MAGIC™ Water Condensation Particle Counter

World's first tippable, self-sustaining, compact water-based CPC for measuring number concentration of ultrafine particles in air.

Aerosol Devices Inc

Moderated **A**erosol **G**rowth with **I**nternal **W**ater **C**ycling

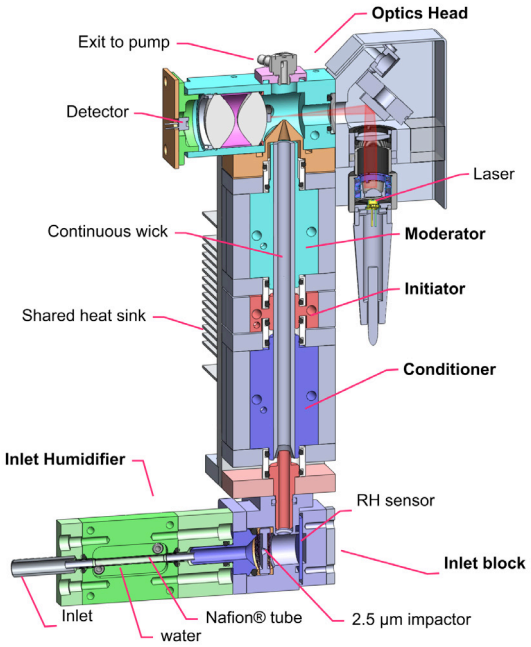
Advantages

- Self-sustaining wick that uses water as the working fluid—low cost, non-toxic, odor free
- Insensitive to short-term changes in orientation, vibration and shock
- Internal data storage
- Portable, compact package with battery option goes places no other CPC can go!

Applications

- Environmental air quality studies – especially useful for distributed monitors
- Mobile studies in vehicles, aircraft, aboard ships, on drones and bicycles!
- Indoor air quality monitoring
- Health effects and epidemiology studies
- Workplace monitoring for nanoparticles

How does it work?



Schematic diagram of the MAGIC CPC showing the pre-conditioning humidifier, condensation growth tube, and optical detector.

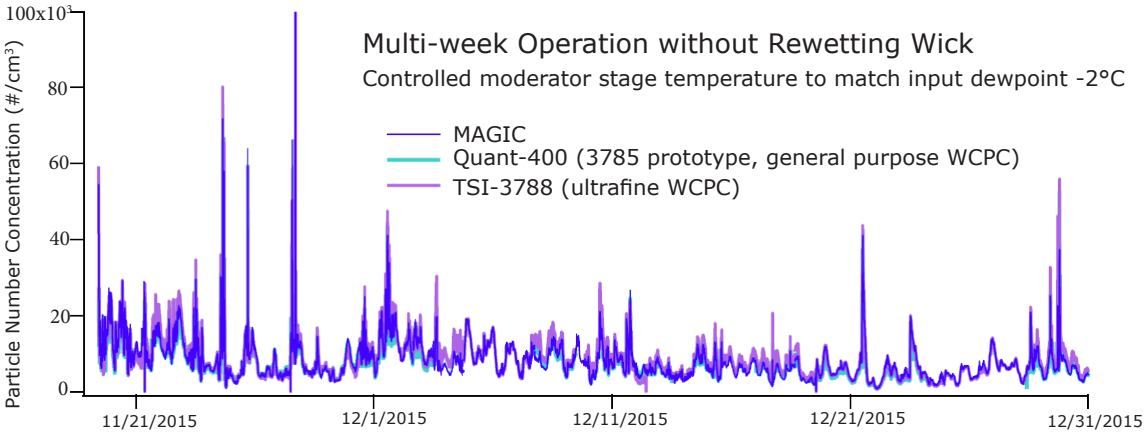
Particles are enlarged by water condensation using a "moderated", 3-stage growth tube, with a wick that spans all three temperature regions.

Water evaporation from the warmed, middle section provides the water vapor that creates supersaturation conditions for condensation activation and droplet growth.

