

## Integrating Nephelometer

### Ecotech M9003 Nephelometer

The Ecotech M9003 Integrating Nephelometer is an innovative, low maintenance instrument designed for general environmental monitoring.



It measures the light scattering coefficient due to particles ( $\sigma_{sp}$ ) using the geometry of a standard integrating nephelometer. The light source (*U.S. Patent Pending*) is a very reliable and stable light emitting diode (LED) array, emitting a Lambertian distribution of light at a fixed wavelength. The optical and electrical background noise is sufficiently low to allow measures of  $\sigma_{sp}$  (for particles) from less than 10 percent of air Rayleigh ( $\sigma_{sp} < 0.25 \text{ Mm}^{-1}$ ) to greater than  $\sigma_{sp} = 2000 \text{ Mm}^{-1}$ . The electronics are microprocessor based, providing flexible menu driven programming of the instrument operation using the display and keypad or a serial port. Data averages can be stored internally and retrieved at any time using a PC.

The instrument has many unique features:

- Internal battery backed real time clock and data logger. Holds up to 49 days of 5 minute averaged data
- Reports on scattering coefficient, can be compensated for Pressure and Temperature (selectable 0, 20, 25 °C or none)
- Easy, automated instrument calibration using the selected span gas, with pressure and temperature compensation
- Automatic zero, span or zero & span check, or zero adjust, with operator selectable intervals of 1,3,6,12 or 24 hrs
- Manual zero and span checks
- Span gas selection table including calibration values for CO<sub>2</sub>, SF<sub>6</sub>, FM-200, R-12, R-22, R-134 or a user defined gas
- Automatic optical reference calibration (every 15 seconds)
- RS-232 serial communication provides remote terminal, polled and unpolled data output modes
- Internal self heating is minimal,  $< 0.2 \text{ }^\circ\text{C}$  (when used without sample inlet heater), thus enabling measurements to be made at close to ambient conditions if desired
- Optional external sample inlet heater which can reduce Relative Humidity to a value set by the operator. (<40 to <90%)
- Internal cell heater is operator selectable to keep the cell temperature the same as the sample air temperature to eliminate condensation forming in the cell.
- Includes internal sample pump, zero pump, span gas valve, zero calibration filter and inlet heater controller.
- Data downloader and Firmware upgrading software supplied on CD
- Operation and Service manuals

#### Options

- Heated Sample Inlet, unheated inlet tube, rain cap, roof flange
- Wall mounting bracket
- Calibration Gas Flow Meter Kit
- 12VDC Power supply for 12V operation.

#### Specifications:

<b>Parameter:</b>	Light scattering coefficient $\sigma_{sp}$ (due to particles)
<b>Ranges:</b>	0 to 2000 $\text{Mm}^{-1}$
<b>Noise:</b>	$< 0.2 \text{ Mm}^{-1}$ , (Lower Detectable limit $< 0.4 \text{ Mm}^{-1}$ ) 60 second data.
<b>Secondary Measurements:</b>	Sample air temperature, cell temperature, relative humidity and cell pressure
<b>Outputs:</b>	4 analogue outputs (2 voltage & 2 current) and 2 RS 232 serial
<b>Filtering:</b>	Kalman (digital adaptive filter) or Moving average (30 seconds)
<b>Optics:</b>	No lenses. Reference brightness measurement
<b>Wavelength:</b>	520nm (green) standard. 470nm (blue) & 630nm (red) also available upon request
<b>Operating Voltage:</b>	110-240 VAC 50/60 Hz (50VA without inlet heater) or optional 12 VDC.

#### Internal Data Logging

**Stored Parameters:** Date & Time,  $\sigma_{sp}$ , Air temp, Cell temp, RH, Pressure, Status  
Maximum of 49 days of 5 minute averages, or 10 days of 1 minute averaged data

For further information please contact our nearest office

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