

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:

- 450nm (blue) for fine and ultra fine particulates (wood fires, automobiles).
- 525nm (green) for visibility.
- 635nm (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 1100 or the Met One BAM1020 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:

- U.S. 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

Parameter:	$\mu\text{g}/\text{m}^3$ and σ_{Scat}
Ranges:	0-2000 $\mu\text{g}/\text{m}^3$ and 0-20000 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, RH and pressure. Enclosure temperature.
Flow rate:	≈ 5 SLPM with default blower. Higher flow can be obtained using the external pump option (in case of common inlet e.g.).
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 (U.S. patent 7, 671, 988)
Wavelength:	525nm (green), 450nm (blue) or 635nm (red)
Operating voltage:	12 VDC (incl 110-240 VAC 50/60 Hz power converter)
Power consumption:	13 watts nominal, 45 watts with heater active
Dimensions:	170mm x 700mm x 215mm (L x W x H)
Weight:	11.2kg

Communications/Data logging

Outputs:	4 analogue outputs (2 voltage & 2 current) and 2 x RS 232 serial ports
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), hourly BAM_{PM} average, hourly mass correction factor, air temperature, enclosure temperature, RH, pressure 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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