



*A general-purpose WCPC that detects particles down to 5 nm, over a wide concentration range from 0 to 10<sup>7</sup> particles/cm<sup>3</sup>!*

### Features and Benefits

- Fast response to rapid changes in aerosol concentration
- High sample flow rate (1.0 L/min) for great counting statistics
- Single particle counting with continuous, live-time coincidence correction for maximum accuracy; photometric mode extends the concentration range to 10<sup>7</sup> particles/cm<sup>3</sup>
- Built-in SMPS compatibility
- Removable wick for easy transport and maintenance

### Water-based Condensation Particle Counter Model 3785

The Model 3785 Water-based Condensation Particle Counter (WCPC) is a general-purpose counter that can detect airborne particles down to 5 nm in diameter. It detects these particles over a wide concentration range from 0 to 10<sup>7</sup> particles/cm<sup>3</sup>, at a high aerosol-sample flow rate of 1.0 L/min. As a result, this WCPC is versatile and well-suited for a broad range of applications, including basic aerosol research, indoor air-quality measurements, health effects research, inhalation and exposure studies, atmospheric and climate studies, and nanotechnology research. Additionally, it can be used as part of a TSI Scanning Mobility Particle Sizer™ (SMPS™) spectrometer.

### Applications

TSI offers the most comprehensive line of CPCs available. Building on a tradition of 30 years experience, TSI CPCs have become the standard to which all others are compared.

General applications include:

- Basic aerosol research
- Filter and air-cleaner testing
- Atmospheric and climate studies
- Particle formation and growth studies
- Combustion and engine exhaust studies
- Inhalation or exposure chamber studies
- Health effects studies

