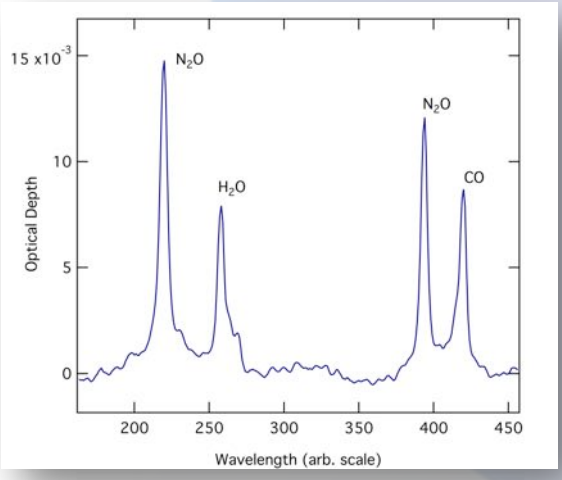
MIRA *Ultra N_2O/CO*

High Accuracy N_2O/CO Analyzer

Monitor N_2O and CO levels in real-time with high sensitivity and accuracy using the* MIRA *Ultra Series N_2O/CO gas analyzer.

Introducing the MIRA *Ultra N_2O/CO,* the World's first portable, high accuracy nitrous oxide and carbon monoxide gas analyzer. The *Ultra N_2O/CO* is based on Aeris' revolutionary, miniature laser-based sensor engine, which achieves sub-ppb sensitivity and accuracy in seconds. The Ultra Series analyzer provides extended, low drift performance via its precision temperature and pressure stabilized optical core. Portable Ultra systems can be uniquely employed for a wide range of fixed, handheld, and mobile applications.

Aeris MIRA Series analyzers operate in the *middle infrared (MIR) region*, achieving unparalleled specificity and sensitivity in a compact, low power consumption platform. The ability to simultaneously monitor *N_2O and CO* in real-time with a portable analyzer enables a wide range of lab as well as field applications that were previously impractical due to traditional size, weight, power, and cost constraints. Ultra Series analyzers offer performance levels traditionally associated with much larger, more expensive gas analyzers, representing a paradigm shift in high accuracy laser-based gas analysis systems.



Distinct spectral "fingerprints" of N_2O and CO in the middle infrared region. Both nitrous oxide and CO levels are reported as raw concentrations or as dry mole fractions.

Key Features

- *Temp stabilization, sub-ppb precision and accuracy*
- *Autonomous, built-in calibration or zero cycles*
- *1 or 2Hz operation*
- *GPS ready for creating N_2O/CO "maps"*
- *Built-in wifi, RS-232, and optional analog out*
- *Lowest, 20W (average) power consumption*
- *Maintenance-free sensor, user-serviceable filters*
- *2-port, differential sampling, Built-in pump*

Real-Time Ambient and Source Monitoring

CO is an EPA Priority Pollutant as well as proxy for thermogenic CO_2, while nitrous oxide is the #3 GHG that is produced in combustion processes, livestock operations, and other activities such as soil fertilization. The MIRA *Ultra N_2O/CO* provides a powerful new tool for lab or field studies of these important species, including regional pollution monitoring (CO) and natural gas leak tracer or soil nitrification studies (N_2O).

As an absorption-based method, MIRA *Ultra* systems achieve high sensitivity and linearity over an extremely wide concentration range. To calibrate or re-zero, Ultra systems come equipped with two programmable sample ports and associated software that enable autonomous calibration (or rezeroing) as well as differential measurements such as in soil chamber studies. For CO, a scrubber can be installed in the analyzer to provide high purity zero gas, in most cases eliminating the need for calibration gases or zero gas generators. As the core is heated to 40°C, Ultra systems are ideal for use in humid environments where condensation is of concern.

About Aeris Technologies, Inc.

Aeris Technologies, Inc. provides ultrasensitive gas analyzers for trace gas monitoring applications. Aeris is redefining the *state-of-the-art* in laser-based gas analysis systems, reaching unparalleled size, weight, power, and cost milestones.

