

**Engineered for Monitoring Performance.
Rugged and Reliable.**

Features and Benefits

- Easy to operate and install
- Simple and flexible data acquisition
- Low maintenance
- 7 nanometer detection
- Pulse height monitor to ensure data accuracy
- Field swappable optics module
- Single particle counting to 100,000 particles/cm³
- Rack mount ready
- Adjustable sampling intervals down to 1 second
- Advanced instrument diagnostics
- Stand alone operation or computer software control

EPC™ Environmental Particle Counter™ Monitor Model 3783

Real-time, Ultrafine Particulate (UFP) number concentrations.

Federal Reference Methods (PM_{2.5}, PM₁₀) and equivalent mass based methods cannot quantify the amount of UFP in the air. The EPC™ monitor provides quantitative UFP concentration data to supplement mass based and FRM equivalent methods. This freshly engineered water-based condensation particle counter detects ultrafine particles down to 7 nanometers and delivers robust field performance. The EPC™ monitor is a good choice for indoor and outdoor ambient monitoring and many other applications that require 24/7 operation.

Flexibility

Targeted at unattended monitoring, the 3783 is easy to use, requires minimal maintenance, and has a variety of configuration choices.

Set-up options: Inlet flow (3.0 or 0.6 L/min), inlet location (front or back), water connection (front or back), and optional rack mount hardware.

Instrument interface: Color touchscreen with graphical interface, upgraded Aerosol Instrument Manager® software or terminal command set.

Data acquisition options: USB stick, Ethernet, USB port, or RS-232 port.



TRUST. SCIENCE. INNOVATION.

*EPA Federal Reference Method (PM_{2.5} or PM₁₀)



Engineering Innovation: Taking Particle Counter Design to the Next Level

The result of thoughtful design, rigorous internal testing and extensive field validation. The EPC monitor was born out of a methodical evaluation of challenges specific to water-based condensation particle counters and high concentration environments. Newly designed air flow,

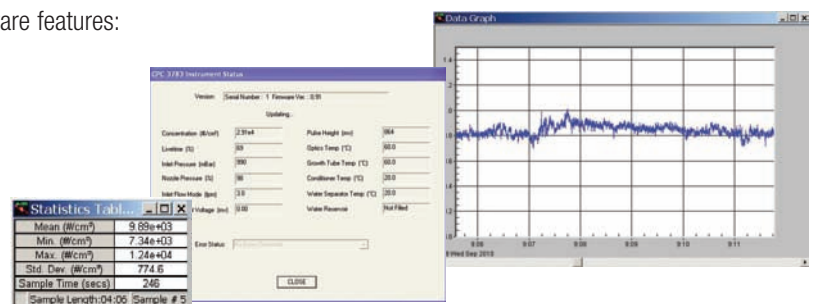
wicking and water handling systems provide superior accuracy, reliability and ease of operation. Advanced instrument diagnostics include a novel pulse height analyzer to monitor wick health, supersaturation state, and instrument status. The 3783 boasts over 20 new design features.

Enhancement	Design Feature
Concentration Accuracy	Optimized wick material and wick geometry Pulse height analyzer to monitor wick health, supersaturation state, and instrument status.
Flow Rate Stability	Critical orifice air flow scheme (no need for flow control orifice) Large surface area internal filters Mechanical nozzle optimization to reduce/eliminate nozzle clogging
Problem Free Operation	Robust new water handling scheme featuring an active water removal system (water separator) Inlet pressure monitor to prevent flooding Minimized Internal Reservoir Reduced water consumption Active drain pump Expanded operating temperature range
Precision Measurements	Enhanced zero count stability Real time clock
On-board Instrument Diagnostics	Nozzle pressure transducer to monitor nozzle health Laser reference detector Expanded software instrument status screen
Convenience & Flexibility	Easily accessible inlet screen assembly Wick cartridge for quick wick replacement Removable, swappable optics modules

Software

The Model 3783 is supplied with powerful Aerosol Instrument Manager® software designed for use with Microsoft® Windows® operating systems. The software features:

- Comprehensive Statistical Analysis
- Advanced Instrument Diagnostics
- Real-time Data Display
- Advanced File Management
- Easy Data Export Options
- Auto recovery from power failure



Operation

The EPC™ monitor utilizes a patented* laminar-flow, water-based condensation growth technique. Particles which are too small (nanometer scale) to scatter enough light to be detected by conventional optics are grown to a larger size by condensing water on them. In this instrument, an air sample is continuously drawn through the inlet via an external pump and a portion of the flow is sent to the exhaust as bypass flow.

