The Portable Optical Particle Spectrometer (POPS) is a light-weight, high-performance, and low-cost particle counter. It is the ideal tool for measuring aerosol size distributions using unmanned platforms and ground-based sensor networks.

Applications

- Aerosol profiling on unmanned platforms such as radiosonde balloons, tethered balloons, and unmanned aerial vehicles (UAVs)
- Ambient environmental monitoring networks
- Work place monitoring
- Indoor air quality research
- Particle measurements in remote environments

Features

- Diameter range: single particle in the diameter range 0.13 - 3 µm in user-specified number of sizing channels
- Diameter resolution: ~5% of diameter
- Adjustable flow rate for different concentration regimes
- Optional ground, airborne or modular enclosure packages to fit your measurement application
- Built-in data acquisition and logging capability

The POPS core system shown without optional enclosure or power supply.

Vertical profile of aerosol concentration measured 17 August 2018 by a balloon-borne POPS over Lhasa, Tibet, China showing elevated aerosol layers near the tropopause (data courtesy Dr. Jianchun Bian and Dr. Zhixuan Bai of the Institute of Atmospheric Physics, Chinese Academy of Sciences).
Operation

Sample aerosol is drawn into the measurement region and surrounded by filtered sheath air. The sample flow is monitored using a laminar flow element and feedback controlled. Particles are illuminated by a 405 nm diode laser. Light scattered by the particle is focused onto a photomultiplier tube by a spherical mirror (38° - 142° collection angle). The intensity of the scattered light pulse is proportional to the diameter of the sampled particle. The POPS is calibrated using NIST traceable polystyrene latex spheres (PSL).

Reference:


Specifications

Particle Size Range
- Min. Detectable (D50) 130 nm
- Max. Detectable 3.0 µm

Particle Concentration Range
- Minimum limited by counting statistics
- Max. with <10% coincidence error 1250 #/cm³ (for 0.1 LPM sample flow rate)

Particle Concentration Accuracy
- +/- 10% < 1000 #/cm³ (for 0.1 LPM sample flow rate)

Flow
- Min. Sample Flow Rate 0.05 LPM
- Max. Sample Flow Rate 0.35 LPM

Environmental Operating Conditions
- Min. Temperature -40 C
- Max. Temperature +35 C
- Ambient Humidity 0-95%, non-condensing

Data Logging and Storage
- On-board 32 GB micro-SD.

Laser
- Wavelength 405 nm
- Power ~ 70 mW

Logging Interval
- 1 Hz

Power Requirements
- DC power (AC adapter or battery)
- Average power consumption 5 W

Communications
- Ethernet Interface 8-wire, RJ-45, 10/100 BASE-T, TCP/IP
- Serial USB (diagnostic mode) RS-232 USB

Physical Dimensions
- Core system 175 x 162 x 88 mm

Weight
- Core system 550 g

Detector Geometry
- Collection angle 38°-142°

Diagram of the POPS measurement chamber.

Specifications subject to change without notice.