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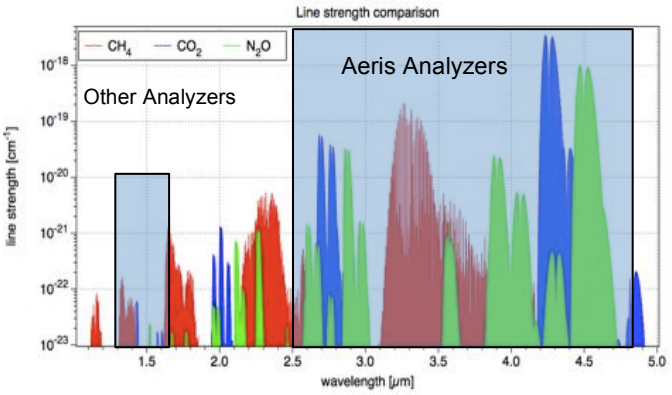
MIRA *Ultra N_2O/CO*
System Specifications

Metric	***Specification***
Measurement method	Middle-Infrared Laser Absorption Spectroscopy
Sensitivity (σ)	CO and N_2O: 500ppt/s
Drift*,**	CO: 1ppb, N_2O: <1ppb
Temp/Humidity	10-35°C/10 to 95% RH (non-condensing)
Concentration Range	0 ppb to 500 ppm**
Size (Nominal)	14.5"W x 12"D x 7"H
Weight	6 kg (13.2 lbs)
Power Consumption	20W after warmup, 45W at startup
Voltage, current	110-220VAC: 1A, 12-15V DC: 4A
Interface/Outputs	WiFi, USB, RS232, analog out (optional)
Memory	32GB, expandable
Data Update Rate	1 or 2 Hz

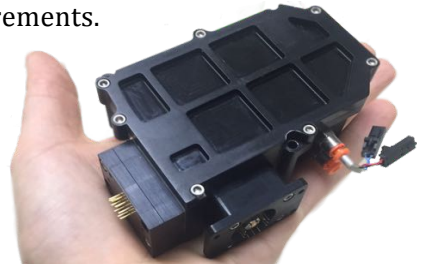
** 24 hours isothermal after 1 hour warmup, or over specified temperature range with 45 minute soaking time,*
***CO using built-in scrubber*

Core Technologies

MIRA series analyzers combine Aeris' Patented multipass absorption cell with solid-state MIR laser technology and custom electronics to achieve sub-ppb sensitivity and ppt-level accuracy in an extremely robust and compact package. The MIRA Platform operates in the mid-IR, where CO and N_2O absorption lines are thousands of times stronger than commonly used near-IR spectra.



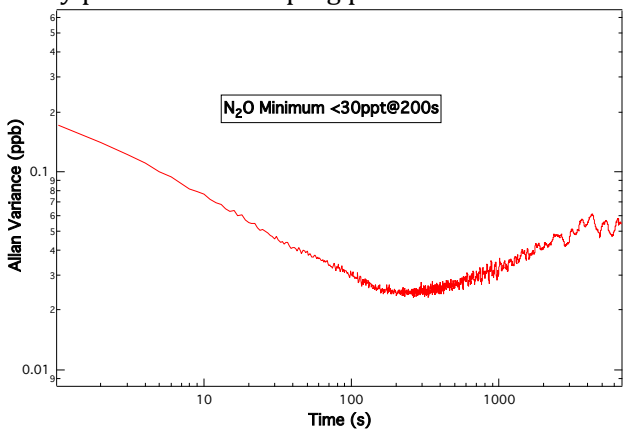
The Patented sensor engine used in all MIRA analyzers uniquely achieves a long absorption path length in an extremely small volume, providing ultra-high sensitivity and rapid response time with reduced pumping and power requirements.



MIRA laser-based sensor engine, comprising a fixed, hermetic optical bench, integrated laser and detector subassemblies, and ultra-compact, 60cc, 13m path length optical multipass cell.

Low-Drift Operation with Differential Mode for Built-In Zero or Automatic Calibration

MIRA *Ultra N_2O/CO* gas analyzers achieve a 500ppt/s sensitivity level, while even lower ppt-accuracy levels can be achieved with signal averaging. *Ultra* systems achieve stable, low drift operation via a temperature and pressure stabilized sensor core, greatly extending the time between or altogether eliminating calibration cycles. *Ultra* systems come with two programmable sampling ports that can be used for either periodic rezeroing or calibration, or for differential measurements. In the case of CO, a compact, long-life, catalytic scrubber can be used as a "zero port", effectively removing slow instrument drift at the sub-ppb level to achieve ppt level accuracy. Featuring a much faster warmup period than *Pico* systems, *Ultra* systems can also be taken into the field to perform high accuracy measurements, using an externally supplied battery pack where wallplug power is unavailable.



Allan Variance data for N_2O displaying system stability after warmup. In this case, the analyzer achieved <30ppt in approximately 3 minutes of signal averaging. Similar data dictates the associated zero or calibration frequency of the instrument, which can be hours to achieve 100 ppt level accuracy.

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