AEROSOL ELECTROMETER MODEL 3068B

MEASURES NET CHARGE OR CONCENTRATION OF GENERATED AEROSOLS

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)

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).

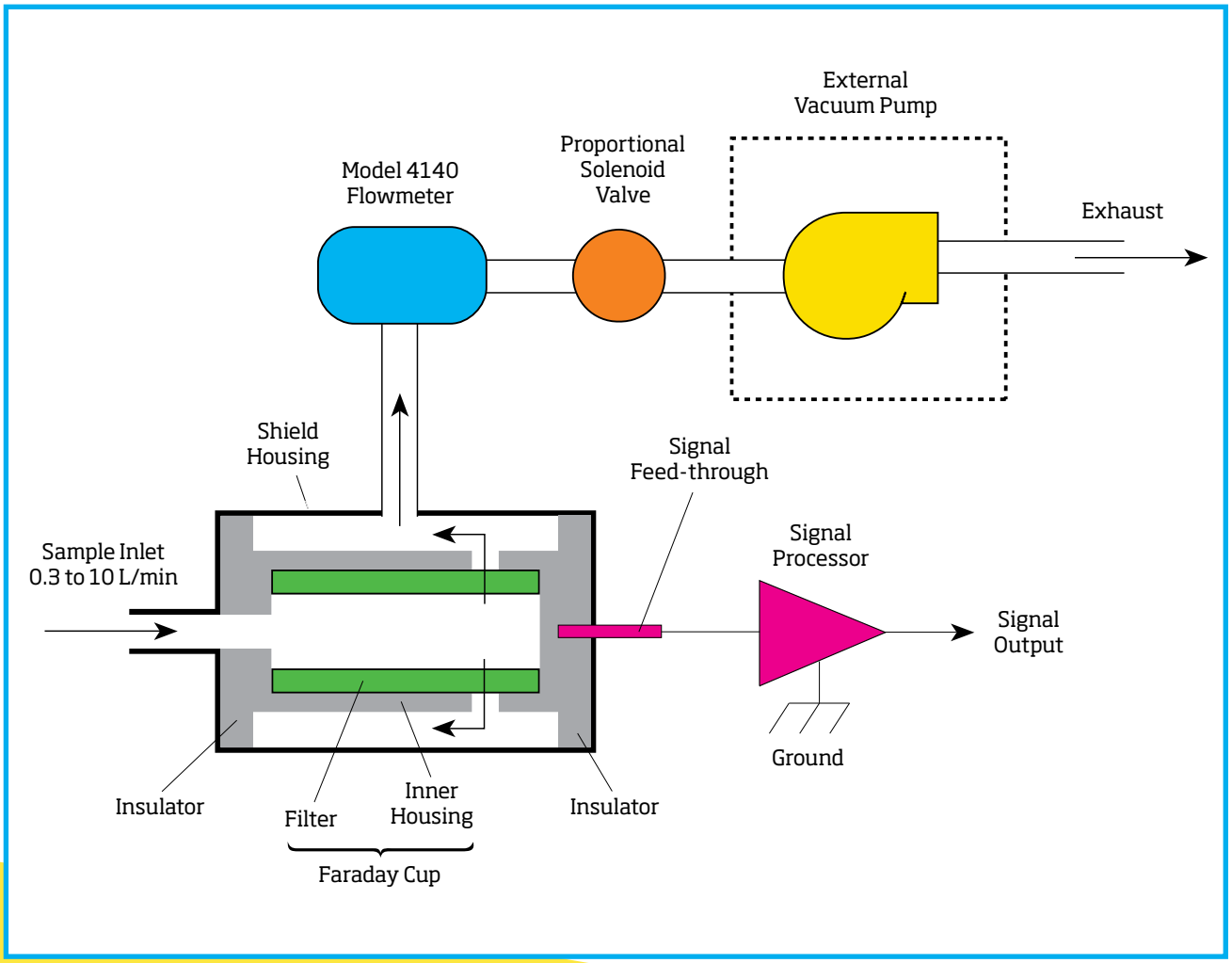
Operational Calculations

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

Where:

N	=	particle number concentration (particles/cm^3)
e	=	elementary unit of charge, 1.602 × 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



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
±12,500 fA

Step Response Time
<2.5 sec

Temperature Drift
< ±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), 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

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.

UNDERSTANDING, ACCELERATED

TSI Incorporated - Visit our website **www.tsi.com** for more information.

USA	**Tel:** +1 800 874 2811	**India**	**Tel:** +91 80 67877200
UK	**Tel:** +44 149 4 459200	**China**	**Tel:** +86 10 8219 7688
France	**Tel:** +33 1 41 19 21 99	**Singapore**	**Tel:** +65 6595 6388
Germany	**Tel:** +49 241 523030		

P/N 5001471 Rev E (A4) Printed in U.S.A.