

Continuous Emissions Monitoring with the Rosemount QX1000 Continuous Gas Analyzer

Application Note

Process Overview

Continuous emissions monitoring systems (CEMS) play a critical role in ensuring regulatory compliance, operational efficiency, and environmental accountability across industries such as power generation, refining, chemicals, and waste incineration. End users face increasing pressure to deliver accurate, reliable emissions data while reducing maintenance burden, downtime, and total cost of ownership.

The Rosemount™ QX1000 Continuous Gas Analyzer is designed specifically to address these challenges in cold/dry extractive, safe area CEMS applications. By combining proven laser-based spectroscopy with robust paramagnetic oxygen measurement in a single, modular platform, the QX1000 delivers precise, interference-free measurement of regulated gases with minimal maintenance and long-term stability.

Measurement Challenges

Operators of cold/dry CEMS installations commonly face the following challenges:

- Measurement drift and frequent calibration: Many conventional technologies require regular calibration to compensate for drift, aging components, or contamination, increasing operating cost and risk of non-compliance.
- Interference from background gases: Cross-interference from moisture, CO_2, or other stack components can compromise accuracy, particularly at low measurement ranges.
- High maintenance burden and consumables: Technologies relying on converters, lamps, moving parts, or consumables increase downtime and lifecycle costs.
- Complex analyzer architectures: Multiple analyzers are often required to measure all regulated gases, increasing footprint, installation complexity, and spare parts inventory.
- Data integrity and audit confidence: Regulatory environments demand stable, repeatable measurements with clear diagnostics to support audits and compliance reporting

The Emerson Solution

The Rosemount™ QX1000 Continuous Gas Analyzer is a continuous gas analysis solution engineered specifically for reliable, real-time measurement in cold/dry extractive applications, with a primary focus on continuous emissions monitoring systems (CEMS). It is designed to deliver stable, interference-free measurements of regulated gases while minimizing maintenance effort, analyzer downtime, and total cost of ownership.



Figure 1. *Designed for safe areas and cold/dry applications measuring standard components, the Rosemount QX1000 Continuous Gas Analyzer is available in a variety of configurations*

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Measurement Technologies

The QX1000 combines Quantum Cascade Laser (QCL) spectroscopy with paramagnetic oxygen measurement in a single, modular analyzer platform. This hybrid approach enables direct, selective measurement of multiple gas components without the need for converters, consumables, or complex sample conditioning inside the analyzer. By targeting specific absorption wavelengths in the mid-infrared region, the laser measurement system provides highly selective detection of gas species such as NO, NO_2, CO, CO_2, and SO_2, while remaining insensitive to common background gases and cross-interference effects.

Unlike conventional analyzer technologies that often infer gas concentrations through conversions or calculated ratios, or rely on reference gas cells, the QX1000 measures individual gas components directly using the fundamental principles of absorption spectroscopy. This direct measurement approach improves accuracy, repeatability, and long-term stability, making the analyzer well suited for regulatory-driven monitoring where data integrity and audit confidence are critical.

Oxygen measurement is provided using a proven paramagnetic sensor, offering robust and stable O_2 measurement. By integrating paramagnetic oxygen detection alongside laser-based gas measurement, the QX1000 delivers a complete emissions monitoring solution within a single analyzer architecture.

Configurable, plug and play solution

The QX1000 is built on a modular, scalable design, allowing customers to configure one to four measurement channels depending on application requirements, in a single analyzer solution thus reducing the need for multiple analyzer cabinets and simplifying system architecture.

This modularity also supports flexible configurations for different plant requirements, from oxygen-only installations to multi-gas CEMS solutions and its compact 19-inch rack or benchtop mounting options allow straightforward replacement of legacy analyzers with minimal disruption to existing infrastructure.

To support modern operational needs, the QX1000 features an integrated web-based human-machine interface (HMI). This interface enables intuitive access to analyzer configuration, diagnostics, calibration workflows, and measurement data using standard web browsers. Continuous diagnostics and status monitoring provide operators with greater visibility into analyzer health and measurement validity, supporting higher system availability and easier troubleshooting.

Measurement Specifications for Standard Ranges[1]

Gas	Min. LOD	Min. Range	Max. Range
NO	0.15 ppm	0-10 ppm	0-2,200 ppm
NO_2	0.08 ppm	0-10 ppm	0-500 ppm
CO	0.05 ppm	0-10 ppm	0-4,500 ppm
CO_2	0.005 %	0-1.5 %	0-100 %
SO_2	0.15 ppm	0-45 ppm	0-1,100 ppm
O_2	0.025 %	0-5 %	0-25 %

(1) Not all gases/ranges will be available in a single analyzer
Additional gases and measurement ranges are available on request
Note that LOD is specifed as 2σ

By combining laser-based selectivity, proven oxygen measurement, and a modular analyzer design, the Rosemount QX1000 provides a robust and future-ready solution for continuous emissions monitoring. The result is a reliable analyzer platform that delivers accurate, repeatable measurements with reduced maintenance requirements and improved lifecycle performance compared to traditional analyzer technologies.

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