

Spirant™ BAM

PARTICULATE MONITOR



The Spirant™ BAM automatically measures and records airborne particulate concentrations using the beta ray attenuation method. It is designated by the US EPA as Federal Equivalent Method for PM₁₀ and PM_{2.5} monitoring.

DESIGNATIONS

Spirant™ BAM 1000:

- PM₁₀: FEM (EQPM-0798-122) AS/NZS 3580.9.11.2016

Spirant™ BAM 1100:

- PM_{2.5}: Class III FEM, (EQPM-0308-170) AS/NZS 3580.9.12:2013

FEATURES

- Long term unattended remote operation of up to 60 days between site visits
- Automatic hourly span checks
- Fast and easy field audits using common audit tools
- Rugged anodised aluminium, stainless steel, and baked enamel construction
- Highly accurate, reliable, and mechanically simple flow system
- Hourly filter advances minimise effects on volatile compounds
- Real-time particulate monitoring option
- Advanced Smart Heater technology precisely controls sample relative humidity
- Integrated datalogger allows the connection of up to six additional meteorological sensors with 182 days of data storage.

OPERATIONS

The Spirant™ BAM uses the beta ray attenuation method to measure particulate concentration.

Every hour, a small ¹⁴C (carbon - 14) element emits a constant source of high-energy electrons (known as beta rays) through a spot of clean filter tape. These beta rays are detected and counted by a sensitive scintillation detector to determine a zero reading.

The instrument automatically advances this spot of tape to the sample nozzle, where a vacuum pump then pulls a measured and controlled amount of dust-laden air through the filter tape, loading it with ambient dust.

At the end of the hour, the dust laden spot is placed back between the beta source and the detector, thereby causing an attenuation of the beta ray signal. This is then used to determine the mass of particulate matter on the filter tape and volumetric concentration of particulate matter in ambient air.

Measurement data, configuration files, error logs, and flow statistics are stored in its internal data logger and are available via RS232 using common terminal programs and ECOTECH Airodis™ software.

Digital dataloggers may obtain data from the unit using serial port commands or by recording the automatic hourly serial output.

The Spirant™ BAM performs continuous user selected evaluation of a variety of criteria for data validation including flow statistics and a comprehensive set of error codes such as power, flow, hardware, tape, nozzle, beta count and span check errors.

MAINTENANCE

Designed to run continuously with only monthly or bi-monthly scheduled maintenance - a single roll of filter tape will last for more than 60 days.

The instrument also contains a comprehensive self-test function which allows the unit to test itself for any mechanical failures in the tape control system.

SPECIFICATIONS

Accuracy:	Exceeds US EPA Class III PM _{2.5} FEM standards for additive and multiplicative bias
Measurement resolution:	0.1 µg / m ³
Display Resolution:	1 µg / m ³
Detection limit:	(2σ) 1 hr: < 4.8 µg / m ³ (3.6 µg / m ³ typical) (2σ) 24 hr: < 1.0 µg / m ³
Range:	1 mg (1000 µg) default setting. Settable from 0.1 mg to 10 mg
Optional ranges:	Available on request
Measurement cycle time:	1 hour
Flow rate:	16.7 litres/minute adjustable 0 - 20 LPM range actual or standardised flow
Filter tape:	Continuous glass fiber filter tape
Span check:	Automatic 0.800 mg (typical) span foil, verified hourly
Beta source:	¹⁴ C (carbon - 14), 60 µCi ± 15 µCi (< 2.22 x 10 ⁶ Beq), half-life 5730 years
Beta detector type:	Photomultiplier tube with organic plastic scintillator
Operating temperature:	0 to + 50 °C
Ambient temperature:	- 40 to + 55 °C (BX - 596 AT sensor) - 30 to + 50 °C (BX - 592) Extended range of sensors available
Ambient humidity:	0 - 90 % RH, noncondensing
Sample humidity control:	Active Smart Heater module, 10 - 99 % RH setpoint
Power supply:	100 - 230 VAC, 50 / 60 Hz. Factory configured
Power consumption:	110 V: 262 W max with Medo pump and inlet heater running (642 W with Gast pump) 230 V: 312 W max with Medo pump and inlet heater running (717 W with Gast pump)
Dimensions:	310 x 430 x 400 mm
Weight:	24.5 kg without external accessories

COMMUNICATION

User interface:	• Menu-driven interface, 8 line 40 character LCD display & keypad
Analog output:	• Isolated 0 - 1 VDC output standard • 0 - 10 V, 4 - 20 mA, 0 - 16 mA switch selectable
Serial interface:	• RS232 two-way serial port for PC or modem communications
Printer output:	• Output only serial port for data or diagnostic output to a PC or serial printer
Telemetry inputs:	• Clock reset (voltage or contact closure), telemeter fault (contact closure)
Alarm contact closures:	• Data error, tape fault, flow error, power failure, maintenance
Error reporting:	• User-configurable available through serial port, display, and relay outputs
Memory:	• 4369 records (182 days at 1 record/hr)

OPTIONS	
RTPM:	• Real-time particulate monitor provides one minute measurements
Aurora™ Interface:	• Enables interfacing of Spirant™ with Aurora™ 2000 Nephelometer for one minute measurements (requires Aurora™ 2000 Integrating Nephelometer)
Sample inlets:	• PM ₁₀ , PM _{2.5} & TSP available

