HealthyPhoton

Model：HPLGM1600-NH3-P
Portable Laser Analyzer for Ultra-sensitive Ammonia Monitoring

Date	Version
2018/3/28	V1.0

Index

1. Introduction

HealthyPhoton's ultra-sensitive ammonia analyzer is based on the second-generation semiconductor quantum cascade laser (QCL) technology. It uses laser's ultra-narrow linewidth to accurately select the high-intensity absorption line of ammonia molecules in the mid-IR region, thereby achieving high-selectivity, high-precision, and robust measurement.

2. Market Pain Points

The ammonia concentration of 2~3 ppmv in flue gas is a great challenge for the accurate estimation of ammonia slip and DeNOx process in most coal-fired power plants. Most of the existing near-IR laser spectroscopy based monitors cannot achieve reliable accuracy under harsh field conditions at the coal-fire SCR outlet. The traditional in-situ cross-duct sensor has an issue that the laser beam cannot penetrate due to high dust. In the meanwhile, vibration, expansion, and contraction of the duct affect the accuracy and the stability of the laser beam, leading to loss of signal, which increases maintenance costs.

Recently, some products have used extractive sampling + near-IR diode laser + multi-pass absorption gas cell technology to make use of a long optical path to compensate for the weak absorption of near-IR spectral lines. However, the long-pathlength absorption cells are not suitable for the severe working conditions of high dust, high temperature and high ammonium bisulfate salt (ABS). After a long-term operation, the cleaning and beam re-alignment of the optical cell greatly increase the difficulty and maintenance cost.

3. Product Description

3.1. Advantages

- QCL+TDLAS technology has a measuring range of 0-20ppmv and accuracy up to 0.01ppmv;
- It does not need the long-pathlength multi-pass absorption gas cell, thereby reduces the difficulty of maintenance and extends the maintenance period;
- The direct high-temperature extractive sampling method eliminates beam walk-off challenges facing by in-situ cross-duct laser-based sensors;
- The sampling pipeline length is less than 3 meters, which reduces the signal delay and improves the real-time feedback for DeNOx optimization;
- The sample flow rate can be as low as 250 mL/min, which can reduce probe wear and reduce maintenance costs;

- Mid-IR laser spectroscopy provides an optional simultaneous measurement of NH3 and NOx with a single probe. Combined with the grid measuring method, the NH3-NOx molar ratio distribution can be assessed using a single analyzer.

3.2. Parameters

Technology	2nd generation QCL+TDLAS	
Specifications	Measuring range	0 ~ 20ppmv (can be customized)
	Response delay (T90)	≤10s
	Linear error/ repeatability	≤±1%F.S.
	Detection limit	0.1ppmv
	Detection accuracy	0.01ppmv
	Calibration/ maintenance cycle	≤2 times/year
	Preheating time	~30 mins
	Size	486 x 230 x 380 cm^3 (L×W×H)
	Weight	16 kg (not incl. pretreatment)
Work condition	Power supply	200 ~ 240 VAC 50Hz
	Temperature	-10 ~ 50°C (No condensation)
	Flue gas temperature	100 ~ 600°C
	Power consumption	<1.5KW (peak)
Pretreatment	Sampling method	Hot-and-wet direct extraction (incl. NOx)
	Sample flow rate	0.25L/min ~ 5L/min
	Sample gas temperatue	≧200 °C
	Water content	No need for water removal
	Dust removal	2-level filtration, accuracy < 0.5μm
Ports	UI	Touch screen (HMI)
	Analog output	4-20mA output (max. load 750Ω)
	Digital output	RS485 Optional: GPRS data backup at HealthyPhoton Cloud server

3.3. Field Experiment Result

The product has been field-tested in several power plants across China. The product's reliability, stability, technological advancement, and portability features have been well recognized by users. Below is the experimental result. The measurement was tested on a 0-15 ppmv NH3/N2 concentration step.