

The Thermo Scientific 8100 Aethalometer Module provides a cost-effective option to users of the TEOM monitor to automatically measure the concentration of black carbon in ambient particulate matter. The add-on is straightforward and requires very little maintenance.

## Thermo Scientific 8100 Aethalometer Module for TEOM Monitor



### Automatic Carbon Measurement

The Thermo Scientific 8100 Aethalometer™ Module provides a simple, cost effective means for automatically measuring the concentration of combustion-related aerosols in ambient air. The unit is a simple add-on to existing or new TEOM 1400ab Ambient Particulate Mass Monitors, and adds particulate black carbon information to the mass concentration values generated by the TEOM monitor.

### Black Carbon Sources

Aerosol black carbon (or BC) is a particulate pollutant species emitted from the combustion of any carbonaceous material. Carbonaceous particulate emissions from combustors include a wide range of components including soot, fuel molecule fragments, pyrolysis and reduction compounds, agglomerates, aerosols containing nitrogen

and sulfur, and almost every other organic species.

The overwhelming source of aerosol black carbon in the atmosphere is the combustion of carbonaceous fuels, with the following main contributors:

- Combustion of fuels for the generation of energy
- Biomass burning for agricultural purposes
- Naturally-occurring forest fires

The first two of these are the result of human (anthropogenic) activities, and are the major contributor of black carbon to the atmosphere.

### Key Features / Benefits

- Simple add-on to the bypass flow of TEOM Ambient Particulate Monitors and FDMS System
- Aethalometer technology quantifies the black carbon (BC) contained in ambient particulate matter
- Integration provides simultaneous PM and BC mass concentration data
- Low maintenance requirements

### 8100 Aethalometer Module

#### Performance Verification

- The performance of Aethalometer monitors from Magee Scientific have been verified by the USEPA Environmental Technology Verification (ETV) program. The Series 8100 Aethalometer Module contains the same technology incorporated in the evaluated instrumentation.
- Aethalometer monitors have been used in a large number of research projects whose findings are documented in peer-reviewed publications.

#### Regulatory Conformity

- CE: EN550011 Group 1, Class B (Emissions); EN55082-1 (Immunity); EN61010-1 (Safety).

#### Standard System Configuration

- Series 8100 Aethalometer Module with one full 15 m (50 foot) roll of filter tape installed, standard modular powercord with U.S. plug.
- 3 m (10 foot) cable to transmit BC information from the Aethalometer Module to the TEOM control unit.
- Two straight and two swivel elbow push-to-connect fittings integrate the unit with the TEOM monitor's ambient bypass flow line.
- Fixtures to support the leak check procedure.
- User's guide.
- Customer quality assurance (QA) report.
- RS232 connector, 3 m (10 foot) RS232 cable, and CD-ROM for PC-based configuration of the unit (usually not needed).

#### Time and Measurement Resolution

- Time base: 5-minute average black carbon mass concentration updated on a rolling basis every minute.
- Black carbon detection: 0.1  $\mu\text{g}/\text{m}^3$  (2s) for 5-minute averaged data.

#### Black Carbon Sensing Components

- LED (light emitting diode) light source operating at 880 nm (near infrared).
- Photodiode located beneath the aerosol collection spot on the filter tape to detect black carbon deposit.
- Photodiode located beneath a clean portion of the filter tape provides a reference reading.
- Firmware periodically turns off the LED to measure the zero base line using the two photodiodes.

#### Filter Tape

- Special construction consisting of quartz fiber material attached to a webbed backing.
- Length of filter tape spool: approximately 15 m (50 feet).
- Capacity: approximately 1500 aerosol collection spots, generally sufficient for 6 to 18 months of operation.

#### Installation Requirements

- Non-condensing weather protected environment, 5-40 °C.

#### Software and Documentation

- Embedded firmware controls all aspects of the Aethalometer Module's operation.
- RS232 port on rear panel, supplied RS232 cable, and CD-ROM for Windows®-based PC's provide advanced configuration capabilities (not required to set up or normal operations of the BC monitor).
- User's guide.

#### Physical Dimensions and Power Requirements

- Enclosure: H: 28 cm (11") x W: 18.6 cm (7.3") x D: 28 cm (11").
- Electrical input: 90-264 VAC, 47-63 Hz through standard three-prong IEC-320-C13 connector with fuse.
- Power requirements: maximum 0.35 A @ 120 VAC (0.2 A @ 240 VAC), typical 0.15 A @ 120 VAC (0.08 A @ 240 VAC)

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