



® Knowledge Beyond Measure.

# EPC™ Environmental Particle Counter™ Monitor

Model 3783



## Engineered for monitoring performance of real-time, ultrafine (UFP) number concentrations

Federal Reference Methods (PM<sub>2.5</sub>, PM<sub>10</sub>) 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, including:

- 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.

### 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 1,000,000 particles/cm<sup>3</sup>
- Rack mount ready
- Adjustable sampling intervals down to 1 second
- Advanced instrument diagnostics
- Stand alone operation or computer software control



## 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.

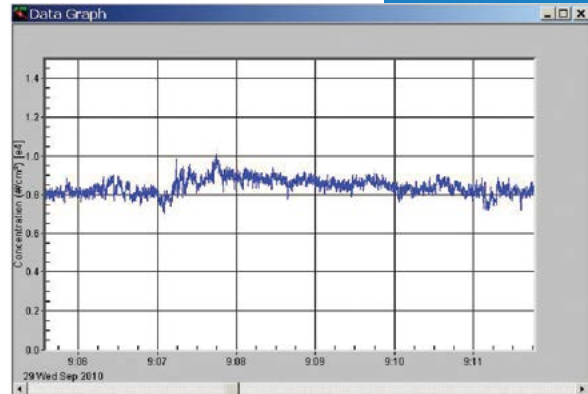
Enhancement	Design Feature
Concentration Accuracy	Optimized wick material and wick geometry
	Pulse height analyzer to monitor wick health, supersaturation state, and instrument status.
Flow Rate Stability	Critical orifice air flow scheme (no need for flow control orifice)
	Large surface area internal 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
Precision Measurements	Expanded operating temperature range
	Enhanced zero count stability
On-board Instrument Diagnostics	Real time clock
	Nozzle pressure transducer to monitor nozzle health
Convenience & Flexibility	Laser reference detector
	Expanded software instrument status screen
	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



CPC 3783 Instrument Status			
Version: [Serial Number: 1 Firmware Ver.: 0.91]			
Updating...			
Concentration (#/cm³)	2.91e4	Pulse Height (mv)	864
Lifetime (%)	69	Optics Temp (°C)	60.0
Inlet Pressure (inBar)	990	Growth Tube Temp (°C)	60.0
Nozzle Pressure (%)	99	Conditioner Temp (°C)	20.0
Inlet Flow Mode (lpm)	3.0	Water Separator Temp (°C)	20.0
Analog Input Voltage (mv)	0.00	Water Reservoir	Not Filled
Error Status: [No Errors Detected]			
[CLOSE]			

Statistics Table...	
Mean (#/cm³)	9.89e+03
Min. (#/cm³)	7.34e+03
Max. (#/cm³)	1.24e+04
Std. Dev. (#/cm³)	774.6
Sample Time (secs)	246
Sample Length: 04:06 Sample # 5	