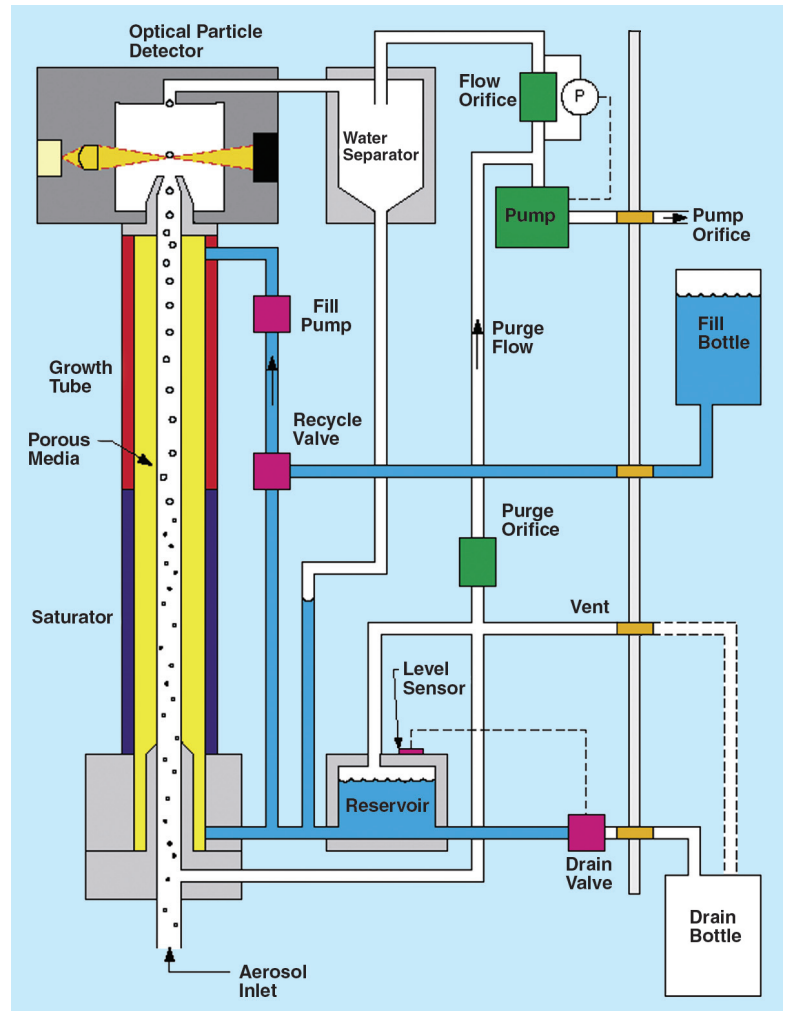


## Operation

In general, TSI CPCs operate on the principle of enlarging small particles using a condensation technique to a size that is large enough to be detected optically. The Model 3785 brings the convenience of using water to the measurement of submicrometer aerosol particles. Using a patented technique<sup>1</sup>, an aerosol sample is drawn continuously through a cooled saturator and then into a heated condenser, where water vapor diffuses into the sample stream. Effectively, water diffuses to the centerline of the condenser faster than heat is transferred from the warm walls, producing supersaturated conditions. Particles that are present in the sample stream (and larger than the minimum activation size) serve as condensation sites for the water vapor. Once condensation begins, particles grow quickly into larger water droplets and pass through an optical detector where they are counted easily.

The Model 3785 WCPC combines continuous, live-time corrected, single particle counting with a temperature-stabilized photometric mode to provide accurate measurements over a very wide particle concentration range (0 to  $10^7$  particles/cm<sup>3</sup>). The single-path sample flow design allows for precise, pressure-corrected flow control. Its high flow rate enables fast response to rapidly changing aerosols.

Real-time particle concentration, totalizer function, and operating parameters, as well as a graph of concentration versus time, are all viewable on the front-panel display. Data are directly accessible via standard interfaces. Records include concentration, particle count, sample time, photometric values, and status information. These can be reported at an interval ranging from 0.1 to 3600 seconds.



<sup>1</sup> Technology from Aerosol Dynamics, Inc., U.S. Patent Number 6,712,881

## Software and Built-in SMPS Compatibility

Every Model 3785 is supplied with 32-bit Aerosol Instrument Manager® software designed for use with Microsoft® Windows® operating systems. TSI Aerosol Instrument Manager software is used for instrument control and provides data collection, management, and export capabilities, as well as several choices for data display.

The Model 3785 comes standard with built-in compatibility for use in TSI Series 3936 Scanning Mobility Particle Sizer (SMPS) spectrometers. Collectively, SMPS spectrometers configured with a Model 3785 provide size-distribution measurement capability from 0.005 to 1.0 µm. Specific size ranges vary depending on the Differential Mobility Analyzer used. Ask your TSI representative for additional information on SMPS spectrometers.

## To Order

### Water-based Condensation Particle Counter

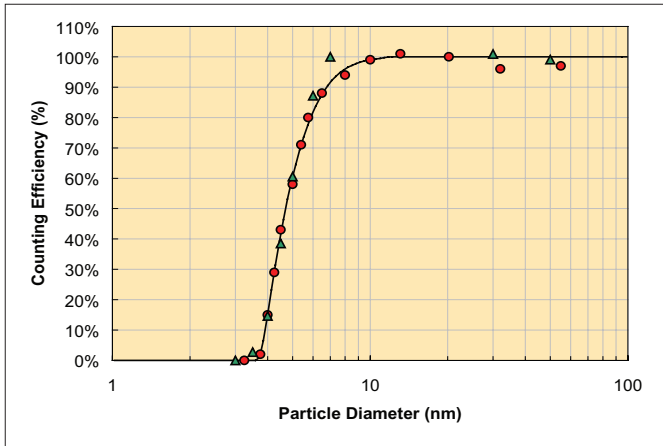
Specify	Description
3785	Water-based Condensation Particle Counter with TSI Aerosol Instrument Manager software

### Optional Accessories

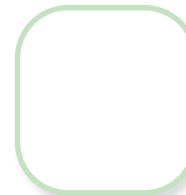
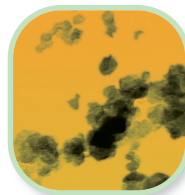
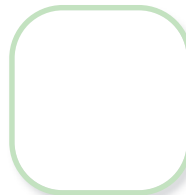
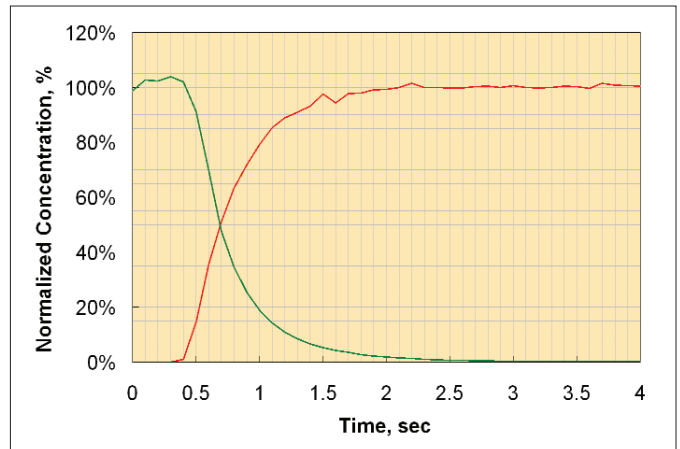
Specify	Description
1031558	Inlet Cyclone (calculated cut-points: 3.3 µm @ 0.6 L/min; 2.15 µm @ 1.0 L/min)
1031518	Maintenance Kit for models 3782 and 3785 WCPCs (includes 5 wicks, 2 inline filters, 1 HEPA filter, and 1 set of reservoir O-rings)
4029003	Wick for models 3782, 3785, and 3786 WCPC (box of 10)

