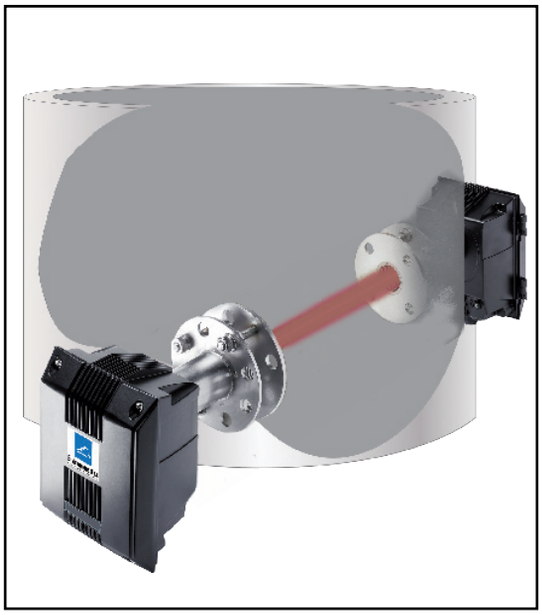
LAS 300 XD

Cross Duct TDL Laser Gas Monitor



Environnement S.A introduces the state-of-the-art laser based analysers to cover number of applications for CEMS regulatory as well as process control such as:

- Coal Fired Boiler HCl Measurement on Dry FGD Scrubber Stack
- Brick manufacturer HCL Stack Measurement
- Incinerator HCl Measurement
- Aluminium Smelter HF Measurement
- Coal Fired Boiler SNCR NH3 Measurement
- Cement plant HCl monitoring

This is the simplest instrument and is likely to be the most reliable.

The two main parts the instruments are arranged on opposite sides of the duct. On one side is the transmitter. This contains the laser and, typically, the signal processing and communication electronics.

On the opposite side is the receiver which contains a photo-detector and power and signals are connected to the transmitter unit. This requires electrical cabling to be secured from one unit to the other.

"State-of-the-art laser based analyers for CEMS regulatory as well as process control"

Gases analysed

4 different versions:
LAS 300 XD for Hydrofluoric acid (HF) and water (H_2O)
LAS 300 XD for hydrochloric acid (HCl) and water (H_2O)
LAS 300 XD for ammonia (NH_3) and water (H_2O)
LAS 300 XD for Oxygen (O_2)

KEY BENEFITS

- High sensitivity (ppb, ppm concentrations)
- Interference free gas measurements
- Large dynamic range
- Absolute measurements: no drift, no calibration, inherently linear
- Real-time (1s response)
- Suitable for harsh environment; sensor unaffected by contaminants (no corrosion)
- Absence of extractive conditioning: eliminates errors related to sample handling
- Very low maintenance, low cost of ownership

Technology

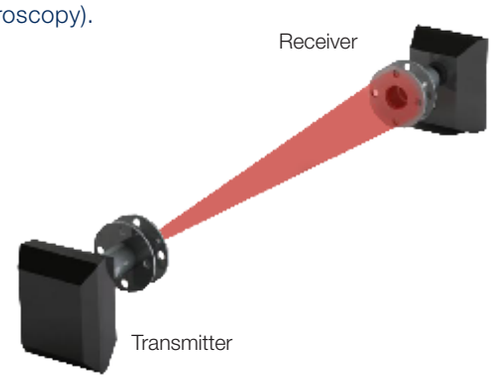
System Description

The Tunable Diode Laser Spectroscopy (TDLS) is the perfect technology to use when you are looking for a selective measurement and a fast response time on some gas components as NH_3, HCL, HF or even O_2 when conditions are too rough for standard O_2 Zirconia In-Situ analysers.

It uses a solid-state laser source with a wavelength that can be adjusted to the gas component unique spectrum, also called gas component “fingerprint”.

TDLS method is a non-contact optical technology and therefore the emitter (laser source) as the sensor stays protected from any contamination or corrosion and so the maintenance operation and the cost of operation are very low compared to other technologies.

Thanks to the improved and fast A/D convertors, the use of Direct Absorption Spectroscopy (DAS) is now the “must” for the TDLS analysers, compared to WMS (Wavelength Modulation Spectroscopy).



By using DAS technology, LAS 300 analysers Series are able to:

- Measure very low gas concentrations (few ppb levels)
- Measure very high gas concentrations – Large dynamic range Vs WMS
- Measure with a very high accuracy (the absorption is directly related to the gas molecule and allows extremely accurate measurement using fundamental and proven signal processing algorithms for single gas and multi-gas applications).
- Measure with a very high linearity (the absorption is measuring the area under the curve - thanks to Beer Lambert law)
- Improve laser scan frequencies that allow an accurate measure even with fast changing process conditions – High Response Time vs WMS.

LAS 300 XD analysers are using TDL combined to DAS are the perfect tools for Ammonia Slip measurement in DeNOx units (SCR & SNCR applications) as for Ammonia measurement in Urea / fertilizers plants. It is also the perfect instrument for the HCl measurement in the Raw Gas Measurement applications as for the low HCl measurement in combustion application (Utilities).

