

# Aurora™ 3000

## 3 Wavelength Integrating Nephelometer



**Aerosol particles in the atmosphere directly influence the Earth's radiative balance by absorbing and scattering the solar radiation, and indirectly, by changing the clouds microphysical properties.**

The amount of sunlight reaching the Earth's surface, rather than being scattered back to space, is an important parameter to accurately model the influence of aerosol scattering on the Earth's radiative balance.

The Aurora 3000 (formerly known as the Ecotech Aurora 3000) provides this measurement by reporting both the integrated and backscattered coefficient.

Using a LED light source, the Aurora 3000 simultaneously measures at 450 nm (blue), 525 nm (green) and 635 nm (red) to enable wide and in-depth analysis of the interaction between light and aerosols.

The Acoem Aurora 3000 includes backscatter measurements that allows both standard integrating measurements of 9 - 170° and also the back scatter 90 - 170°.

### APPLICATIONS

- Studies on backscatter & forward scatter
- Scattering enhancement factor (e.g. In combination with the Acoem Aerosol Conditioning System ACS 1000)
- Scattering Ångström exponent calculations
- Determination of single scattering albedo
- Easy integration with the Acoem ACS 1000.

### FEATURES

- High powered LED light source increases measurement accuracy
- Single light source & detector used for all wavelengths
- Heat generated by the LED light source is a fraction of that generated by a flash lamp, minimising changes in sample RH
- Easy automatic calibration, ensures repeatability of measurement
- Automatic optical reference calibration
- Single light source & detector used for all wavelengths
- Facilitates a wide measuring range (0 to 20,000 Mm<sup>-1</sup>).

### BENEFITS

- Simplified automatic calibration using internal valves, ideal for remote locations
- Fully automatic zero check or adjust, automatic span check or automatic zero and span check available in intervals of 1, 3, 6, 12, 24 hrs or weekly
- 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 (60 W max, 14 W nominal)
- Holds up to 33 days of 5 minute data averages, 6 days of 1 minute data, or every measurement cycle (3 seconds)
- Our LED light source is guaranteed not to fail within 3 years, & often exceeds 5 years life time
- An LED light source uses the same light path for each wavelength ensuring consistency of measurement, eliminating the need for PMTs & band pass filters maximising light intensity
- Remote control through serial interface
- Suitable for high altitude applications.

## SPECIFICATIONS

<b>Measured parameters:</b>	Light scattering coefficient ( $\sigma_{sp}$ ) at (450, 525 & 635 nm) Backscatter coefficient ( $b\sigma_{sp}$ ) at (450, 525 & 635 nm)
<b>Ranges:</b>	0.0 to 20,000 Mm <sup>-1</sup>
<b>Lower detectable limit:</b>	< 0.3 Mm <sup>-1</sup> full and back scatter (60 second averaged data) (0.1 Mm <sup>-1</sup> optional)
<b>Secondary measurements:</b>	Sample air temperature, enclosure temperature, sample relative humidity and sample pressure. (sample flow for MFC option)
<b>Intensity function:</b>	Full scatter 9 – 170 °C Backscatter 90 – 170 °C, parameterised by Müller et al, 2010
<b>Flow rate:</b>	≈5 SLPM with default blower (1 to 17 l/min for MFC option)
<b>Operating temperature:</b>	- 20 to 45 °C
<b>Operating RH:</b>	10 to 95 %
<b>Calibration:</b>	Span gas available for CO <sub>2</sub> , SF <sub>6</sub> , FM-200, R-12, R-22, R-134 or a user defined gas
<b>Optics:</b>	Reference light source measurement
<b>Light source:</b>	Stable LED light source (US patent 7,671,988)
<b>Wavelength:</b>	450 nm (blue), 525 nm (green), 635 nm (red)
<b>Operating voltage:</b>	12 VDC (incl 110 – 240 VAC 50/60 Hz power converter) (14 W nominal, 45 W with heater active)
<b>Dimensions:</b>	170 x 700 x 215 mm
<b>Weight:</b>	11.2 kg
<b>Altitude:</b>	2000 m (15,000 m with 12 V operation).

## COMMUNICATIONS & DATA STORAGE

<b>Outputs:</b>	4 analog outputs (2 voltage & 2 current) & 2 x RS232 serial ports
<b>Filtering:</b>	Kalman (digital adaptive filter), moving average (30 seconds) or no filter
<b>Stored parameters:</b>	Date & Time, $\sigma_{sp}$ (450, 525 & 635 nm), air temperature, enclosure temperature, RH, pressure instrument status, raw measure counts or measure ratios, sample flow for MFC option
<b>Capacity:</b>	Maximum of 33 days of 5 minute averages, or 6 days of 1 minute averaged data, 2000 lines of data if all measurement cycles (3 seconds)
<b>Data Collection:</b>	Airodis™ demo analysis software provided free.

## LOWER COST OF OWNERSHIP

- Fully automatic zero & span calibrations
- Low power internal 12 V sample heater
- Long lasting low power LED light source
- No bandpass filters to be replaced.

## OPTIONS

- MFC & automated ball valve
- Roof flange kit & rain cap with insect screen
- Gas calibration kit & wall mount bracket
- Exhaust tubing kit
- Aerosol dryer
- ACS 1000 interfacing.



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