Accessories must be ordered separately

TSI Model 3785 Efficiency,  
Ambient and Sucrose Particles



TSI Model 3785 Response Time



## Specifications

### Model 3785 Water-based Condensation Particle Counter

#### Particle Size Range

**Min. Detectable Particle ( $D_{50}$ )** 5 nm, verified with DMA-classified ambient and sucrose particles

**Max. Detectable Particle** >3  $\mu\text{m}$

#### Particle Concentration Range

**Single Particle Counting** 0 to  $3 \times 10^4$  particles/cm<sup>3</sup> nominally (continuous, live-time coincidence corrected)

**Photometric Counting**  $10^4$  to  $10^7$  particles/cm<sup>3</sup>

**Particle Concentration Accuracy**  
 $\pm 10\%$  at  $< 2 \times 10^4$  particles/cm<sup>3</sup>

#### Response Time

<2 seconds to 95% in response to step change

#### Flow

**Aerosol Flow Rate** 1.0  $\pm$  0.1 L/min

**Flow Source** Internal diaphragm pump. May be operated with an external vacuum and critical orifice but requires change to internal plumbing. (Consult TSI for details.)

#### Flow Control

Internal pump controlled to calibrated pressure drop across orifice with inlet pressure correction

#### Purge Flow

0.035 L/min

#### Inlet Flow (Aerosol + Purge)

1.035 L/min

#### False Background Counts

<0.001 particle/cm<sup>3</sup>, 1-hour average

#### Aerosol Medium

Air only, 10 to 40°C (50 to 104°F)

#### Environmental Operating Conditions

**Ambient Temperature Range** 10 to 40°C (50 to 104°F)

**Ambient Humidity Range** 0 to 90% RH, noncondensing

**Inlet Pressure Operation (Absolute)**

50 to 110 kPa (0.5 to 1.1 atm)

#### Inlet Pressure (Gauge)

$\pm 2.5$  kPa ( $\pm 10$  in. of water)

#### Condensing Liquid

Water (distilled water recommended)

#### Filling System

Internal liquid-injection pump with water-recycling capability, source-water container located externally

#### Communications

**USB** Type B connector, USB 2.0 compatible at 12 MB

**RS-232** 9-pin, D-sub connector



#### Analog Output

0 to 10 V proportional to concentration (log scaling) or DMA voltage control

#### Front Panel Display

140x32-pixel VF display provides output of particle concentration, bar-graph history of particle concentration, particle totalizer, flow rate, and operating parameters

#### LEDs

Particle, Status, Flow, Liquid

#### Buttons

Display, Totalizer, Pump, Drain/Prime

#### Rear-Panel Connections

USB, com port, power, water source, vent, water drain, pump exhaust, aerosol inlet (1/4" OD SS tube), analog output BNC

#### Software

Supplied with TSI Aerosol Instrument Manager software

#### Calibration Check

Recommended annually

#### Power Requirements

100 to 230 VAC, 50/60 Hz, 125 VA

#### Dimensions (HWD)

31 x 16 x 28 cm (12 x 6 x 11 in.), not including fill bottle or bracket

#### Weight

5.5 kg (12 lbs.)

*Specifications are subject to change without notice. TSI, the TSI logo, Scanning Mobility Particle Sizer, and Aerosol Instrument Manager are trademarks of TSI Incorporated. Microsoft and Windows are trademarks of Microsoft Corporation.*

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