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AURORA 1000

INTEGRATING NEPHELOMETER

Easy to use and maintain, the Aurora 1000 lowers the cost of ownership for aerosol light scattering, visibility and particulate monitoring instrumentation.

The Aurora 1000 monitor uses a single wavelength for scattering coefficient visibility measurements at one of three user specified wavelengths.

Ecotech, through collaboration with globally renowned atmospheric research institutes, now provide the scientific community with the most advanced commercially available nephelometers.

Using a single wavelength LED light source, the Aurora 1000 can be equipped with any of the following 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, sea salt).

Increased accuracy

- Automatic calibration
- Easy maintenance/cleaning of the measurement cell
- Long lasting LED light source
- Intuitive software and maintenance
- Automatic optical reference calibration
- Facilitates a wide measurment range (0 to 20 000 Mm^{-1}).

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 watts max, 13 watts nominal).
- Holds up to 61 days of 5 minute data averages or 12 days of 1 min data.
- Data downloading and firmware upgrading software supplied on USB or internet.

LED vs flash lamp

- Our LED light source is guaranteed not to fail and often exceeds 5 years compared to a flash lamp that is recommended to be changed every 4-6 months
- 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.

Lower cost of ownership

- Fully automatic zero and span calibrations.
- Low power internal 12V heater eliminates the need for external inlet heater.
- Long lasting low power LED light source.
- No bandpass filters to be replaced.
- Unique in its simplicity and practicality.

SPECIFICATIONS

Parameter:	Light scattering coefficient (σsp) at (450, 525 or 635nm)
Ranges:	0.0 to >20000 Mm^{-1}
Lower detectable limit:	<0.3 Mm^{-1} (60 second averaged data)
Secondary measurements:	Sample air temperature, RH and pressure. Enclosure temperature.
Flow rate:	≈5 SLPM with defaut 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, SF6, 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) or no filter
Stored parameters:	Date & Time, σsp(635, 525 or 450), Air temperature, Enclosure temperature, RH, Pressure instrument status
Capacity:	Maximum of 61 days of 5 minute averages, or 12 days of 1 minute averaged data

OPTIONS

- Internal flow control and $PM_{2.5}$ sampling 3 slpm
- Solar power option
- Sample bypass
- Roof flange kit and rain cap with insect screen
- Gas Calibration kit
- Wall mount bracket.

APPLICATIONS

- Visibility measurements (Airports, City pollution, AAQMS)
- Dust/sand storm monitoring and early detection networks
- Bushfire pollution monitoring and early detection networks
- $PM_{2.5}$ mass measurement correlation studies.

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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 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 provides this measurement by reporting both the integrated and back-scattered coefficient.

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

The Ecotech 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 and forward scatter
- Scattering enhancement factor (eg. In combination with the Ecotech ACS)
- Scattering Ångstrσm exponent calculations
- Determination of single scattering albedo.

Increased accuracy

- High powered LED light source increases measurement accuracy.
- Single light source and 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 and detector used for all wavelengths.
- Facilitates a wide measuring range (0 to 20 000 Mm^{-1}).

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 watts max, 14 watts nominal).
- Holds up to 33 days of 5 minute data averages or 6 days of 1 min data.

LED vs flash lamp

- Our LED light source is guaranteed not to fail within 3 years and often exceeds 5 years compared to a flash lamp that is recommended to be changed every 4-6 months.
- 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 (σsp) at (450, 525 and 635nm)
	Backscatter coefficient (bσsp) at (450, 525 and 635nm)
Ranges:	0.0 to >20000 Mm^{-1}
Lower detectable limit:	<0.3 Mm^{-1} full and back scatter (60 second averaged data) (0.1 Mm^{-1} optional)
Secondary measurements:	Sample air temperature, RH and pressure. Enclosure temperature.
Intensity function	full scatter 9-170 °C
	back scatter 90-170 °C, parameterised by Mueller et al, 2010
Flow rate:	≈5 SLPM with defaut 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, SF6, 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)
	(14 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) or no filter
Stored parameters:	Date & Time, σsp(635, 525 and 450), Air temperature, Enclosure tempera ture, RH, Pressure instrument status
Capacity:	Maximum of 33 days of 5 minute averages, or 6 days of 1 minute averaged data

LOWER COST OF OWNERSHIP

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

OPTIONS

- External pump control
- Sample bypass valve used in conjunction with external pump plate kit
- Roof flange kit and rain cap with insect screen
- Gas calibration kit and wall mount bracket

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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.

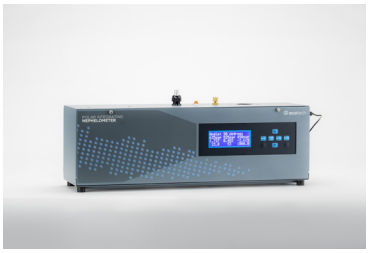
The phase function, defined as the amount of light scattered as a function of the scattering angle, is a key parameter to accurately model the influence of the aerosol scattering on the earth's radiative balance. Polar nephelometers provide this measurement.

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.
- Simplified automatic calibration using internal valves, ideal for remote locations.
- 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 (σsp) 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, SF6, 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, σsp(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 Ångstrσm exponent calculations
- Determination of single scattering albedo.

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