



# MIRA Ultra N<sub>2</sub>O/CO<sub>2</sub> High Accuracy Analyzer w/GPS

**Monitor N<sub>2</sub>O and CO<sub>2</sub> levels in real-time with high sensitivity and accuracy using the MIRA Ultra Series N<sub>2</sub>O/CO<sub>2</sub> gas analyzer.**

Introducing the MIRA Ultra N<sub>2</sub>O/CO<sub>2</sub>, the World's first truly portable, high accuracy nitrous oxide and carbon dioxide gas analyzer. The Ultra N<sub>2</sub>O/CO<sub>2</sub> is based on Aeris' revolutionary, miniature laser-based sensor engine, which achieves ultra-high sensitivity and accuracy in seconds. The Ultra Series analyzer provides extended, low drift performance via its precision temperature and pressure stabilized optical core. Rackmount and portable MIRA Ultra gas analyzers are available for a wide range of fixed 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<sub>2</sub>O and CO<sub>2</sub> 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 representing a paradigm shift in high accuracy laser-based gas analysis systems.



## Key Features

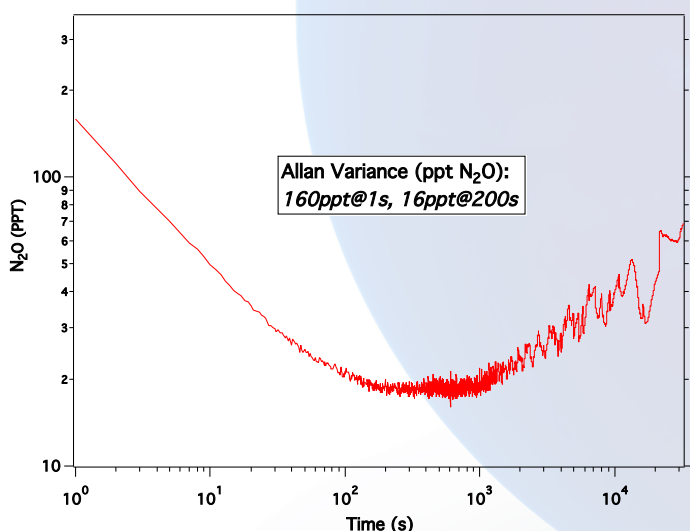
- Unmatched 200ppt/s N<sub>2</sub>O and 200ppb/s CO<sub>2</sub>
- Ultra-high stability and accuracy <0.1% long-term
- Autonomous, built-in calibration or zero cycles
- Up to 10Hz operation, 1 Hz standard
- GPS ready for creating N<sub>2</sub>O/CO<sub>2</sub> "maps"
- Built-in wifi, RS-232, and optional analog out
- Lowest, 22W (average) power consumption
- Maintenance-free sensor, user-serviceable filters
- 2-port, differential sampling, programmable calibration and re-zero

## Real-Time 24/7/365 Ambient/Source Monitoring

The MIRA Ultra N<sub>2</sub>O/CO<sub>2</sub> provides a powerful new tool for lab or field studies of these two critical GHG's, achieving sensitivity and accuracy levels previously only obtained in instruments 10x the size and 10x the power consumption. Due to the unmatched low power consumption and compact size and weight, MIRA Ultra N<sub>2</sub>O/CO<sub>2</sub> systems enable new field applications previously impractical with competing analyzers. MIRA Ultra systems can also uniquely be easily solar-powered in the field, with complete, self-powered solutions available for autonomous 24/7/365 monitoring in remote, unattended locations. Accuracy levels in the tens of ppt (N<sub>2</sub>O) and tens of ppb (CO<sub>2</sub>) regimes are achieved in seconds with MIRA Ultra gas analyzers, easily meeting or exceeding WMO targets for these two important species. As an absorption-based method, MIRA Ultra systems provide unmatched linearity over an extremely wide concentration range, typically spanning 5-6 orders of magnitude.

## About Aeris Technologies, Inc.

Aeris Technologies, Inc. provides high accuracy, ultrasensitive gas analysis solutions for fixed, mobile, and handheld applications. Aeris is redefining the *state-of-the-art* in laser-based gas sensing, reaching unparalleled performance, size, weight, power, and price milestones.



Allan Variance for N<sub>2</sub>O after warmup: In this case, the analyzer achieved <20ppt in approximately 3 minutes of signal averaging. Sub-100ppt accuracy is maintained for at least 8 hours.

