# Cambustion

# CLD50



**New Technique! Fast measurement of NO & $NO_2$**

## New! *Fast* Response NO and $NO_2$ Analyzer

- Transient $NO_X$: Raw exhaust sampling
- Super sensitive yet ultra-fast mode for Air Quality / Ambient applications

- Independent *fast* measurement of both NO & $NO_2$
- Time response from **15ms $T_{10-90\%}$**
- Dual-mode:
  - Raw engine exhaust measurement
  - Air Quality & Ambient applications
- Sensitivity **5 ppb – 5,000 ppm** across 8 detection ranges
- Portable (17.2kg / 45×37×13cm)
- On-board 10Hz data logger
- Data output: – 0–10V analogue DC on 10 & 100Hz BNC
  - AK protocol (option)

### Introduction:

Launched in 2021, the CLD50 is designed for both engine exhaust and air quality single channel applications with 15ms and 100ms time response respectively

### Raw Engine Exhaust Mode

The CLD50 is capable of both [NO] and [$NO_2$] measurement directly ($NO_2$ via LIF) with only oxygen and a power supply needed. The use of these detection methods ensures minimal cross sensitivities and allows retention of millisecond response times.

Other typical applications include pre- or post- catalyst engine exhaust [NO] measurement, SCR development, aftertreatment retrofit investigations and cold start.

### Air Quality / Ambient Mode

Cambustion have developed a super-sensitive yet ultra-fast version for air quality work in response to many researchers requesting faster real time data with a strong emphasis on identifying individual “gross emitters” entering urban environments and clean air zones. In ambient mode the CLD50 has a lower detection limit of 5 parts per billion while retaining a response time of 100ms, allowing an in-depth look into the real human exposure from passing traffic and other polluters. The equipment is suitable for road infrastructure and clean air zone evaluation, plus on-board mobile applications including “chase studies” with heated/unheated sample line options of various lengths.

# CLD50 Fast NO & $NO_2$ Analyzer

**CLD50**


## Case studies:

An example of a gasoline passenger car cold start [NO] and its correlation with the exhaust gas oxygen sensor signal (after 30s) is shown here:

https://youtu.be/caKkQ3Q_NFI

Loading in alternative set points and dispensing with the heated sample line allows for air quality measurements down to ppb levels where it has been used for cabin air vent assessment during urban and motorway driving:

https://youtu.be/Ds5QivyJxII

...also roadside measurement at a junction showing the effects of a vehicle accelerating away from lights:

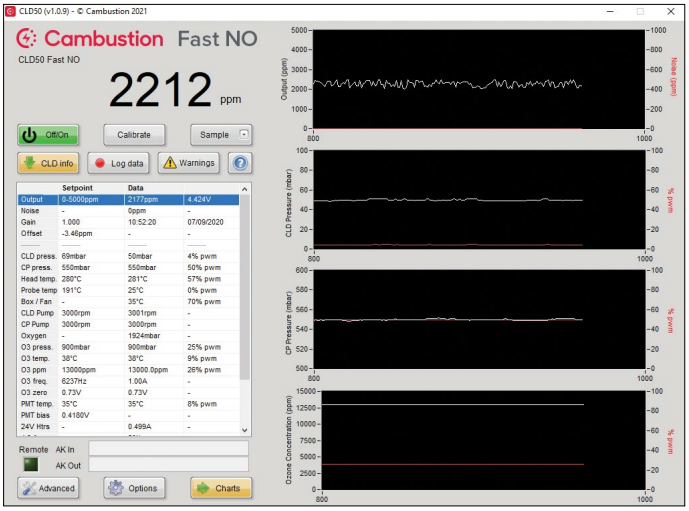
https://youtu.be/0wcc82dbeao

...and urban cyclist $NO_x$ inhalation studies:

https://youtu.be/uzoXW4qDIJI

## A new digital data platform

The CLD50 maintains the CLD500's analogue output option, but now includes 10Hz digital data output.




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.*

Patent application No. GB1906650.5

All specifications subject to change without notice

## Specifications:

| | |
|---|---|
| Measurement principles | Chemiluminescence Detector (CLD) for NO, Laser Induced Fluorescence (LIF) for $NO_2$ |
| Sample heads | One (heated / unheated)<br>Up to 3m length |
| Time response $T_{(10\text{-}90\%)}$ | 15ms (Raw exhaust mode)<br>100ms (Ambient mode) |
| Sample pressure range | 0.8 – 1.3 bar absolute |
| Sensitivity | 5ppb – 5,000ppm<br>(across 8 detection ranges) |
| Dimensions | 45 x 37 x 13cm |
| Weight | 17.5kg |
| Data output channels | Analogue: 10Hz & 100Hz<br>Digital: 10Hz or AK |
| Gas required | Oxygen (pure), $NO/NO_2$ span & $N_2$ zero/calibration gases |
| Calibration gas flow rate | 7 litres / min |
| Electrical supply | 90-240V 50/60Hz 350W max |
| NO signal quench factors for the CLD | • −1.8% per % $H_2O$ (up to 10% vol $H_2O$)<br>• −0.6% per % $CO_2$ |
| $NO_2$ signal quench factors for the LIF | • −1.8% per % $H_2O$ (up to 10% vol $H_2O$)<br>• −1.1% per % $CO_2$ |

Cambustion is an independent, privately owned company with headquarters in Cambridge, UK and customers in more than 30 countries worldwide

Cambustion continue to research & develop novel instrumentation, and now also offer Measurement Consultancy; helping our global clients to solve a wide range of particle and gas measurement issues.

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