

# Thermo Scientific TEOM 1405-DF Ambient Particulate Monitor

Continuous dichotomous ambient air monitor

The Thermo Scientific™ TEOM 1405-DF Ambient Particulate Monitor simultaneously measures PM-10, PM-2.5 and PM-Coarse mass concentration as it exists in the ambient air.

- U.S. EPA PM-2.5 , PM-10-2.5, PM-10 Equivalent Monitor (EQPM-0609-182, EQPM-0822-207, EQPM-0822-208)
- Accounts for volatile and non-volatile PM fractions
- Combines control unit, mass sensor and FDMS into a single integrated unit
- Embedded FTP server, Ethernet, USB, RS-232 and RS485 communications
- Activol flow control



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The 1405-DF monitor is composed of two Filter Dynamics Measurement Systems (FDMS) and two TEOM mass sensors housed in a single cabinet, network-ready configuration that includes the control system with touch screen user interface.

The TEOM 1405-DF system is designed to provide representative short and long term reading of the ambient PM concentration, even in the presence of volatile materials. Conventional PM monitoring approaches do not account for the rapid loss that can occur with collection on a filter while sampling ambient PM. The 1405-DF monitor overcomes this challenge by automatically generating mass concentration measurements ( $\mu\text{g}/\text{m}^3$ ) that account for both non-volatile and volatile PM-10, PM-2.5 and PM-Coarse components. The system's default data

output consists of a running 1-hour and 24-hour average mass concentration updated every 6 minutes and on the hour respectively. The monitor computes a 1-hour FDMS base and reference mass concentrations updated every 6 minutes. Users can select additional averaging times from 30 minutes to 23 hours.

The 1405-DF monitor provides a self-referencing, NIST-traceable true mass measurement using our own proven high reliability TEOM technology. The system differentiates itself from other PM measurement methods by utilizing a direct mass measurement that is not subject to measurement uncertainties found in surrogate techniques such as beta attenuation, light scattering and pressure drop.

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Standard System Configuration	Menu-driven software for user interaction via 1/4 VGA display with touch screen, connecting and Interface cables, and vacuum pump, consumables for average first year's operation (ambient), RPCOMM and ePort software for local or remote communication
Instrument Performance	Measurement Range: 0 to 1,000,000 $\mu\text{g}/\text{m}^3$ (1 $\text{g}/\text{m}^3$ ), resolution: 0.1 $\mu\text{g}/\text{m}^3$ , precision: $\pm 2.0 \mu\text{g}/\text{m}^3$ (1-hour avg),
(3 l/min, 1s, stable conditions)	$\pm 1.0 \mu\text{g}/\text{m}^3$ (24-hour avg), accuracy for mass measurement: $\pm 0.75\%$
Data Averaging and Output	Real-time mass conc average: 1 hour rolling average updated every six minutes, long-term averaging: 1, 8, and 24 hr, data output rate: selectable from 10 sec to 24 hour
Operating Range	The temperature of the sampled air may vary between $-40^\circ$ and $60^\circ \text{C}$ . The TEOM sensor and control units must be weather protected within the range of $8^\circ$ to $25^\circ \text{C}$ . An optional complete outdoor enclosure provides complete weather protection.
Sample Flow	Activol flow control system uses the mass flow sensors and the measured ambient temperature and pressure to maintain constant volumetric flow rates. Main flow rate: Fine PM filter: 3.0 l/min; Coarse PM filter: 1.67 l/min, bypass flow rate: 12.0 l/min
Data Storage	Internal data logging of user-specified variables; capacity of 500,000 records.
Filter Media	Sample filter: Pallflex TX40, 13 mm effective diameter, sample conditioner filter: 47mm diameter housed in an FRM-style molded filter cassette, maintained at $4^\circ \text{C}$ . Suitable for collecting and archiving time-integrated PM samples for subsequent laboratory analysis.
Sample Conditioning	Sample Equilibration System (SES) dryer lowers the main flow relative humidity and allows for mass transducer operation at $5^\circ \text{C}$ over the peak air monitoring station temperature. Purge Filter Conditioner contains a heat exchanger that maintains the temperature of the main flow and particle filter at $4^\circ \text{C}$ to efficiently filter the volatile and non-volatile PM in the sample.
Data Output and Input	ePort software to view and change system operation from PC, touch screen user interface, Ethernet with embedded FTP server, USB, RS232, RS485, 8 user-defined analog outputs (0-1 or 0-5 Vdc), 2 user-defined contact closure alarm circuits, 4 averaged analog inputs (0-5 Vdc) with user-defined conversion to engineering units
Power Requirements	Instrument: 100-240 VAC, 440 VA, 47-63 Hz Pump: 120 VAC/60 Hz: 4.25 A; 240 VAC/50 Hz: 2.25 A
Dimensions	17" (43.2 cm) W x 19" (48.3 cm) D x 55" (140 cm) H
Weight	83 lbs (38 kg)
Safety/Electrical Designations	Designed to meet: CE: EN 61326:1997 + A1:1998 + A2:2001 + A3:2003, EN:61010-1, UL: 61010-1:2004, CSA: C22.2 No. 61010-1:2004, FCC: Part 15 Subpart B, Class B
Approvals and Certifications	U.S. EPA PM-2.5 Equivalent Monitor EQPM-0609-182 U.S. EPA PM-10-2.5 Equivalent Monitor EQPM-0822-207 U.S. EPA PM-10 and Equivalent Monitor EQPM-0822-208 TÜV PM-2.5 and PM-10 Equivalent Monitor

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

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