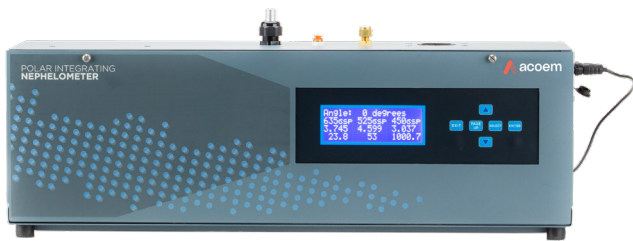


# Aurora™ 4000

## Polar 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 microphysical properties of clouds.**

The Aurora 4000 (formerly known as the Ecotech Aurora 4000) is the first commercially available polar nephelometer in the world. The instrument provides measurements of integrated light scattering between 10° - 90° and 180°, with the user able to select up to 18 separate angles between the 10° to 90° starting angle of integration.

It uses the same three wavelength technology as the Aurora 3000 but also automatically measures the amount of light scattered in different angular sectors by varying its backscatter shutter position. The Aurora 4000 simultaneously measures at 450 nm (blue), 525 nm (green) and 635 nm (red), using the proven LED light source (Müller et al., AMT, 2011), to enable wide and in-depth analysis of the interaction between light and aerosols.

These measurements from the Aurora 4000 can contribute to determining the phase function, defined as the amount of light scattered as a function of the scattering angle.

The phase function is a key parameter to accurately model the influence of the aerosol scattering on the Earth's radiative balance.

### BENEFITS

- High powered multi-wavelength LED light-source increases measurement accuracy
- Higher flow available via the external pump & MFC option
- Raw measurement counts available for customised data analysis
- An automated ball valve inlet bypass option available for use with common inlet manifolds
- Simplified fully automatic & scheduled calibration (zero & /or span) using internal valves, ideal for remote locations
- Robust instrument for unattended operation
- 12 VDC operation (60 W maximum, 15 W nominal)
- Automatic optical reference calibration
- 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 %)
- Our LED light source is guaranteed not to fail within 3 years & often exceeds 5 years life time
- Heat generated by the LED light source is a fraction of that generated by a flash lamp, minimising changes in sample RH
- LEDs emit light at a specific wavelength eliminating the need for band pass filters
- An LED light source uses the same light path for each wavelength ensuring consistency of measurement, eliminating the need for multiple PMTs & maximising light intensity
- Remote Control through serial interface
- Easily integrates into the Acoem Aerosol Conditioning System ACS 1000.

## SPECIFICATIONS

<b>Measured parameters:</b>	Light scattering coefficient ( $\sigma_{sp}$ ) at (450, 525 & 635 nm) over 2 to 18 angular sectors
<b>Ranges:</b>	0 to 20,000 $Mm^{-1}$
<b>Lower detectable limit:</b>	< 0.3 $Mm^{-1}$ over all sectors (60 second averaged data) (0.1 $Mm^{-1}$ full scatter & backscatter)
<b>Secondary measurements:</b>	Sample air temperature, enclosure temperature, sample relative humidity & sample pressure (sample flow for MFC option)
<b>Intensity function:</b>	9 to 170°
<b>Angular resolution:</b>	1 deg increments within 0.3 deg accuracy
<b>Flow rate:</b>	≈5 l/min (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 supply converter) 13 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>	25 pin external I/O analog outputs (2 voltage & 2 current) 2 x RS232 serial ports (multi-drop, service)
<b>Filtering:</b>	Kalman (digital adaptive filter), or no filter
<b>Stored parameters:</b>	Date & time, $\sigma_{sp}$ (450, 525 & 635 nm), sample air temperature, enclosure temperature, RH, barometric pressure & status for up to 18 angles, raw measurement counts or ratios, sample flow for MFC option
<b>Capacity:</b>	2000 lines of data (based on capture of all 18 angular segments)
<b>Data Collection:</b>	Airodis™ demo analysis software provided free.

## OPTIONS

- Automated ball valve (sample bypass)
- MFC & automated ball valve
- Roof flange kit & rain cap with insect screen
- Gas calibration kit & wall mount bracket
- Exhaust tubing kit
- Aerosol dryer
- ACS1000 interfacing.

## APPLICATIONS

- Studies on backscatter & forward scatter
- Scattering enhancement factor
- Scattering Ångström exponent calculations
- Determination of single scattering albedo
- High altitude aircraft based campaigns.



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