

# Beta-Attenuation Mass Monitor

## BAM 1020

Met One Instrument's BAM-1020 beta attenuation mass monitor has US-EPA certification (EQPM-0798-122) as an Equivalent Method for PM<sub>10</sub> monitoring. It has corresponding certifications in the United Kingdom, Korea, and China for automatic monitoring and recording of PM<sub>10</sub> concentrations.

The BAM-1020 may be equipped with a sharp cut cyclone PM<sub>2.5</sub> or a WINS PM<sub>2.5</sub> sampling inlet for automatic monitoring of finer particulate matter. The BAM-1020 can also be configured for the monitoring of total suspended particulate (TSP).

The BAM-1020 is manufactured using a time-proven design offering its users the highest level of reliability, performance and agreement with the FRM. This design insures low maintenance and servicing costs, as well as minimal manpower requirements for its routine operation.

### Features

- Long term, unattended remote operation
- Very low operating costs
- Data retrieval through RS-232 port
- Internal datalogger included which allows up to six additional air quality or meteorological measurements
- Automatic 'zero and span'



The Model BAM 1020, Beta-Attenuation Mass Monitor,

- check once per hour
- Operates with Met One Instruments MicroMet Plus or Air Plus Software
- Optional Sampling Inlets for TSP, SCC-PM<sub>2.5</sub>, WINS-PM<sub>2.5</sub>
- Data memory accessible from main menu
- 1 hour to 24 hour averages available

### Operation

The BAM-1020 is controlled by an advanced microprocessor system that makes it fully automatic. At the beginning of the sampling period, beta ray transmission is measured across a clean section of filter tape. This section of filter

tape is then mechanically advanced to the sampling inlet. Particulate matter is then drawn into the sample inlet and deposited on the filter paper. At the completion of the sampling period, the filter tape is returned to its original location and the beta ray transmission is re-measured. The difference between the two measurements is used to determine, with exceptional accuracy, the particulate concentration.

The mass density is measured using the technique of beta attenuation. A small <sup>14</sup>C beta source (60 µCi) is coupled to a sensitive detector that counts the emitted beta particles.



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The filter tape is placed between the beta source and the detector. As the mass deposited on the filter tape increases, the measured beta particle count is reduced according to a known equation.

### Design and Construction

The Filter Tape Transport System is based upon a design that has been used for over two decades in Japan. Met One Instruments is now building the transport system under permanent license agreement for the BAM-1020. The transport reflects the quality and precision of superior design. Responding to the requirements of current data validation requirements, an improved electronic measurement system was developed using the A-Bus micro-processor controller and data logger. All operations of the unit are displayed with the 8 line by 40 character display.

Serial interface #1 is used for data transfer and instrument operations status. This interface is often used with modem for remote communications.

Serial interface #2 is an output only and may be used with a printer or computer. Output may be set for date, time, data printout or may be set to one of two diagnostic modes. An optional Multi-Drop interface is available.

Analog outputs of concentration with special error coding and contact closures for error conditions are accessible from the error log setup screen.

### On Line Data Validation

The BAM-1020 is always evaluating its operation to ensure highest confidence and the highest quality data recovery of any unit of its type. The user may select various criteria for data validation, includ-

ing deviation from the rolling average, high value excursions and many other common criteria for logging such as power failures. An error log is maintained with the date, hour and type of error. This data is printed during routine data recovery.

For the benefit of users not using the serial port, the analog message informs the user that the BAM-1020 has a question about data or operation. The operator may then use the optional modem connection to verify diagnostics or a laptop to interrogate the error log during the next site visit.

### Self Calibration

Reliable, accurate measurements are assured with the automatic zero and span calibration conducted each cycle. Should the instrument fail to perform to specification an error is logged in memory and data is flagged. Zero testing is performed at the beginning and end of every sample cycle and is based on the BAM 1020's ability to hold a constant output when measuring blank filter paper. Span measurements are made by an automatic insertion of a reference membrane in the measurement path.

### Specifications

<b>Range:</b>	0-.1, .2, .25, .5, 1, 2, 5, 10 mg/m <sup>3</sup>
<b>Cycle:</b>	1 hour
<b>Detection Limit:</b>	1 µg/m <sup>3</sup> on 24 hrs 5 µg/m <sup>3</sup> on 1 hour
<b>Resolution:</b>	±1 µg/m <sup>3</sup>
<b>Accuracy:</b>	±8% of indication for 1 hour mode, ±2% compared to FRM for 24 hour mode
<b>Beta Source:</b>	<sup>14</sup> C, 60 µCi
<b>Filter Tape:</b>	Continuous Glass Fiber Type
<b>Flow Rate:</b>	0-20 SLM user adjustable
<b>Data Storage:</b>	200 days (1 hour sample)
<b>Power:</b>	100-230 VAC, 50/60 Hz
<b>Temperature Range:</b>	-30°C to +60°C (0-90% RH, Non-condensing)
<b>Dimensions:</b>	310(H)x430(W)x400(D) (mm)

### BAM Filter Tape

