

# PORTACOUNT<sup>®</sup> PRO Model 8030 Respirator Fit Tester Theory of Operation

Application Note RFT-002

The PORTACOUNT<sup>®</sup> PRO Respirator Fit Tester measures the particle concentration inside and outside the respirator and calculates a fit factor, the ratio of the two measurements. As with any aerosol based quantitative fit testing technique, the respirator must be equipped with high efficiency filters. Since few particles penetrate a high efficiency filter, any particles found inside the respirator can be attributed to face seal leakage.

Particles entering the PORTACOUNT PRO Respirator Fit Tester pass through a saturator tube where they are combined with alcohol vapor. They then pass into a condenser tube where alcohol condenses on them, causing each to grow into a larger droplet. The droplets then pass through a focused laser beam, producing flashes of light which are sensed by a photo-detector. The particle concentration is determined by counting the light flashes.

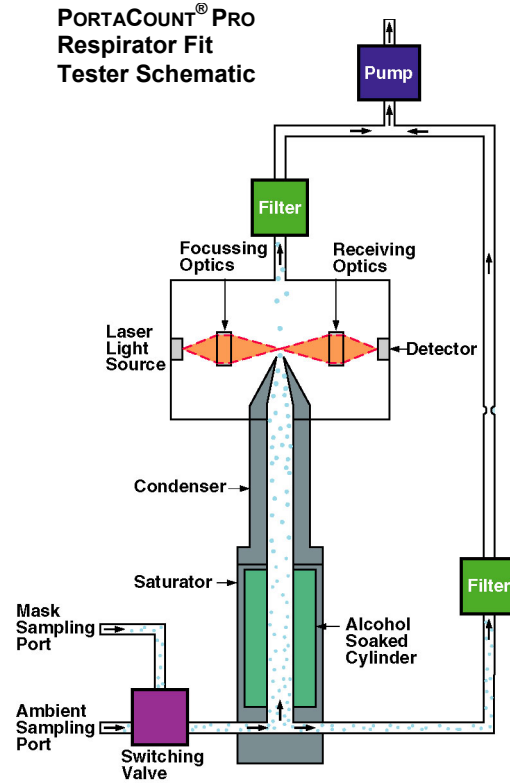
This unique single particle counting capability differentiates the PORTACOUNT PRO from all other fit testing techniques or instrumentation. The PORTACOUNT PRO Respirator Fit Tester detects lower concentrations of particles, up to several orders of magnitude lower, than other methods. Thus, it will operate with ambient aerosol, eliminating the need for high concentrations of aerosol generated in a tent or chamber.

The concept of using a condensation nucleus counter (CNC) for the purpose of quantitative respirator fit testing was first demonstrated in 1981 by Dr. Klaus Willeke of the University of Cincinnati.

#### Reference:

Willeke, K., H.E. Ayer, J.D. Blanchard. "New Methods For Quantitative Respirator Fit Testing With Aerosols". *American Industrial Hygiene Association Journal*, Feb. (1981).

PORTACOUNT<sup>®</sup> PRO  
Respirator Fit  
Tester Schematic



Licensed under US Patent No. 5,117,190 and other patents from Commissariat a L'Energie Atomique, France. U.S. Patent No. 6,125,845. Other patents pending.

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