### 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 vapor and its temperature is equilibrated.

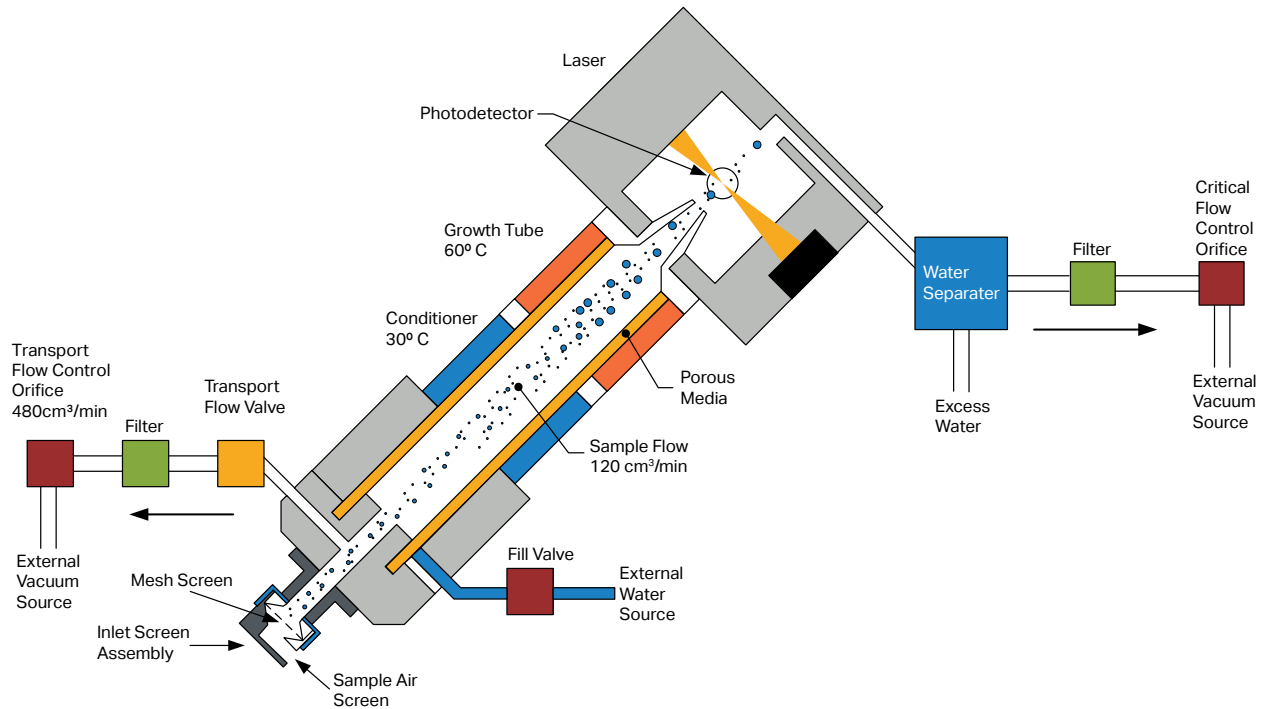
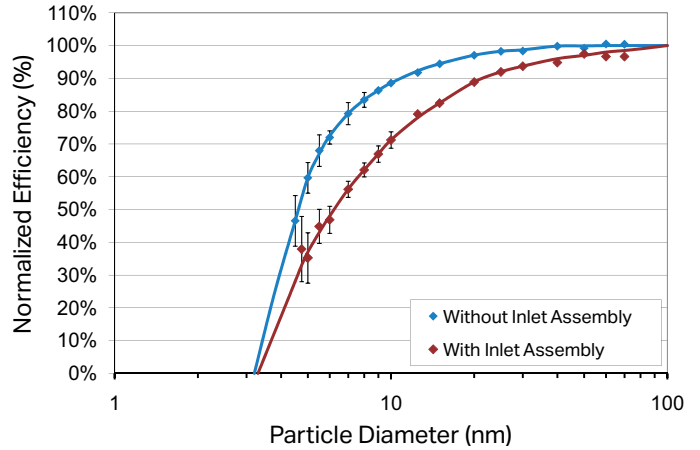
### Condensation

The sample then passes to a growth section where wetted walls are heated to produce an elevated vapor 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.

EPC Model 3783 Detection Efficiency



## Specifications

# EPC™ Environmental Particle Counter™ Monitor

Model 3783

### Particle Size Range

Min. Detectable Particle (D50)	7 nm, verified with DMA-classified sucrose
Max. Detectable Particle	> 3 µm

### Particle Concentration Range

Single Particle Counting	0 to 10 <sup>6</sup> particles/cm <sup>3</sup> , with continuous live-time correction
--------------------------	---

### Particle Concentration Accuracy

±10% at 10<sup>6</sup> particles/cm<sup>3</sup>

### 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 cm <sup>3</sup> /minute

### False Background Counts

<0.01 particles/cm<sup>3</sup>, 1-hour average for 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<sub>2</sub>O)

### 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

Requires external vacuum; recommended 6 std. L/min at 400 mbar.

Specifications are subject to change without notice.

TSI and the TSI logo are registered trademarks in the United States and may be protected under other country's trademark registrations.



Knowledge Beyond Measure.

TSI Incorporated - Visit our website [www.tsi.com](http://www.tsi.com) for more information.

USA	Tel: +1 800 874 2811	India	Tel: +91 80 67877200
UK	Tel: +44 149 4 459200	China	Tel: +86 10 8219 7688
France	Tel: +33 1 41 19 21 99	Singapore	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		

### Communications

Protocol	ASCII command set interfaces
▪ RS-232	9-pin, D-Sub connector
▪ USB	Type B connector, USB 2.0 compatible at 12 MB
▪ Ethernet	8-wire RJ-45 jack, 10/100 BASE-T, TCP/IP
Data Logging	USB flash drive
Averaging Interval	1, 2, 4, 5, 6, 10, 12, 15, 20, 30, or 60s software provides more avg. options

### Outputs

Digital Display	6" VCA color touch screen with 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 software included. Not SMPST™ spectrometer compatible.

### Calibration

Recommended annually.

### Power Requirements

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

### Connections

Inlet	1/4" tube
Low-flow Inlet	1/4" Swagelock® tube fitting

### Dimensions (H x W x D)

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

### Weight

9.9 kg (22 lbs)

## 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 PM10 inlet, a PM1 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