CONDENSATION PARTICLE COUNTER MODEL 3772



The Condensation Particle Counter (CPC) Model 3772 is a compact, rugged, and full-featured instrument. It detects airborne particles down to 10 nm in diameter at an aerosol flow rate of 1.0 L/min, over a concentration range from 0 to 10^4 particles/cm^3. This CPC is ideally suited for applications that do not require measurement of high concentrations, such as basic aerosol research, filter and air cleaner testing, particle counter calibration, environmental monitoring, mobile aerosol studies, particle shedding and component testing, and atmospheric and climate studies. 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

Features and Benefits

+ Fast response to rapid changes in aerosol concentration
+ Butanol-friendly features, including anti-spill design, water-removal system, and improved resistance to optics flooding
+ Removable saturator wick for easy transport and maintenance
+ Built-in data logging and storage capability with removable memory card
+ Built-in SMPS compatibility
+ Auto recovery from power failure

UNDERSTANDING, ACCELERATED

Operation

In a laminar-flow, alcohol-based CPC, an aerosol sample is drawn continuously through a heated saturator in which alcohol is vaporized and diffuses into the sample stream. Together, the aerosol sample and alcohol vapor pass into a cooled condenser where the alcohol vapor becomes supersaturated and ready to condense. Particles present in the sample stream serve as condensation nuclei. Once condensation begins, particles that are larger than a threshold diameter grow quickly into larger droplets and pass through an optical detector where they are counted easily.

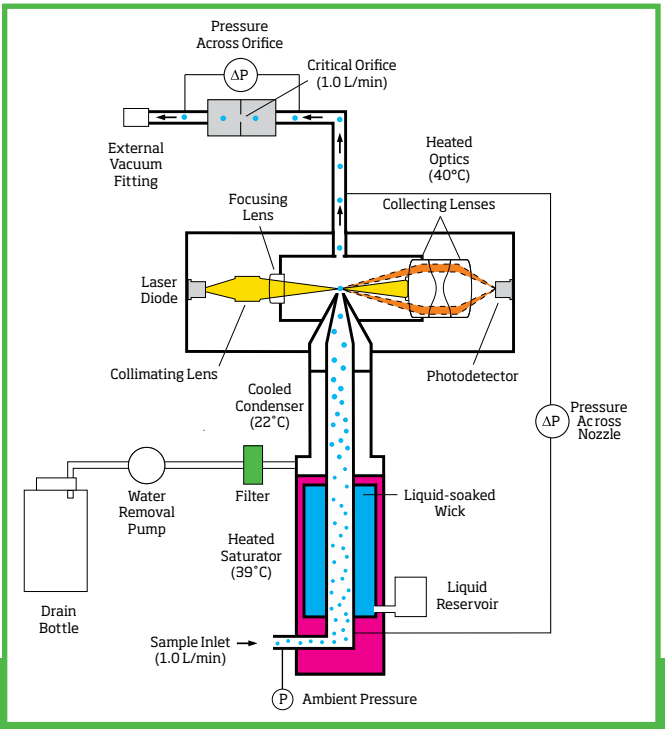
The Model 3772 employs single-particle-count mode operation to measure concentrations up to 10^4 particles/cm^3. The detector counts individual pulses produced as each particle (droplet) passes through the sensing zone. A high signal-to-noise ratio and continuous, live-time coincidence correction provide great measurement accuracy, even at very low concentrations. An external vacuum pump is required to draw the aerosol sample through the Model 3772. The volumetric flow rate is controlled accurately and reliably using an internal critical orifice.

Real-time concentration, totalizer function, operating parameters, and user settings are all viewable via the front panel LCD display. Data are directly accessible via standard USB and RS-232 serial interfaces at a maximum time resolution of 0.1 second. Instrument reading and status can be monitored through Ethernet in real-time.

Software and Built-in SMPS Compatibility

Every Model 3772 is supplied with Aerosol Instrument Manager® software designed for use with Microsoft® Windows® operating systems. The software is used for instrument control and provides data collection, management, and export capabilities, as well as several choices for data display.

The Model 3772 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 3772 CPC provide size-distribution measurements from 0.01 to 1.0 µm. Specific size ranges vary depending on the Differential Mobility Analyzer (DMA) used and DMA/CPC flow rate settings. Ask your TSI representative for additional information on SMPS spectrometers.

