

BAM 1022

REAL-TIME BETA ATTENUATION MASS MONITOR



The Met One Instruments, Inc. BAM 1022, Real-Time Beta Attenuation Mass Monitor, continuously measures the mass concentration of ambient particulate matter collected onto glass filter tape with time resolution of one-minute.

The BAM 1022 employs an in-line sampling geometry in which the attenuation of beta rays across filter media is measured and particulate matter is sampled simultaneously. This allows ambient sampling to occur for virtually 60 minutes each hour. It also allows for beta ray measurements to be made for virtually the entire hour thereby improving sensitivity and time resolution.

The BAM 1022 employs a unique “in-situ” sampling technique where the beta measurement is kept at a near fixed temperature above ambient conditions, thereby minimising measurement error due to loss of semi-volatile particulate material or due to excessive moisture in the sample stream. Highly accurate measurements are made without having to employ expensive Nafion dryers thereby increasing reliability and decreasing operating costs. The integrated shelter does not employ air conditioning, nor does the sampling system employ flow splitters. This results in easier service, enhanced reliability and lower power consumption.

The BAM 1022 comes integrated into its own lightweight equipment shelter with easily detachable pump box making it ideal for easy installation. Power consumption is modest as no air conditioning is required. No component weighs more than 40 lb. The entire system may be set up and put into operation in less than ten minutes.

The BAM 1022 has US EPA designation for $PM_{2.5}$ (EQPM-1013-209) for which a dedicated hourly output channel is available. A second, real-time output channel will provide the user with continuous PM updates down to 1 minute time resolution.

The BAM 1022 is also designed to be used as a permanent fixed location compliance monitor.

The BAM 1022 is ideal for the following applications:

- Criteria-grade air quality surveillance networks
- Near-roadside PM monitoring
- Rapid-deployment applications such as emergency responder and controlled burn work
- Research and development.

THE BAM 1022 OFFERS THE FOLLOWING ADVANCED FEATURES:

- In-situ measurement of PM that provides high accuracy, minimal measurement artifacts
- Reduced background determination frequency
- Unsurpassed performance under high ambient dew point operation
- Advanced communications features allowing remote operation and cloud-based communication
- Advanced diagnostics
- Improved sensitivity compared to other in-line beta attenuation mass monitors
- Meteorological and other sensor inputs.

SPECIFICATIONS

Measurement Principle:	Beta Attenuation
US EPA Designations:	EPA Class III Federal Equivalency Method (EQPM-1013-209)
Measurement Range:	- 15 $\mu\text{g}/\text{m}^3$ to 10,000 $\mu\text{g}/\text{m}^3$
Accuracy:	Meets US EPA Requirements for Class III PM _{2.5} FEM
Data Resolution:	0.1 $\mu\text{g}/\text{m}^3$
Lower Detection Limit:	< 2.4 $\mu\text{g}/\text{m}^3$ (Hourly, 2 σ) / < 0.5 $\mu\text{g}/\text{m}^3$ (24 Hour, 2 σ)
Sampling Time:	Continuous Air Sampling with Hourly Tape Advance
Measurement Cycles:	Primary: Automatic Hourly PM Measurement (Required for PM _{2.5} FEM Operation) Secondary: User Selectable Short Term Averages (1, 5, 10, 15, or 30 minute)
Sample Flow Rate:	16.7 litres / minute
Filter Tape:	Continuous glass fiber filter, 30 mm x 21 m roll. Up to 2 months operation per roll
Maintenance Interval:	8 Weeks (minimum)
Span Check:	Manual Audits Performed with Zero and Span Foils (Included)
Beta Source:	¹⁴ C (carbon-14), 60 $\mu\text{Ci} \pm 15 \mu\text{Ci}$ (< 2.22 x 10 ⁶ Beq), Half-Life 5730 years
Detector Type:	Scintillation Photomultiplier Tube
Operating Temperature Range:	- 30 to + 50 °C
Operating Humidity Range:	0 to 90 % RH, non-condensing
Enclosure:	Instrument is integrated into its own weatherproof enclosure and sits on a separable pump box
Analog Output:	Two channels; optically isolated; switch settable voltage or current 0 - 1, 0 - 2.5, 0 - 5 VDC / 0 - 20, 2 - 20, 4 - 20 mA (Hourly Concentration and/or or User Selectable Short Term Average)
Serial Interfaces:	1 channel; full duplex RS232, USB, and Ethernet serial (Shared common serial output) Baud rates 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Compatible Software:	Comet™ (included), Air Plus™, terminal programs such as HyperTerminal®
Data Logger Memory:	108,134 records (12.5 years @ 1 record / hr 75 days @ 1 record / min)
Power Supply:	100 - 230 VAC; 50 / 60 Hz universal AC power
Power Consumption:	300 W (Including BAM 1022, Inlet Heater, BX-126 or BX-127 Pump, and Vent Fan)
Approvals:	NRC, ISO-9001, ROHS, US EPA



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