Saturation

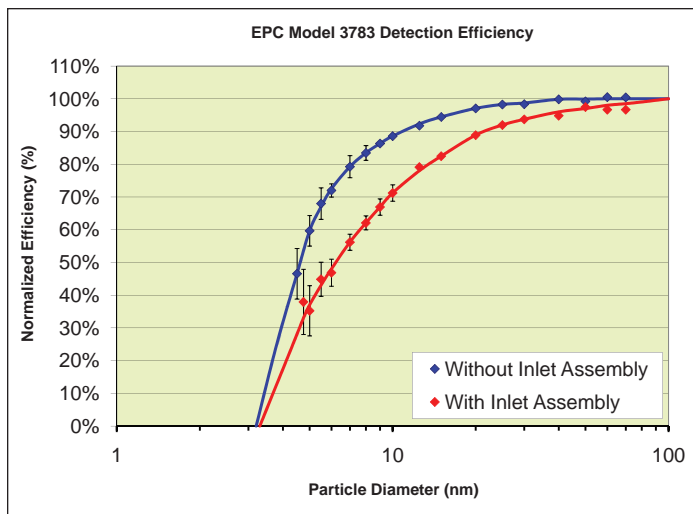
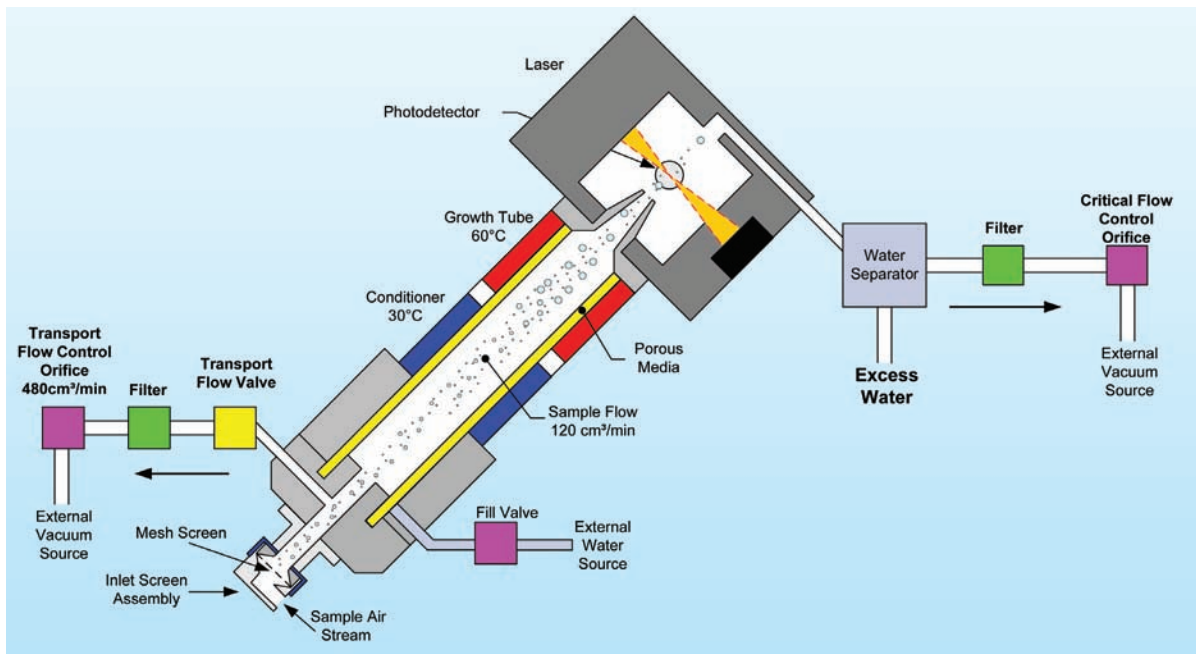
The aerosol sample is pulled through a cool region saturated with water vapour and its temperature is equilibrated.

Condensation

The sample then passes to a growth section where wetted walls are heated to produce an elevated vapour pressure resulting in a thermodynamic 'supersaturation' condition. The small cool particles in the flow stream act as nuclei for condensation, and grow into micron sized droplets.