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# MIRA Ultra N<sub>2</sub>O/CO<sub>2</sub> System Specifications

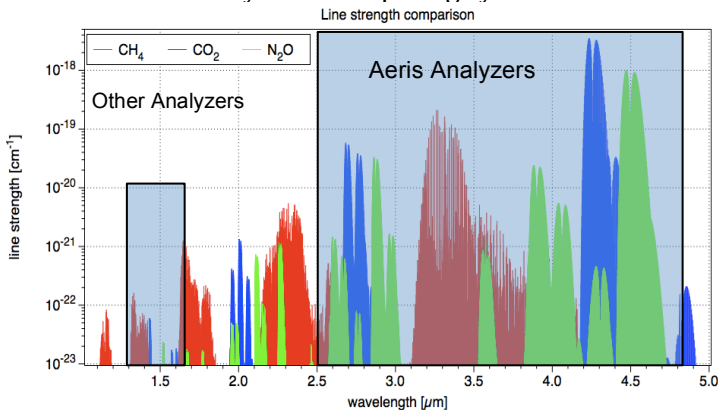
Metric	Specification
Measurement method	Middle-Infrared Laser Absorption Spectroscopy (Direct Absorption)
Sensitivity ( $\sigma$ )	N <sub>2</sub> O: <200ppt/s, CO <sub>2</sub> : <200ppb/s
Drift***	N <sub>2</sub> O: <1ppb, CO <sub>2</sub> : <1ppm
Temp, Humidity	5-40°C, 10 to 95% RH (non-condensing)
Concentration Range	N <sub>2</sub> O: 2 ppb to 500 ppm, CO <sub>2</sub> : 10 ppm to 10%
Size (Nominal)	14.5"W x 12"D x 7"H, 17x11x5-3/8 (Rackmount Version)
Weight	6 kg (13.2 lbs), 9kg (19.6lbs) Rackmount Version
Power Consumption	<25W after warmup, 60W at startup
Voltage, current	110-220VAC: 1A, 12-15V DC: 4A
Interface/Outputs	Wi-Fi, USB, RS232, analog out (optional)
Memory	32GB, expandable
Data Update Rate	1 or 2 Hz standard, up to 10Hz (optional)

\* 24 hours isothermal after 1 hour warmup, or over specified temperature range with 45 minute soaking time,

\*\*CO<sub>2</sub> stability <200ppb with periodic rezeroing using built-in scrubber

## Core Technologies

MIRA series analyzers combine Aeris' Patented multipass cell technology with MIR solid-state lasers and custom electronics to achieve superior sensitivity and accuracy in an extremely robust and compact platform. MIRA analyzers operate in the mid-IR, where N<sub>2</sub>O and CO<sub>2</sub> absorption is thousands of times stronger than in the near-IR, resulting in significantly better sensitivity than competing systems.



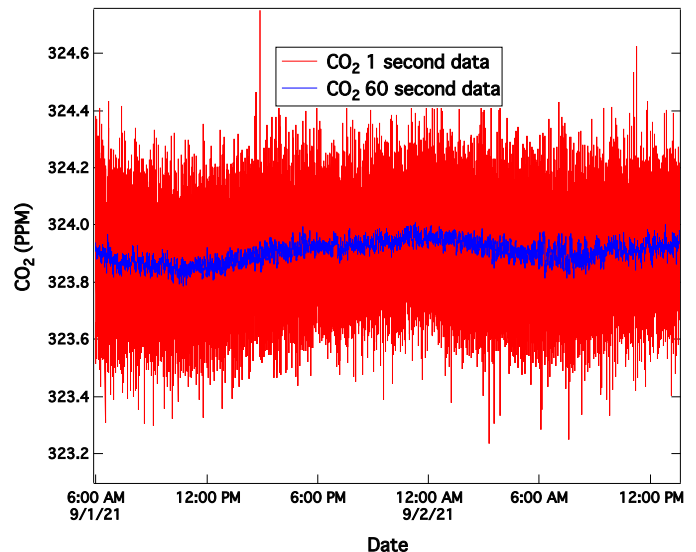
The Patented MIRA spectrometer engine achieves a 13m absorption path length in an extremely small volume (60cc), resulting in ultra-high sensitivity, rapid response time, and low power consumption.



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, Differential Mode, and Autonomous Zero and Span Calibration

Ultra systems achieve stable, low drift operation via a temperature and pressure stabilized sensor core, achieving unparalleled accuracy and reproducibility for both gases simultaneously. This stability greatly extends the time between or, in some cases, altogether eliminates the need for regular calibration cycles. Two programmable sampling ports are built-in for calibration or re-zeroing of the analyzer, or for differential measurements such as in soil chamber studies. For CO<sub>2</sub>, 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 suitable for use in humid environments.



Typical long-term drift of the MIRA Ultra as measured for CO<sub>2</sub> over a period of 30 hours. Red shows the 1s data with an associated sensitivity level of 200ppt, while at 60s averaging the analyzer exhibits an accuracy level of approximately 30ppb.