

S3.4.2 CALIBRATION OF A LOW COST PARTICLE SENSOR

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In this work, we developed and calibrated a low cost particle sensor which provides comparable measurements with the aerodynamic particle sizer (APS 3321). First, the performance of eight randomly selected laser light scattering particle sensors were tested against the APS using road dust and sodium chloride particles in a laboratory chamber. Results show sensor repeatability and strong positive correlations with APS, but typically particle concentration underestimations and high dependence on particle source. The linear parametric models developed in the sensor evaluation were also validated by comparison with non-parametric regression models.

Using one of the optimized sensors, a platform was designed to produce a user friendly and more accurate air monitoring instrument. The assembly was further tested in a residential, outdoor, and machine shop environment, and laboratory generated road dust, sodium chloride, potassium chloride, ammonium sulfate, magnesium sulfate, and sucrose particles. The newly developed sensor exhibited much less sensitivity to particle source and was capable of adjusting measurements to match those of APS.