# WATER-BASED CONDENSATION PARTICLE COUNTER

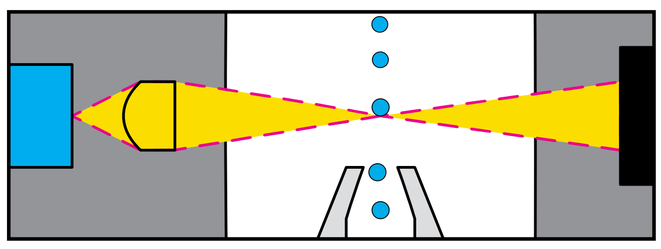
Working Principle: Some particles are too small to scatter enough light to be detected by conventional optics. These very small particles are grown to a larger size by condensation.

Particle is too small to scatter light

Water droplet around small particle

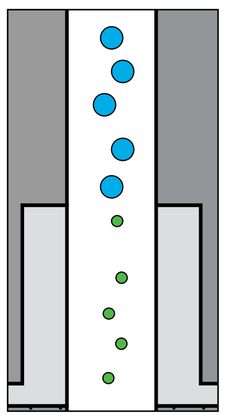
## 4. Counting

The enlarged particles pass through a laser beam and scatter light. Each pulse of scattered light is counted individually.



## 3. Growth

The sample moves through a humid chamber where it becomes supersaturated, forcing water vapor to condense onto the cooled particles. The particles are now large enough to register when they pass through the laser beam.



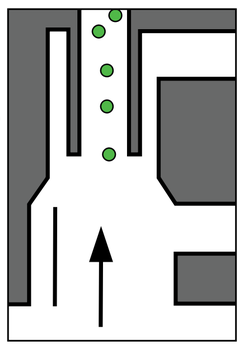
## 2. Temperature Conditioning

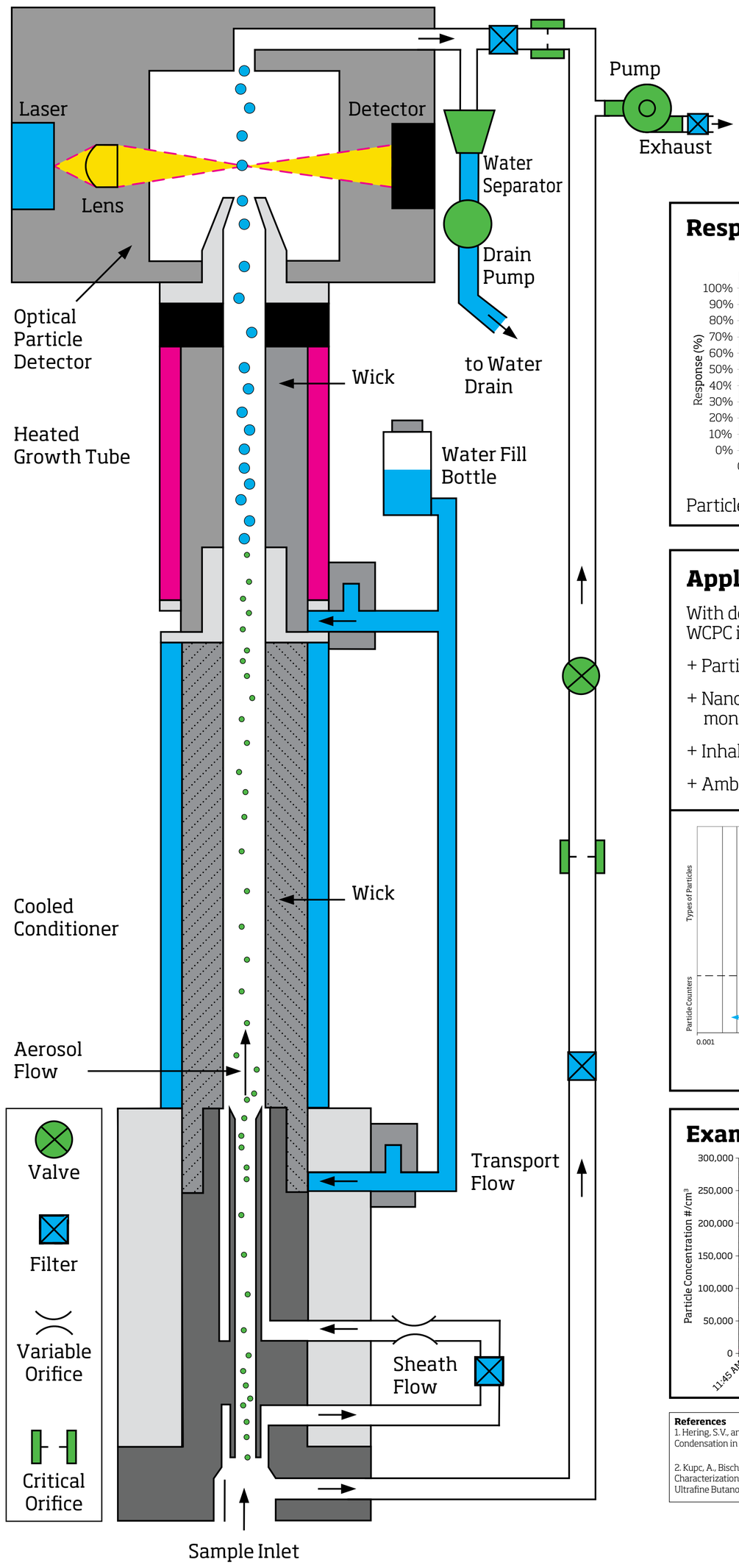
The aerosol sample moves through a chilled, humid chamber to cool the particles and saturate the sample with water vapor.



