

Aurora™ 2000

PM_{2.5} CORRELATING NEPHELOMETER



The Aurora™ 2000 PM_{2.5} Correlating Nephelometer is part of the new generation nephelometers using a single wavelength and an LED light source to measure aerosol light scattering and derive particulate concentrations.

The Aurora™ 2000 enables a correction factor to be used in order to derive PM_{2.5} concentrations. This improves the correlation between the Aurora™ and Reference PM_{2.5} methods while providing 1 minute measurements from the Aurora™ 2000. The correction factor can be entered manually or automatically derived from hourly averages from a continuous PM_{2.5} monitor.

BENEFITS

- Simplified automatic calibration using internal valves, ideal for remote locations
- Fully integrated package including: internal sample pump, sample heater, internal calibration valves, zero air pump and data logger
- Internal sample heater with temperature or RH control, which can be enabled by the user to eliminate the effects of humidity (RH: < 30 to < 90 %)
- 12 VDC operation (45 watts max, 13 watts nominal).

Light Source

The Aurora™ 2000 can be equipped with any one of the following LED light sources:

- 450 nm (blue) for fine and ultra fine particulates (wood fires, automobiles)
- 525 nm (green) for visibility
- 635 nm (red) for large particulates (e.g. pollen).

CONFIGURATIONS

Aurora™ 2000 PM_{2.5} Nephelometer - manual correction factor configuration

In applications where the aerosol chemistry is stable, a correction factor can be manually entered which then provides excellent results with minimal maintenance and a high degree of correlation.

Aurora™ 2000 Automatic correlating PM nephelometer configuration

In applications where aerosol chemistry is subject to change, a correction factor derived from manual sampling may be unreliable. In this case the Aurora™ 2000 may be connected directly to a PM_{2.5} compliance monitor, either the ECOTECH Spirant BAM or the Met One BAM 1020, in order to monitor and log PM hourly averages generated by the BAM (PM_{BAM}). These hourly averages are compared to the Aurora's hourly average scattering coefficient (σ_{scat}) and a scattering to PM coefficient factor (σ_{scat}/PM) is calculated. This factor is then applied to the next hour of 1 minute scattering coefficients measured in order to determine a 1 minute average for PM concentrations (PM_{aurora}).

The derived correction factor can also be used to determine changes in aerosol sources through deviations in light scattering from the expected values.

This configuration of the Aurora™ 2000 nephelometer provides the following parameters:

- US EPA compliance data for PM_{2.5} measurement
- Scattering coefficient (σ_{scat})
- BAM_{PM} averages – 1 hour average only
- Corrected real time 1 minute PM concentrations PM_{aurora}
- Sample temperature, relative humidity and barometric pressure.

SPECIFICATIONS

Measured parameters:	$\mu\text{g}/\text{m}^3$ and σ_{Scat}
Ranges:	0 - 2000 $\mu\text{g}/\text{m}^3$ and 0 - 20,000 Mm^{-1}
Lower detectable limit:	3 $\mu\text{g}/\text{m}^3$ ($<0.3 \text{ Mm}^{-1}$) (60 second averaged data)
Secondary measurements:	Sample air temperature, relative humidity (RH), barometric pressure and enclosure temperature
Flow rate:	$\approx 5 \text{ l}/\text{min}$ with default blower. Higher flow can be obtained using the external pump option (e.g. in case of common inlet)
Operating temperature:	- 20 to 45°C
Operating RH:	10 to 95 %
Calibration:	Span gas available for CO_2 , SF_6 , FM-200, R-12, R-22, R-134 or a user defined gas
Optics:	Reference light source measurement
Light source:	Stable LED light source (US patent 7,671,988)
Wavelength:	525 nm (green), 450 nm (blue) or 635 nm (red)
Operating voltage:	12 VDC (incl 110 - 240 VAC 50/60 Hz power supply converter)
Power consumption:	13 watts nominal, 45 watts with heater active
Dimensions:	170 x 700 x 215 mm
Weight:	11.2 kg

COMMUNICATIONS & DATA LOGGING

Outputs:	25 pin external I/O analog outputs (2 voltage & 2 current) 2 x RS232 serial ports (multi-drop, service)
Filtering:	Kalman (digital adaptive filter), moving average (30 seconds) and no filter
Stored parameters:	Date & time, $\mu\text{g}/\text{m}^3$, σ_{sp} (635, 525 or 450 nm), hourly BAM_{PM} average, hourly mass correction factor, sample air temperature, enclosure temperature, RH and barometric pressure and instrument status
Capacity:	Maximum of 48 days of 5 minute averages, or 10 days of 1 minute averaged data.

OPTIONS

- Solar power option
- Roof flange kit and rain cap with insect screen
- Gas calibration kit
- Wall mount bracket.



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Air Pollution Monitoring Systems

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