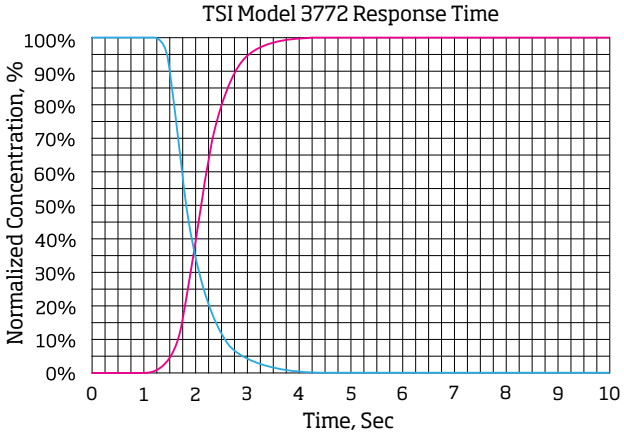


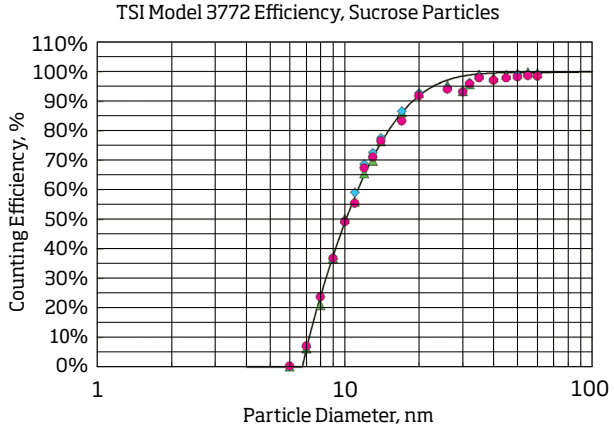
Selectable Size Limits

The optional Model 376060 Particle Size Selector (PSS) lets you choose any of eleven cutoff sizes between 0.020 and 0.122 micrometer. The PSS uses a series of fine-mesh screens to remove small particles by diffusional capture. An additional set of diffusion screens (available separately) lets you select cutoff diameters up to 0.25 micrometer.

*Calculated using efficiencies for 3772 CPC and diffusion screen

Diffusion Screens	Particle size cut, µm (50%)*
0	0.010
1	0.020
2	0.031
3	0.041
4	0.052
5	0.062
6	0.072
7	0.083
8	0.092
9	0.102
10	0.112
11	0.122





TO ORDER

Condensation Particle Counter

Specify	Description
3772	Condensation Particle Counter with TSI Aerosol Instrument Manager software

Accessories

Specify	Description
3032	Vacuum Pump, 115 V
3032-1	Vacuum Pump, 230 V/50 Hz
3032-EC	Vacuum Pump, 230 V (Europe only)
3033	Vacuum Pump, 115 V, recommended when using multiple CPCs that require an external vacuum source (North America only, customers in other parts of the world must contact TSI for model number and power ratings.)
376060	Particle Size Selector with 11 screens
376061	Additional screens for Particle Sizer Selector, set of 12
1031558	Inlet Cyclone (calculated cut-point: 2.15 µm @ 1.0 L/min)
1031515	Maintenance Kit for 3772 and 3771 CPCs (includes 2 micropump filters, 3 butanol fill/drain filters, and 2 saturator wicks)
1031514	Replacement Saturator Wick Kit for 3772 and 3771 CPCs (includes 2 saturator wicks)

Accessories must be ordered separately

SPECIFICATIONS

CONDENSATION PARTICLE COUNTER
MODEL 3772

Particle Size Range

Min. Detectable Particle (D_{50})	10 nm, verified with DMA-classified sucrose particles
Max. Detectable Particle	>3 µm

Particle Concentration Range
0 to 10^4 particles/cm^3, single particle counting with continuous, live-time coincidence correction

Particle Concentration Accuracy
±10% at <10^4 particles/cm^3

Response Time
About 3 sec to 95% in response to concentration step change

Flow

Aerosol Inlet Flow Rate	1.0 ± 0.05 L/min
Flow Source	External vacuum
Flow Control	Volumetric flow control of aerosol flow by internal critical orifice; differential pressure across critical orifice is monitored

Operating Temperatures

Saturator	39 ± 0.2°C
Condenser	22 ± 0.2°C
Optics	40 ± 0.2°C

False Background Counts
<0.001 particle/cm^3, based on 12-hr average

Aerosol Medium
Recommended for use with air; safe for use with inert gases such as nitrogen, argon, and helium (performance specifications are for air)

Environmental Operating Conditions

Ambient Temperature	10 to 35°C (50 to 95°F)
Ambient Humidity	0 to 90% RH, noncondensing
Ambient Pressure	75 to 105 kPa (0.75 to 1.05 atm)

Condensing Liquid

Working Fluid	Reagent-grade n-butyl alcohol (not included)
Filling System	Electronic liquid-level sensor initiates automatic filling as needed, requires connection to fill bottle (included with instrument)
Water Removal	All condensate is collected and removed automatically by a constant flow-rate micropump, may be switched on for use in humid environments

Communications

Protocol	Command set based on ASCII characters

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 and Storage
SD/MMC flash memory card

Averaging Interval
1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, or 60 seconds (set from front panel), software provides more averaging options

Analog Inputs
Two BNC connectors, 0 to 10 V (data recording for external sensors)

Outputs

Digital Display	Concentration, time and total counts, status (temperatures, pressures, laser power, etc.) and user settings
Analog	BNC connector, 0 to 10 V, user-selectable function output (linear/log concentration or DMA voltage control)
Pulse	BNC connector, TTL level pulse, nominally 350 nanosec wide

Software
Supplied with TSI Aerosol Instrument Manager® software

Calibration
Recommended annually

Required Utilities

Power	100 to 240 VAC, 50/60 Hz, 210 W maximum
Vacuum	60 kPa (18 in Hg) minimum gauge

Physical Features

Front Panel	Aerosol sample inlet, LED indicator lights (status, particle), 2-line LCD display, 6 operating buttons, flash memory card slot
Rear Panel	Power connector, USB, Ethernet, two 9-pin D-sub serial connectors, two BNC inputs, two BNC outputs, fan, butanol-fill connector, butanol-drain connector, external vacuum port, fill bottle and bracket

Dimensions (H x W x D)
26 × 18 × 25 cm (10 × 7 × 10 in), not including fill bottle and bracket

Weight
5.5 kg (12 lbs)

Specifications are subject to change without notice. Design specifications for the Model 3010, the predecessor of the Model 3772, are covered in U.S. patent number 4,790,650. 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.

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