaust
- Signal Output
- Signal Processor
- Ground
- Faraday Cup
- Insulator
- Filter
- Inner Housing
- Shield Housing
- Sample Inlet 0.3 to 10 L/min
**Primary Measurement**
Particle total charge indicated by current

**Displayed Values**
Particle current or calculated number concentration (based on user specified charge/particle) and flow rate

**Sensitivity**
\[ \pm 1 \times 10^{-15} \text{ A (} \pm 1 \text{ fA)} \text{ RMS at 1 sec averaging time} \]

**Measurement Range**
\[ \pm 12,500 \text{ fA} \]

**Step Response Time**
< 2.5 sec

**Temperature Drift**
< \pm 2 \text{ fA} in 24 hours over operational temperature range

**Operational Temperature Range**
5 to 35°C (ambient)

**Storage Temperature Range**
-20 to 50°C

**Operational Humidity Range**
0 to 90% RH (ambient), noncondensing

**Aerosol Sample Rate**
Automatic flow control from 0.3 to 10 L/min using external vacuum source; manual flow settings available for increased flow accuracy

**Flow Accuracy**
0.3 to 2 L/min (±3%); 2.0 to 10 L/min (±5%)

**Particle Size Range**
0.002 to 5 μm

**Particle Type**
Solids and nonvolatile liquids

**Dimensions (H x W x D)**
196 × 213 × 304 mm (7.7 × 8.4 × 12 in.)

**Weight**
4.5 kg (9.9 lb.)

**Power requirement**
50 to 60 Hz, 100/120/230/240 VAC, 0.1/0.1/0.05 0.05 A

**Vacuum requirements**
Vacuum that can produce 10 L/min at a pressure drop of 114 cm of water (to produce full flow)

**Front Panel Output**
Two-line LCD alphanumeric display, keypad

**Software**
Aerosol Instrument Manager software supplied with instrument (RS-232 and USB-compatible)

**Interface**
Membrane touch-panel

**Communications**
RS-232 and USB

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**TO ORDER**

**Aerosol Electrometer**
Specify | Description
--- | ---
3068B | Aerosol Electrometer

**Accessories**
Specify | Description
--- | ---
3033 | Vacuum Pump
3082 | Electrostatic Classifier Platform
3081A | Long Differential Mobility Analyzer (DMA)
3085A | Nano DMA

Accessories must be ordered separately

Specifications are subject to change without notice.

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