MEASUREMENT SYSTEM FOR THE SIMULTANEOUS AND CONTINUOUS DETERMINATION OF PM-FRACTIONS AND ULTRAFINE PARTICLES

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Abstract

According to a recently published report by the European Environment Agency about one third of Europe's population in cities is exposed to excessive concentrations of particulate matter (PM). These people are also exposed to high concentrations of ultrafine particles caused for example by traffic and heating. Numerous other articles in the press recently underline that air pollution is one of the major dangers to human health worldwide. We will present a new measurement system that can measure the number concentration and size distribution of airborne particles from 8 nm to 40 µm. In addition, it also reports simultaneously different PM-fractions such as PM-1, PM-2.5 and PM-10. With a time resolution of 5 minutes it can further capture dynamic changes in the aerosol distribution caused for example by rush hour traffic in the morning and afternoon.The measurement system combines a scanning mobility particle sizer in which the working fluid to condense the particles can be chosen to be water or butanol with a continuous ambient air quality monitoring system. In the latter a polychromatic light source is used to illuminate aerosol particles as they pass through the optical sensing volume. The scattered light of each individual particle is then detected with a photomultiplier. The system is operated through a touchscreen with intuitive graphical user interface and integrated data logger. Data can be easily viewed on the screen or later extensively evaluated through the included software. We will show and discuss selected measurements in which the additional information of particle size distribution helps to interpret the PM-data and facilitates source apportionment.

Keywords: Particle number concentration, particle size distribution, nanoparticle measurement, airborne particle measurement

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