HealthyPhoton

Model：HPE-1817-NH_3

Atmospheric NH_3 Open-path Laser Analyzer

Date	Note
2018/3/28	V1.0

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1. Introduction

HPE-1817-NH3 is based on the state-of-the-art Wavelength-Modulated Quantum Cascade Laser Absorption Spectroscopy (WM-QCLAS) technology. The product relies on the laser beam's multiple reflections between two high-reflection mirrors exposing to the atmosphere, creating an effective optical path-length of several tens of meters. The weak absorption of the laser energy at the spectral peak is extracted from the noise using phase-sensitive lock-in amplification of the modulated laser wavelength/amplitude signal. The trace gas concentration is retrieved based on HealthyPhoton's innovative absorption spectral characterization algorithm.

HPE-1817-NH3 can be used for Eddy Covariance Flux studies. It is able to accurately quantify the net exchange flux of atmospheric ammonia at various ecosystems.

2. Product Description

- **Open-path analysis:**

Unlike the slow response time of traditional extractive sampling plus closed-path analyzers, the response time of our open-path gas analyzers can reach down to 0.1 seconds. There is no adsorption and hysteresis of the NH3 molecule on the inner surface of sampling and pretreatment channels.

- **Low power consumption for versatile field deployment:**

An open-path analyzer requires no sampling pump, which reduces the power consumption and weight of the instrument. It is easy to carry. With solar panels, it can be used in areas with no power grid, giving much more freedom for users to select research sites.

- **Wavelength modulation technology:**

The laser wavelength is carefully selected within the absorption range of the target gas for rapid scanning-type measurement, thereby obtaining the best-shaped peak (for spectral retrieving), eliminating the interference of non-target gases.

- **Noise filtering and shielding:**

To obtain the most sensitive measurement results, analog circuit electronics were optimized for the extremely low-noise laser current source and the optical detector. An innovative phase-sensitive lock-in amplification algorithm was developed to avoid the electromagnetic interference in the natural environment and the influence of optoelectronic noise.

- **Central wavelength controller:**

A reference optical path with an automatic feedback scheme ensures the most accurate tracking of the spectrum. The central wavelength of the laser is locked in the center of the molecular transition.

- **Stable temperature control:**

Passive cooling and semiconductor cooling enable accurate laser temperature control. The most accurate measurement results are ensured at ever-changing atmospheric temperature conditions.

- **Ambient pressure and temperature compensation:**

Real-time accurate measurement of ambient temperature and pressure, combined with built-in compensation algorithms, ensures the most accurate results under ever-changing atmospheric conditions.

- **Winter/Summer Modes:**

The working mode can be switched according to the ambient temperature to expand the instrument's operating temperature range and to improve measurement accuracy.

2.1. Parameters

NH_3 measurement accuracy	0.2ppb+0.05% reading (0,1s, 1σ)
Measuring range	0~20 ppmv
Atmospheric pressure range	300~1000 Torr
Environment humidity	<99% R.H, no condensation @40°C (lens heated)
Dimension	960mm x φ200 mm
Weight	<10kg
Data storage	Campell Scientific CR3000® CF Card Storage
UI	UI on PC
Communication port	RS232 serial port (optional for Ethernet)
Power supply	24~36VDC
Power comsumption	<100Watts