Principle of Operation

The TDL Laser Gas Monitor measures gas concentration using tunable laser absorption spectroscopy. Light from a single mode laser source is directed through the gas to measure and, as the laser frequency is tuned, the intensity of light received by the photodetector varies depending on the concentration of a specific gas present in the sample.

The absorption of light follows the Beer-Lambert law shown in Equation 1.

$$T(\upsilon)=(I/I_0)=\exp[-\alpha(\upsilon)L]$$

Equation 1: Beer-Lambert law.

Where I is the intensity of the transmitted light, I_0 is the intensity of the received light, α is the absorption coefficient for a given frequency, υ and L is the pathlength. Each gas absorbs light in a characteristic way. The attenuation of the light over the fixed pathlength is directly proportional to the concentration of the gas species of interest. The concentration value can be calculated using the known linestrength and other physical parameters. By tuning a laser and recording a whole absorption peak, variations in peak width due to broadening variations such as by changes in pressure or those induced by background species, can be tolerated.

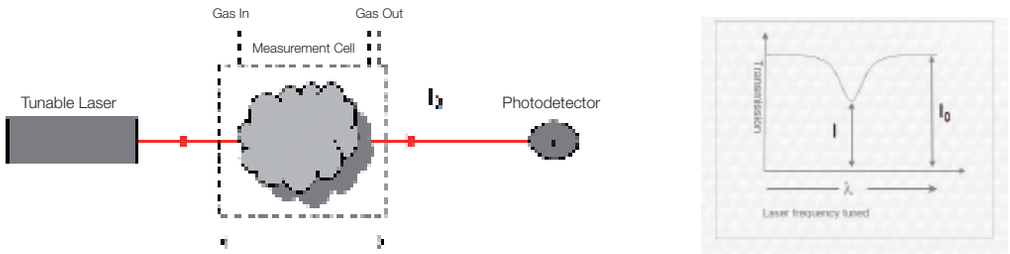


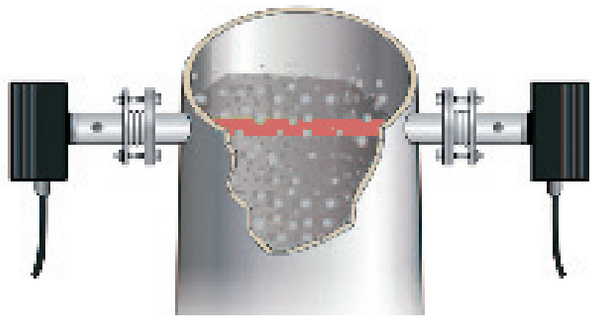
Figure 1: Tunable laser absorption spectroscopy : Principle of measurement

Characteristics

Installation

LAS 300 Cross Duct analysers are very easy to install. The two main parts of the instrument are arranged on opposite sides of the duct. On one side is the transmitter and on opposite side the receiver.
The transmitter unit on the opposite contains the laser and, typically, the signal processing and communication electronics. The receiver unit contains a photodetector, when power and signals are connected to the transmitter unit by two 8-core cables.
Alignment of the 2 units is also simple, thanks to the 2 specific alignment bodies delivered with the whole LAS 300 XD system. For additional ease of alignment, an optical alignment aid is also available as an option.
The purge connectors are part of the window purge body and options are available to ease the installation and arrangement of the purging system:
as a complete purge system that includes blower / filter and regulator (when there is no instrument air available at the installation point) or an advance Pre and Post filtration system that includes regulator assembly and flow regulator.

In case of specific installation conditions, such as high flue gas temperature or large insulation material on duct, options are available to cover it.



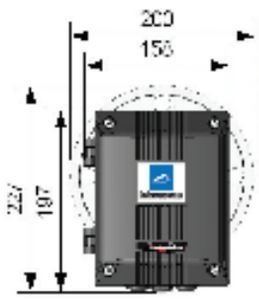
Technical Specifications **Based upon 1m pathlength**

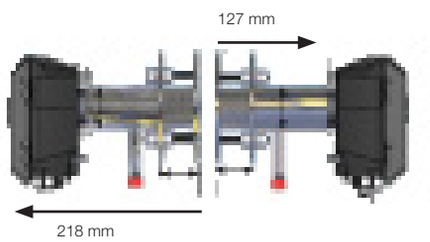
Gas	HF / H_2O	HCl / H_2O	NH_3 / H_2O	O_2
Lower detection limit	0,1 ppm (1Hz) / 0.05%	0,15 ppm (1Hz) / 0.05%	0,15 ppm (1Hz) / 0.05%	0.01%
Resolution	< 0,1 ppm	< 0,15 ppm	< 0,15 ppm	<0.01%
Measurement range				
Minimum	0-2 ppm / 0-5%	0-10 ppm / 0-5%	0-15 ppm / 0-5%	0-10%
Maximum	0-100 ppm / 0-50%	0-3000 ppm / 0-50%	0-500 ppm / 0-50%	0-100%
Response time	1 s	1 s	1 s	1 s

