

QCL Gas Monitoring Systems



- Very high sensitivity
- In-situ and real-time

TDL-Quantum

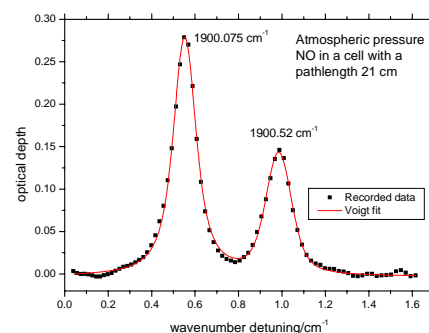
The **TDL-Quantum** system is a compact mid-IR gas monitoring system based upon a room temperature single mode continuous-wave quantum cascade laser (CW-QCL).

TDL-Quantum cascade laser systems offer:

- Very high sensitivity gas monitoring
- Real-time response (1s)
- In-situ, non-invasive monitoring



Field deployable versions available



Example spectrum of nitric oxide recorded using the TDL-Quantum system

Applications

- High sensitivity gas sensing for industrial process control
- Combustion diagnostics
- Trace gas monitoring
- Absorption spectroscopy in the range 4-20 μm
- Plasma monitoring
- Isotope monitoring

Features

- On-board signal processing for standalone operation
- Built-in microprocessor for co-averaging spectra
- Scan rate typically at 1 kHz
- External modulation capability for wavelength modulation spectroscopy up to 1 MHz

Why CW-QCLs?

CW-QCLs offer up to an order of magnitude increase in sensitivity and improved precision over comparable pulsed-QCL based systems.

CW-QCLs have narrower linewidth

Phase-sensitive detection techniques such as wavelength modulation can be applied

General specifications

QCL	
Current	<2 A
Modulation frequency	DC to 1 MHz
Temperature	-10 to +40 °C
Photodetector	
Temperature	-70 °C
Incident Power	1 µW – 1mW
Input/Output	
Analogue output	4–20 mA current loop (optional) or voltage (optional)
Digital output	RS232, RS485, modbus (optional), ethernet (optional)
Analogue input	4–20mA process temperature and pressure reading (optional)
Power	
Power supply	100 - 250 VAC, 50/60 Hz
Enclosure	
Electronics	19-inch 3U high rack
Maintenance	
Interval	Every 6–12 months is recommended
Remote maintenance	Engineer can check via (optional) GPRS modem or Ethernet (optional)
Start up	
Warm up time	Typically <5 minutes

Some example gas species that can be detected and detection limits:

Species	Detection Limit*
NO	100 ppb
NO ₂	100 ppb
SO ₂	1 ppm
CO	10 ppb
CO ₂	10 ppb
NH ₃	50 ppb
N ₂ O	50 ppb

* based upon a 1 m pathlength, temperature of 296K, and pressure of 1 bar

Many other species can be monitored as most molecules absorb light in the mid-IR region.

Options

- For increased sensitivity, a multipass optical cell with a pathlength of up to 20 m can be incorporated in to a system
- Window purging assemblies are available for aggressive environments

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