

# Carbon Dioxide (CO<sub>2</sub>) Monitor

- 4 ppbv level at 1 s averaging
- Cavity-enhanced technology
- <sup>13</sup>CO<sub>2</sub>/<sup>12</sup>CO<sub>2</sub> ratio measurement



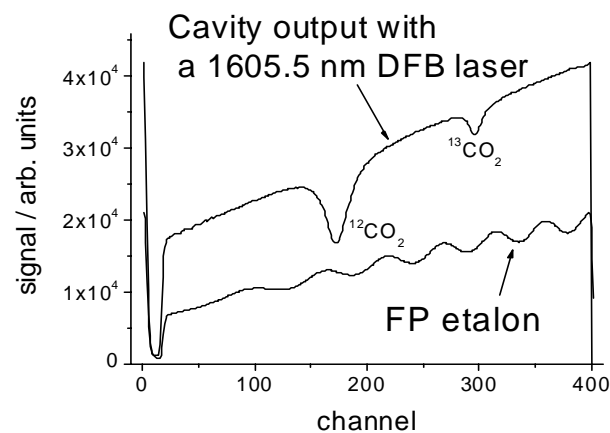
The carbon dioxide (CO<sub>2</sub>) laser diode based cavity-enhanced absorption sensor for ambient, airborne and vehicle-mounted measurements from TDL Sensors Ltd.

## Features

- CO<sub>2</sub> direct cavity-enhanced absorption measurement
- Limit of detection 0.3 ppmv at 1 s averaging and a 1602.5 nm laser
- Limit of detection 4 ppbv at 1 s averaging and a 2004 nm laser
- Absolute measurements
- Low operating cost

## Applications

- Air quality monitoring on sites
- Ambient carbon dioxide monitoring across roads and cities
- Carbon isotope measurements
- Research of CO<sub>2</sub> reactions with other species
- Breath analysis



Cavity output and Fabry-Perot etalon signals for 5 % CO<sub>2</sub> gas in synthetic air at pressure of 107.9 Torr, temperature of 293.2 K and a DFB laser at 1605.5 nm.

<sup>13</sup>C<sup>16</sup>O<sub>2</sub>  $R(16)$  ( $\nu_1=6228.4362$  cm<sup>-1</sup>,  $S_1=2.017 \times 10^{-25}$  cm<sup>-1</sup>/(molecule cm<sup>-2</sup>) at 293.15 K) and <sup>12</sup>C<sup>16</sup>O<sub>2</sub>  $R(0)$  ( $\nu_2=6228.6899$  cm<sup>-1</sup>,  $S_2=1.737 \times 10^{-24}$  cm<sup>-1</sup>/(molecule cm<sup>-2</sup>) at 293.15 K)

## Ordering Options

Data logger  
GPRS modem or Ethernet



## Carbon Dioxide Monitor

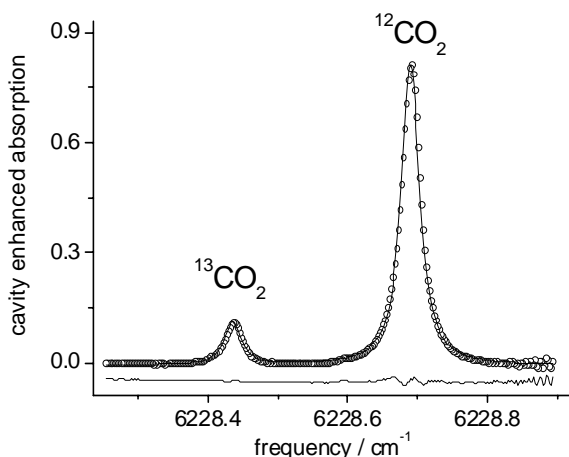
Carbon Dioxide Diode Laser Gas Sensor offers:

- In-situ, real-time ambient concentration measurements
- 4 ppbv sensitivity at 1 s averaging and 2004 nm
- 0.3 ppmv sensitivity at 1 s averaging and 1602.5 nm
- Very low maintenance
- Negligible drift

# Specifications

Measurement	
<b>CO<sub>2</sub> detection limit*</b>	4 ppbv at 1 s averaging and a DFB laser at 2004 nm ( $S=1.33 \times 10^{-21} \text{ cm}^{-1}/(\text{molecule cm}^{-2})$ ) 284 ppbv at 1 s averaging and a DFB laser at 1602.5 nm ( $S=1.84 \times 10^{-23} \text{ cm}^{-1}/(\text{molecule cm}^{-2})$ ) 3 ppmv at 1 s averaging and a DFB laser at 1605.5 nm ( $S=1.74 \times 10^{-24} \text{ cm}^{-1}/(\text{molecule cm}^{-2})$ )
<b>Accuracy</b>	2% of reading
<b>Linearity</b>	Better than 1%
<b>Resolution</b>	< detection limit values
<b>Response time (T<sub>90</sub>)</b>	<2s (depending on air flow rate and application conditions)
<b>Optical cell volume</b>	<90 cm <sup>3</sup> at cavity base length of 28 cm
<b>Carbon isotope ratio δ<sup>13</sup>C</b>	<1.8 ‰ for measurements at 1605.5 nm and CO <sub>2</sub> concentration of 5 %
<b>Carbon isotope ratio δ<sup>13</sup>C</b>	<1.8 ‰ for measurements at 2004 nm and CO <sub>2</sub> concentration of 65 ppmv
Input/Output	
<b>Analogue output</b>	4–20mA current loop (optional)
<b>Digital output</b>	RS232, RS485, modbus (optional), ethernet (optional)
<b>Relay output</b>	SPCO rated, 24VDC/280VAC 2A (optional) – maximum of 4
<b>Analogue input</b>	4–20mA process temperature and pressure reading (optional)
<b>Display</b>	Graphic back lit LCD
Power	
<b>Power supply</b>	85 - 254 VAC, 50/60 Hz @100VA or 24VDC (optional)
Maintenance	
<b>Interval</b>	Every 6–12 months is recommended
<b>Remote maintenance</b>	Engineer can check via (optional) GPRS modem or Ethernet (optional)
Certification	
<b>Laser class</b>	Class 1, laser wavelength of 1605 nm
<b>Warm up time</b>	Typically <10 minutes

\*Defined for mirror reflectivity of 0.99982, separated by a distance of 28.2 cm, CO<sub>2</sub> linestrength at 296 K and typical observed experimental noise-equivalent cavity enhanced absorption of  $6.3 \times 10^{-5} \text{ Hz}^{-1/2}$ .



Processed CO<sub>2</sub> cavity-enhanced absorption spectrum at 1605.5 nm, Voigt fit and residual, recorded for a human breath sample (20 cm<sup>3</sup>) at pressure 107.6 Torr.

CO<sub>2</sub> concentration was measured to be 4.1 % in the human breath sample.

## Contact Details:

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## Distributor: