/ LaserGas™ III Ultra SP NH3/H2O PS-18 Emissions

NEO Monitors' LaserGas™ III Ultra NH3/H2O tunable diode laser (TDL) analyzer is specifically designed for autonomous, outdoor operation; monitoring ammonia (NH3) emission including hazardous areas. It provides highly accurate, real-time, in-situ, hot/wet NH3 emissions measurements using dynamic water compensation. Unlike other TDL analyzers on the market, the LaserGas™ III Ultra, continuously measures both NH3 and H2O concentrations, making it possible to accurately and automatically compensate for the effects of water broadening and dilution on the final reported NH3 value. Our 30+ years of experience with NH3 emissions monitors has made it possible to design and verify that this NH3 analyzer not only meets the US EPA PS-18 performance criteria but is the market leader in performance, reliability, and robustness.

Fig. 1: LaserGas™ III Ultra NH3/H2O mounted on a stack.

/ Features

In-situ hot/wet measurements
0 – 5 ppmv minimum range
Dynamic H2O compensation
Dynamic gain
Fast response time
Low power consumption (<10 W)
Life-time calibration
Linear concentration response up to six orders of magnitude

/ PS-18 validated specifications (NH3)

Parameter	Value
LOD	0.1 ppmv-m
Response time	<15 s
Sum of Interferences	<0.125 ppmv
Minimum transmission	0.1%
Linearity error	<1%
Amb. Temperature	-40°C - +65°C

/ PS-18 interference testing at 248°F (120°C)

Interferent	Test
O2 (21%)	✓
H2O (15%)	✓
CO2 (15%)	✓
CH4 (500 ppmv)	✓
Total interference*	<0.125 ppmv

**Table shows only the most significant gases, but Total includes all interferents that were tested.*

LaserGas™ III Ultra NH3/H2O passes all interference tests specified in Performance Specification 18 adapted to NH3.

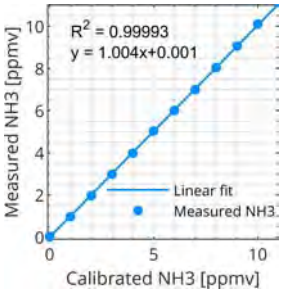

Fig. 2: Measured LaserGas™ III Ultra NH3/H2O response from 0 to 10 ppmv. TDLs are intrinsically linear and the analyzer is capable of covering approximately six orders of magnitude in concentration with a linearity better than 1%.

/ Dynamic water compensation

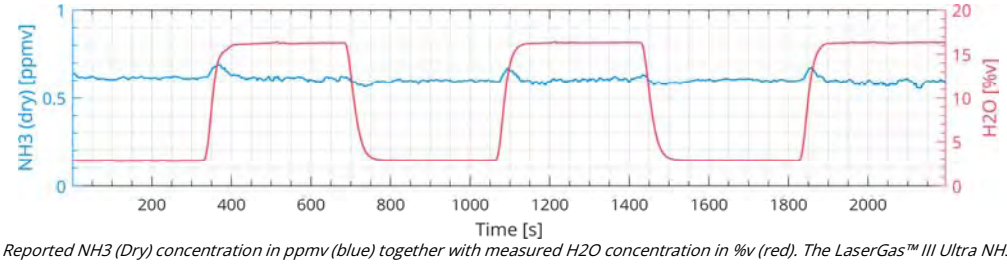

Fig. 3: Reported NH3 (Dry) concentration in ppmv (blue) together with measured H2O concentration in %v (red). The LaserGas™ III Ultra NH3/H2O actively measures both NH3 and H2O simultaneously, then dynamically compensates the NH3 measurements for the broadening and dilution effects of the H2O that is present in emission stream. The result is an NH3 analyzer that accurately measures NH3 regardless of moisture content.

/ Specifications (H2O)

Parameter	Value
LOD	0.5 %v-m
Response time	<15 s
Sum of Interferences	<0.03 %v
Minimum transmission	0.1%
Linearity error	<1%

NH3 and H2O are measured simultaneously
IROSS™ signal processing suppresses H2O interference
Dynamic compensation of the NH3 concentrations based on H2O measurements
Correct NH3 measurements at any moisture level in the gas stream
Dual NH3+H2O reporting is also available

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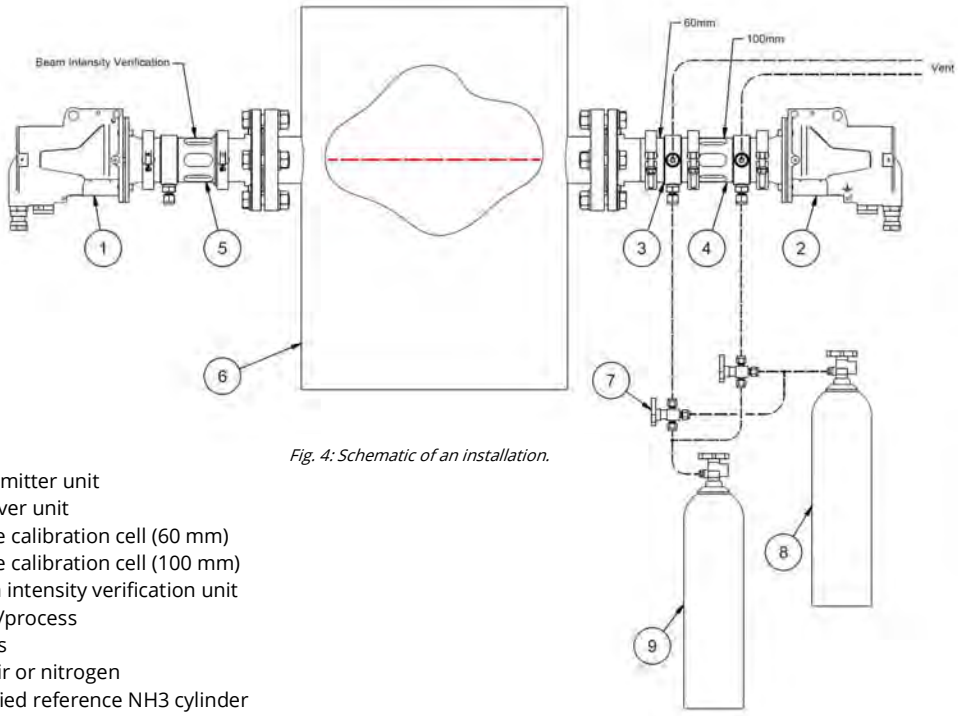

Fig. 4: Schematic of an installation.

1. Transmitter unit
2. Receiver unit
3. In-line calibration cell (60 mm)
4. In-line calibration cell (100 mm)
5. Beam intensity verification unit
6. Stack/process
7. Valves
8. Dry air or nitrogen
9. Certified reference NH3 cylinder

/ Quality control testing

Daily zero and mid-level validations

The LaserGas™ III Ultra NH3/H2O analyzer comes with a built-in servo-controlled reference cell, which is used for automatic line-tracking. This reference cell also provides a simple way to quickly check the calibration drift without the need to use external gas.

Zero, low- mid- and high level validations

The LaserGas™ III Ultra NH3/H2O analyzer can be equipped with in-line calibration cells (60 mm or 100 mm) that are attached with standard flanges between the analyzer and the process. These calibration cells are stackable and allow for validation of zero / low, mid, and high levels using a single certified NH3 reference gas cylinder.

Fig. 5: 60 mm calibration cell.

Fig. 6: 100 mm calibration cell.

Table 1: Configuration for calibration drift validation check.

	Zero	Low	Mid	High
60 mm	-	NH3	-	NH3
100 mm	-	-	NH3	NH3

Automatic beam intensity measurements

The LaserGas™ III Ultra NH3/H2O analyzer measure the beam intensity every second and alarm levels can be easily configured by the user.

In-line beam intensity verification

An optional accessory for beam intensity verification is available. This allows the user to challenge the instrument with calibrated beam intensity attenuators and verify that the measurements are unaffected.

Reporting

The LaserGas™ III Ultra NH3/H2O analyzer logs time-stamped data every second (configurable). The logs include all relevant information from the process: Temperature, pressure, beam intensity, NH3 concentration, H2O concentration, laser temperature and many more. The data is stored on the analyzer and can be accessed over ethernet.

Fig. 7: LaserGas™ III Ultra.

/ Maintenance

> Yearly calibration validation check recommended
> Window purge with dry air or nitrogen
> Repairs at NEOM corp. in Houston, TX

/ Accessories

> HMI (up to 4 analyzers)
> Beam intensity verification unit