TEOM® Series 1400a Ambient Particulate Monitor

Real-Time, True Mass Measurement of Suspended Particulate Matter as PM-10, PM-2.5, PM-1 and TSP

Analyze • Detect • Measure • Control™

Thermo ELECTRON CORPORATION

Most Advanced Technology

The TEOM Series 1400a Ambient Particulate Monitor is the choice of air pollution monitoring networks worldwide to measure particulate mass concentrations continuously. The system has become the de facto standard for particulate mass concentration measurements in areas such as Canada, Hong Kong, the United Kingdom and France due to its high data quality, reliability and unparalleled support.

The instrument incorporates the patented *tapered element oscillating microbalance*, a microweighing technology that provides true mass measurements. Using a choice of sample inlets, the hardware can easily be configured to measure PM-10, PM-2.5, PM-1 or TSP concentrations. This microprocessor-based unit easily accommodates all siting requirements and provides internal data storage, and advanced analog and serial data input/output capabilities.

For special applications, alternate configurations are available as the Sample Equilibration System (SES) and Series 8500 Filter Dynamics Measurement System (FDMS™ Unit).

Regulatory Aprovals

The TEOM Series 1400a monitor has received the following major regulatory recognitions:

- USEPA PM-10 equivalency approval EQPM-1090-079.
- PM-2.5 measurements within the context of a USEPA correlated acceptable continuous monitor (40 CFR 58).
- European Union guidelines for the continuous monitoring of PM-10.
- German EPA approval as an equivalent TSP and PM-10 monitor.
- Australian Standard 3580.9.8-2001, and approvals in Japan, Korea and Taiwan.

Filter-Based Mass Measurement

Filter-based, direct mass measurements are considered the standard technique for determining particulate mass concentration. TEOM instruments from Thermo Electron Corporation are the only filter-based systems with real-time data output and real-time mass measurement capability. The exchangeable filter in the Series 1400a monitor can also be used to determine heavy metal concentrations using atomic absorption (AA) and inductively coupled plasma (ICP).

Unique Principle of Operation

The Series 1400a monitor incorporates an inertial balance that directly measures the mass collected on an exchangeable filter cartridge by monitoring the corresponding frequency changes of a tapered element. The sample flow passes through the filter, where particulate matter collects, and then continues through the hollow tapered element on its way to an active volumetric flow control system and vacuum pump.

The TEOM mass transducer does not require recalibration because it is specially designed and constructed from non-fatiguing materials. Its mass calibration may be verified, however, using an optional Mass Calibration Verification Kit that contains a filter of known mass. Active volumetric flow control is maintained by mass flow controllers whose set points are constantly adjusted in accordance with the measured ambient temperature and pressure.

Both the mass and flow rate measurements are verifiable using NIST-traceable standards.

Application Range

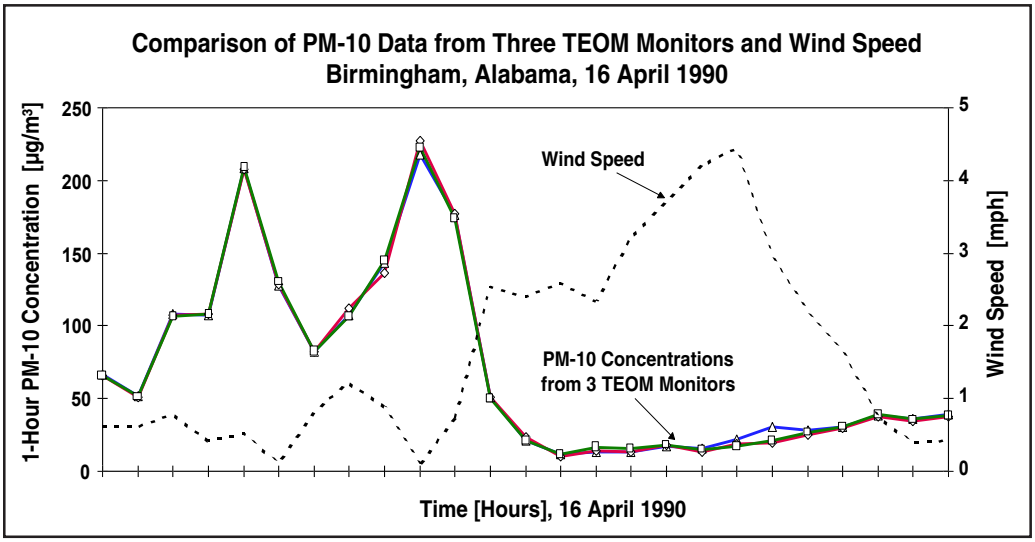
The TEOM Series 1400a monitor is used to monitor ambient air quality in the following major applications:

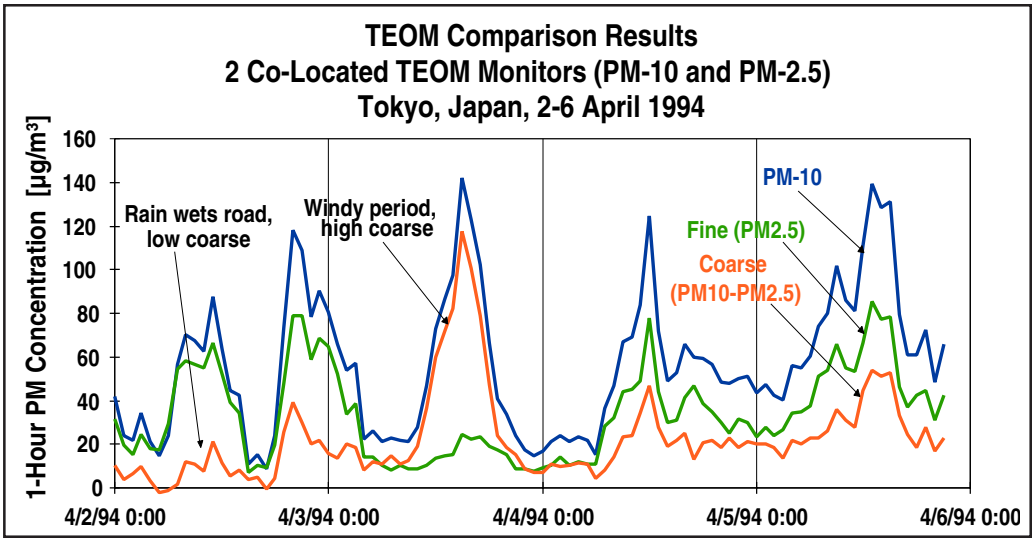
- Air quality monitoring networks, including background sites.
- Special studies and super sites for PM-10, PM-2.5 and PM-1 characterization.
- Routine input for air quality index or pollutant standards index.
- In and around industrial and material handling facilities.
- Remediation projects (Superfund, hazardous waste).
- Indoor air, exposure chamber, and industrial hygiene measurements.

Unsurpassed Short-Term Precision

One-hour average mass concentration data from two co-located TEOM monitors demonstrate the instrument's unsurpassed precision. The Series 1400a monitor meets the stringent one-hour performance acceptance criteria established by the California Air Resources Board.

The instrument's data quality also permits different particle size fractions such as PM-10 and PM-2.5 to be compared with each other at short averaging times. With this resolution, one can see the relationship between different PM measures changes with meteorology, regional or local conditions. This can provide vital information in the study of human health effects. Other applications of time-sensitive data include source identification and control, short-term compliance monitoring, emergency response, forensic investigations, and numerical modeling.





ACCU™ System

With the optional Automatic Cartridge Collection Unit added to the Series 1400a system, users can add manual PM sampling to the automated mass concentration results generated by the continuous monitor. The ACCU System attaches to the bypass flow line of the TEOM monitor, and permits users to sample ambient PM and gases with a choice of collection methods for subsequent analysis.

The system's eight internal flow channels can be fitted with a variety of filter holders, filter packs, or PUF (polyurethane foam) samplers. A new filter holder for X-ray fluorescence (XRF) analysis makes use of the molded FRM-style 47 mm filter cassettes available from Thermo. The user specifies the conditions under which each of the ACCU System's flow channels is operated, including time of day, particulate concentration, meteorological data and/or other inputs from external sources.

Complete Outdoor Enclosure

The optional Complete Outdoor Enclosure allows the TEOM monitor to be installed at locations at which a permanent shelter is not available. The housing provides the proper weather-proof environment to ensure long-term performance. It provides not only heating for cold climates, but also active air conditioning for instrument operation in summer heat.

Quality Assurance

A mumber of tools provide users with the ability to perform in-field audits of the TEOM monitor's mass measurement and active volumetric flow control system. Under software support, users can use the single pre-weighed filter contained in the Mass Calibration Verification Kit to confirm the mass calibration of the instrument. The Streamline™ Flow Transfer Standard is an orifice-based device that provides high-quality flow rate measurements even under challenging environmental conditions.

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