

## Thermo Scientific DataRAM 4™

Portable continuous particle sizing monitor/Dual Wavelength Nephelometer

### Expandable to a complete particle characterization system

- Aerodynamic particle size separators allow measurement of specific particulate fractions such as the thoracic, respirable, PM10, PM2.5, and PM1.0 fractions.
- An omnidirectional sampling inlet and an in-line mist and fog elimination heater are available for ambient air monitoring.
- An isokinetic sampling probe / nozzle kit enables duct / stack monitoring.
- Self calibration extends unattended operation
- A unique programmable automatic zeroing feature permits longterm unattended field operation
- Has both RS232 and RS485 data ports for bi-directional digital communications.



The Thermo Scientific DataRAM 4™ continuously monitors and logs the real-time concentration and median particle size of airborne dust, smoke, mist and fumes. In addition, air temperature and humidity are displayed and recorded. With appropriate particle discriminators, it provides measurements correlated with PM10, PM2.5, PM1.0, and respirable fractions. Its patented two-wavelength particle detection system provides the volume median particle diameter of the sampled aerosol, over a concentration range up to 400 mg/m<sup>3</sup>. Unlike typical particle counting devices, the Thermo Scientific DataRAM 4™ is totally immune to particle coincidence errors, even at the highest concentrations.

Volume median particle sizes down to 0.05 µm can be measured by this unique spectral nephelometric technique. The Thermo Scientific DataRAM 4™ monitors the concentrations of fine particulates in ambient air by a combination of aerodynamic size preselection, two wavelength nephelometry, and concurrent sensing / correction for relative humidity. This patented technique provides a continuous measurement of PM2.5, independent of particle size and moisture - without heating, diffusion drying, or denuding the sample stream.

# Thermo Scientific DataRAM4™ Specifications

<b>Concentration measurement range</b>	(Referred to gravimetric calibration with SAE Fine test dust) (mmd = 2 to 3 µm, $\rho_g = 2.5$ , as aerosolized) 0.001 to 400 mg/m <sup>3</sup>
<b>Scattered coefficient range</b>	$1.1 \times 10^{-6}$ to $0.6 \text{ m}^{-1}$ (approximately) @ $\lambda = 880 \text{ nm}$
<b>Precision/ repeatability</b>	(2-sigma - at constant temperature):
<b>Concentration measurement range</b>	(auto ranging) Referenced to gravimetric calibration (NIST traceable) with SAE Fine test dust (mmd - 2 to 3 µm, $\rho_g = 2.5$ , as aerosolized) 0.0001 to 400 mg/m <sup>3</sup>
<b>Precision / repeatability</b>	(2-sigma) For single-wavelength concentration sensing at 25°C ±1% of reading or ± 0.001 mg/m <sup>3</sup> , whichever is greater
<b>Accuracy</b>	Referenced to gravimetric calibration (NIST traceable) with SAE Fine test dust (mmd = 2 to 3 µm, $\rho_g = 2.5$ , as aerosolized) ±2% of reading ± precision
<b>Resolution</b>	0.1% of reading or 0.1 µg/m <sup>3</sup> , whichever is greater
<b>Scattering coefficient range</b>	$10^{-7}$ to $0.4 \text{ m}^{-1}$ (resolution: 3 significant digits, maximum)
<b>Visual range (@ <math>\lambda = 550 \text{ nm}</math>)</b>	0.001 to 337 km (resolution: 3 significant digits, maximum)
<b>Angström coefficient measurement range</b>	0.0 to 4.0
<b>Particle sizing range</b>	(log-normal, $\rho_g = 2.0$ , $m = 1.50$ ) 0.05 to 4 µm
<b>Particle size range for concentration measurements</b>	0.08 to 10 µm
<b>Temperature measurement range</b>	5°F to 140°F (-15°C to 60°C); accuracy: 0.05°C
<b>Relative humidity measurement range (@ 25°F)</b>	0 to 100% noncondensing (accuracy: 2%)
<b>Sampling flow rate range (user selectable)</b>	1.0 to 3.0 liters/min. (accuracy: 0.05 liters/min., adjustability: 0.1 liters/min.)
<b>Measurement/display integration time range</b>	(user selectable) 1 to 60 sec. (selectable in 1-sec. steps)
<b>Measurement/display update frequency</b>	1 per sec.
<b>HEPA filter cartridge replacement frequency</b>	(typical) less than 1 per 5 yrs (@ < 1 mg/m <sup>3</sup> )
<b>Alarm level range</b>	(user selectable) selectable over entire measurement range 0.001-400mg/m <sup>3</sup>
<b>Data logging averaging periods</b>	(user selectable) 1 sec. to 24 hrs. (selectable in 1-sec. increments)
<b>Data logging memory capacity</b>	50,000 data points in up to 99 tags (data sets)
<b>Programmable zeroing periods</b>	(user selectable) 1 to 168 hrs. (selectable in 1-hr increments; if enabled, logging period must be more than 10 min.)
<b>Elapsed time readout range</b>	1 sec. to 100,000 hrs. (over 11 yrs.), in sec., min., and hrs.
<b>Digital communications</b>	RS232/RS485; full duplex, 9600 baud, software-controlled, filtered
<b>Computer requirements</b>	IBM-compatible PC, Windows™ 95 or higher; 8 MB memory or more
<b>Analog outputs</b>	(user selectable) 0 to 5 V and 4 to 20 mA with selectable full scale ranges between 0.1 and 400 mg/m <sup>3</sup>
<b>Power</b>	Internal battery; rechargeable, sealed lead-acid, 6.5 Ahr, 6 V, 20-hr run time between charges (typical) AC line: universal voltage charger / power supply (included) 100-250 V, 50-60 Hz (CE marked) Optional solar power system (Model DR-SOL)
<b>Alarm Outputs</b>	Alarm switch: 30 V (off, open), 2.5 A (on, closed) Alarm signal: 0 V (off), 5 V (on) (1 mA maximum load current) Audio alarm (back panel): More than 65 dB @ 1 m
<b>Operating environment</b>	14°F to 122°F (-10°C to 50°C); 10 to 95% RH, noncondensing
<b>Storage environment</b>	-4°F to 158°F (-20°C to 70°C)
<b>Dimensions</b>	5.28 in. (134 mm) H x 7.25 in. (184mm) W x 13.63 in. (346 mm) D
<b>Weight</b>	11.7 lbs (5.3kg)
<b>Safety approvals and certificates</b>	The DataRAM 4™ complies with US FCC rules (Part 15) and has received CE certification.
<b>Standard accessories included</b>	Universal voltage battery charger / power supply Standard HEPA filter cartridge Analytical filter holder PC communications software disk Digital output cable

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