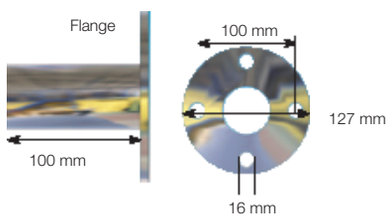
Controller Type	Entry System	Standard System	PLUS System
No of Sensor Channels	1	1	1 to 16
ICON Driven Multilingual Menus	Not applicable (2 line LCD display)	Emission and Alarm levels Quality Assurance results Calibration screens Review data logs Show graph and bar chart Set up and password Advanced calculations (Mass, Normalisation)	Emission and Alarm levels Quality Assurance results Calibration screens Review data logs Show graphs and multi bar charts Set up and password Advanced calculation (Mass, normalisation)
Filter Optimization Diagnostics	None	Pulse log review for diagnosing location of leaking bags/or failing ESP plates	Pulse log review for diagnosing location of leaking bags/or failing ESP plates
Emission Data Logs Long (avg for reporting) Short (process trends) Pulse data Alarms	None	Capacity stated for I sensor (plus QAL3 channels) • 2 months @ 15 minutes • 7 days @ 1 minute • 2 hours @ 1 second • 500 entries	Capacity stated for 4 sensor (plus QAL3 channels) • 2 months @ 15 minutes • 7 days @ 1 minute • 2 hour @ 1 second • 500 entries
Outputs	1 x RS232 (modbus RTU) 1 x 4-20mA (500) 1 relay (0.5A@ 110V)	1 x RS485 (modbus RTU) 1 x 4-20mA (500 Ohms) 2 x Relay (2 A @ 250V, user selectable)	1 x RS485 (modbus RTU) 4 x 4-20mA (500 Ohms) 4 Relay (2A @ 250V user selectable)
Inputs	Input for plant off indication	1 input for plant off indication, bag cleaning reference and multiple calibrations	4 inputs for plant off indication, bag cleaning reference and multiple calibration
Enclosure Size (mm)	220 W x 123 H x 80 D	220 W x 123 H x 80 D	263 W x 160 H x 91 D
Power Supply	100 to 240 VAC (50-60Hz), 1A	100 to 240 VAC (50-60Hz), 1A	100 to 240 VAC (50-60Hz), 1A

Specification

Dimensions & Technical Data







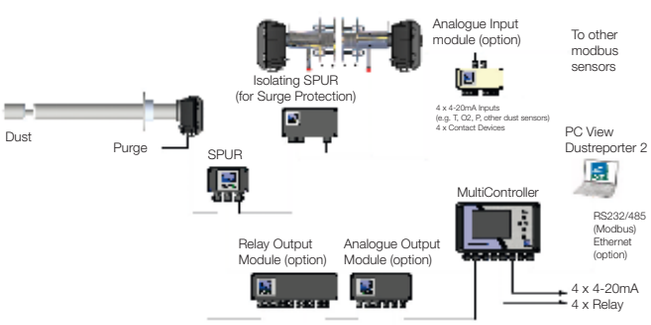
Operating temperature	-10°C to +55°C
Enclosure rating	IP65
Transmitter / Receiver material Flanges material	Die-cast aluminium (epoxy coated) SS 316 L
Flange material	DN40 PN20 or 1.5" 150lb ANSI
Power	24 V DC
Air purge	Air consumption 30-40 l/min
Stack temperature	0-450 °C (other temperatures upon request)
Stack diameter	0,5 to 6 m
Outputs	2 x 4-20 mA - 2 x relays - RS 232 / 485 Modbus

Options:

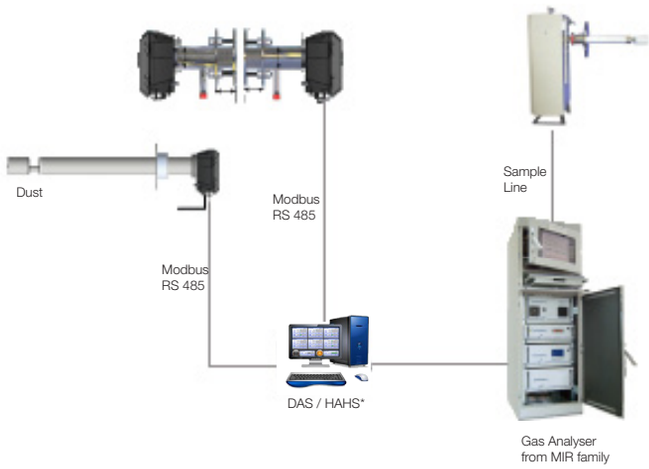
- Purge Air unit (Blower + filters and pressure regulator)
- Optical Alignment aids
- Weather protection covers
- Evaluation unit for control
- Specific flanges (length and/or material)

Example of Communication

With PCME MultiController Architecture



With WEX™ DAHS* Architecture



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