

# Online Speciation of Carbonaceous Aerosols



## Carbonaceous Aerosol Speciation System – ‘CASS’

### KEY FEATURES

- Continuous analysis of Carbonaceous Aerosols
- Online determination of OC/EC
- Online determination of TC, BC, BrC, %BB
- Sampling time 20 min to 24 hours
- Uses ambient air as carrier gas
- Rugged, all-steel construction
- Unattended operation of 1 month minimum

European Patent EP19213028.4 and other patents pending



Developed and manufactured in  
Europe by Aerosol d.o.o., Slovenia

### APPLICATIONS

- Air Quality monitoring
- Health Effects, Climate Change research
- Field measurement projects
- Emissions testing

# Product specifications

## BASIC DESCRIPTION

Real time/online **TC/BC/EC/OC** and **BrC** analysis with the Carbonaceous Aerosol Speciation System - CASS.

The Magee Scientific CASS is a revolutionary scientific instrument that measures TC/BC/EC/OC and BrC in near-Real-Time.

The equipment contains **no fragile glassware and requires no special gas supplies.**

In contrast to existing methods, the CASS offers greater reliability, greater flexibility, and very substantial operational cost savings for aerosol analysis.

\*European Patent EP19213028.4 and other patents pending

## MEASUREMENT PRINCIPLE

Optical Analysis of BC with continuous collection of aerosol on filter and simultaneous measurement of attenuation of transmitted light at wavelengths 370, 470, 520, 590, 660, 880 and 950 nm.

Thermal Analysis of TC with flash-heating of sample collected on a quartz filter to convert all Carbon to CO<sub>2</sub>.

The mathematical principle is simple:

Total Carbon (TC) =

Black (or Elemental) Carbon (BC, EC) + Organic Carbon (OC).

Measure TC with the TCA08;

Measure BC/EC with the AE33 Aethalometer;

Derive OC immediately in near-Real Time by subtraction:

OC = TC - EC.

The AE33 Aethalometer also identifies 'Brown Carbon' (BrC) by multi-wavelength optical analysis, to separate Biomass Smoke from Diesel Emissions.

## AE33 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.

\*United States Patent 8,411,272, United States Patent 9,018,583, other patents pending

## SOURCE APPORTIONMENT

Discrimination of Black Carbon from fossil fuel versus biomass combustion possible with built-in analysis by a two-component model in Aethalometer AE33.

## SPECIFIED PERFORMANCE OF AE33

Analytical sensitivity of BC - proportional to time-base and sample flow rate settings: ≈ 0.03 µg/m<sup>3</sup> @ 1 min, 5 LPM (or 0.015 µg/m<sup>3</sup> in HS mode)

Detection limit of BC (1 hour) <0,005 µg/m<sup>3</sup>

Detection range of BC: <0.01 to >100 µg/m<sup>3</sup>

## SPECIFIED PERFORMANCE OF TCA08

Analytical sensitivity of TC: <0.5 µg C

Detection limit of TC: <0.1 µg C/m<sup>3</sup> for 1-h timebase, 16.7 SLPM flow

Detection range of TC: <0.03 µg/m<sup>3</sup> to > 300 µg/m<sup>3</sup> Total Carbon

## SAMPLING FLOW RATES

Sampling flow rate of **BC/EC** adjustable from 2 to 5 LPM, provided by closed-loop stabilized internal pump and two mass flow sensors.

Sampling flow rate for **TC** of 16.7 SLPM (1 m<sup>3</sup>/h), provided by closed-loop stabilized internal pump.

## OPERATOR INTERFACE

### Display

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

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

Network ready for remote management and data transfer.

## DATA OUTPUT & STORAGE

### Output

Digital data via RS-232 COM port and Ethernet.

Network ready for remote management and data transfer.

### Timebase

BC/EC: 1-second (1 Hz) or 1 minute

TC/OC: 20 minutes to 24 hours

### 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.

## QUALITY CONTROL AND ASSURANCE

Automatic or manual sample flowrate calibration using an externally-attached calibrator.

Validation of optical performance using kit of NIST-traceable optical standards for BC.

Pre-programmed built-in zero air test - clean air test for TC and BC.

## PHYSICAL SPECIFICATIONS

- Dimensions: 78 x 48 x 57 cm
- Weight: 89 kg
- Electrical Power supply: 100-230VAC, 50/60Hz (auto-switching)
- Power consumption: 625 W
- Internal Vacuum Pump
- Modular hardware, constructed in a fully-enclosed 19" rack Mount chassis, hermetically sealed

## ACCESSORIES

**Neutral Density Optical Filter validation kit** (PN 7662)

**Ambient meteorological sensor** (PN 5510)

**PM2.5 inlet** (2.5 µm @ 5 LPM) (PN 4110)

**Flow Calibrator** (PN 7900)



Scan the code for more info

## GENERAL INQUIRIES:

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