



® Knowledge Beyond Measure.

Aerosol Electrometer

Model 3068B



Measures net charge or concentration of generated aerosols

TSI's Aerosol Electrometer 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.

Features and Benefits

- Provides readings in real time
- High sensitivity: ± 1 fA
- Wide dynamic range with no range settings ($\pm 12,500$ 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)

Applications

- Instrument calibrations such as Condensation Particle Counter calibration
- Particle concentration measurements
- Submicrometer filter-efficiency tests
- Certain types of submicrometer size-distribution measurements



Accurate, Measurements of Electrical Current, Flow Rate, and Total Net Charge on Particles 0.002 to 5 µm in Size

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).

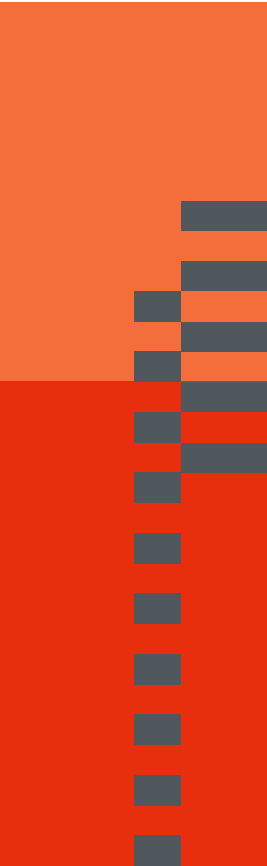
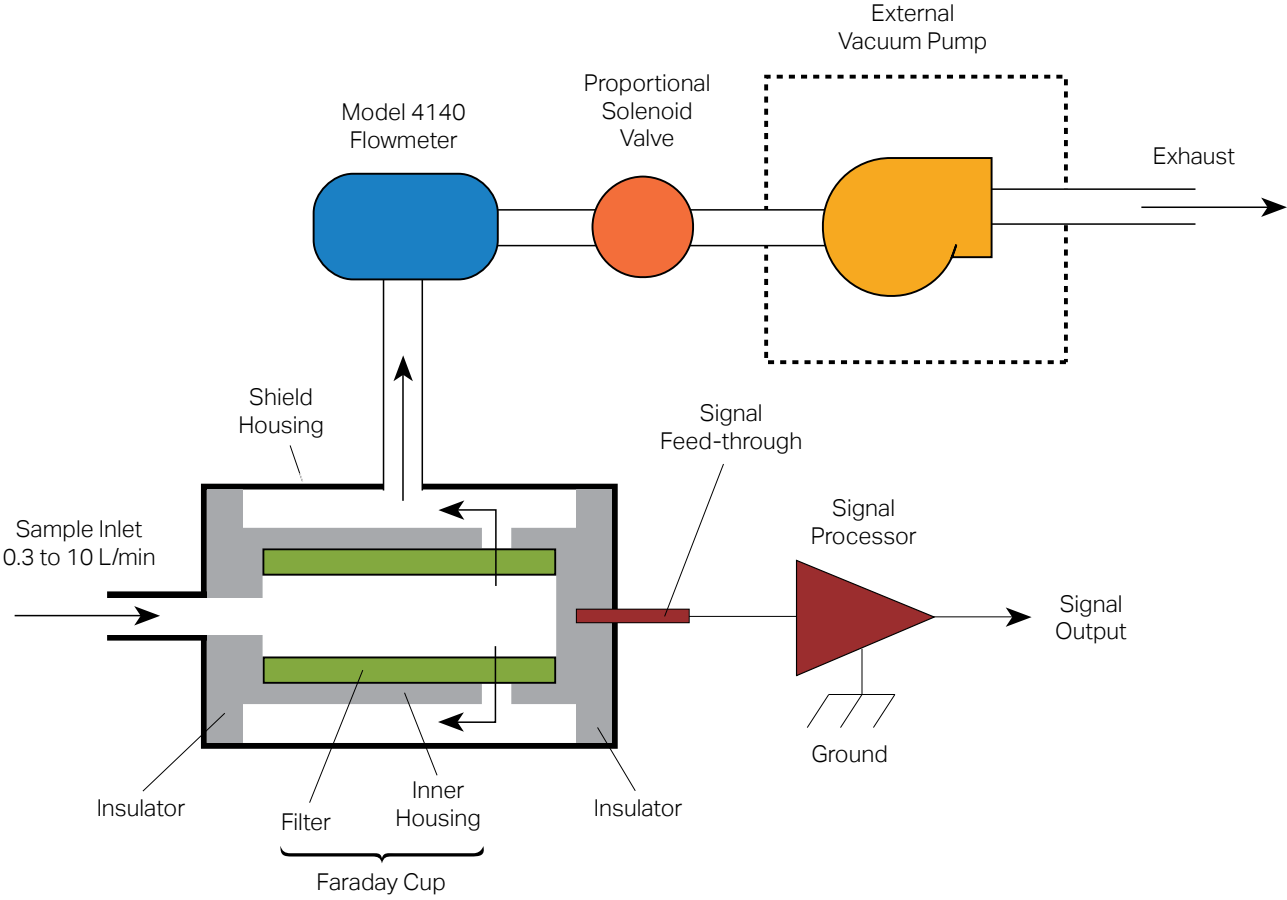
Operational Calculations

$$N = \frac{I}{e \times n_p \times q_e}$$

Where:

- N = particle number concentration (particles/cm³)
- e = elementary unit of charge, 1.602×10^{-19} Coulombs
- n_p = number of charges per particle
- q_e = flow rate (cm³/sec)
- I = electrical current (Amps)

Instrument Schematic for Aerosol Electrometer Model 3068



Specifications

Aerosol Electrometer

Model 3068B

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

$\pm 1 \times 10^{-15}$ A (± 1 fA) RMS at 1 sec averaging time

Measurement Range

$\pm 12,500$ fA

Step Response Time

<2.5 sec

Temperature Drift

$< \pm 2$ 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), non-condensing

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 ($\pm 3\%$); 2.0 to 10 L/min ($\pm 5\%$)

Particle Size Range

0.002 to 5 μm

Specifications are subject to change without notice.

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Particle Type

Solids and nonvolatile liquids

Dimensions (H x W x D)

19.6 x 21.3 x 30.4 cm (7.7 x 8.4 x 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

To Order

Aerosol Electrometer

Specify	Description
3068B	Aerosol Electrometer

Accessories

Specify	Description
3033	Vacuum Pump
3082	Electrostatic Classifier
3081A	Long Differential Mobility Analyzer (DMA)
3085A	Nano DMA



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