Cambustion

LIF/CLD 600

New Technique! Interference-free *fast* measurement of NO_2

Preliminary Information

Next Generation Fast NO and NO_2

For transient NO_x: exhaust, intake and in-cylinder applications

Improved [NOx] measurement in terms of:

- Large scale pressure range to include turbo applications
- Independent measurement of NO and NO_2
- *Fast* response **interference-free measurement of NO_2**

Data output options:

- AK over ethernet /serial
- To file or analogue
- CAN*

- Fully digital data logging at up to 4 kHz
- 2 millisecond $T_{10\text{-}90\%}$ time response
- Options for NO, NO_2 and HC in one instrument
- Available with 1 or more channels
- Web-based control and configuration

Introduction

Cambustion was founded in 1987 in order to commercialise the world's first fast response flame ionisation detector. We recently announced the 6th generation of the fast FID.

This is now joined by the 3rd generation of fast CLD for NO, and a technique new to fast emissions analysers, Laser Induced Fluorescence for **interference-free NO_2 measurement**.

As in previous versions, the detector is miniaturized and housed in a remote sample "head" close to the sampling point on the engine, in order to yield a millisecond time response to transients. The head incorporates an upgraded constant pressure heated sampling system allowing measurement from a wider range of fluctuating pressure conditions including those found within a firing engine cylinder.

Modular multi-gas design

Unlike the 500 series, where a separate head and control cabinet was needed for each gas species, the 600 series allows NO, NO_2 and THC to be measured by one sample probe.

The options available are: NO only; NO and NO_2; HC only; HC and NO; HC, NO and NO_2.

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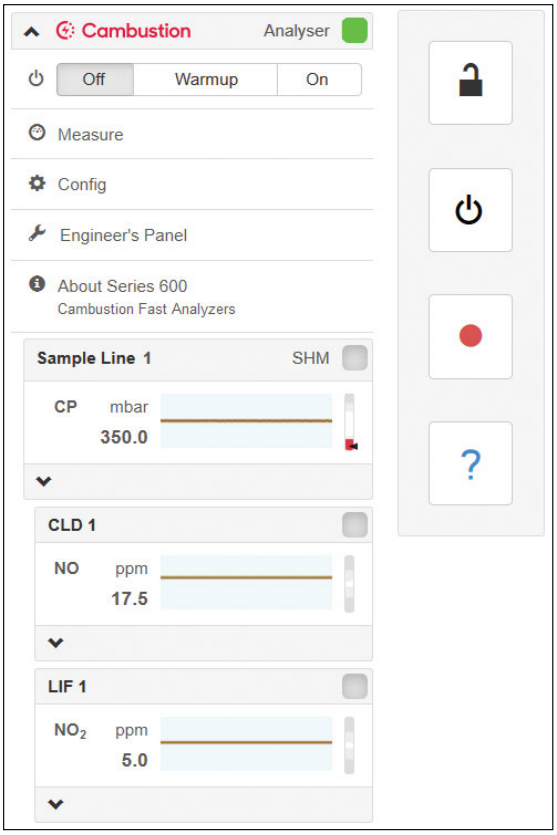
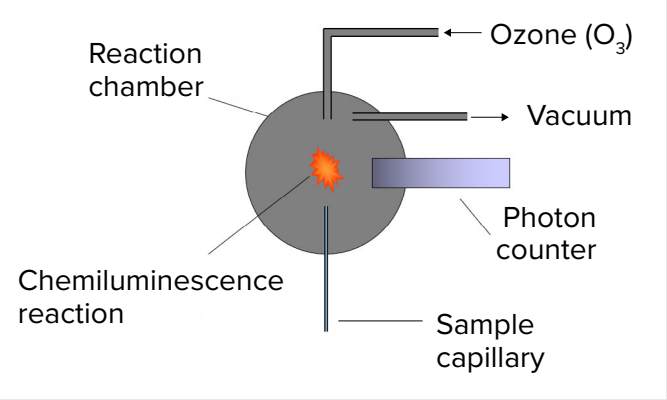
A new digital data platform

As with the FID600, the CLD600 and LIF600 include the ability to log the data digitally at up to 4 kHz. A web-browser based user interface not only allows control of the instrument, but also visualisation of the fast data in a real-time in-browser oscilloscope.



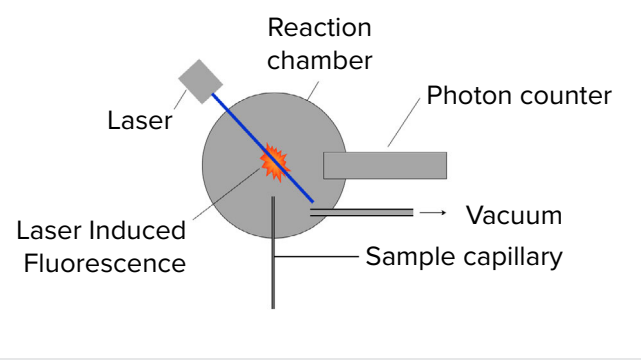
Measurement principle for NO: CLD

The CLD600 uses the industry standard method of reacting nitrogen oxide with ozone, producing chemiluminescence which is proportional to the NO concentration. As with the CLD500, the measurement chamber is miniaturised close to the sampling point, which results in the ultra-fast response time.



Measurement principle for NO_2: LIF

Conventional bench analysers use a "NOx converter" to convert NO_2 into NO before it is measured with CLD. The use of Laser Induced Fluorescence (LIF) instead allows a much faster time response (2 ms for the LIF600 compared with 8 ms for the CLD500), with no known cross sensitivities, and differentiation of NO and NO_2 without the need for an extra channel.



Specifications — CLD600 and LIF600

Measurement principle	Chemiluminescence Detector (CLD) for NO Laser Induced Fluorescence (LIF) for NO_2
Sample heads	1 or more
Time response	2 ms (direct) 20ms (soot filtered)
Data rate	4 kHz
Sample pressure range	0.4 – 2.5 bar absolute
Sample flow extracted	3 lpm sample + 3 lpm bypass
Detection limit	1 ppm
Data output	To file, analogue, AK over Ethernet, CAN*
All specifications subject to change without notice	

* with a future software update

Patent pending

For FID (hydrocarbon) specification, see the separate brochure for the FID600

Reference:

F. Leach et al., *The Influence of Cycle-to-Cycle Hydrocarbon Emissions on Cyclic NO:NO2 Ratio From a HSDI Diesel Engine, ASME ICEF 2020, 2904 https://doi.org/10.1115/ICEF2020-2904*

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