POPS

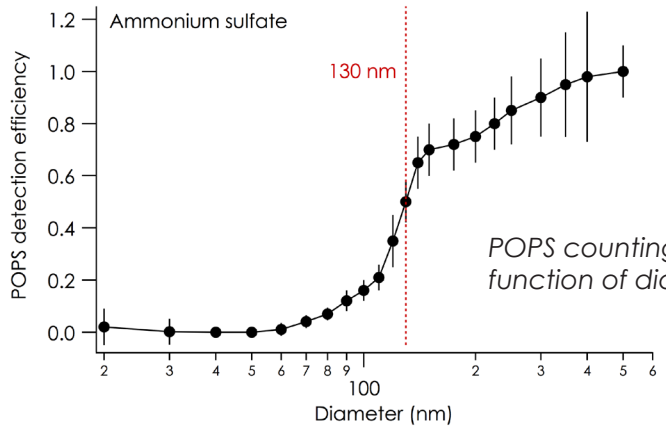
The Printed Optical Particle Spectrometer (POPS) is a light-weight, high-performance, and low-cost particle counter. It is the ideal tool for measuring aerosol size distributions using unmanned platforms and ground-based sensor networks.

Applications

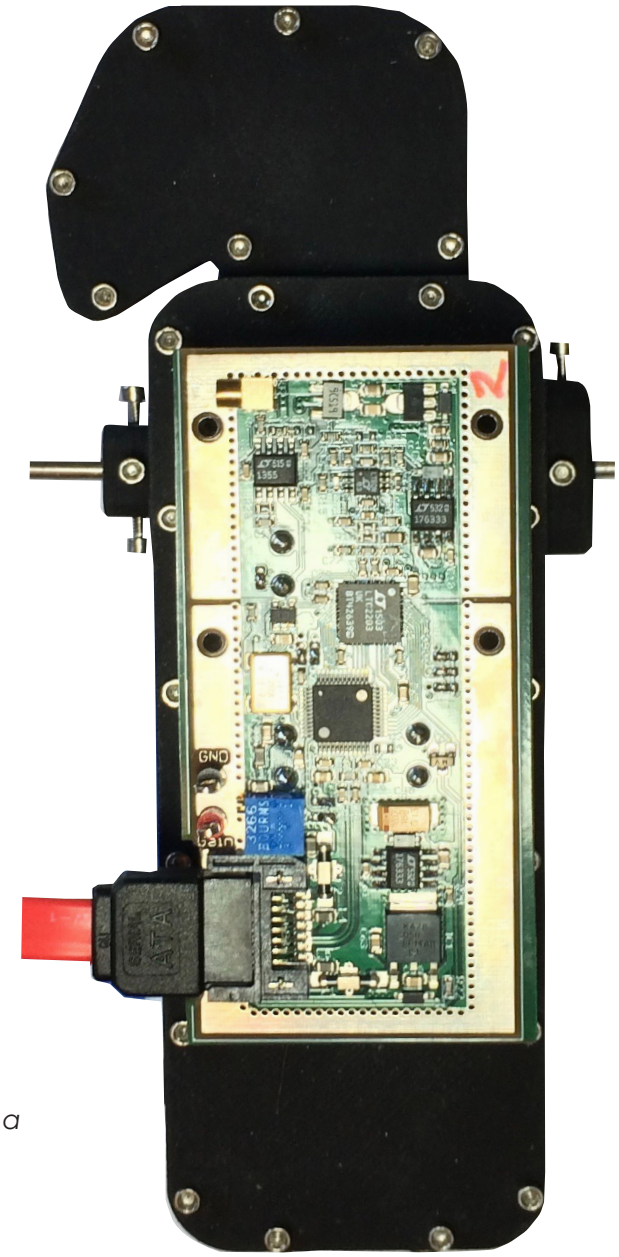
- Tethered and free balloon systems
- Unmanned aerial vehicles (UAV)
- Ambient environmental monitoring networks
- Work place monitoring
- Aerosol research
- Indoor air quality
- Particle measurements in harsh environments

Features

- Diameter range: 0.14 - 3 µm in user-specified channels
- Diameter resolution: ~5% of diameter
- Adjustable flow rate for different concentration regimes
- Optional ground, airborne or modular enclosure packages to fit your measurement platform and application
- Built-in data acquisition and logging capability



POPS counting efficiency as a function of diameter.



