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 (formerly known as the Ecotech 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 & 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 W max, 13 W nominal)
- Remote control through serial interface.

Light Source

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

- 450 nm (blue) for fine & 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 Acoem 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 & barometric pressure.

SPECIFICATIONS

Measured parameters:	$\mu g/m^3$ & σ_{Scat}
Ranges:	0 - 2000 $\mu g/m^3$ & 0 - 20,000 Mm^{-1}
Lower detectable limit:	3 $\mu g/m^3$ (< 0.3 Mm^{-1}) (60 second averaged data)
Secondary measurements:	Sample air temperature, relative humidity (RH), barometric pressure & enclosure temperature
Flow rate:	≈5 l/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:	450 nm (blue), 525 nm (green), or 635 nm (red)
Operating voltage:	12 VDC (incl 110 - 240 VAC 50/60 Hz power supply converter)
Power consumption:	13 W nominal, 45 W with heater active
Dimensions:	170 x 700 x 215 mm
Weight:	11.2 kg
Altitude:	2000 m.

COMMUNICATIONS & DATA STORAGE

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) & no filter
Stored parameters:	Date & time, $\mu g/m^3$, σ_{sp} (635, 525 or 450 nm), hourly BAM_{PM} average, hourly mass correction factor, sample air temperature, enclosure temperature, RH & barometric pressure & instrument status
Capacity:	Maximum of 48 days of 5 minute averages, or 10 days of 1 minute averaged data.

OPTIONS

- Exhaust tubing kits
- External pump & pump controller kit
- Automated ball valve (sample bypass)
- Roof flange kit & rain cap with insect screen
- Gas calibration kit
- Wall mount bracket.

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