microAeth® MA200 Black Carbon monitor







The microAeth® MA200 is a compact, real-time, wearable 5-wavelength UV-VIS-IR Black Carbon monitor with a 15 sampling location automatic filter tape advance system which allows for up to 2-3 weeks of continuous measurements.

The device is a self-contained instrument with built-in pump, flow control, data storage, and battery with onboard GPS, satellite time synchronization, accelerometer, altimeter/barometer, and sensors for relative humidity and temperature.

The MA200 is designed for on-person, mobile applications and multi-day / multi-week measurement campaigns with low-power operation.

The spectrum measurement provides insight into the composition of light absorbing carbonaceous particles and helps to distinguish among the different optical signatures of various combustion sources such as diesel, woodsmoke, biomass, and tobacco.

The instrument supports the DualSpot® loading compensation method which corrects for optical loading effects and provides additional information about aerosol optical properties.

Example Applications

Wearable personal monitoring	Mobile monitoring
Continuous real-time monitoring	Multi-week monitoring
Exposure assessment	Health effects
Occupational safety	UAVs & vertical profiling**
Source apportionment	Woodsmoke
Tobacco	Biomass

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Measurement Method	Real-time Aethalometer® method, 5 wavelength absorption analysis by measuring the rate of change of transmitted light due to continuous particle deposition on filter. Measurement at 880 nm interpreted as concentration of Black Carbon ('BC'). Measurement at 375 nm interpreted as Ultraviolet Particulate Matter ('UVPM') indicative of woodsmoke, tobacco, and biomass burning.
Measurement Wavelengths	880 nm, 625 nm, 528 nm, 470 nm, 375 nm
DualSpot® Loading Compensation	Real-time analysis by measuring the rate of change in absorption of transmitted light due to the continuous collection of aerosol on filter. Simultaneous collection on two spots in parallel at different flow rates.
Timebases	1, 5, 10, 30, 60, or 300 seconds
Flow Rates	Internal pump provides 50, 75, 100, 125, or 150 ml/min. DualSpot® compensation not compatible with all settings.
Measurement Range	Per sampling location, 0-1 mg BC/m^3, filter sampling location lifetime dependent on concentration and flow rate setting, decreasing proportionally with lowest wavelength optical source enabled: IR only mode, average 5 µg BC/m^3 for 24 hours at 100 ml/min IR only mode, average 100 µg BC/m^3 for 3 hours at 50 ml/min IR only mode, average 1 mg BC/m^3 for 15 minutes at 50 ml/min
Measurement Resolution	0.001 µg BC/m^3
Limit of Detection	30 ng BC/m^3, 5 min timebase., 150 ml/min flow rate, SingleSpot™
Pump Options	Standard internal diaphragm pump. Optional internal rotary vane pump.
Flow Control	Internal mass flowmeters with closed-loop control
Filter Material / Capacity	MA200 Filter Tape Cartridge with Polytetrafluoroethylene (PTFE) material (15 sampling locations)
Sampling	3 mm diameter spot(s) created on filter tape. User selectable DualSpot® or SingleSpot™ mode.
Environmental Sensors	Accelerometer, Relative Humidity, Temperature, Altimeter/Barometer
Dimensions	L: 136.75 mm (5.38 in), W: 85 mm (3.35 in), D: 35.75 mm (1.41 in)
Weight	420 grams (14.82 ounces)
Memory	16 GB internal flash memory, providing storage for 31,250,00 data lines; 1 second timebase: 361 days of data.
On-board Interface	Low power screen, 3 buttons
Location Services	GPS with internal antenna
Date/Time Format	ISO 8601 with satellite synchronization or manual computer synchronization
Wireless	802.11 b/g/n Wi-Fi with AES hardware encryption, Bluetooth Low Energy. Available in future firmware releases.
Connections	USB 2.0, 3.3V TTL Serial, DC input via barrel jack, Aerosol sample inlet and outlet ports
USB Communication / Client Application	USB connectivity to cross-platform microAeth® Manager software available on macOS® and Windows®. microAeth Manager software is included and facilitates settings configuration and data download. Exported data can be uploaded to AethLabs Dashboard server for processing and visualization.
Serial Communication	3.3V TTL serial connectivity for uploading new instrument firmware, flow calibration, streaming data and polling protocols to request data, modify settings and control. Command line interface (CLI) polling protocols: AethLabs protocol and Bayern-Hessen protocol.
Total Run Time	Up to 14 hours at 60 second timebase, 100 ml/min flow rate on single battery charge. Run time may vary due to PM concentrations and settings.
Battery	Internal 3.6V 3200 mAh (11.52 Wh), 1 cell rechargeable lithium-ion battery
Charging	Fast charging DC via barrel jack AC adapter (~3 hours to full charge, instrument turned off) or USB charging (~6.5 hours to full charge, instrument turned off) Power Supply Adapter: Input: 100~240 VAC 50/60Hz 0.4A, Output: 5VDC / 2A, with option for Type A, C, G, or I plug
Operating Environment	5 ~ 40 °C operating, non-condensing.
Included	microAeth MA200, 1 MA200 Filter Tape Cartridge, Barrel jack AC adapter with 1 territory-specific plug, USB communication/charging cable, Serial to USB converter cable, 1 meter sampling hose with swivel tube connector, Lapel clip for sampling hose. Cross-platform microAeth® Manager software and manual available for download via AethLabs website
Accessories & Consumables	MA200 Filter Tape Cartridge, MA Series Flow Calibration Kit, microCyclone™ PM2.5 Size-selective Inlet, Serial to bare leads cable, Portable Aerosol Dryer

Specifications are subject to change without notice. microAeth MA Series products are protected by patent #8,411,272. Additional patents pending. Aethalometer® and DualSpot® are trademarks of Magee Scientific Corp. used under license. Specifications - microAeth MA200, Aug 2018, Rev 01

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