

PAX

Photoacoustic Extinctionmeter



Outcome

Climate change is one of the greatest existential threats that mankind is currently facing and scientists around the world are racing to measure the optical properties of aerosols, especially black carbon, so that their impact on climate becomes more clearly identified. The Photoacoustic Extinctionmeter (PAX) provides the aerosol scattering, absorption and extinction coefficients, the parameters that climate models require. The equivalent black carbon (eBC) mass concentrations are derived from the absorption coefficient when employing the 870 nm PAX and from the 532 nm PAX is derived the equivalent brown carbon (eBrC). Its light weight and convenient size has made it the go-to instrument for installing in vehicles, on towers and anywhere that high quality, accurate measurements are needed of the optical properties of aerosol.

Overview

The Photoacoustic Extinctionmeter is a sensitive, high-resolution, fast-response instrument for measuring aerosol optical properties relevant for climate change and carbon particle sensing. This instrument directly measures in-situ light absorption and scattering of aerosol particles, from which it derives extinction, single scattering albedo and back carbon (soot) mass concentration. With no filter-media artifacts, the PAX provides a highly accurate measure of absorption from black carbon.

The PAX is available in three wavelengths depending on research objectives. The PAX 870nm wavelength is designed for absorption which is highly specific for black carbon (soot) particles; scattering best for large particles. The PAX 532nm wavelength measures within the visual range, typically what the human eye observes. The PAX 405nm wavelength is designed for absorption and correlates to the organic, or brown carbon content; this wavelength is efficient scattering for fine and ultra fine particles.

Applications

- Air quality and visibility
- Atmosphere and climate
- Mobile platform BC monitoring
- Health effects
- Combustion source emissions
- Biomass burning

Advantages

The PAX measures amplified pressure waves created when black carbon particles absorb light and heat the surrounding air. This approach mitigates the uncertainty of filter-based systems. The low power consumption, easy calibration, integrated data storage, user defined averaging periods, and continuous autonomous operation make the PAX the ideal solution for monitoring black carbon on a stationary or mobile platform.



Product Specifications

Measured Parameters:

- Absorption coefficient, Babs
- Scattering coefficient, Bscat
- Pressure
- Temperature
- Relative humidity

Derived Parameters:

- Black carbon (BC) mass
- Extinction coefficient, Bext
- Single scattering albedo, SSA
- Dew Point

Additional Specifications:

- Measurement range (Absorp and Scattering): $< 1 \text{ Mm}^{-1}$ - $100,000 \text{ Mm}^{-1}$ (870 nm, 60 sec. averaging)
- Angular integration for scattering: 6 to 174°
- Response time: < 19 sec; one second resolution
- Zero check: On demand or automate at user selectable intervals

Environmental Operating Conditions:

- Temperature: 0° - 40°C
- Relative humidity: 0-90% non-condensing
- IP20 rated

Data System and Power Requirements:

- Data system: PAX Maintenance Console (PMC) and software (included) Executable program in LabVIEW, external PMC software package for maintenance, data playback, and archiving.
- Power requirements: 90-264V, 47-63Hz (AC Power), or 12VDC

Weight:

- Instrument: 18kg
- Dimensions: 18cmH x 48cmW x 61cmD
- Rackmountable

Available Accessories

- Diffusion dryer (for high humidity environments)
- Filters (for zero cal)
- PM 1.0 or 2.5 cyclone
- Science Care Program
- 1 and 2 Year Extended Warranty
- Lifecycle Care Program

The Droplet Guarantee

Droplet understands how the versatility and performance of an instrument can impact your research, career, and the world we live in. As you strive to provide a better understanding of our planet, we guarantee to be here to support you through your journey.

Whether you are establishing your first laboratory or are a tenured researcher; we have a team of scientists, engineers, and technical staff available to assist with application questions, technical support, data analysis, and training.



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