Detection

The droplets are passed through a laser beam and create a large light pulse. Every particle pulse event is detected and counted. In this technique particle concentration is measured by counting every single particle in the air stream.



To Order

EPC™ Environmental Particle Counter™ Monitor

Specify	Description
3783	Environmental Particle Counter with TSI Aerosol Instrument Manager® Software

Optional Accessories

Specify	Description
3032	Vacuum Pump (115 V., 60 Hz)
3032-1	Vacuum Pump (220v/50hz)
3032-EC	Vacuum Pump (230 VAC; EU Configuration)
3031200	Environmental Sampling System (includes a standard PM ₁₀ inlet, a PM ₁ cyclone, a flow splitter and a Nafion dryer)
1031558	Inlet cyclone (3.3µm cut at 0.6LPM inlet flow only)
1183001	3783 Maintenance Kit
376060	Particle Size Selector with 11 screens Adjust 3783 efficiency cut-point up to eleven sizes between ~0.01 and ~0.2 µm
376061	Additional screens for Particle Size Selector, set of 12 Adjust 3783 efficiency cut-point up to ~0.45 µm

Specifications

Model 3783

EPC™ Environmental Particle Counter™ Monitor

Particle Size Range

Min. Detectable Particle (D_{50}) 7 nm, verified with DMA-classified sucrose
 Max. Detectable Particle > 3 μm

Particle Concentration Range

Single Particle Counting 0 to 10^6 particles/ cm^3 , with continuous live-time electronics processing

Particle Concentration Accuracy

$\pm 10\%$ at 10^6 particles/ cm^3

Response Time

High-flow Mode <3 seconds to 95% in response to concentration step change

Low-flow Mode

<5 seconds to 95% in response to concentration step change

Flow

High-flow Inlet 3 ± 0.3 Liters/minute

Low-flow Inlet 0.6 ± 0.06 Liters/minute

Aerosol Flow Rate 120 ± 12 $\text{cm}^3/\text{minute}$

False Background Counts

<0.01 particles/ cm^3 , 1-hour average Dewpoint <30°C (i.e. <35°C at 75% RH)

Aerosol Medium

Air only

Environmental Operating Conditions

Ambient Temperature Range 10 to 38 °C (50 to 100.4 °F)

Ambient Humidity Range 0 to 90% RH, non condensing

Inlet Pressure Operation (Absolute)

50 to 110 kPa (0.5 to 1.1 atm)

Inlet Pressure (Gauge)

0 to -5 kPa (-20" H_2O)

Condensing Liquid

Water, distilled (<6ppm) or HPLC water. Tap water must not be used.

Water System

External 1 L bottle for up to 4 weeks operation

Water Consumption

250 ml/week

Vacuum

External vacuum; pump not included in instrument accessories



Communications

Protocol Interfaces

RS-232

USB

Ethernet

Data Logging

ASCII command set

9-pin, D-Sub connector

Type B connector, USB 2.0 compatible at 12 MB

8-wire RJ-45 jack, 10/100 BASE-T, TCP/IP

USB flash drive

Data averaging interval of 1 to 3,600s

1, 2, 4, 5, 6, 10, 12, 15, 20, 30, or 60s

software provides more avg. options

Averaging Interval

Outputs

Digital Display

6" VCA color touch screen w/graphical interface.

Graph of concentration vs. time, concentration, time and total counts, and status

Analog Output

BNC connector, 0 to 4V proportional to log conc.

Digital Output

Data download using USB or RS-232 serial interface

Software

TSI Aerosol Instrument Manager® CPC/EAS software included. Not SMPS™ spectrometer compatible.

Calibration

Recommended annually

Power Requirements

100 to 240 VAC, 50/60 Hz, 175 W maximum

Connections

Inlet $\frac{1}{4}$ " tube

Low-flow Inlet $\frac{1}{4}$ " Swagelock® tube fitting

Dimensions (HWD)

20.3 x 48.3 x 30.5 cm (8 x 19 x 12 in.)

Weight

9.9 kg (22 lbs)

Specifications are subject to change without notice. The technique of using a Condensation Particle Counter with diffusion screens to select specific size ranges is covered in U.S. Patent Number 5,072,626. TSI, the TSI logo, Scanning Mobility Particle Sizer, SMPS, EPC, Environmental Particle Counter, and Aerosol Instrument Manager are trademarks of TSI Incorporated. Swagelok is a registered trademark of the Swagelok Company.

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