

ADVANCED MEASUREMENT OF AEROSOL BLACK CARBON



AE33

AETHALOMETER®

Advanced
Black Carbon
Measurement

KEY FEATURES

- Full Spectrum 7-Wavelength analysis: UV – IR, 1 Hz data rate
- DualSpot™ Technology for filter loading effect compensation
- Real-time source apportionment
- Calibration and Validation by ND optical kit
- Network ready for remote management and data transfer
- Integrates with Total Carbon Analyzer TCA08 for OC/EC analysis
- Integrates with CO2 and meteorological sensors for additional data
- Integrates with an external pump for High altitude BC monitoring

APPLICATIONS

- Air Quality monitoring
- Real-time source apportionment
- Emissions testing
- Climate Change research
- Health Effects research
- Combustion research

PRODUCT SPECIFICATIONS

MEASUREMENT PRINCIPLE

Continuous collection of aerosol on filter with simultaneous measurement of attenuation of transmitted light at wavelengths of 370, 470, 520, 590, 660, 880 and 950 nm. Black Carbon concentration measurement is defined by the absorption measurement at 880 nm. Multiple wavelength analysis for source apportionment (identification of biomass smoke), studies of aerosol light absorption, radiative transfer, atmospheric optics. High data rate capability for source and emissions testing.

DUALSPOT™ TECHNOLOGY

Simultaneous analysis of light absorption by aerosol deposits collected on 2 spots in parallel at different loading rates. Mathematical combination of data yields Black Carbon result independent of spot loading effects and provides additional information about aerosol composition.

SOURCE APPORTIONMENT

Discrimination of Black Carbon from fossil fuel versus biomass combustion possible with built-in analysis by a two-component model.

SENSITIVITY

Proportional to time-base and sample flow rate settings: approximately 0.03 µg/m³ @ 1 min, 5 LPM.

DETECTION

Detection Limit (1 hour): <0.005 µg/m³
Range: <0.01 to >100 µg/m³ Black Carbon
Resolution: 0.001 µg/m³ or 1 ng/m³

SAMPLING

Aerosol sample collected on filter tape consisting of PTFE-coated glass fibers, supported by a reinforcement backing. Tape advances automatically when user selectable loading threshold is reached, typically once every few hours depending on concentration and flow rate. Size selective inlets (impactor, cyclone) may be attached.

- Time-base 1 second or 1 minute, post-processing to any time resolution
- Flow-rate 2 to 5 LPM provided by internal pump.
- Flow measured by two mass flow sensors and stabilized by closed-loop control.

OPERATOR INTERFACE

Display

8.4" color touch-screen with status indicator LED's.

Interface

Graphical User Interface with basic data display and control, advanced screens for detailed reporting and parameter setup.

Remote management

Network ready for remote management and data transfer.

STORAGE

Data are written to internal memory once every time-base period. Stored data may be transferred over a network or to a manually inserted USB drive.

DATA OUTPUT

- Digital data via RS-232 COM port and Ethernet
- Analog output via AOM module

QUALITY CONTROL AND ASSURANCE

Automatic or manual sample flowrate calibration using an externally-attached calibrator. Verification of optical performance using a set of neutral density optical filters. Automatic or manual Dynamic Active Zero and stability tests may be programmed to occur at specified time intervals.

PHYSICAL SPECIFICATIONS

- Dimensions (HxWxD): 28 × 43 × 33 cm
- Weight: 21 kg
- Electrical Power supply:
- AC: 100-230VAC, 50/60Hz (auto-switching)
- Power consumption: 25 W average
- Internal Vacuum Pump:
dual diaphragm, brushless motor
- Modular hardware, constructed in a fully-enclosed 19" rack mount 6U chassis, hermetically sealed

RELATED PRODUCTS

AEccessor remote access from PC

Integrates with Total Carbon Analyzer TCA08 for OC/EC analysis

Aerosol Inlet Dryer including external pump

INSTALLATION REQUIREMENTS

- Temperature: 5°C - 55°C
- Rel. humidity: 5% - 95% (non-condensing)
- Operating altitude: Sea Level to 3000 m
(Operating range can be extended to 5000 m a.s.l. with an external air pump – optional accessory)

AETHALOMETER® AE33

ACCESSORIES

Neutral Density Optical Filter validation kit

Ambient meteorological sensor with 10-m cable

Wind speed and direction sensor

Sample stream dryer

PM2.5 inlet (2.5 µm @ 5 LPM)

PM1 inlet (1 µm @ 5 LPM, 2.5 µm @ 2 LPM)

CO₂ sensor integrated with AE33 airflow & data

Flow Calibrator ALICAT FP-25 (0.1-25 LPM)
Includes communication cable

Insect Screen Assembly with Water Trap

Tape Sensor Calibration Disc kit

GPS module

External pump for high-altitude operation