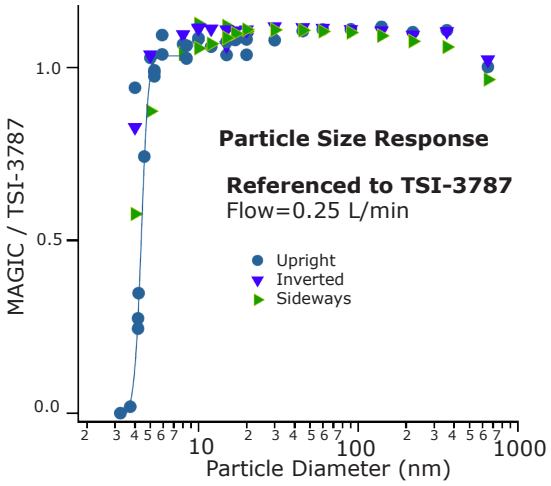
Water vapor is recovered by the cooler, downstream "growth" section of the wick and transported back to the warmed mid-section via capillary action. The system tolerates short-term tipping, as there are no liquid reservoirs. A removable Nafion® pre-conditioning humidifier extends operation time between resupplying water.

Droplets are individually counted with a laser sensor measuring the total concentration of ultrafine particles up to 10^5 particles/cm^3.

U.S. Patents #6712881, #7736421, #8801838, #9821263, German Patent #10392241, Chinese Patent #201180052428.5 and Japanese Patent #5908475. Other patents pending. Manufactured by Aerosol Dynamics Inc. under sublicense from TSI Incorporated. Distributed by Aerosol Devices Inc.



Time series of particle concentrations comparing particle detection efficiency of the MAGIC CPC against two comercial condensation particle counters. (above)



Detection efficiency as a function of particle size comparing the MAGIC CPC to a more sensitive benchtop CPC. (right)

Specification Overview

Particle Size Range	5 nm to ~2.5 µm diameter
Orientation	Short term operation in any orientation – insensitive to tipping, shock or vibration. Upright orientation recommended for long-term operation.
Sample Flow Rate	0.3 L/min
Concentration Range	0.01 to 10^5 particles/cm³ single particle counting with live-time coincidence correction
Averaging Time	1 second to 30 minutes, user selectable
Precision	Concentration measurement precision within 10% for co-located units sampling the same aerosol
Working Fluid	Water (distilled or cleaner)
Operating Time	Continuous operation >24 hrs at inlet sample RH of 50% before needing a water recharge. Operation time can be extended with optional pre-conditioning humidifier – see accessories below.
Data Logging	On-board non-volatile data storage. 125,000 records; approximately 1 week of 5-sec averaged data
Communications	Serial Type B USB and RS-232 9-pin DIN; digital pulse BNC, analog pulse BNC
Output Data	Timestamp, concentration, raw counts, live time, clock time, temperature readings, input T/RH, flow
Dimensions	LWH 18.5 cm x 16.5 cm x 21 cm
Weight	2.0 Kg (excludes pre-conditioning humidifier, battery or power supply) Power supply and line cord weight adds 0.4 Kg
Environmental Operating Conditions	Ambient Temperature 10- 35°C Cabinet Humidity - 5 to 95% RH, non-condensing CPC must be housed in room, enclosure or weather protected environment
Optional Accessories:	
Model PCH200 Pre-Conditioning Humidifier	Nafion® tube humidifier attaches unobtrusively to CPC inlet to increase the relative humidity RH, allowing for long term operation in dry air. 0.1 Kg
Model Batt200 External Battery	Lithium Ion (qty 2, rechargeable), battery connections and holding bracket; up to 8 hours of run time. 0.57 Kg battery (each), 0.33 Kg bracket

For a complete listing of the MAGIC CPC specifications visit our website at https://aerosoldevices.com/magic-cpc-specifications/.
Nafion® is a registered trademark of The Chemours Company FC, LLC
Specifications are subject to change without notice.

Who We Are

A team of engineers and scientists passionate for revolutionizing the science of airborne particle counting and collection for physical, chemical and biological analysis. Aerosol Devices Inc. was formed in 2014 by Ms. Pat Keady and Dr. Susanne Hering, both past Presidents of the American Association for Aerosol Research (AAAR) and leaders in the field with numerous aerosol measurement patents and publications.

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