Scanning Mobility Particle Sizer

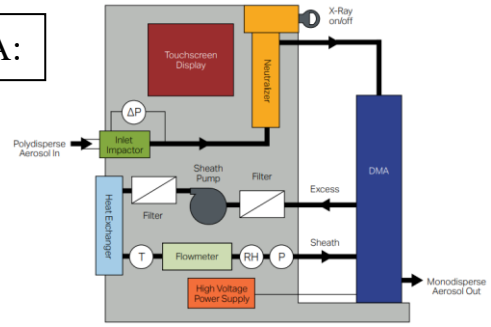
Advanced Instrument for High-Resolution Measurement of Aerosol Size Distribution

INTRODUCTION:

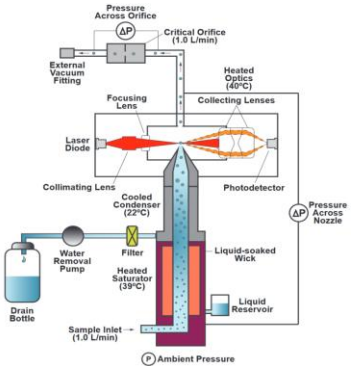
The Scanning Mobility Particle Sizer (SMPS) is a high precision instrument designed for real-time measurement of aerosol particle size distributions in the submicron range.

The SMPS system classifies particles based on their electrical mobility and measures size-resolved number concentrations with high accuracy. It provides data critical for understanding particle dynamics, transport, nucleation, and growth processes in both indoor and outdoor environments.

DMA:



CPC:



OBJECTIVES:

- Aerosol size distribution analysis
- Air quality monitoring
- Cloud condensation nuclei (CCN) studies
- NPF and particle growth studies
- Climate modelling

DATA OUTPUT:

- Particle size distribution
- Total particle number concentration
- Mean, geometric, and modal diameters.

KEY SPECIFICATIONS:

Size Range: 10.1 – 1000 nm (configurable)

Size Resolution: 128 channels per decade (Up to 384 total channels)

Time Resolution: ~2–5 minutes per scan

Number Concentration Range: 0 – 10^4 particles/cm^3

Flow Rate: 1 L/min sample flow; 10 L/min sheath flow (standard)

MEASUREMENT AND WORKING PRINCIPLE:

The SMPS system operates by first charging aerosol particles using a neutralizer (Kr-85). These charged particles are then classified by their electrical mobility using a Differential Mobility Analyzer (DMA), which selects particles of a specific size at any given time.

These size-classified particles are then counted by a Condensation Particle Counter (CPC), which enlarges them via butanol vapor condensation to detectable sizes. By scanning the voltage across the DMA, the system produces a full-size distribution in each measurement cycle.

The SMPS offers high-resolution sizing data essential for aerosol research and can detect dynamic processes such as nucleation bursts, coagulation, and aging of aerosol populations.

KEY FEATURES:

- High Accuracy: Precise sizing and counting of nanoparticles.
- Wide Size Range: Captures ultrafine to accumulation mode particles.
- Automated Operation: Programmed scanning and data acquisition
- Research-Grade Reliability: Used worldwide in atmospheric observatories and laboratories.

Principal Investigator: Mr. Sachin S. Patil, Sc-B
Contact: sachin.patil@tropmet.res.in

LF No: