

AURORA 4000

POLAR 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 cloud's microphysical properties.

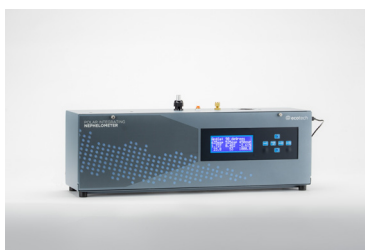
The phase function, defined as the amount of light scattered as a function of the scattering angle, is a key parameter to accurately model the influence of the aerosol scattering on the earth's radiative balance. Polar nephelometers provide this measurement.

The Aurora 4000 is the first commercially available polar nephelometer in the world that allows the measurement of atmospheric aerosol phase function.

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 525nm (green), 450nm (blue) and 635nm (red), using the now proven LED light source (Mueller, 2010), to enable wide and in-depth analysis of the interaction between light and aerosols.

The instrument provides more specific light scattering measurements from for up to 18 angles between 10° and 170°, with customised resolution.



BENEFITS

- Programmable number and value of angles, from 2-18 between 10 and 170°C respectively.
- High powered LED light-source increases measurement accuracy.
- Higher flow available via the external pump option for common inlet cases.
- Raw measurement counts available for customised data analysis.
- Single light source and detector used for each sector measurement.
- Simplified fully automatic and scheduled calibration (zero and/or span) using internal valves, ideal for remote locations.
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- Robust instrument for unattended operation.
- 12 VDC operation (60 watts maximum, 15 watts nominal).
- Automatic optical reference calibration.

LED vs flash lamp

- 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 %).
- Our LED light source is guaranteed not to fail within 3 years and often exceeds five years.
- 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 and maximising light intensity.

SPECIFICATIONS

Measured parameters:	Light scattering coefficient (σ_{sp}) at (450, 525 and 635nm) over 2 to 18 angular sectors
Ranges:	0.0 to >20000 Mm^{-1}
Lower detectable limit:	<0.3 Mm^{-1} over all sectors (60 second averaged data) (0.1 Mm^{-1} optional)
Secondary measurements:	Sample air temperature, enclosure temperature, sample relative humidity and sample pressure
Intensity function	9-170 °C
Angular resolution	1 deg increments within 0.3 deg accuracy
Flow rate:	≈5 l/min
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) and 635nm (red)
Operating voltage:	12 VDC (incl 110-240 VAC 50/60 Hz power converter) 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), or no filter
Stored parameters:	Date & Time, σ_{sp} (635, 525 and 450nm), air temp, enclosure temp, RH, pressure, status for up to 18 angles or raw measurement counts or ratios
Capacity:	2000 lines of data (based on capture of all 18 angular segments)

OPTIONS

- External pump control
- Solar power panels and batteries
- Roof flange kit and rain cap with insect screen
- Gas calibration kit and wall mount bracket.

APPLICATIONS

- Studies on backscatter and forward scatter
- Scattering enhancement factor
- Scattering Ångström exponent calculations
- Determination of single scattering albedo.

For your local certified distributor visit:

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Ecotech Pty Ltd

T (Australia) 1300 364 946 **T** (International) +61 3 9730 7800
E info@ecotech.com **W** www.ecotech.com

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