POPS optical chamber (actual size)

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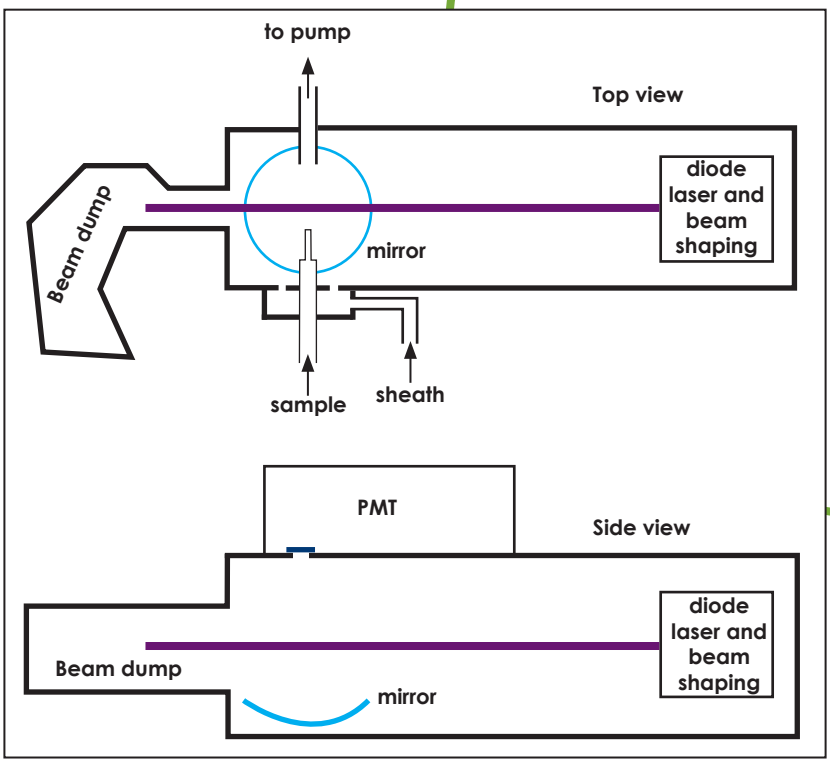
Handix SCIENTIFIC

Operation

Sample aerosol is drawn into the measurement region and surrounded by a filtered sheath air flow. The sample flow is monitored using a laminar flow element and controlled through a feedback control loop. Particles are illuminated by a 405 nm diode laser with a Gaussian beam profile. 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 and calibrated using NIST traceable polystyrene latex spheres (PSL).

Reference:
Gao, R.S., et al., A light-weight, high-sensitivity particle spectrometer for PM2.5 aerosol measurements, Aerosol Science and Technology 50, 88-99, 2016.



Specifications

Particle Size Range

Min. Detectable (D50)	140 nm
Max Detectable	3.0 µm

Particle Concentration Range

Minimum limited by counting statistics

Max with <10% coincidence error	1250 #/cm^3

(for 0.1 LPM sample flow rate)

Particle Concentration Accuracy

+/- 10% < 1000 #/cm^3

(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 8 GB flash memory stick (stores up to 15 days of particle-by-particle data at <1 s averaging).

Laser

Wavelength	405 nm
Power	~ 70 mW

Averaging Interval

1-300 seconds set in software

Power Requirements

AC power	100-240 VAC, 50/60 Hz
DC power	+12VDC/-12VDC
Average power consumption	7 W

Communications

Ethernet Interface	8-wire, RJ-45, 10/100 BASE-T, TCP/IP
Serial (diagnostic mode)	9-pin, D-sub

Physical Dimensions

Balloon system	TBD
Benchtop system	TBD

Weight

Balloon system	TBD
Benchtop system	TBD

Detector Geometry

Collection angle	90° +/- 52°

Specifications subject to change without notice.

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