

True mass measurement,  
conditioning system for the Thermo  
Scientific TEOM® series monitors

Product Specifications

## Thermo Scientific 8500 FDMS Filter Dynamics Measurement System



### Key Features

- Accounts for nonvolatile and volatile PM components with innovative self-referencing methodology
- Hourly mass concentration average updated every six minutes
- Scientifically validated – total mass of aerosol chemical species
- California Approved Sampler (CAS), PM-2.5 and PM-10 regulations

The Thermo Scientific 8500 FDMS Filter Dynamics Measurement System accomplishes the challenging task of accounting for both the volatile and non-volatile components of particulate matter (PM), and reporting the combination as a mass concentration result. This is done by measuring the volatile portion of the sample independently from the total incoming sample, and using this fraction in calculating the PM mass concentration.

The sampling and measurement system of the 8500 FDMS® is based upon a number of successful technologies applied by Thermo Scientific, including the true-mass filter-based TEOM® microbalance, a diffusion drying system, and a self-referencing technique to assess the volatile component of ambient PM.

The FDMS 8500 system provides a new PM measurement approach that offers the ability to quantify the PM mass concentration as it exists in ambient air.

The FDMS 8500 system takes into account the dynamics of PM that have been deposited on a sample collection filter, and how that material behaves over time. The device is designed to provide high-quality, representative PM mass concentration readings for both short-term averages (one hour) as well as 24-hour averages. The system's basic output consists of running 1-hour average mass concentration (in  $\mu\text{g}/\text{m}^3$ ) of PM-10, PM-2.5 or PM-1 updated every six minutes. The unit also computes the base mass concentration and reference mass concentration over the same averaging times.

## Product Specifications

To maintain optimal product performance, you need immediate access to experts worldwide, as well as priority status when your air quality equipment needs repair or replacement. We offer comprehensive, flexible support solutions for all phases of the product life cycle. Through predictable, fixed-cost pricing, our services help protect the return on investment and total cost of ownership of your Thermo Scientific air quality products.

### Thermo Scientific FDMS 8500 Filter Dynamics Measurement System

<b>Instrument Performance</b>	Measurement Range: 0 to 5,000,000 $\mu\text{g}/\text{m}^3$ (5 $\text{g}/\text{m}^3$ ). (3 l/min, 1s, stable conditions) Resolution: 0.1 $\mu\text{g}/\text{m}^3$ . Precision: $\pm 2.5 \mu\text{g}/\text{m}^3$ (1-hour avg), $\pm 0.8 \mu\text{g}/\text{m}^3$ (24-hour avg). Minimum Detectable Limit for Mass Measurement: 10 nanograms, 0.06 $\mu\text{g}/\text{m}^3$ (1-hour ave). Accuracy for Mass Measurement: $\pm 0.75\%$ .
<b>Flow Control</b>	Two mass flow controllers (0-5 and 0-20 l/min) with 1% of full-scale accuracy. Active volumetric flow control of sample stream using ambient temperature and pressure sensors. Mass concentration expressed either in standard or actual terms (user selectable).
<b>Sample Conditioning System</b>	FDMS dryer contains specially-designed Nafion <sup>®</sup> tubing inlet on the main flow to minimize potential for particle loss. The dryer lowers the main flow relative humidity, and allows for mass transducer operation at 5° C above the peak air monitoring station temperature. Purge Filter Conditioner contains a heat exchanger that maintains the temperature of the main air flow and particle filter at 4° C. An integrated humidity sensor that follows the SES dryer measures the main flow line humidity to determine the drying efficiency.
<b>Data Averaging and Output</b>	The system computes mass concentration information as mass concentration (sample MC adjusted by purge MC), volatility coefficient, volatile mass concentration and nonvolatile mass concentration. Real-time Mass Concentration Averages: 1 hour running average, updated every six minutes. Long-Term Averaging: 1, 8 (user selectable), 12 and 24 hr, updated every hour.
<b>Operating Range</b>	The temperature of the sampled air may vary between -30° and 50° C, excluding the size-selective inlet, the instrument must be weather protected within the range of 8° to 25° C. Total flow rate of 16.7 l/min (1 $\text{m}^3/\text{h}$ ), with a main flow rate of 3 l/min and bypass flow rate of 13.67 l/min. Temperature of mass sensor and internal sample tube: 5° C above peak station temperature (default 30° C, with set point range of 30° to 40° C).
<b>Data Storage</b>	Internal data logging of 1 to 8 user-specified variables; capacity of up to 10 weeks of hourly mass concentration data.
<b>Filter Media</b>	Collection filter: Pallflex TX40, 13 mm effective diameter. Must use molded-TEOM style filter cartridge. Purge filter: 47 mm diameter filter housed in an FRM-style molded filter cassette, maintained at 4° C. Suitable for collecting and archiving time-integrated particulate matter samples for laboratory analysis.
<b>Software and Documentation</b>	RPCOMM and RPDATA software downloadable from the <a href="http://Thermoscientific.com">Thermoscientific.com</a> to retrieve and view data on a number of computer platforms.
<b>Data Output and Input</b>	Four-line display on control unit. RS232 serial connector for two-way communication with network and computer devices using the AK protocol. 3 user-defined analog outputs (0-1, 0-2, 0-5 or 0-10 VDC).
<b>Dimensions &amp; Power</b>	FDMS: 28 cm (11") W x 17.8 cm (7") D x 55.9 cm (22") H, 10 kg (22 lb), 1 A @ 120 VAC, 0.5 A @ 240 VAC. Sensor unit: 35.6 cm (14") W x 28 cm (11") D x 99 cm (39") H, 18.2 kg (40 lb), power from control unit. Control unit: 43.2 cm (17") W x 38.1 cm (15") D x 22.9 cm (9") H, 14.6 kg (32 lb), 1 A @ 120 VAC, 0.5 A @ 240 VAC. Pump: 15.3 cm (6") W x 28 cm (11") D x 20.4 cm (8") H, 7.3 kg (16 lb), 4.25 A @ 120 VAC, 2.25 A @ 240 VAC. System height: sensor unit only is 99 cm (39" H, total system including sensor unit and FDMS kit is 160 cm (63") H. Cables between FDMS Unit and TEOM control unit: 10 m valve control cable and 10 m status cable.

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This product is manufactured in a plant whose quality management system is ISO 9001 certified.

#### Air Quality Instruments

27 Forge Parkway  
Franklin, MA 02038 USA

(866) 282-0430  
(508) 520-0430  
(508) 520-1460 fax

[www.thermoscientific.com/AQL](http://www.thermoscientific.com/AQL)

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