## 1. Sampling

An aerosol sample is continuously drawn into the instrument with an internal pump while the flow rate is continuously measured to enable concentration calculations.



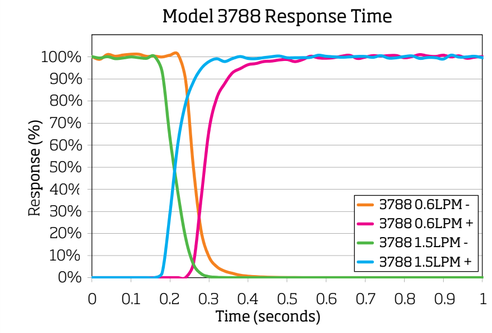



## Water Versus Butanol

Compared to other common condensates such as butanol or isopropanol, water is both more eco-friendly and easier to handle. Using water as a working fluid eliminates the potential for problems measuring high-humidity samples, which can occur in alcohol setups.

Water and alcohol also respond differently to different materials which may slightly affect minimum detectable particle size, depending on the material being measured.

## Response Time

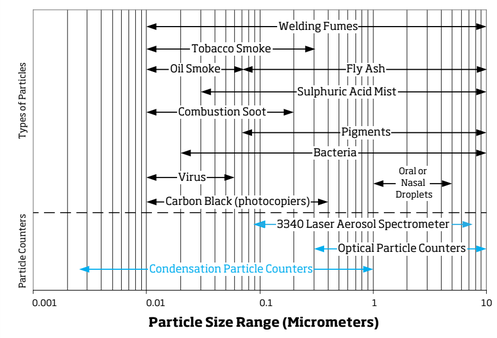



Particles detected in less than half a second.

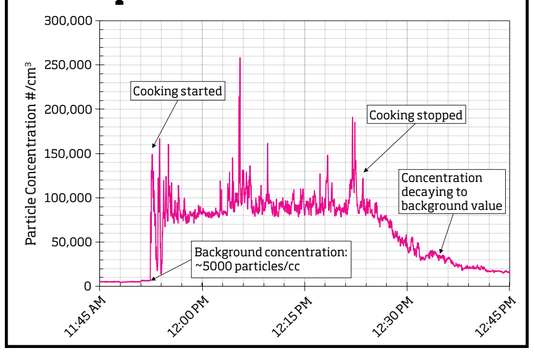
## Applications

With detection down to 2.5 nanometers, the WCPC is ideally suited for:

+ Particle formation and growth studies
+ Nanotechnology research or process monitoring
+ Inhalation or exposure chamber studies
+ Ambient monitoring with SMPS




## Example Results





**References**

1. Hering, S.V., and Stolzenburg, M.R. (2005). A Method for Particle Size Amplification by Water Condensation in a Laminar, Thermally Diffusive Flow. *Aerosol Sci. Tech.* 39(5): 428-436.

2. Kupc, A., Bischof, O.F., Beeston, M., Tritscher, T., Krinke, T.J. and P.E. Wagner (2013). Laboratory Characterization of a New Nano Water-Based CPC 3788 and Performance Comparison to an Ultrafine Butanol-Based CPC 3776. *Aerosol Sci. Tech.* 47(2): 183-191.


UNDERSTANDING, ACCELERATED

UNDERSTAND MORE AT
WWW.TSI.COM/PARTICLE